

THE ORIGINAL MAGAZINE FOR MODEL ENGINEERS

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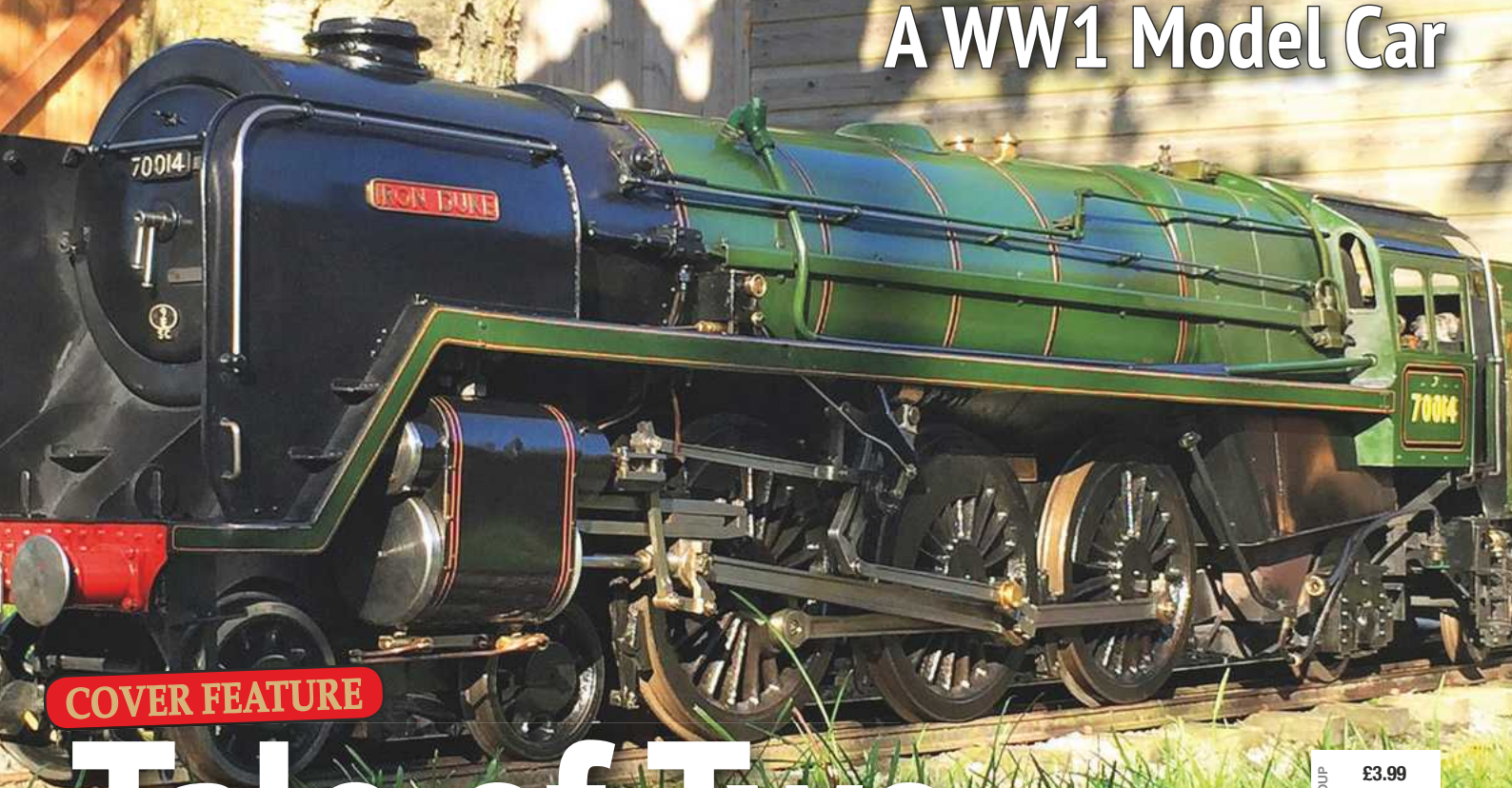
# MODEL ENGINEER

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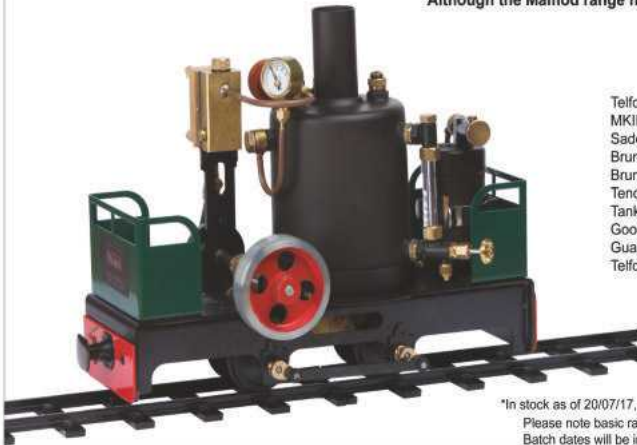
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Locomotives | Rolling Stock | Track | Accessories | Upgrades | Fixing kits & Washers | Chuffers | G Scale Figures | Curve Setters

## BRAND OF THE MONTH: MAMOD LTD

Mamod have been manufacturing live steam models since 1936. Based in Birmingham, Mamod continues to produce high quality steam engines as it did when it was first established by Geoffrey Malins. Although the Mamod range has expanded vastly since those early years, it still produces engines with all the passion and quality engineering that was first seen during those founding years of Mamod.



|                  |           |           |
|------------------|-----------|-----------|
| Telford          | MTELGO    | £452      |
| MKIII            | MK3       | From £336 |
| Saddle Tank      | MST       | From £336 |
| Brunel           | MBrunelOG | £440.00   |
| Brunel Goods Set | BGS-CC-N  | £520.00   |
| Tender           | MTDR      | £39.00    |
| Tanker           | MTNK      | £39.00    |
| Goods Wagon      | MGWN      | £44.00    |
| Guards Van       | MGVAN     | £50.00    |
| Telford Tender   | MTDR-T    | £45.00    |



\*In stock as of 20/07/17, please note these loco's may no longer be available, check stocks online or call.  
Please note basic range takes 4 weeks from initial order and other locomotives are in batches.  
Batch dates will be in product description. Locomotives in stock will state instant dispatch available.

Dream Steam Works manufactures a range of upgrades and enhancements for old Mamod, MSS, IP Jane & PPS Janet locos.

|                            |             |        |
|----------------------------|-------------|--------|
| Upgrade Cylinders          | DSUPCYL     | £50.00 |
| Ceramic Gas Burner Set     | DSUPGBS     | £78.00 |
| Three Wick Meths Burner    | DSUP3WMB    | £45.00 |
| Dead Leg Lubricator        | DSUPDL      | £26.60 |
| Steam Regulator Kit        | DSUPSRK     | £31.20 |
| Small Brass Chimney Cowl   | DSENSMCWL   | £3.30  |
| Brass Cab Hand Rails       | DSENSCH     | £4.20  |
| Brass Side Tank Hand Rails | DSENSTHR    | £5.20  |
| Brass Smoke Box Hand Rails | DSENSBXHR   | £3.10  |
| Cylinder Covers            | DSENCYCV    | £6.80  |
| Brass Sand Boxes           | DSENSBX     | £12.50 |
| Brass Tank Tops            | DSENTTT     | £9.40  |
| Lubricating Oil            | SWLUB30     | £2.60  |
| Meths Burner Wick          | DSWWK6      | £1.90  |
| Curve Tipped Syringe       | DSWCTS      | £2.10  |
| 460 Steam Oil 500ml        | DSW460SO500 | £5.20  |
| 220 Steam oil 500ml        | DSW220SO500 | £5.20  |
| Solid Fuel Tablets         | 980001      | £3.50  |
| Water Filler Bottle        | DSWWFB      | £3.20  |
| Meths Filler Bottle        | DSWMFB      | £2.60  |

| ROUNDHOUSE  |                |
|-------------|----------------|
| On Order    |                |
| Silver Lady | Due Dec 2017   |
| Little John | Due March 2018 |
| Russell     | Due Feb 2018   |
| Buildog     | Due Oct 2017   |
| Buildog     | Due June 2018  |

| In Stock Now*                        |        |
|--------------------------------------|--------|
| Millie - Black - 32mm                | £628   |
| Millie - Deep Bronze Green - 32mm    | £628   |
| Sammy - 32mm & 45mm                  | £628   |
| Bertie - Blue - 32mm                 | £628   |
| Bertie - Yellow - 32mm               | £628   |
| Bertie - Victorian Maroon - 32mm     | £628   |
| Bertie - Deep Brunswick Green - 32mm | £628   |
| Karen - WD Grey - R/C - 32mm         | £1,792 |
| Lady Anne - Maroon - R/C - 32mm      | £1,474 |



WE HOLD A FULL RANGE OF MSS SPARES FOR OLD MAMOD & MSS LOCOS

|                                                            |       |        |
|------------------------------------------------------------|-------|--------|
| Festiniog Railway Ashbury First Class 4-Wheel Carriage Kit | 16C01 | £73.50 |
| Festiniog Railway Third Class Ashbury 4-Wheel Carriage Kit | 16C02 | £73.50 |

|                                                      |       |        |
|------------------------------------------------------|-------|--------|
| Dinorwic Slate Wagon Kit                             | 16W01 | £20.00 |
| Festiniog Railway 2 Ton Braked Slate Wagon Kit       | 16W03 | £26.60 |
| Festiniog Railway 2 Ton Unbraked Slate Wagon Kit     | 16W04 | £25.40 |
| War Department Light Railways K Class Skip Wagon Kit | 16W06 | £19.50 |
| Dinorwic Quarry Slab Wagon Kit                       | 16W08 | £25.50 |
| Dinorwic Quarry "rubbish" Wagon Kit                  | 16W09 | £25.50 |

|                         |      |       |
|-------------------------|------|-------|
| Slaster's Mek-Pak       | 0502 | £5.00 |
| Slaster's Mek-Pak Brush | 0505 | £3.70 |

## PECO 32mm (SM32) Track

|                                    |          |        |
|------------------------------------|----------|--------|
| Flexi Track - 12 Pack              | SL600x12 | £97.00 |
| Flexi Track - 4 Pack               | SL600x4  | £36.00 |
| Flexi Track - Single               | SL600x1  | £9.00  |
| Setrack Curve - 6 Pack             | ST605x6  | £41.00 |
| Setrack Curve - Single             | ST605x1  | £6.90  |
| Setrack 38 Radius Curve - Single   | ST607    | £6.90  |
| Setrack 38 Radius Curve - Six Pack | ST607x6  | £41.00 |
| Right Hand Point                   | SLE695   | £42.50 |
| Left Hand Point                    | SLE696   | £42.50 |
| Y Point                            | SLE697   | £42.50 |
| Small Radius Right Hand Turnout    | SLE691   | £42.50 |
| Small Radius Left Hand Turnout     | SLE692   | £42.50 |
| Wagon Turntable and Crossing       | SL627    | £16.00 |
| Rail Joiners - 24 Pack             | SL810    | £2.80  |

## 45mm (G45) Track

|                                   |         |        |
|-----------------------------------|---------|--------|
| Flexi Track - Six Pack            | SL900x6 | £75.00 |
| Flexi Track - Single              | SL900x1 | £13.00 |
| Setrack Curve - Six Pack          | ST905x6 | £40.00 |
| Setrack Curve - Single            | ST905x1 | £8.00  |
| Setrack Straight - Six Pack       | ST902x6 | £40.00 |
| Setrack Straight - Single         | ST902x1 | £8.00  |
| Right Hand Point                  | SL995   | £54.00 |
| Left Hand Point                   | SL996   | £54.00 |
| Point Motor Mounting Plate        | PL8     | £3.60  |
| Metal Rail Joiners - 18 Pack      | SL910   | £5.40  |
| Insulating Rail Joiners - 12 Pack | SL911   | £3.10  |
| Dual Rail Joiners - 6 Pack        | SL912   | £5.50  |

## SLATER'S

|                                                            |       |        |
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|                                                      |       |        |
|------------------------------------------------------|-------|--------|
| Dinorwic Slate Wagon Kit                             | 16W01 | £20.00 |
| Festiniog Railway 2 Ton Braked Slate Wagon Kit       | 16W03 | £26.60 |
| Festiniog Railway 2 Ton Unbraked Slate Wagon Kit     | 16W04 | £25.40 |
| War Department Light Railways K Class Skip Wagon Kit | 16W06 | £19.50 |
| Dinorwic Quarry Slab Wagon Kit                       | 16W08 | £25.50 |
| Dinorwic Quarry "rubbish" Wagon Kit                  | 16W09 | £25.50 |

|                         |      |       |
|-------------------------|------|-------|
| Slaster's Mek-Pak       | 0502 | £5.00 |
| Slaster's Mek-Pak Brush | 0505 | £3.70 |

## MSS

|                                      |           |         |
|--------------------------------------|-----------|---------|
| Side Tank Locomotive (32mm/45mm)     | 909003    | £200.00 |
| Saddle Tank Locomotive (32mm/45mm)   | 909013    | £230.00 |
| Side Tank Locomotive Kit (32mm/45mm) | 909011    | £190.00 |
| Jubilee Coach (32mm)                 | 990601    | £55.00  |
| Maroon Tender (32mm/45mm)            | 911403    | £53.00  |
| Green Tender (32mm/45mm)             | 911405    | £53.00  |
| Black Tender (32mm/45mm)             | 911401-BL | £53.00  |
| Blue Tender (32mm/45mm)              | 911402-BL | £53.00  |
| Maroon Passenger Coach (32mm/45mm)   | 911201    | £53.00  |
| Blue Passenger Coach (32mm/45mm)     | 911201BL  | £53.00  |
| Log Wagon (32mm/45mm)                | 911501    | £53.00  |
| Goods Van (32mm/45mm)                | 911101    | £53.00  |
| Guards Van (32mm/45mm)               | 911001    | £53.00  |
| Coal Wagon Grey (32mm/45mm)          | 911505    | £53.00  |
| Coal Wagon Unpainted (32mm/45mm)     | 911505-1  | £53.00  |
| Pair of Flat Bed Wagons (32mm/45mm)  | 911301    | £57.00  |
| Straight Track                       | 910003    | £34.00  |
| Curved Track                         | 910005    | £34.00  |
| Left Hand Point                      | 910001    | £24.40  |
| Right Hand Point                     | 910002    | £24.40  |

## BACHMANN

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| Percy and the Troublesome Trucks Set | 90069 | £220.00 |
| Thomas with Annie & Clarabel Set     | 90068 | £220.00 |
| Thomas' Christmas Delivery           | 90087 | £265.00 |
| Toby the Tram                        | 91405 | £165.00 |
| Thomas the Tank Engine               | 91401 | £204.75 |
| James the Red Engine                 | 91403 | £252.85 |
| Percy the Small Engine               | 91402 | £180.00 |
| Emily                                | 91404 | £250.00 |
| Annie Coach                          | 97001 | £58.00  |
| Clarabel Coach                       | 97002 | £58.00  |
| Emily's Coach                        | 97003 | £58.00  |
| Emily's Brake Coach                  | 97004 | £58.00  |
| Troublesome Truck 1                  | 98001 | £59.50  |
| Troublesome Truck 2                  | 98001 | £59.50  |
| Ice Cream Wagon                      | 98015 | £56.00  |
| Tidmouth Milk Tank                   | 98005 | £39.00  |
| S.C. Ruffey                          | 98010 | £70.00  |
| Explosives Box Van                   | 98017 | £56.00  |
| Open Wagon Blue                      | 98012 | £56.00  |
| Open Wagon Red                       | 98013 | £56.00  |
| Sodor Fruit & Vegetable Co. Box Van  | 98016 | £56.00  |
| Sodor Fuel Tank                      | 98004 | £56.00  |

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## ON THE COVER...

Mike Johns was familiar with two splendid 7 1/4 inch gauge Britannia locomotives; built in 1952 and 1962 by Eastleigh railwaymen, they were both contemporaries of their prototypes. He writes a short biography of both engines, the identities of which have been confused more than once! Photo, Mike Johns.

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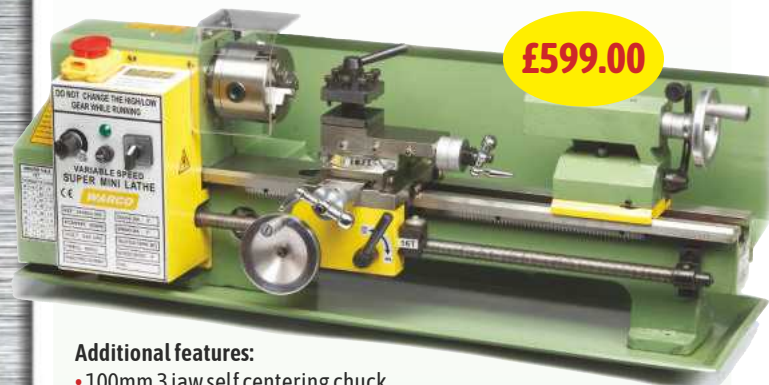
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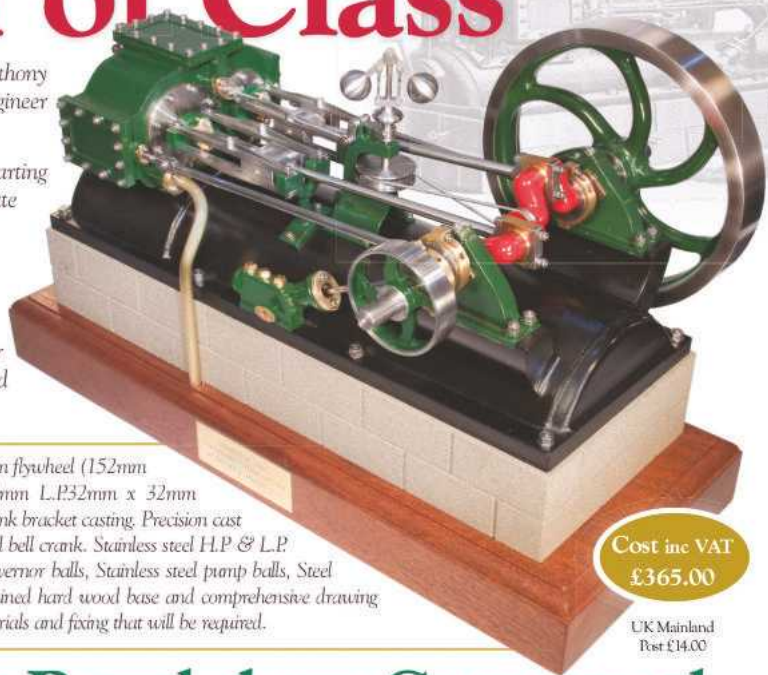
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The kit comprises the following: Cast iron flywheel (152mm dia.) Grey iron cylinder halves (H.P.22mm L.P.32mm x 32mm stroke). Engine base, Engine bed. Crank bracket casting. Precision cast crank halves, slide bar brackets and bell crank. Stainless steel H.P. & L.P. cylinder end cap blanks. Steel governor balls, Stainless steel pump balls, Steel drive band, Copper tube, Machined hard wood base and comprehensive drawing pack, which suggests other materials and fixing that will be required.

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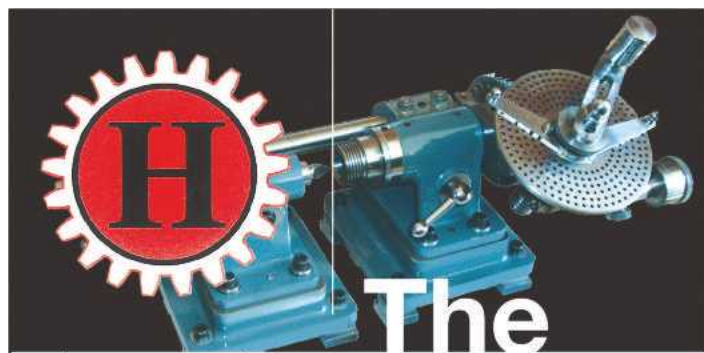
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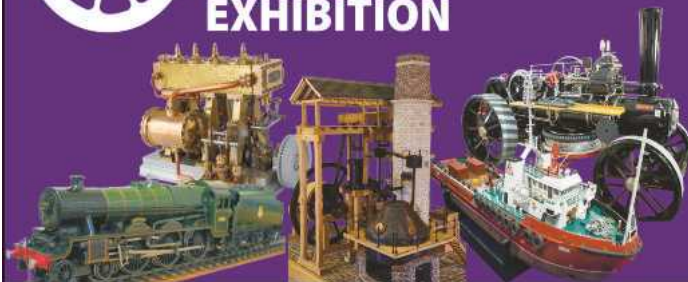
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## Model Engineering Courses: Milling

The Society of Model and Experimental Engineers (SMEE) offer a range of courses aimed at beginners in the hobby of model engineering. The majority of the 2017 courses have already been completed and it is anticipated that they will run again in 2018, but if you are new to milling, specifically there is just time to remind you that there is to be a one day course on Saturday 23<sup>rd</sup> September 2017. The venue is the SMEE headquarters at Marshall House, 28 Wanless Rd., London SE24 0HW and the day starts promptly at 9.30am with breaks for morning coffee and lunch, and will be completed by about 6pm.

The milling course is based around demonstrations, teaching and discussion and is not 'hands-on'; the intention is that you will return to your own workshop with your new-found knowledge, eager to put it into practice safely and with confidence. It should be noted that the tutorial is not directed exclusively to milling machine owners but is equally as relevant to those practising milling in the lathe. The course content is described fully on the SMEE website (see below).

## Central Southern Gauge-0 Group

To small scales now and the Central Southern gauge-0 Group are holding a Model Railway Show at the Allendale Community Centre in Wimborne, Dorset BH21 1AS on Sunday 22 October, 10am - 4pm. There's to be a 'bring and buy' section for anyone with pertinent goods they may wish to part with but remember to bring your wallet also! Search online for [csg0g.org](http://csg0g.org)



DIANE  
CARNEY  
Editor



A splendid Meccano model of the Laxey Wheel presented by the West London Meccano Society. (Photo courtesy of St. Albans MES.)

## St. Albans BIG Model Show

St. Albans & District MES are holding their annual exhibition of model engineering over the weekend of 23/24 September this year so if you are in the vicinity of this active and productive home counties club why not go along and enjoy the show? Entitled *Models That Move* the focus is on exactly that - trains running, traction engines trundling, drones flying, boats sailing and Salextric racing - so a great day out for the children too. Visiting clubs will be bringing along exhibits as well and there will be a selection of specialist trade stands. The exhibition opens in Townsend Church of England School, High Oaks, St. Albans AL3 6DR at 10am and closes at 5pm both days. Refreshments and free parking are available and there is a small entry charge, proceeds going to the club.

[www.stalbansmes.com](http://www.stalbansmes.com)

The charge for the course is £75 for members and £85 for non-members. Whilst membership is not essential, those new to the hobby will discover that there are many benefits to membership of this Society. Application forms for both membership and the milling course can be downloaded from the SMEE website ([www.sm-ee.co.uk](http://www.sm-ee.co.uk) and [www.sm-ee.co.uk/ctt-training](http://www.sm-ee.co.uk/ctt-training)) or obtained by contacting the Course Co-ordinator, 33 Felstead Avenue, Clayhall, Ilford IG5 0QH.

## Progress at Almondell

What must be one of the most ambitious miniature railway constructions ever undertaken by a model engineering society is now just about three years into the work and what an inspirational project it

is. In July 2014 the long and arduous process of clearance began in the heavily wooded area of land adjacent to Almondell Park near Broxburn, West Lothian as the creation of a brand new railway by the Edinburgh Society of Model Engineers started. Working parties of between six and a dozen volunteers meet regularly and plant and machinery is hired in when necessary, sometimes for a week of planned earth works. A regularly updated bulletin keeps members and anyone interested abreast of the work which is steady, well organised and showing positive signs of significant progress; track beds are beginning to be properly defined, surfaces laid and some track is now in position in places. I would recommend a look at the website: <http://edinburgh-sme.org.uk/category/weekly-news>

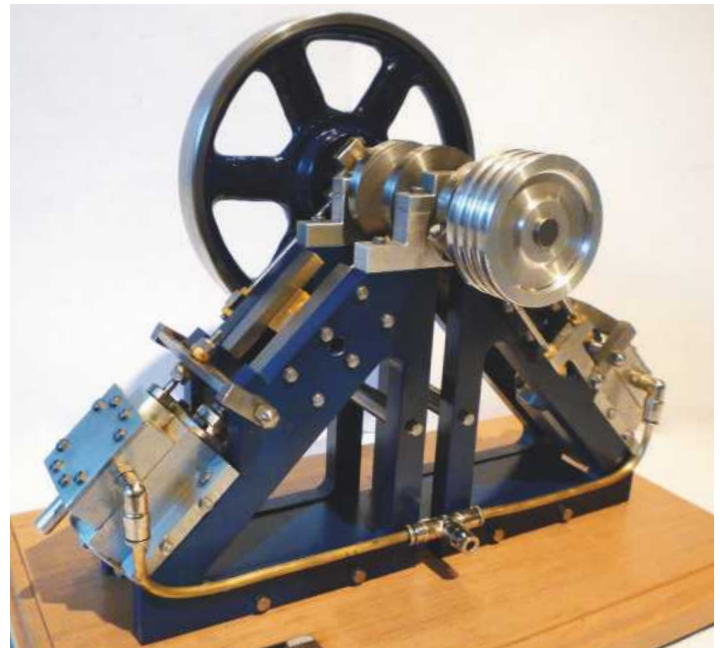
# The Middleton Inverted Vee Engine

PART 2

Rodney Oldfield completes another small stationary steam engine by designer, Bob Middleton.



Once again, Bob Middleton has come up with a new concept for a small stationary engine and it has been my privilege to be one of the first to build this Inverted Vee Engine. This article describes its construction which, as with all Bob's engines, is invariably from stock size material.



The frame clamped to the base spacer.

## The base spacer

The spacer is straightforward to make (fig 7). I had a piece of aluminium, 18 x 6 inches x  $\frac{7}{16}$  inch thick (the thickness doesn't matter) which took a bit of hacking out, but I

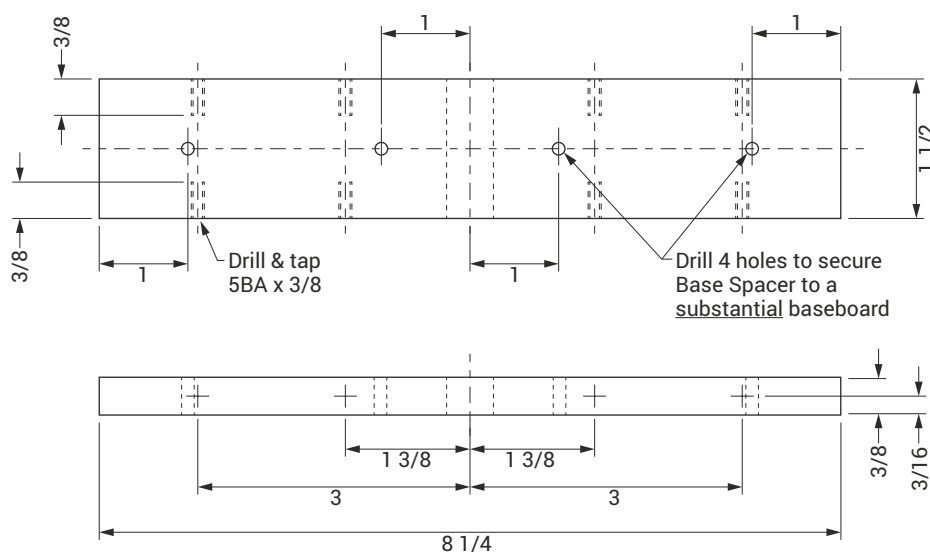
got there. In order to drill the bottom two 5BA screw holes accurately, line up the bottoms of the frame. Clamp both frames onto the base plate and square the two frames using the  $\frac{1}{8}$  inch reamed hole and the  $\frac{1}{4}$  inch reamed hole (photo 7). Spot through both plates, drill and tap 5BA both plates and bolt onto the base. Place a  $\frac{1}{2}$  inch thick square bar in between the bolted-on plates and the other two plates, clamp together on the base. Spot, drill and tap 5BA.

## Frame cross brace

I used  $\frac{3}{8}$  inch diameter bar (it does not matter what you use as long as it looks good). Drill and tap 5BA both ends. They must both be exactly the same length as the width of the base plate.

## Cylinder

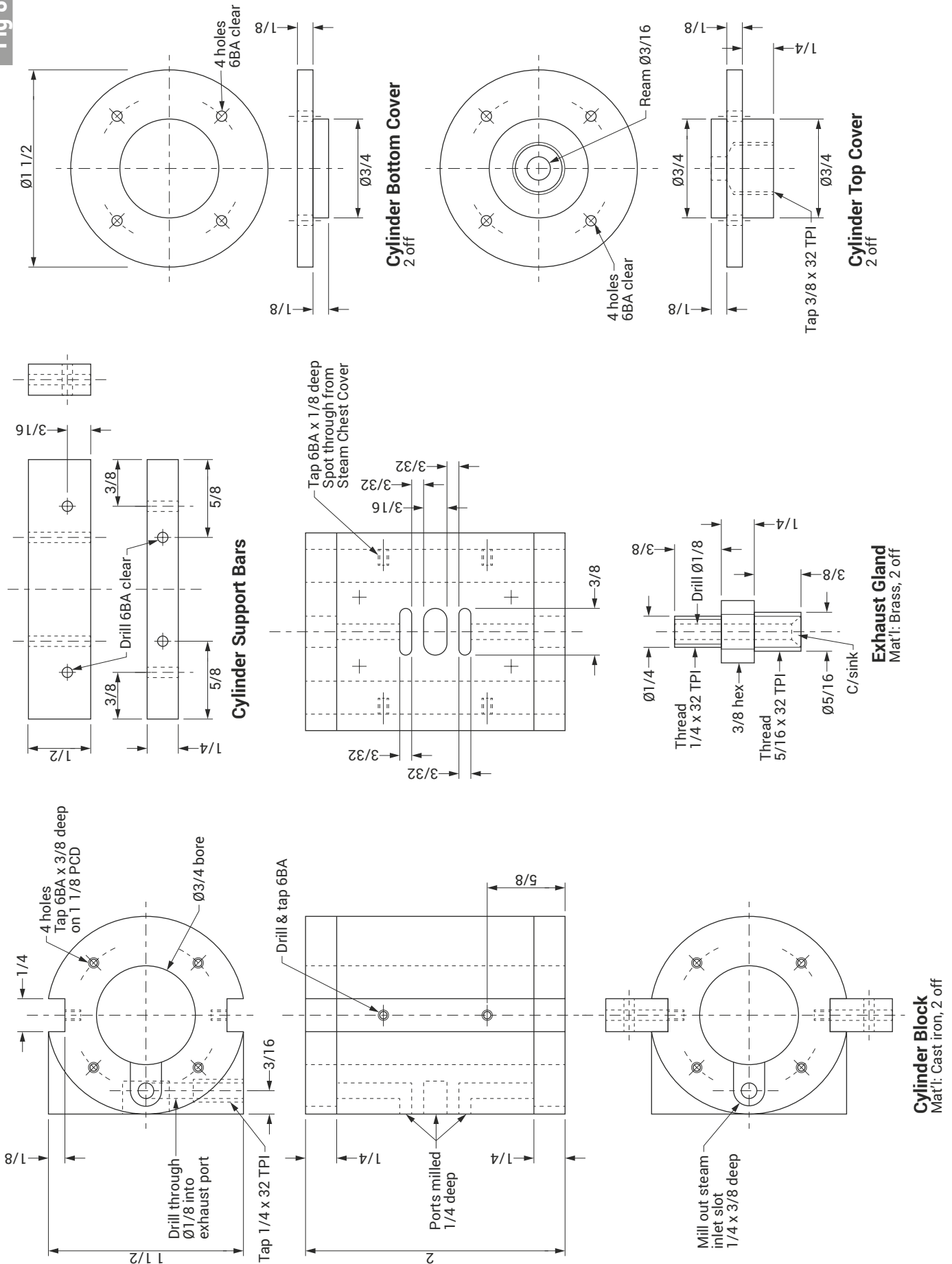
Refer to fig 8. I had a 2 x 2 inches square bar of aluminium so I machined it down to the correct size in



Base Spacer  
Mat'l: Steel, 1 off

Fig 7

Fig 8



the four jaw chuck (I am well aware that aluminium is not an ideal material for cylinders but I was working on the principle that the model will only run for display purposes and will definitely last my time out so therefore it is good enough for me; also, it is easier to drill and tap! The choice is yours.

First, bore out to  $\frac{3}{4}$  inch. If your bore is a little too big it does not matter as you will be making pistons to suit. Whilst it is square, do all the milling of the cylinder support bar slots and drilling, marking the slots for the porting as accurately as possible (use your digital callipers). Mill out the port slots  $\frac{1}{4}$  inch deep as in the drawing, taking great care.

Next, mill out the steam inlet slots  $\frac{3}{16}$  inch deep then drill  $\frac{1}{8}$  inch connecting hole to the port whilst it is still in the vice. I then machined a 45 degree angle on the underside of the cylinder block, approximately  $\frac{5}{16}$  inch wide. The cylinder support bars are made from  $\frac{1}{2} \times \frac{1}{4}$  inch material. Drill 6BA clearance measurement as shown in the drawing (I use aluminium) then screw them onto the cylinder block (**photos 8, 9 and 10**).

### Cylinder cover plates

I used some 2 inch diameter aluminium bar protruding out of the chuck approximately 1 inch. Turn the O/D to  $1\frac{1}{2}$  inch, then turn the boss to fit the bore diameter. Drill and ream a  $\frac{3}{16}$  inch hole, 1 inch deep. In order to mark out the positions of the four holes in the cylinder cover I placed a pointed lathe tool in the tool post and scribed a circle of  $1\frac{1}{8}$  inch diameter. To scribe the location of the holes on the scribed circle I put No. 1 jaw in the top position and then, using the pointed lathe tool, wound the cross slide back across the scribed circle to mark the location of two holes. Then I turned the chuck through 90 degrees to mark the location of the other two holes (**photo 11**).

With the parting tool, move over leaving a  $\frac{1}{8}$  inch flange and plunge in to approximately  $\frac{3}{4}$  inch diameter. Move over again and repeat until you have a full



Cylinders bored and ports cut.



Completed cylinders; the underside view on the left.



Cylinder end covers drilled and deburred.

$\frac{1}{4}$  inch length before parting off. Fastening in the chuck on the bore diameter boss, drill tapping size (for whatever tap you are using for the gland)  $\frac{5}{16}$  inch. Whilst it is still in the chuck, tap it out. Also, if you want to make it fancy, put a groove on the boss and groove out the flange a little.

Take all the sharp edges off and polish. Repeat the same for the bottom cover but *do not drill it* - and remember, there is only the flange; no boss. When all four are finished, centre pop and spot with a small drill in the grooves you have made. Drill out to 6BA clearance (**photo 12**). I made the mistake of drilling six holes in the bottom cover. Do not do this!

Next, place the end covers onto the cylinder then spot through one hole, drill 6BA

tapping size and tap out. Mark the top cover and cylinder in position, bolt on and repeat with the other three holes.

### Steam chest

I turned mine down from a rather large piece of aluminium in my four jaw chuck to the outer measurements (**fig 9**). Aluminium is a lot easier to machine, drill and tap and is quite adequate as a steam chest material. The last turning bit is the hole,  $\frac{5}{16}$  inch x 32 tpi; I used  $\frac{1}{8}$  inch BSP because I have both taps and dies but you do your own thing. Next drill  $\frac{1}{8}$  inch diameter hole  $1\frac{1}{2}$  inch deep, then using a  $\frac{3}{32}$  inch drill, drill 2 inches deep. Take all the sharp corners off and place in the vice on the milling machine. Mill the centre out as shown in the drawing, then put to one side.



Cylinder support bars in the foreground.



Marking the position of the holes on the cylinder cover plates.



Steam chests and their covers.

### Steam chest cover

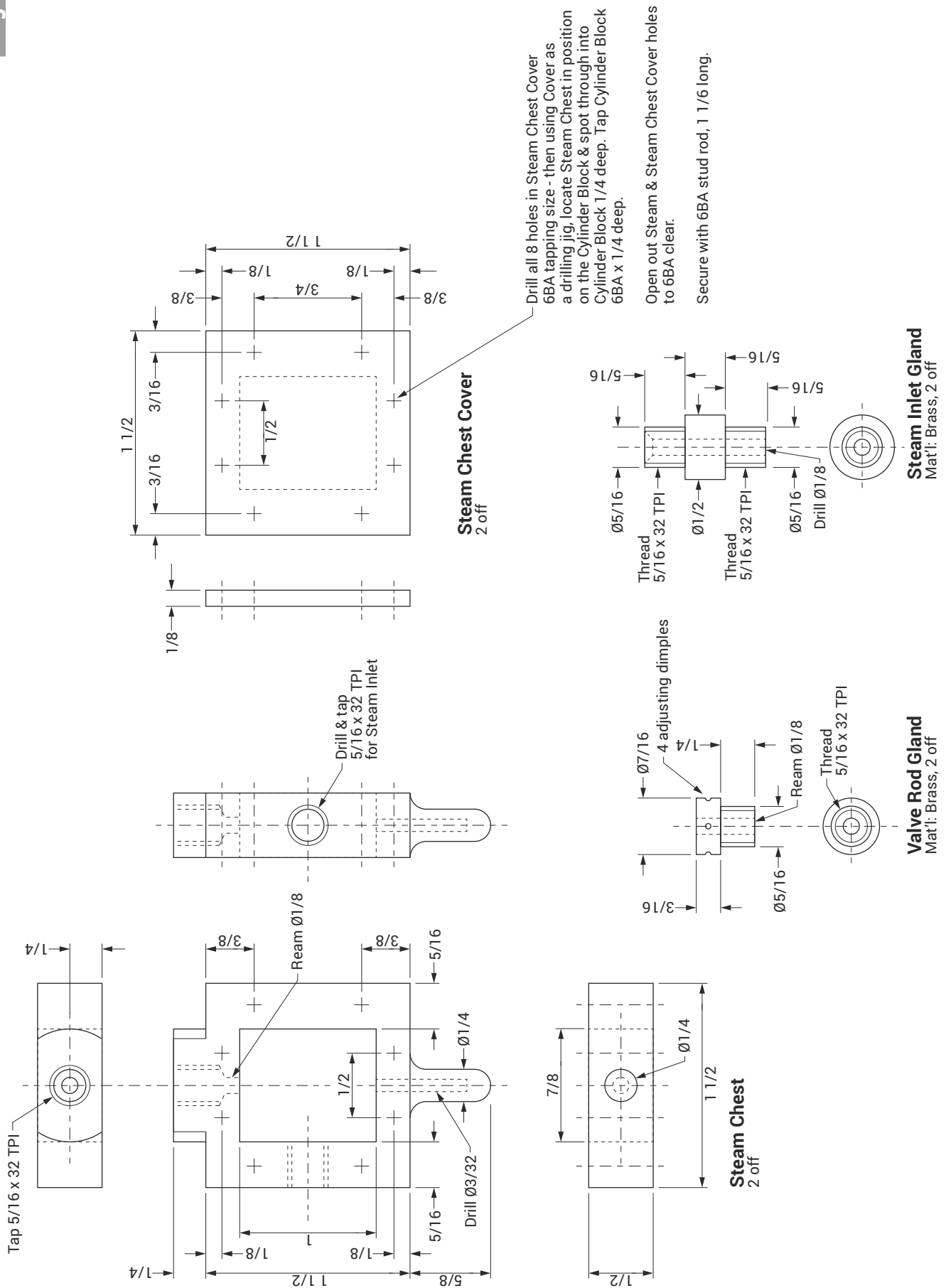
I cut mine from  $\frac{1}{8}$  inch stainless steel sheet then I marked it out very accurately from the drawing. I drilled the eight holes 6BA tapping size and used this as a drilling jig. Place it onto the cylinder block, making sure it is centred and level with the outside edges. Spot through one hole, then drill and tap the cylinder 6BA. Bolt the steam chest cover onto the cylinder and, if everything is lined up, drill and tap the other seven holes (**photo 13**).

Drill out the steam chest cover 6BA clearance and place it onto the steam chest, lining up with all the edges. Drill through 6BA clearance and take off all sharp corners.

Do not forget to mark each piece to the corresponding partner piece.

●To be continued. ➤

Fig 9



# West Dean College Conservation Workshops

**Roger Backhouse** looks at a selection of significant engineering models.



James Wong puts the finishing touches to one of SMEE's oldest models, a beam engine made by James Littlewood Naylor in 1843.

In its 119 year history, the Society of Model and Experimental Engineers has acquired a collection of engineering models including locomotives, ships, stationary engines, tools and experimental equipment. All have stories, whether of makers, donors, construction or restoration. Some of the SMEE's models will feature in this occasional series of articles.

**S**MEE's Stationary Engines Committee members have restored many to working order and conserved others for display. Models are kept off site but SMEE arranges displays at exhibitions when possible.

## The West Dean link

With models of particular historic interest, SMEE seeks professional help with restoration or conservation. SMEE's link with West Dean College came through the current SMEE Vice Chairman, Professor Norman Billingham, an expert in polymers, who teaches their conservation students materials science.

West Dean is a unique arts college founded by the wealthy artist and designer, Edward James and now run by the Edward James Foundation. Located in the South Downs

between Chichester and Midhurst, it's also noted for gardens which are open to the public (**photo 2**).

West Dean students have conserved several SMEE models as part of their coursework and a fascinating SMEE visit to the student's exhibition in July 2017 showed conservation techniques at first hand.

## Conservation courses

At the time of writing, Jon Privett headed the metals conservation course with Associate Tutor, Belinda Hager. Jon trained at West Dean and then worked in various settings including conservation of ecclesiastical silver and domestic metalware at the Victoria and Albert Museum, conserving sculptures for Robert Harris and then as Head of Conservation for



West Dean College gardens are normally open to the public.



LEFT: Eve Taylor shows the padlock and key she made as part of coursework. Eve has a background in silversmithing and jewellery. RIGHT: Examples of students' metal treatments and coatings. Also shown are examples of treatments given to a coin.



How to treat ferric corrosion - different methods shown by Stacey Hibberd.

Plowden and Smith, a major conservation firm. Belinda, from New Zealand, has a background in jewellery developing an interest in conservation.

Courses mix theoretical understanding with practical experience. Students study materials science and chemistry to understand the materials they will deal with and learn how objects degrade. They also study material culture and understanding objects in their historical context; this is particularly important in conservation where items may have come from widely differing environments.

Knowledge of how objects were made helps in understanding how they should be conserved. Practical elements make up a large part of the courses and students first learn some workshop skills in 'making' - one of their projects is for each to make a padlock and key (photo 3). They

then carry out conservation projects on different materials which could be ironwork, copper alloys or even precious metals (photo 4).

Students make many of their own scribing and chasing tools.

Student, Eve Taylor says, 'students learn a range of metalworking including casting, etching, engraving and gilding (photo 5). Eve has a background in silversmithing and restored ormolu furniture at Brighton's Royal Pavilion; she is planning to remain self employed when she finishes at West Dean.

Jon Privett says, 'students are already highly committed when they arrive' but he expects most students to have some background in making and there is a practical test first. Many have studied art history but students from different backgrounds are welcome.

He's proud of the worldwide reach of his ex-students.

Conservation is increasingly international and transnational discussions help solve conservation problems.

### Work for SMEE

One of the first projects was conserving the *Jenny Lind* model described in *Model Engineer* issue 4529 (4 March 2016). Norman Billingham agreed with Jon Privett that this would make a good student project. West Dean's then students, Hannah Collacott and Natalie Mitchell produced a detailed condition report and carried out work under supervision. Readers may recall that the model had been displayed at the Model Engineer Exhibition at Sandown Park in 2014 (photo 6).

Students, Harriet Knightly, Joshua Schaffer, Kaori Arakaki, Suzanne Van Leer and Rupert James then conserved model internal combustion engines made by Edgar Westbury. He pioneered

I/C engine modelling, writing extensively in *Model Engineer* and his models were recently donated to SMEE (photo 7). These models needed considerable conservation work. Edgar Westbury's amazing contribution to model engineering will feature in a future article.

Jon Privett noted that aluminium, as used in the Westbury engines, is challenging to conserve but he rates composite objects that mix organic and non-organic materials involving wood, leather or even plastic as difficult, especially where these have been heavily used or have degraded over time.

### Small pump

With a degree in art history, Francesca Levey has worked at the Wallace Collection specialising in Asian arms and armour. Francesca liked working on SMEE's small pump as it had moving parts, therefore it was very different from most other objects tackled. Conservation principles remained the same - to ensure that no further damage is done, that condition is stabilised, to preserve as much of the item's history and make any changes reversible (photo 8).

The pump was made by Commander Barker, noted for many fine models including exquisite models of ships' engines displayed in Merseyside Maritime Museum. On initial inspection, it was



SMEE's Jenny Lind model conserved by former students, Hannah Collacott and Natalie Mitchell with Jon Privett behind.



Edgar Westbury's model internal combustion Kiwi engine conserved at West Dean. Several models came to SMEE in a poor state with many parts missing.

difficult to tell the metals used, though both brass and ferrous parts were identified. Brass could have been lacquered. Conservators do not usually remove coatings so Francesca used white spirit as the cleaner. (Meths would have removed the lacquer.) Her other concern was to ensure that the moving parts were not too affected by dust which can attract moisture, thereby damaging models.

Once cleaned metal parts were treated with a microcrystalline wax and the moving parts were oiled.

This pump has a glass beaker that was cracked and although it was quite stable, handling it could worsen the damage so Francesca sought advice from the glass and ceramics conservation workshop. West Dean encourages interdisciplinary working.

Each object has a history, not only of the maker but also of subsequent users and conservators aim to keep as much of this as intact as possible. For example, there was an oily finger print on the glass beaker which was retained. Beneath the beaker Francesca found a slip of oil soaked paper with an inventory number. This was also kept but it's now protected in a plastic sleeve. Now that the object has been stabilised it should resist further corrosion.

### 1902 vertical steam engine made by J. Hallett

In preparing the condition report - something that conservators must do - for the vertical steam engine (photo 9), Stacey Hibberd found it wasn't necessary to dismantle the engine though it was removed from the wooden base. Fortunately moving parts didn't need loosening but there was a residue of old oil around the engine. Stacey carried out cleaning using swaps and IMS (industrial methylated spirits). All students learn to make swabs of different sizes using cotton wool wrapped around cocktail sticks (photo 10). The wooden base was cleaned with water and detergent.



LEFT: Small pump conserved by Francesca Levey. Problems included a heavy dust deposit and the cracked beaker.  
RIGHT: Stacey Hibberd conserved this fine stationary engine made by J. Hallett in 1902.



A screw holding strapping round the cylinder was loose so the thread was bulked up with PTFE tape (photo 11). Stacey then coated metal parts with microcrystalline wax.

Students have varied backgrounds. Stacey began as a farrier and blacksmith before taking a foundation degree in silversmithing and jewellery. The College is proud of the employment record of its former students. Stacey has already been offered a job when she leaves West Dean.

### John Littlewood Naylor's engine of 1843

Jimmy Wong conserved one of SMEE's earliest models, a beam engine made by John Littlewood Naylor in 1843 (photo 12). Unfortunately, SMEE's records have no information about this engine or its maker but its conservation enabled them to discover more about its construction. Evidence of lamination confirmed that some metal parts were wrought iron. Jon Privett thought the cast iron base would have been much trouble to make involving, as it did, preparation of a pattern and mould. He speculates as to whether more than one was possibly made.

Jimmy's condition report found that the model was in generally good condition but there were cracks in the beam, a missing securing clip, rusty iron wire holding



Making cotton swabs; an essential part of conservation work.



Hallett engine with screw holding strapping round cylinder that had worked loose. Now bulked up with PTFE tape.



One of SMEE's oldest models made by John Littlewood Naylor in 1843. It had the condenser underneath and was known as the 'poker engine' using a red hot bar to heat water.

parts together and once work started it became clear an outlet pipe was damaged.

For this project Jimmy cleaned surfaces using de-ionised water with a mild surfactant. He had to make a replacement brass clip, ageing this with a commercially available patination treatment (**photo 13**). Cracks in the beam were not treated as the model was not intended to run again but to stabilise the outlet pipe Jimmy made a nylon tube insert.

Jimmy found that the rubber gasket for the safety valve had deteriorated. Organic materials are a major challenge for conservators. The rubber gasket was almost certainly not original and may have been laboratory tubing. Jimmy consolidated this with 5% Paraloid B72, a plastic consolidant and adhesive. Paraloid is widely used as it is easily reversed and dissolves in a range of solvents.

Around 30% of West Dean's students are from overseas. Jimmy has a degree in chemistry and usually works in Hong Kong museums. He was also seconded to conservation work on *HMS Belfast*, handling the very different scale of work conserving a battery room and the mounting for a 4 inch HA/LA Gun.

### Facilities available

Students use workshop facilities (**photo 14**) including space for heat treatments (**photo 15**) and a laboratory of measuring and testing instruments to help analyse materials. Lab equipment includes a Fourier Transforming Infrared Spectrometer that identifies materials by comparing them with a 'library' in a computer, a Lambda 25 UV/VIS Spectrometer, described by Norman Billingham as 'a sophisticated way of measuring colour' and a microscope using both visible light and UV illumination (**photo 16**), good for identifying layers of materials, particularly appropriate where objects have had several coats of



**LEFT:** Clip made by Jimmy Wong to replace one missing. It was artificially aged to match the engine.  
**RIGHT:** Workshop for metal conservation students.



**LEFT:** Heat treatments area available for students to use. **RIGHT:** A microscope can view objects under ordinary or ultraviolet light. Resulting fluorescence enables different layers to be distinguished.

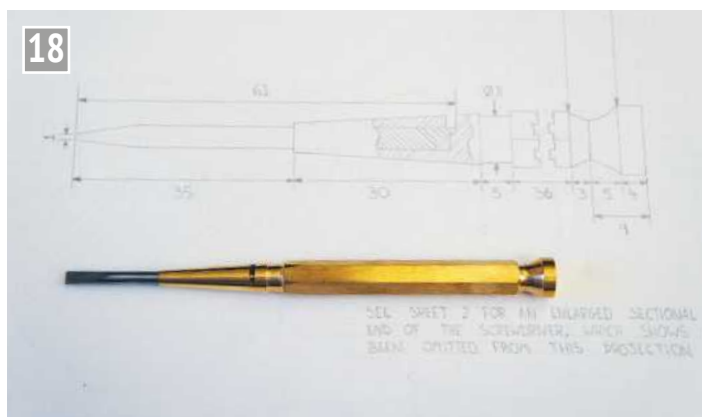


*Clock made by a student.*

paint or lacquer. There is also a Hounsfield Tensometer to test the strength of materials.

### Other objects conserved

Students on placement have the opportunity to work on a range of objects, very different in scale from SMEE models. One example



*Screwdriver made by student.*

is given on a student blog. A Harvey oscillating steam engine was conserved to remove rainwater damage that had occurred during storage. Challenges including understanding the workings, removing a one ton flywheel and avoiding contact with asbestos packing (**ref 1**).

### Horology

West Dean also offers courses in horological conservation. Though processes are different, students draw on common training in materials science and make an 18th Century style clock as part of the course using some silversmithing techniques

(photo 17). Students also make tools (photo 18), learning bench skills and the range of processes that might be needed in conservation including sand casting weights (photo 19).

It was interesting to meet one student, Stephen Loader, who'd developed an interest in clocks through model engineering. He told me he'd been inspired by the remarkable work of Cherry Hill. West Dean students often go on to produce work of a very high standard.

Again, this workshop has good facilities including Lorch and Schaublin lathes (photo 20). As with metals conservation students will have a fulfilling and creative time.

### Conservation courses

West Dean offers other conservation courses including furniture conservation and ceramics conservation, both fascinating but outside the field of model engineering.

### Courses

West Dean offers a range of full time and short courses



Clock parts made by student, Greg Gorton.

including a Graduate Diploma and a Postgraduate Diploma leading to a Masters. In September 2017, a new course for a Foundation Degree starts where students will include in their portfolios making a replica 16th Century casket learning many different metalworking skills.

Other departments run a variety of training ranging from creative short courses to Foundation, Diploma and Masters degrees. Degrees are awarded by the University of Sussex.

ME



Schaublin lathe at West Dean horological workshop. The college is well equipped for horological students.

### INFORMATION

Website: [www.westdean.org.uk](http://www.westdean.org.uk)

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Tel: +44 (0)1243 811301

Email [reception@westdean.org.uk](mailto:reception@westdean.org.uk)

Society of Model and Experimental Engineers  
[www.sm-ee.co.uk](http://www.sm-ee.co.uk)

### REFERENCE

1. [www.westdean.org.uk/study/school-of-conservation/blog/metalwork/the-disassembly-of-harvey-a-vertical-oscillating-steam-engine](http://www.westdean.org.uk/study/school-of-conservation/blog/metalwork/the-disassembly-of-harvey-a-vertical-oscillating-steam-engine)

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# Rescaling Moving Coil Meters

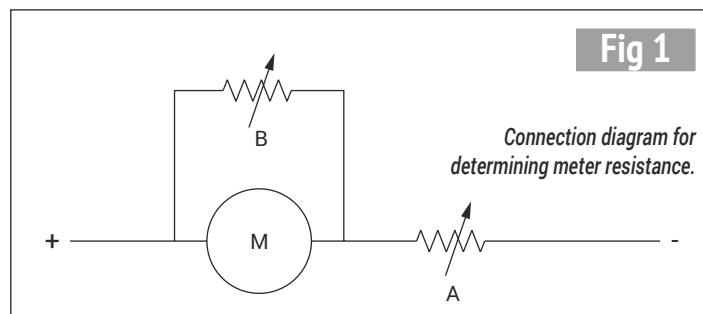
## PART 2

**Graham Astbury** describes a way of changing the scales and sensitivity of these instruments.



Continued from p.379  
M.E. 4568, 1 September 2017

**H**aving determined the full-scale deflection of the meter the next task was to determine the resistance of the meter as this determines the series resistor needed to change the sensitivity. It is not advisable to use a multimeter to try to measure the resistance of a meter as a typical multimeter, which has a centre-scale reading of 50 ohms or so, will pass a current of around 40mA through the meter which would clearly overload most meters. The simplest safe method of measurement can be done by connecting a second decade box across the meter terminals whilst it is displaying full-scale and adjusting the resistance across the meter until it reads exactly half scale. If you are doing this yourself do use a voltage of around 12 volts. This will have the minimum impact on the current drawn as there will be a small reduction in total resistance when the resistance across the meter is added. The circuit diagram for this set-up is given in **fig 1**. The second decade box 'B' is then read off and the meter resistance is the same as the decade box setting. In my case this was 4 ohms. If you do not have a decade box, or cannot be bothered to make one, then you can still determine the resistance of the meter by selecting a fixed resistor for resistor 'A' in fig 1 to give somewhere near full scale. Read the meter as X and then connect resistor 'B' across the meter selecting 'B' so that the reading drops by around half and read it as Y. Anywhere



between  $\frac{1}{3}$  and  $\frac{2}{3}$  of the initial reading will be satisfactory. The meter resistance is then calculated from the equation

$$R = \frac{(X - Y) \times B}{Y}$$

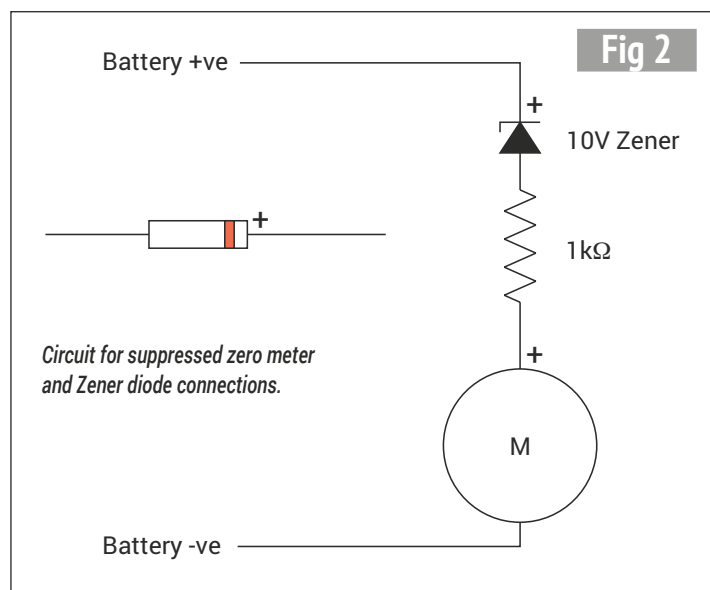
I decided that on a meter as small as this one, which is only 40mm in diameter, the scale would be virtually unreadable if calibrated from zero to say 15 volts so a suppressed zero expanded scale was called for, starting at 10 volts and ending with 15 volts giving an effective full scale of 5 volts. To read 5 volts full-scale with a 5mA movement would require a resistance of 1 kilohm, calculated using Ohm's Law

$$R = \frac{V}{i} = \frac{5}{0.005} = 1000 \text{ ohms}$$

Theoretically it is necessary to take account of the resistance of the meter itself but, in this case, 4 ohms is trivial compared with the resistance required so can be ignored. In fact, the resistor itself will be 1000 ohms  $\pm 1\%$ , which equates to a resistance of anything between 990 and 1010 ohms, so the meter resistance is less than the error in the resistor itself. This covers the series resistance required but now the question

of suppressing the zero arises.

To achieve an offset of 10 volts I used a simple 10 volt Zener diode. For those who are not familiar with the term Zener diode, it is also known as a breakdown diode or avalanche diode. Under normal forward biased conditions it conducts like any normal diode but when reverse biased it does not conduct until the voltage across it reaches the 'breakdown' or 'avalanche' voltage. Hence it always drops a fixed voltage irrespective of the current flowing. Using a 10 volt Zener diode will mean that the meter will only show the voltage above 10 volts as the Zener diode will not conduct until there is 10 volts across it. The circuit is shown in **fig 2**. As the maximum current through the Zener will be 5mA the wattage will be 10 volts times 5mA, or 50mW, so anything above this rating is suitable. Mine is a 3 watt Zener diode. There is one further slight complication in that Zener diodes are generally made with a tolerance of  $\pm 5\%$  so a 10 volt Zener diode will have an effective voltage drop of anything between 9.5 volts and 10.5 volts. I had to buy a pack of 10 of them so I sorted through them until I found the nearest to 10 volts that I could



find, using the circuit in fig 1 and measuring the voltage across the diode. In fig 1 the resistor 'B' is replaced by the Zener diode and the meter is a standard multimeter. The resistor 'A' needs to be sufficient to give a current though the Zener of about the same order as the full-scale deflection of the meter with the suppressed zero. This completes the electrical side of the re-scaling.

### Redrawing the scale

Since the meter is to read from 10 to 15 volts I had to redraw the meter scale. As the original was printed in white on black I decided to do the same. Having removed the outer case, I could see that the original face was fastened onto the magnet and formed the upper pivot

for the movement so was not easily removable (**photo 8**). Many meters have a separate thin, usually aluminium, scale attached with small screws so it can be removed. Since mine formed part of the meter I had to measure the new scale *in situ* using a rule. It is not essential to get the exact same size of scale and text printing as long as the scale is geometrically similar in that the scale covers the angle of movement of the pointer and the pivot centre is aligned with the centre of the new scale. Incidentally, the majority of panel meters like this one have a 100 degree movement, not 90 degree as a quick glance at it would make you think.

Having drawn the new scale using my drawing package I used a black background with white letters and lines as my



*The movement out of its case.*

inkjet printer, excellent as it is, does not print in white. I printed the finished scale onto cream coloured 160gsm card as using white card leaves the finished printed scale looking a bit too stark. After leaving it to dry for 24 hours I carefully cut round the outside of the scale and attached it to the original meter scale using double-sided adhesive tape. If you do this type of modification do be careful not to catch the pointer when sticking the new scale on. Also, do not dismantle the meter on your normal workbench as any fine steel filings will stick to the magnet and may get between the poles, obstructing the movement of the coil and pointer. Such filings are difficult, if not impossible, to remove without damaging the meter (don't ask!). The final

meter, assembled, is shown in **photo 9**.

When I tried the new rescaled voltmeter with the Zener diode and series resistor on the car battery it read 12 volts. On switching on my voltage regulated battery charger at 14.0 volts the meter read 14 volts so I was happy with the calibration. I had previously measured the voltage of the battery both off and on charge using an AVO meter Model 8 Mark III so was fairly confident that the voltages were correct.

### The Ammeter

I dismantled the 240 degree instrument and removed the scales, which were attached with small countersunk screws. This is shown in **photo 10**. Note that the original meter was calibrated for measuring 0-1A, 0-10mA and



*The meter rescaled and reassembled.*



*The 240 degree meter with the scales removed.*

0-30V. As the meter showed three scales and it had only two terminals at the back it clearly could not have been calibrated with internal shunts or series resistors. Again, I set it up with the series resistance from the decade box and I calculated that it read 10mA full scale. The resistance of the meter itself was 27 ohms. When re-scaling to measure higher currents the meter resistance has to be known as it is necessary to calculate the shunt resistance required to be placed across the meter terminals so that it reads the desired range. As the meter reads 10mA and the resistance is 27 ohms, the voltage across the meter when reading full scale is therefore, from Ohm's Law:

$$V = iR = 0.010 \times 27 = 0.27 \text{ volts or } 270\text{mV}$$

To recalibrate the meter to read 100 amps full scale means that the meter must be connected across a resistance which drops 270mV at 100 amps. Thus the required resistance is:

$$\frac{V}{i} = \frac{0.27}{100} = 0.0027 \text{ ohms or } 2.7 \text{ milli-ohms, which is extremely low.}$$

Unfortunately, it is quite difficult to buy resistors made to these sorts of values off the shelf.

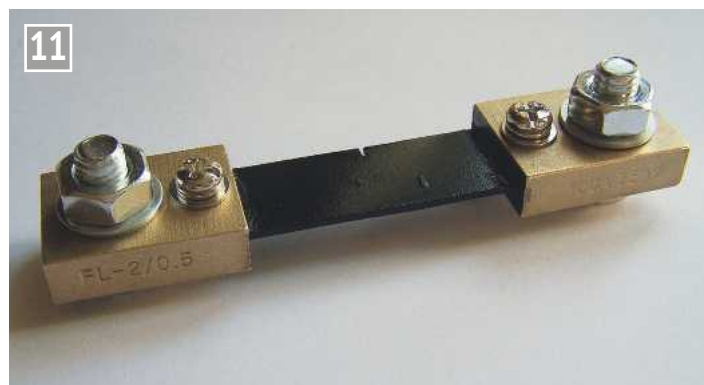
I did search the internet and found a meter shunt specifically designed to allow a low range ammeter to register much higher currents. The one in **photo 11** is a 100 amp shunt but at 100 amps it only drops 75mV, which is an industry standard voltage. Consequently, it was of no use where the voltage that I required was 270mV. If the 100A commercial shunt were to be used it would only read

$$\frac{75}{270} \times 100 = 27.7\% \text{ of full-scale at its full current.}$$

Clearly, a special custom made shunt was required.

●To be continued.

Next time I will go on to discuss the making of high current shunts.



A commercial 100A shunt. Photo 1. The 'back to front' meter.

## Nomenclature

|   |                                                    |
|---|----------------------------------------------------|
| A | Surface area of one side of shunt, mm <sup>2</sup> |
| B | Resistance of parallel resistor, ohms (Ω)          |
| i | Current, amps (A)                                  |
| l | Length, mm                                         |
| R | Resistance, ohms (Ω)                               |
| r | Meter resistance, ohms (Ω)                         |
| t | Thickness, mm                                      |
| V | Voltage, volts (V)                                 |
| w | Width, mm                                          |
| W | Power dissipation, watts (W)                       |
| X | Meter reading without parallel resistor, mA        |
| Y | Meter reading with parallel resistor, mA           |
| ρ | Resistivity, ohm-mm (Ω·mm)                         |
| Ω | Ohms                                               |

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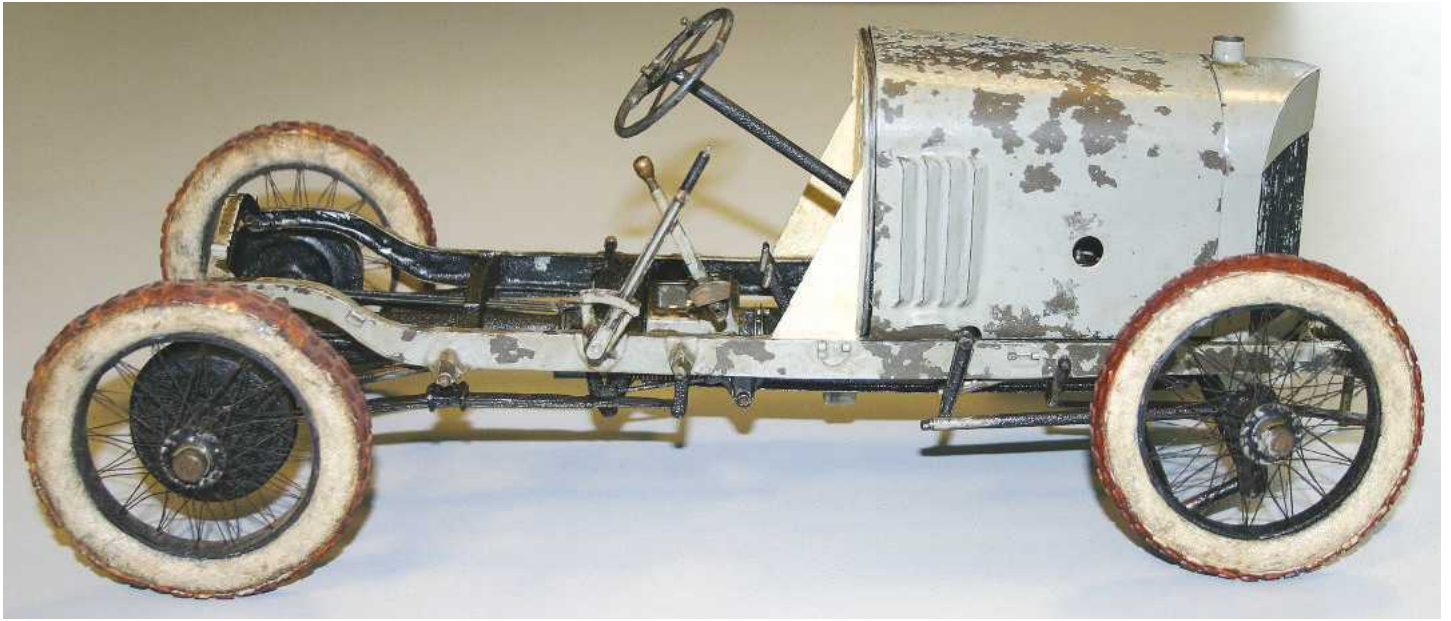
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The model car made by Colonel Icke whilst captive as a WW1 Prisoner of War.

# An Ingeniously Made Model

**Mark Kallenberg**  
describes an astonishing  
survivor of the Great War.

In December 1917 *The Autocar* magazine printed an article about a model car made by a British Army Officer who was being held as a prisoner of war at a German POW camp. The article begins: *The Work of a British Officer who for over Three Years has been and still remains a Prisoner*

*of War in Germany.' December 29th, 1917. (photo 1).*

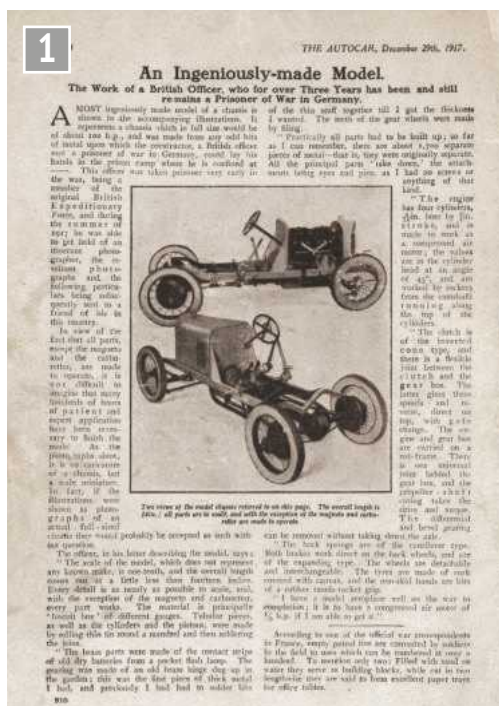
Nearly 100 years later a work colleague of mine, Sophie Parr - who knew of my passion for cars and motorbikes, especially old ones - asked would I mind having a look at a model car that her father, Bill Roberts, who recently passed away, had left her as it had been partially dismantled and, whilst she had the parts, she couldn't be sure where they all went.

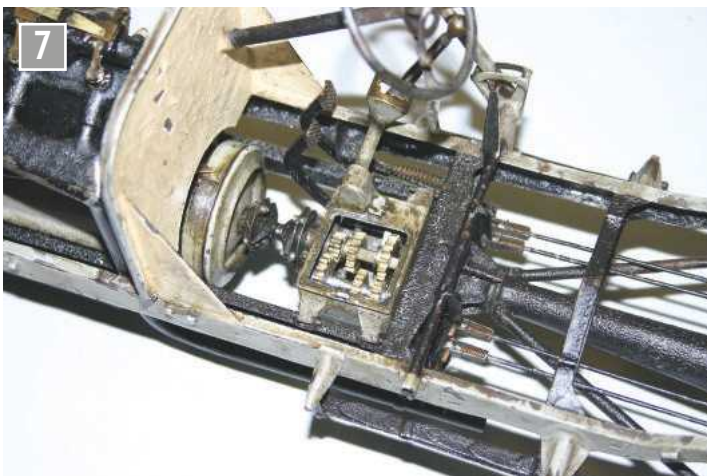
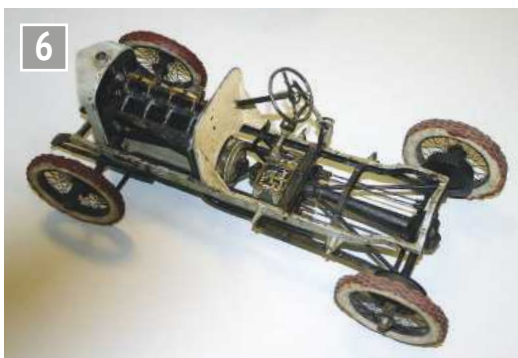
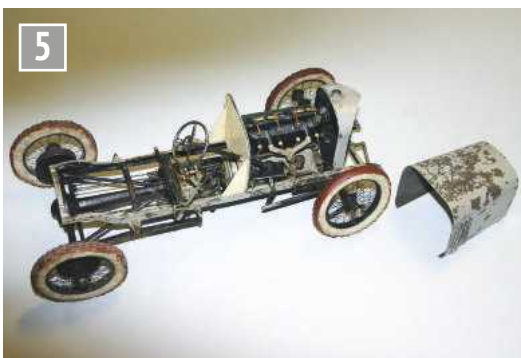
Intrigued, and glad of the challenge of trying and solve any mechanical puzzle, I was happy to oblige. The following day I was presented with a battered cardboard box; all I knew was there was a model

car in the box that possibly needed some repair. What presented itself left me near speechless as sat there was what is termed in the motoring world a 'barn find'. It was a tenth scale model car that had been hand crafted one hundred years earlier and which had spent the last 25 years in this box, tucked away in an attic. After talking to Sophie and finding out more about the car and the man who made it, I felt the story had to be told so I am doing what I can to make sure it does not disappear for another 25 years!

## The builder and his model

John Henry Townsend Icke was born on 12th April, 1888 in South Africa then moved, at an early age, to Phoenix, Arizona. Unfortunately, both parents died whilst out there and in 1901, at the age of 13, his Grandparents went out to the States and brought him back to live with them in the UK. During World War 1 Colonel Icke served with the South Lancashire Regiment, Prince of Wales' Volunteers (photos 2, 3 and 4) and was one of the





many soldiers who crossed the Channel right at the start of the war but found himself captured and sent to a prison of war camp in Blankenburg, Germany. With time on his hands the Colonel decided to make a model car.

The car wasn't based on any particular make or model of the time but was of John's own design. Far from having any of the machine tools we have available to us these days - the likes of a lathe, milling machine or even a pillar drill - John had nothing, not even fastenings such as nuts, bolts screws or washers. John went on to construct a car using any materials he could find which were mainly tin cans, nails and bits of wire. A total of some 1700 components were used in the construction of the car which had a four cylinder engine with a working clutch, three speed gearbox and a working back axle. The engine, from the crankshaft to valve springs, all worked and the car was able to run on compressed air. With such limited materials and ways of manufacturing items, many have been constructed from tin and soldered together. Unlike our modern day materials, where there are various melting point soft solders available, John probably only had plumber's solder. An art he must have mastered was being able to solder various components together without 'unsoldering' others and, again, probably having only a soldering iron heated by a naked flame. Some of the wooden formers and mandrels which he used to make the car are still with it. The gears in the gearbox and differential were all hand filed. At a time when many cars still ran on chain drive, John designed a differential that could be removed from the back axle without having to take the axle off the car! With no nuts, bolts or screws, the sump and differential cover are held in place with metal pins that are easily removed to expose the

BLAKENBURG (MARK)

12<sup>TH</sup> July, 1917.

Dear Mr. Wood,

Gwen told me some time ago that you would like to have some photographs of that motor of mine if I ever had any taken. Several weeks ago, a wandering photographer arrived so I seized the opportunity and got him to do three views of it. I enclose the results. One of them is pretty bad but the other two are more or less satisfactory. I will try and describe the thing: to begin with it does not represent any known make; it is a modified road racer which on the full size would be about 100 HP. The scale of the model is 1/10 and the overall length comes out a little less than 14 inches. Every detail is as nearly as possible to scale and with the exception of the magneto and the carburettor, every part works. The material is principally biscuit box of varying thickness. The other parts are made of nails and wire of different gauges. Tabular pieces, as well as the cylinders and pistons were made by rolling thin tin round a mandrel and soldering. The brass parts were made of the contact strip of old, dry batteries of a pocket flash lamp. The gearing was made of an old brass hinge dug up in the garden. This was the first piece of thick metal I had. Previous to that I had to solder bits of the thin stuff together till I got the thickness I wanted. The teeth of the gear wheels were made by filing. Practically all the parts had to be built up; so far as I can remember there are about 1700 separate pieces of metal - (this is, they were originally separate). All the principal parts 'take down'; the attachments being eyes and pins as I had no screws or anything of that kind. The engine has four cylinders, 9/16 inch bore x 1/2 inch stroke and is made to work as a compressed air motor. The valves are in the cylinder head at an angle of 45 degrees and are worked by rockers from the camshaft running along the top of the cylinders. The clutch is of the inverted cone type. There is a flexible joint between clutch and gearbox. The gearbox gives three speeds and reverse, direct on top, with gate change. The engine and gearbox are carried on a subframe. There is one universal joint behind the gearbox and the propeller shaft casing takes the drive and torque. The differential and bevel gearing can be removed without taking down the axle. The back springs are cantilevered, both brakes work direct on the back wheels and are of the expanding type. The wheels are detachable and are interchangeable. The tyres are cork covered with canvas and the non-skid bands are bits of a rubber tennis-racquet grip. I think that is all there is to say about it. I have a new aeroplane well on the way to completion. It is to have a compressed air motor of one fifth HP if I am able to get it. I always feel that making these things is perhaps a rather childish form of amusement but I must say it passes the time better than anything else I have discovered. I never seem to have a minute to spare. It is a great point to be always occupied; if you are not it is perfect hell. If I produce any more works of art I will send you photos of them, if I can, but I sincerely hope I shan't have to go on in this way much longer.

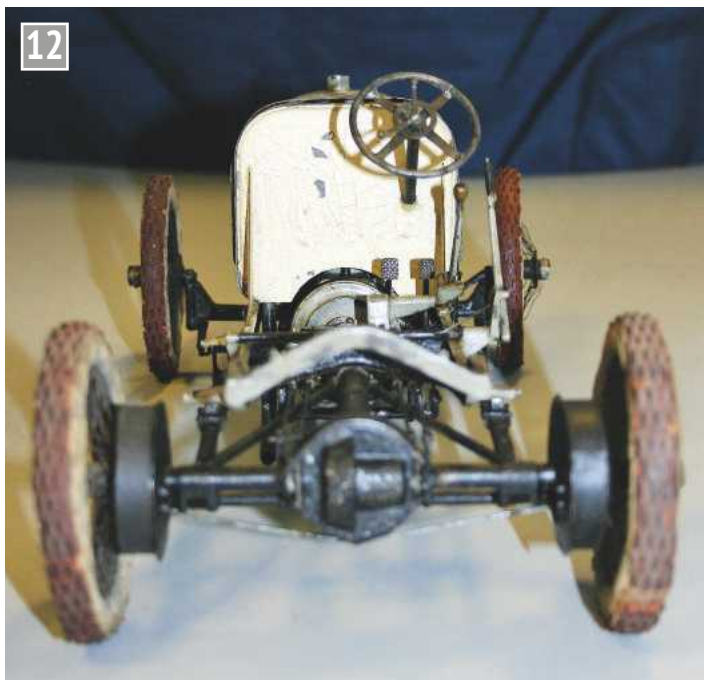
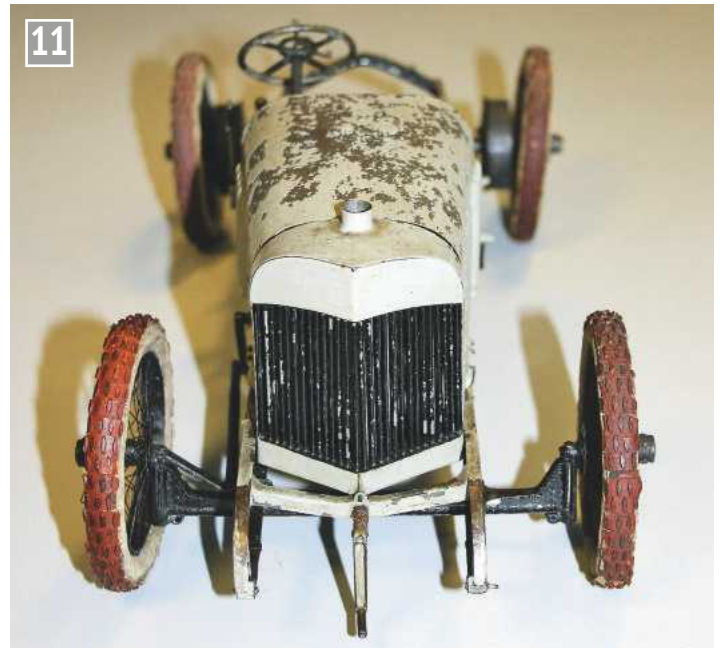
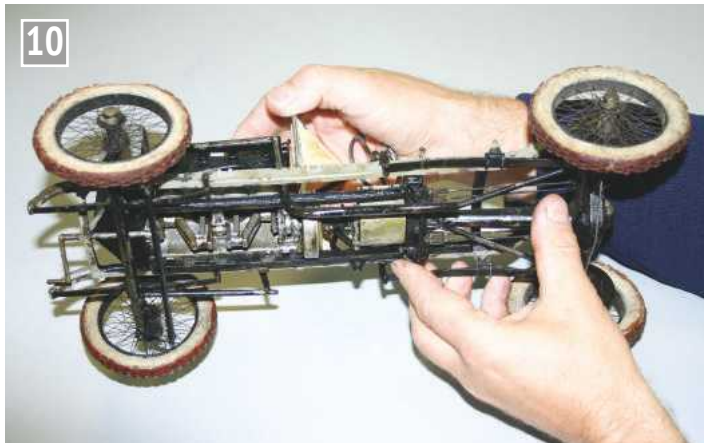
workings. With more ingenuity, the tyres were constructed using the grip off a tennis racquet. Above is a facsimile of a letter he sent to his father-

in-law, Mr. Wood describing the making of the model.

The photographs (photos 5 to 13) show some of the details of this remarkable model.

After constructing the car, as mentioned in his letter, John went on to build a model plane which again had a working engine although, from the

collection of pictures Sophie has, we actually found pictures of two different model planes (photos 14 and 15), the second looking more advanced



in design than the first. Unfortunately, the whereabouts of these models is unknown and it's likely they have not survived over the last century.

At the end of WW1, in 1918 John married Gwendolen Jane Wood and they went on to have one child, John Michael Icke who also joined the Armed Forces and was a Lieutenant

Colonel in the Royal Marines. John became a career soldier until his retirement. One of the many things he did during his military career was to write the Small Arms Manual for the British Army on which the current manual is based. Colonel John Icke died on 6th October 1964, at the age of 76, near Frome Somerset.

Whilst investigating the history of this amazing model car and its creator I have also discovered that not only did Sophie's Great Uncle John - on her Mother's side - have creative talent but also her grandfather, Bill Roberts, through his company, Shawcraft which he ran with two other partners, where the

original makers of Dr. Who's Daleks. They also built models for war movies. Sophie's father - also Bill Roberts - originally worked for his father at Shawcraft but went on to run his own classic car restoration business specialising in Frazer Nash sports cars which he also raced for many years.

ME



# A Tale of Two Britannias

**Mike Johns**  
sets the  
record  
straight.



**O**ver the years there have been references in magazines and elsewhere to the 7½ inch gauge Britannia that now resides in Canada and to the man credited with its construction. The latest was in a recent Club News in *Model Engineer* (issue No. 4537, 24 June 2016) where the builder's name was quoted as Len Willoughby although, in fact, it should have read Jim Hoyle. Some of the confusion that has arisen may have been because both men came from the Eastleigh area in Hampshire and both were employed by British Railways, Southern Region as Footplate Inspectors. Having met both and been involved with both locomotives at different times I thought it time to set the record straight.

## Len Willoughby's Iron Duke

The first prototype Britannia, No. 70000 was unveiled to the public in January 1951 and the fourth, No. 70004 *William Shakespeare* was displayed at the Festival of Britain in London later that year. The first 7½ inch gauge model Britannia appeared some two years later in Eastleigh having been built by the late Len Willoughby, then Chief Footplate Inspector



August 1954. 7½ inch gauge Britannia class No. 70014 Iron Duke sits on its platform trolley in Eastleigh Locomotive Works yard in front of the full size locomotive. (Courtesy John Butt.)



The picture that started it all. 2015 - the 7½ inch gauge model of No.70000 Britannia owned by Chuck Laws at the in British Columbia Society of Model Engineers' Burnaby track. Chuck is seen with his wife on the tender. The bogie van contains two propane cylinders with changeover valve to enable sustained operation in hot weather. *Model Engineer* issue 4537 (24 June 2016).

at Eastleigh Locomotive Shed. He had help from John Butt, at the time an apprentice in Eastleigh Locomotive Works. This model was based on No. 70014 *Iron Duke* as fitted with the original style of tender with inset coal space, which was one of the two full size locomotives allocated to BR Southern Region at Stewarts Lane depot for use on the Golden Arrow train. The model was initially operated in the Eastleigh area on a portable track where it always attracted attention giving rides for the public and usually driven by Len or John. This was where I first saw the miniature 70014 in use after having joined BR as a locomotive works apprentice myself.

Building such a large scale model in the early 1950s was not easy owing to shortages of materials. The frames for Len's were hacked out of steel, originally parts for a Bofors gun, while Bassett Lowke Royal Scot castings were used for cylinders and frame stretchers. This meant the

frames were erected at the maximum width between the wheels rather than on the axle box centrelines as applied to the prototypes. The boiler was of copper, riveted and silver soldered. A description of this model was published in *Model Engineer* in the early 1950s.

In 1954 John Butt, Graham Taylor (another Works apprentice) and I were deputed to collect the model 70014 from Len's workshop and manhandle it on a platform trolley through the Eastleigh streets into the Locomotive Works yard to go on display at the Works annual open day that August. The full size No. 70014 *Iron Duke* was the main exhibit that year and the opportunity was taken to exhibit the model on its trolley in front of the prototype for comparison purposes (**photo 1**). At the end of the day the three of us had the job of moving the model back to Len's workshop. Shortly afterwards, at John Samuels' invitation, Len took *Iron Duke* to visit and run on the 7½ inch gauge Greywood Central



Mid-1950s. Model No. 70014 runs double-headed with an Immingham on John Samuel's Greywood Central Railway. Len Willoughby is driving the Britannia with John Butt on the Immingham. (Courtesy John Butt.)



Mid-1950s. No. 70014 stands quietly at Greywood showing its narrow coal space tender. (Courtesy John Butt.)



Late 1970s. Model No. 70014 stands on the branch line bridge on the late Ian Allan's Great Cockcrow Railway near Chertsey. (Courtesy Kim Richardson.)



August 2001. Model of No. 70000 at work on the Burnaby track with Lindsay McDonnell on the regulator. The leading bogie vehicle contains the one propane cylinder the locomotive then ran with. (Photo, Mike Johns.)

Railway built on John's private estate at Walton-on Thames (photos 2 and 3). Whilst on this railway, Len, with John Butt's help, succeeded in running No. 70014 for 25 actual miles non-stop.

Around 1958 the model *Iron Duke*, together with the portable track, was sold to Colonel Ronnie Hoare of Ferndown, Dorset who had a large collection of railway models in various scales. It appeared (unsuccessfully) in a Christies sale following overhaul and re-painting by John Adams; was sold on to Robert Avery and then, on his death in 1986, passed to Peter Dickson who still has it. From 1986 *Iron Duke* had resided at the late Ian Allan's Great Cockcrow Railway near Chertsey into the early 2000s (photo 4). It has never left England and currently resides in the Buckinghamshire/Oxfordshire area.

Being so involved with this model of *Iron Duke* kindled John Butt's interest in building a Britannia for himself and he subsequently went on to design and build his own 7¼ inch gauge model, to a very high standard, over the next 35 plus years. His development drawings for this model were turned into production drawings by the late Dick Stockings who, with Jays Foundry, Norwich, produced a range of castings. The drawings and some patterns were then sold to Alan Gibson who was well known for his work in smaller scales. They were then passed on, redrawn to 1.54 inch scale and later marketed by Jim Vass and are currently available through Horley Miniature Locomotives. Several models have been built from these drawings including that built by the late Alan Priest and finished

as No. 70045 *Lord Rowallan* which sold at auction for £62,000 in April 2016.

### Jim Hoyle's Britannia

The late Jim Hoyle will have known the model *Iron Duke* and its builder before he went on to build his own miniature in 7¼ inch gauge, No. 70000 *Britannia*, but as fitted with the later style of high-sided tender, and this model was completed in 1962. This was the locomotive that shortly after completion was sold to Walter Kent in Canada for £1000 (it is believed) who had it moved to Vancouver, British Columbia, Canada, to put on static display as part of his collection. It was then purchased by Lindsay McDonnell, a New Zealander living in Canada, who initially ran it as a 7¼ inch gauge model at the original British Columbia Society of Model Engineers' (BCSME) raised

multi-gauge track in Langley, BC. He took the model to New Zealand in 1975 but could not run it at that time owing to the lack of 7¼ inch gauge tracks over there. When Lindsay opted to move back to Canada on a permanent basis the model returned too and in 1978 was converted to 7½ inch gauge by the expedient of skimming the flanges off the existing wheels and fitting separate tyres to each at the appropriate back to back distance. The new steel tyres were machined by Gavin McCabe of the NZ club, Hutt Valley MES during a visit to Canada.

In 1994 it was decided to replace the original steel boiler with its copper firebox with a new Briggs type boiler in steel that was designed by Lindsay and built and erected by Dave Watt, a seagoing marine engineer and skilled modeller from New Zealand.

Construction of a welded steel Briggs boiler is simpler as there are no firebox water legs and it does not require stays. Conventional tubes are fitted in the barrel while the steel dry sides and back of the firebox are lined inside with a suitable insulation board ( $\frac{1}{2}$  inch thick Kaowool). It is usual to fit circulating tubes between the top back of the crown plate and the lower rear of the boiler barrel to stimulate water circulation. In Lindsay's design this facility is enhanced by having a series of copper water tubes using standard fittings as a form of radiator on each side connected at the back of the crown plate and lower rear of the boiler barrel. Experience has shown such boilers are relatively quicker in steam raising when compared with conventional tubular boilers and the water circulation is sufficiently forceful to keep the interior plate surfaces clean, particularly as it is practice to blow down such boilers completely at the end of operating sessions. Other changes made during this time were conversion to propane firing owing to the difficulties in getting good steam coal in western Canada, the fitting of balanced slide valves in place of the plain type Jim had built the model with and the fitting of vacuum brakes. The balanced slide valves are estimated to take some 60% of the load and wear off the valve gear. The original slide valve cylinder castings used on Britannia were of the Royal Scot type designed by Henry Greenly, then available through Bassett Lowke Ltd.

This was the form the model was in when it took part in the major event staged by the US based International Brotherhood of Line Steamers (IBLS) to commemorate the Millenium in 2000, which began at the BCSME track at Burnaby (photos 5 and 6) and continued for a full week. This gathering was the first stage in a series of events spread over some four weeks and visiting all the major  $7\frac{1}{2}$  inch gauge tracks down the West

Coast of America, finishing in Los Angeles, California. The attendees came from Canada, the USA, UK, Australia and New Zealand, some also bringing their models along for the whole trip.

My wife and I arranged to visit Canada that year and this was where we got to know Lindsay and his wife, Catherine and was the first time I came into close contact with the model No. 70000. Subsequently I was fortunate enough to be able to visit Canada regularly over the following 13 years and stay with Lindsay and Catherine when I usually found that *Britannia* was in need of some sort of attention (photo 7). This was generally maintenance that was overdue but in 2006 or 7 the superheater had failed with blown elements and in order to get the locomotive back in service I removed the superheater and re-arranged the smokebox pipework. When train working there was some loss of power and the locomotive did seem to use more water so careful handling was needed with passenger trains at BCSMEs hilly track. Lindsay had plans to fit a new stainless steel, co-axial superheater but this had not been done when in 2014 he sold No. 70000 to Chuck Laws, another BCSME member who continues to run it at the club. Chuck now expects to fit the new co-axial superheater shortly.

In the meantime I had met Jim Hoyle and his son, Tony when they were invited to the annual guest days at the Great Cockcrow Railway (with which



About 2003. Model of No. 70000 running on Tom Miller's private track in Oregon to the South east of Portland with Mike Johns on the regulator. This was during a tour when No. 70000 visited Train Mountain in southern Oregon and a number of club and private tracks between there and Burnaby. (Photo, Lindsay McDonnell.)



Another photo taken at Tom Miller's private railway.

I'd been involved since 1978) and was able to confirm the early history of No. 70000 as well as my keeping Jim up to date with events in Canada. He had gone on to build a  $7\frac{1}{4}$  inch gauge rebuilt Royal Scot which is now in Tony's care at Southampton.

Both John Butt and Lindsay McDonnell have helped with many details of the locomotive's histories in compiling this article but any errors or omissions are solely down to the author.

ME

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# IMLEC 2017

## Southport Model Engineering Club

PART 3

**Diane Carney's**  
final report  
on this year's  
competition.



Continued from p.373  
M.E. 4568, 1 September 2017

**T**he final day of the competition was a little cooler but none the worse for that.

### 19) Trevor McKelvey: LMS Black 5 (5 inch gauge)

Trevor is another contender from the Urmston Society and was today driving Jim Moyle's Black 5 which was completed in 1988 (photo 19). It is one of a well-known pair that were designed and built together by Jim and his friend, Dave Roberts, another frequent IMLEC entrant. The two engines are regularly seen passenger hauling at Urmston. Trevor opted for 11 passengers, exactly as Billy Stock had done the day before but Trevor didn't run quite as efficiently; the locomotive was blowing off for a good part of the run and on the 7th lap he was very slow ascending the bank. There was also a little stoppage time of just over four minutes as he waited for steam - and he dropped the poker part way round which probably didn't help with his concentration. He finished the day in 18th place.

### 20) Marcus Peel: LNER B1 (5 inch gauge)

Marcus, from the host club, is another IMLEC regular



Marcus Peel and Thompson B1, Springbok did well but six of his ten passengers returned on foot.



Trevor McKelvey from Urmston was first to go on Sunday morning.

but has entered a variety of locomotives over the years, this time with an engine that he once owned himself but which is now owned by a Southport colleague, Dave Richards, although it has been dormant for about three years. It was built by John Downs of the Mold & Wrexham club to the Martin Evans design (photo 20). Marcus elected to take ten passengers at the start but came home with only four having stopped for steam and dropping off six. I can't recall where in the run this happened but it's usually a strategy undertaken during the final lap

or two. I am guessing this was the case as Marcus achieved a very good result and finished up fourth overall.

### 21) Paul Tompkins: BR Britannia (5 inch gauge)

This was a much anticipated run, especially by the regular IMLEC contenders. So many times we have seen Paul finish near the top of the board but he has never won. The locomotive itself has a similar history, having come second twice, although it did win once in 1997 at Llanelli driven by its owner, Len Steel from Guildford. It was built



The eventual victor, Paul Tompkins starts away with a heavy train.



Everything was going well for John Cottam at this point. Sadly, it wasn't to last.

by Lionel Flippance in 1984 and he came second with it at Urmston in 1985. Following extensive mechanical work the engine was tip-top condition today, with carefully balanced coupled wheels, and Paul made an impressive and confident start with his 19 passengers (**photo 21**). The run was faultless and Paul's driving technique was highly professional; coal consumption was well under 2 pounds giving a good specific fuel consumption figure of just 9.363 lb/HP/hr. He went straight to the top of the table and there he stayed!

## 22) John Cottam: S.R. Merchant Navy (5 inch gauge)

We saw John, a member at Chesterfield & District MES, take the IMLEC title in 2015 at Nottingham with his 5 inch P2 and we witnessed him finish in eighth place at Urmston last year with this Southern Pacific so we knew he was a contender this time. This magnificent locomotive in its original Southern form was completed in 2004. It has prototypical chain driven valve gear and the boiler - a Britannia boiler, in fact - has 32 tubes and three radiant superheaters. It is presently fitted with a Rosebud grate (514  $\frac{5}{16}$  inch holes if you are interested!) and is performing very well with it. John has opened up and softened the blast which is now via five 3/16 inch nozzles and the chimney is about  $\frac{1}{4}$  inch bigger over all. With an optimistic 22 passengers the train departed

well and completed one lap (**photo 22**). On the second lap, however, disaster struck as something pertaining to the hydrostatic lubricator came adrift and ominous smoke began to issue. Concerned for the safety of the locomotive and passengers, John decided to retire, fearing the consequences of a fire. It was a sad end to the day for John.

## 23) Jeanie Walker: LNER Peppercorn A2 (5 inch gauge)

I have to declare a particular interest in this run so forgive me if I ramble on a bit. I took Jeanie, our daughter, on her first trip around the Urmston track, where she is still a member, one 'May Day Steam' weekend at the age of three weeks. She has never needed much encouragement to take an interest in the running of the engines and, since being old enough, has been a confident passenger driver at the track. The locomotive, designed by the late Dougie Spence of Edinburgh for Jeanie's dad, Peter Walker, is believed to be unique in 5 inch gauge; it was entered by its maker once before, at Leyland in 1993 where, in its second season running, it set off in torrential rain and slipped and slid its way round the park. Today was a much better run for Jeanie (**photo 23**) and with fair weather combined with the fearlessness of youth (and perhaps a refusal to be outdone by any Britannia!) she opted for 19 passengers. Having been advised to make



The look of concentration says it all as Jeanie Walker makes her way towards the start line.

sure there was a good coal fire burning before leaving the steaming bays, Jeanie set off from the start line and settled into a steady, trouble free run. She set the reverser at an optimum for the track and left it alone, preferring not to be distracted from her other duties (like shovelling coal!). The score board was of little importance, really as Jeanie thoroughly enjoyed the run and came home to a rousing round of applause. On reflection, of course, the A2s were not really known for their efficiency (245 square feet of fire grate takes some feeding!) but for accelerating away with heavy trains on demanding Scottish routes. Proudly sporting

its Aberdonian headboard, Jeanie's run probably recreated a typical Edinburgh Waverley - Aberdeen turn. Look out for Jeanie at Birmingham next year, maybe with a different, engine!

## 24) Carl Mayhew: LNER 01 (5 inch gauge)

Carl is a member at Wigan & District MES and has often competed in IMLEC. His locomotive for the day, an LNER 01 - Nigel Gresley - was built by Geoff Crank, also of Wigan, and was painted and lined by Dave Gregson and splendid it looks, too (**photo 24**). Carl had an unfortunate start to his attempt as the recording equipment rather



Carl Mayhew from Wigan had to run twice following a 'computer error'.



**25** Judith Bellamy looks ready for anything. Maybe she'll have a bit of good luck this year.

inexplicably failed part way round so the data was useless. Carl was given an opportunity to run again, I believe (in the interests of fairness) with the same load as he had requested the first time. He set off with nine passengers but struggled for a large part of the first lap as the eight-coupled locomotive seemed to slip excessively, even on the level. Before long four of the passengers had been detrained to give the engine a chance and this certainly seemed to do the trick as once they surmounted the summit the first time they really got going and there was no further trouble. Coal consumption was rather high for a lightly loaded train, however, and the final figures were not good for Carl on this occasion. It would be interesting to know how well the coupled wheels were balanced and whether this might have had a bearing on the loss of traction early on.

#### **25) Judith Bellamy: BR 9F (5 inch gauge)**

Judith, from the Leeds club, is clearly intending to become an IMLEC stalwart, this being her third attempt (**photo 25**). She was, as always, here with her father, Arthur who largely built the locomotive; it was finished off by David Mayall (this year's runner up).

As they said themselves: *if enthusiasm was part of the equation we would be near the top every time!* Unfortunately, though, Judith has had a bit of 'mechanical bad luck' over the last couple of years and was forced to retire at Urmston last year. Southport, however, was a much luckier track for her and she had a good start and a 'clear round'. Far more cautious than either of the other two 9Fs though, she opted for just 12 passengers. Coal used, however, was on a par with the other two so the overall efficiency figure was considerably lower. I expect Judith was just glad to have had a decent and trouble free run.

#### **26) Kevan Ayling: SR Leader (5 inch gauge)**

Kevan, from the Sussex Club, Worthing & District SME is often kept for the final run of the day as he has a reputation for collecting up every spectator on the park and taking them for an evening trip. He was the penultimate contender this year with his very unusual model in this scale - a Bulleid Leader (**photo 26**). This model, named *Brighton*, was first steamed in 1996 following six years of research, design and construction. It has competed twice before including at



**26** Powerful engine(s)! Kevan Ayling has been a runner up with this locomotive and looks confident once again.

Llanelli in 1997 (coming second to this year's winning locomotive, *Coer de Lion*). The Southern's Leader, an 0-6-0+0-6-0 is not perhaps everyone's cup of tea in terms of aesthetics but this model does have a 'presence', especially in its new, slightly menacing black livery. Kevan is a Bulleid fan and it's probably fair to say that he had IMLEC in mind at the design stage. The 1 3/4 inch cylinder bores are intended to provide power that equates, in total, to about a third more than Kevan's 2-8-2 with which he won in 1998. Despite the fact that the train was restricted in length (the hosts put a limit on the number of trucks for safety reasons), it performed fairly well once Kevan had dealt

with an injector fault on an early lap. The 26 passengers all came home after 30 minutes and the coal used wasn't much over 3.3 pounds - specific fuel consumption was modest and the equipment recorded an average drawbar HP of 0.553 - the highest of the competition, of course. He finished sixth overall.

#### **27) Tom Parham: GWR 2-8-0 (5 inch gauge)**

Bringing up the rear was Tom Parham who had probably travelled the farthest from his home club of Maidstone, Kent. The locomotive was built by Tom's father, Martin to the Martin Evans design he named Swindon, and completed in 1989 (**photo 27**). It has



**27** Tom Parham runs with a lightly loaded train having slipped to a stand on the gradient.

proved utterly reliable and a real workhorse; indeed, it is employed in regular passenger hauling at the track in Mote Park, Maidstone and in over 28 years has needed relatively little maintenance and has not yet required a significant overhaul. Tom set off with 12 in total but, again, just like the previous eight-coupled locomotive, he suffered a lot of slipping during the first lap and had to drop off most of the passengers leaving just six (and a young Tompkins making a half) to complete their journey. This all cost Tom quite dearly and he finished in the last handful, curiously making the two 2-8-0s the poorest performing (of all those who finished) 5 inch gauge engines of the weekend.

Well, congratulations to Paul Tompkins! A well deserved win if ever there was one. Congratulations also to Adrian Hinchcliffe who won the 3½ inch gauge competition.



*Three ladies entered this year. Surely we can make it five next year?  
From left to right, Jeanie Walker, Karen Howard and Judith Bellamy. Well done all!*

I have been contacted by an interested reader who asks why there is not more made of the importance of wheel balancing and I tend to agree that it is an element that would certainly add interest to the competition.

I shall end with a couple of photos (photos 28 and 29) of the presentation and three special contenders (yes, I am biased!)

Analysis of the results will no doubt keep many readers occupied for a while. It's probably true to say that now that the calculations are done with the aid of some clever electronics and a computer program, they are as accurate as they have ever been. Every competitor was given a framed certificate with a photograph and all the data collected during their run.

I have been contacted by an interested reader who asks why there is not more made of the importance of wheel balancing and I tend to agree that it is an element that would certainly add interest to the

competition. Would a future host club like to consider the practicalities of providing this information in addition to producing the results they already do? Possibly ...

Southport Model Engineering Club's IMLEC team put on a tremendous event that was enjoyed by everyone. Congratulations to the club and thank you again for stepping in at relatively short notice. I would particularly like to mention Brian Horner who promptly and cheerfully answered every question I asked before, during and after the event.

The competition goes to Birmingham in 2018 - the place where it all started in 1969 - for the fiftieth (bar one - but let's not argue) IMLEC. See you there!

ME



*Paul Tompkins received the trophy from last year's winner - and, coincidentally, the Britannia's builder, Lionel Flippance.*

# The Barclay Well Tanks of the Great War

PART 27

**Terence Holland** describes and constructs two appealing, century old locomotives.



Continued from p.324  
M.E. 4567, 18 August 2017

This constructional series addresses Andrew Barclay 0-4-0 and 0-6-0 narrow gauge locomotives supplied for use in the First World War. Built without the use of castings, the 0-4-0 design is described as two versions; as-built for the British Admiralty in 1918 and as rebuilt and currently running on the Tallylyn Railway as their locomotive No.6, *Douglas*. The 0-6-0 engines described were built in 1917 and operated on 60 centimetre gauge track at the Western Front in France. These were small, spartan machines of which only 25 were supplied and none have survived into preservation.



*The author's painting of Douglas at Pendre in the 1980s.*

## Current progress

The next stage on my rebuild, with all the moving parts in place, was to test, lag and paint the boiler ready for refitting. My boiler was built in 1980 but received a major overhaul with the fitting of new silver soldered stays in 1997. These were 'modern' copper rivet stays; replacing the threaded stays, which I had originally caulked with

high temperature soft solder - and it took a lot of work to remove all traces of the soft solder (**photo 120**). All things considered, though, it's 36 years old this year and hadn't been used for some three years so it was with some trepidation that I carried out the boiler test. 'Er-indoors kept well out of the way, expecting some 'railway Esperanto'! I needn't have worried as it



*Boiler with copper rivet stays.*



*Boiler test in progress.*

stood the 200 psig hydraulic test with no problems (**photo 121**). Now I can put it all back together and carry out the steam test.

### Boiler lagging

Lagging the boiler is the next big job so a word or two here about the process may be useful (if 'jumping the gun' a little). I note that it's important to make a neat job of the lagging and, in particular, the cleading as it's the only part of the boiler on show apart from the backhead.

Looking at the side view of these locomotives it is obvious that the finished, lagged boiler barrel diameter is a fair bit bigger than that of the smokebox; even though boiler barrel and smokebox diameters are the same. The difference is due to the substantial layer of boiler lagging and, on the model, this is made from wood strips and equates to a thickness of  $\frac{1}{4}$  inch.

The original, prototype boilers and smokebox were often, in fact, rolled up from one piece of plate, i.e. they are of the same diameter. The  $5\frac{1}{2}$  inch diameter boiler barrel and smokebox could, of course, be made the same way, using an extra long piece of  $5\frac{1}{2}$  inch copper tube. The problem would be how to silver solder the tubes into the smokebox tubeplate.

As I have found out in the past, fitting wood strip lagging

to a circular boiler barrel is not an easy task; it needs four pairs of hands - i.e. me, 'er-indoors and two more besides! I didn't want to fit the strips directly to the boiler with adhesive as one never knows what effect strange materials could have on the copper. The answer was to make a composite sheet from cartridge paper and thin cotton material using PVA adhesive. 'Er-indoors helped out here and came up with an old cotton bed sheet - the remainder will come in useful as workshop rag. This forms a substantial base for fitting the wood strips. I managed to find some 4 x 18mm batten at the local DIY but when calculating the amount required I forgot that each piece needed to be cut in half along its length - so I've ended up with twice what's needed! Never mind I'll add it to my 'hoard' and I'm sure it'll come in handy some day.

The next step was to make a template from a piece of card and use this to mark out and cut the paper/cloth laminate to size, leaving a generous allowance for overlap at the seam. **Photograph 122** shows a part assembled lagging band. Note that the barrel is wound with a layer of glass tape.

To slit the batten along its length I set up a slitting saw in the lathe, along with a jury-rigged platen and guide as shown in **photo 123**.



*Part assembled lagging.*

The blade is only  $\frac{1}{64}$  inch wide so virtually no material was lost on the width and a quick count afterwards showed that I still had ten digits! I glued the battens in place on the backing sheet with PVA adhesive, leaving a  $\frac{1}{8}$  inch gap between each piece. **Photograph 124** shows the lagging assembly fitted around the boiler barrel with the joint glued. Fit it so that the wood strips are in contact with the boiler barrel and hold it in place with temporary wire. Once the adhesive has dried overnight, the wire can be removed and the 'five thou' brass cleading sheets fitted.

Follow this up with the  $\frac{1}{2}$  inch wide brass lagging bands made from  $\frac{1}{16}$  inch thick brass sheet. These are fairly inaccessible on the completed engine and should

be painted gloss black. If you prefer polished brass bands, give them a good 'brassoing' before assembly and then a quick spray with artists' picture varnish - that should make things a bit easier for the cleaner!

Fitting the drain cocks at this stage before the valve gear is fitted makes sense. Once the cocks are in place, the cylinder lagging can be fixed before the cocks are linked up to their layshaft. The drain cocks were shown in fig 57 (M.E. 4543). The lagging plates for the cylinders were shown in fig 84 last time. Figure 83 showed the arrangement of the drain cock layshaft and levers.

●To be continued.



*Jury-rigged slitting on the Myford.*



*Lagging assembly in place.*

# Technologie sans Frontières

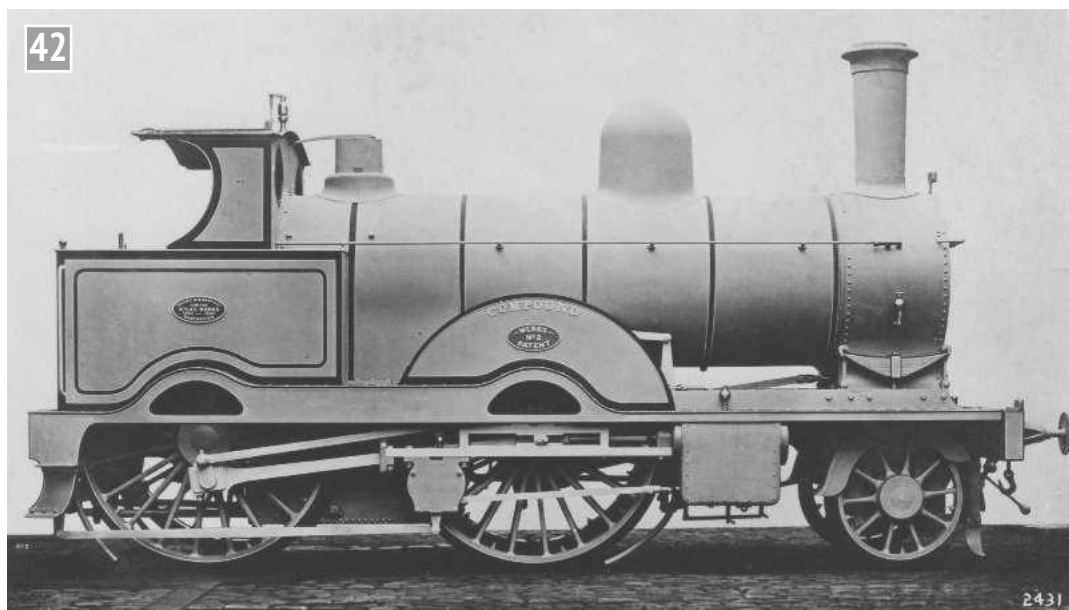
PART 6

Dr. Ron Fitzgerald looks at English and French locomotive design in the second half of the nineteenth century.

Continued from p.295  
M.E. 4567, 18 August 2017

**'All steam locomotives in France are scheduled to be withdrawn by 1971. Thus will end the story of the finest locomotive work the world has ever seen; a story of highly efficient but often highly complicated machines, worked by the best trained and most competent locomotive men there have ever been.**

**A lot of superlatives perhaps but nobody who has studied steam locomotive work in many countries will deny their truth.' Dr. P. Ransome-Wallis.**



Webb compound Ouest 901 of 1884 as renumbered 500. (Source: collection Roelof Brettschneider.)

## Alfred de Glehn and the French compound tradition

John van Riemsdijk, in his two comprehensive studies of the compound locomotive (ref 1), is perhaps overly dismissive of Webb's work (ref 2). The influence of the Experiment and the compounds was both direct and indirect on the next generation of compounds but the focus had now shifted to continental Europe. The LNWR machines were closely observed on both sides of the channel and the audience at Webb's 1883 Institute of Mechanical Engineers paper included not only Mallet but several other major continental railway engineers. A subsequent IME paper, given six months later by Georges Marie, an engineer of the Paris-Lyons Railway and son of E. Marie, chief engineer of that line between 1868 and 1882, shows that Marie fils had seen

Experiment and corresponded with Webb concerning it.

In fact, another French railway, the Ouest, whose allegiance to Britain dated back to Locke and Buddicom, was precipitate in acquiring an identical machine to Experiment. In 1883, the Ouest CME, Clerault, ordered from the Manchester firm, Sharp, Stewart & Co., their works No. 3203 (ref 3). The locomotive was indistinguishable from Experiment, sufficiently so to justify the assumption that Sharp, Stewart built it from Crewe drawings. She was delivered as Ouest No. 901 (photo 42), before Webb had read his paper on Experiment. Interestingly, the high pressure cylinders were 13 inches in diameter which was the size to which Webb reduced Experiment's high pressure cylinders after running the machine for some time. Oeust

901 may thus have benefited from this experience before Experiment herself. 901 was put to work on the Paris-le Havre run but her performance was undistinguished and she was quietly retired to the Ouest's Sotteville works, rustivating there until 1909 when the breakers took a hand in the matter.

Ouest 901 can be assumed to have suffered from all of the shortcomings that Experiment had cultivated on the Irish Mails but where Clerault abandoned compounding for the next seven years, Alfred de Glehn took a more resolute position. As noted above, he had already concluded that the Oustrance was exceeding its permissible crank axle loading and that dividing the cylinder output between more than two cylinders was the answer. This led him to consider compounding because it

offered the prospect of a controlled distribution of the energy contained in the steam. Economy in fuel consumption seems to have been a secondary issue (ref 4).

There can be no doubt that de Glehn was aware of developments in his former home country. As head of locomotive studies and development at the Société Alsacienne de Constructions Mécaniques (SACM) he would be expected to be fully conversant with the current technical literature in English, French and German. Although there is no record of his being a member of either the Institution of Civil Engineers or the Mechanicals, the Transactions of both were publicly available and he is unlikely to have missed reading Mallet and Webb's papers. There was also extensive correspondence currently taking place in the journals *The Engineer* and *Engineering* on compounding and Webb's locomotives. Assuming that the shortcomings of the Webb machines had come to his notice he was academically capable of carrying out the same type of analysis that Ahrons had undertaken. From this it would have been apparent that a more even crankshaft turning moment could be obtained from four cylinders than was possible with three.

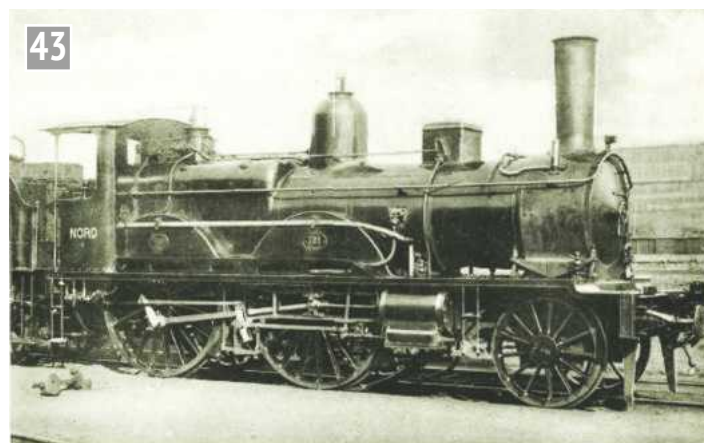
De Glehn decided to approach the Nord with a proposal for an experimental four-cylinder compound locomotive. *Engineering*, in an article published in June 1898 (ref 5), states that: ... the plans for the locomotive had been

prepared in 1884 and next year the engine entered into service ...

The date of the locomotive is sometimes given as 1886 (ref 6) but Koechlin's building register resolves any ambiguity; the locomotive carries their builder's number 3755 and was delivered in 1885. It was built at the declining Mulhouse works of SACM rather than the new Belfort works.

It has been said that de Glehn's approach was to Gaston du Bousquet (ref 7). This is questionable as du Bousquet was not the Ingenieur en Chef du Matériel et de la Traction du Réseau Nord in 1884. He was appointed locomotive superintendent at the Nord's Lille division in 1883 and was not promoted to chief locomotive superintendent for the Nord Railway until 1889. Delabeque was Ingenieur en Chef on the Nord until 1888 when he was succeeded by Ferdinand Matthias. Matthias lasted for just short of one year and Du Bousquet was appointed in succession to Matthias as supreme head of the department in 1890. In 1884 it was Delabeque who held the ultimate authority to authorise SACM and de Glehn to proceed with the proposal.

The new locomotive (photo 43) received the number 701 in the Nord lists even though it remained SACM property until it proved itself. The leading wheels were 4 feet 3 3/8 inches, the drivers 6 feet 10 3/4 inches and the fixed wheelbase was 18 feet 1 1/2 inch, all relics of the Outrance and its GNR predecessor. The double plate frames of the

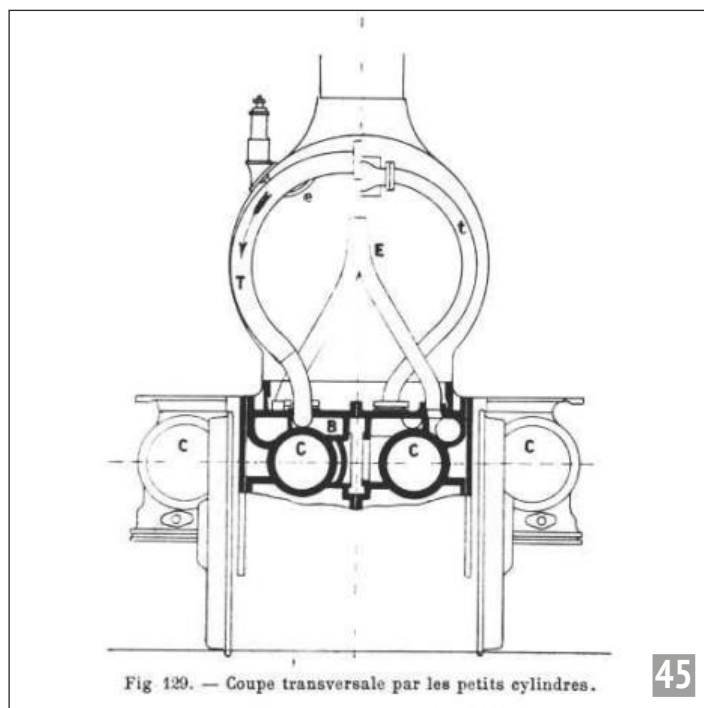


Nord No. 701, 1885/6. The first de Glehn four cylinder compound. (Source: collection Roelof Brettschneider.)

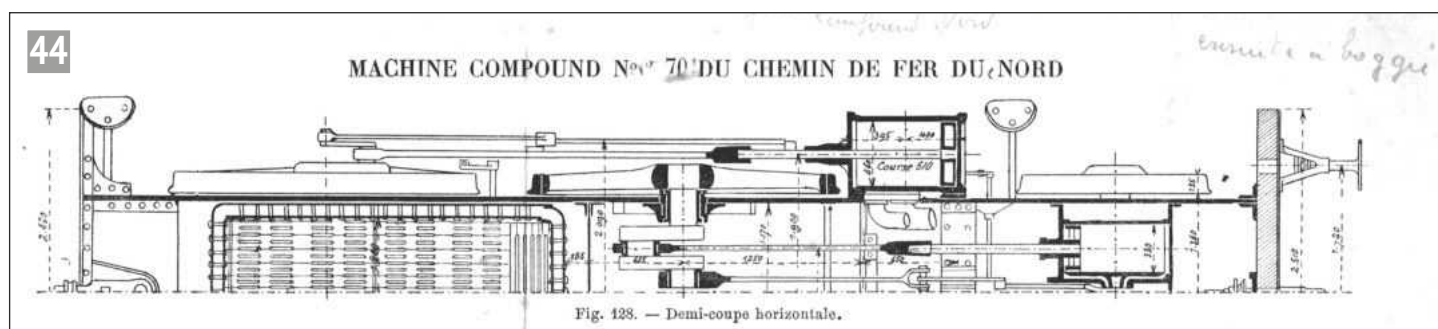
Outrance were dispensed with and the new locomotive had inside, single plate frames only, possibly of steel rather than wrought iron (photo 44). Roy's radial axlebox was used for the leading carrying wheel following its successful

application to the third series of Outrance, built between 1884 and 1885.

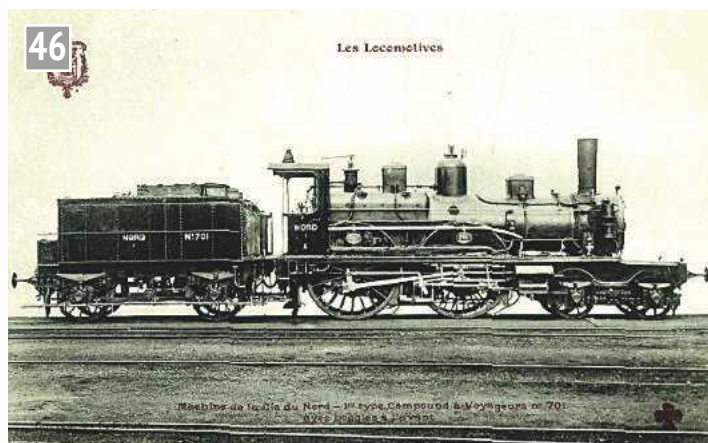
The steam expansion was divided across two pairs of high and low pressure cylinders (photo 45), the first use of four-cylinder



Cross section through Nord 701 showing cylinders. (Source: Les Locomotives Nouvelles, Pierre Guedon. Planche III.)



Half plan of frames of Nord 701. (Source: Les Locomotives Nouvelles, Pierre Guedon. Planche III.)



Nord no. 701, the pioneer de Glehn compound rebuilt with Alsace Bogie. (Source: collection Roelof Brettschneider.)

compounding in locomotive work (ref 8). The two 13¼ inch diameter high pressure cylinders were located between the frames and the two 18½ inch low pressure cylinders outside the frames. All cylinders had a stroke of 24 inches, the expansion ratio in each set being 1:1.94, notably lower than Webb's Experiment and Compound classes. The high pressure units drove the crankshaft of the leading axle in front of the firebox and the trailing axle was driven by the low pressure units. De Glehn also chose to leave the driving axles uncoupled, doubtless for the same reasons that that had influenced Webb.

Between the high pressure cylinders, the slide valves had vertical faces and the valves were driven by inside Stephenson's gear with eccentrics between the cranks. The outside, low pressure valves were below the cylinders driven by Walschaerts gear (ref 9). A single wheel reversing gear was arranged in such a way that the cut-offs of the cylinders could be varied independently or simultaneously and a valve on the footplate could be used to admit supplementary steam to the receiver for starting. The receiver pressure was limited to 75 psi. The Belpaire firebox boiler had 1,182 square feet of heating surface and the working pressure was 160 psi (ref 10).

The pedigree of Nord 701 can be readily seen as Webb,

Sturrock, Delabeque/Banderalli via the Nord Outrance class and Alfred de Glehn/SACM. From Webb came the divided drive using compound expansion, uncoupled wheels, inverted outside valves and the radial box front axle. Sturrock and the GNR class 264 lingered in the wheel sizes and the wheelbase whilst Delabeque's contribution was the Belpaire boiler. Notwithstanding this synthesis of established Nord practice, the degree to which 701 (ref 11) was a joint development between the Nord and SACM is questionable considering the well known injunction in the building contract that the Mulhouse firm should carry *tout les risques et perils* of the project and that the locomotive should be returned to SACM in the event of it not proving satisfactory. It was Alfred de Glehn who gave the design its original features.

The critical de Glehn development was the four-cylinder compound layout with its operating permutations. By manipulating the independent valve gear controls and the simpling valve, four alternative modes of operation were open to the driver. He could isolate either the outside or the inside cylinders and work them as two or four cylinder simple expansion, in the latter case exhausting the high pressure cylinders directly to atmosphere. Working under compound conditions he could admit live steam to the receiver and thus increase the pressure in the low pressure

cylinders up to the limit of the relief valve. Boiler steam added to the high pressure exhaust also gave a bonus in the form of adding superheat to the low pressure steam. Known as reinforced compound working, it meant that a considerable boost was available at starting or in sustained hill climbing. Finally, the cut-off of the high pressure and the low pressure cylinders could be independently varied to suit load conditions.

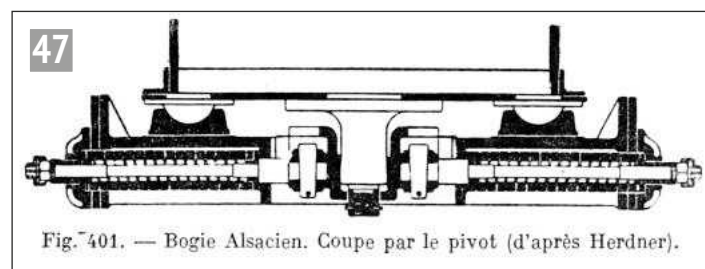
In the hands of a highly trained and sensitive driver the results were virtuosic but the potential for catastrophe was very considerable; indeed, the training and competency of the driver was always to be a central issue in the success of compound operation. On the Nord Railway at least, the rigorous approach to the theoretical and craft education of its footplate staff was perhaps the most important single factor in the twentieth century European ascendancy of its main line running practice.

The locomotive was put into regular traffic service on the Paris-Longueau-Lille run and whilst detailed performance figures do not seem to have been made public it is known to have worked with a 20% coal saving over the Outrances on the same trains. Although it is nowhere explicitly stated, the crankshaft problems can be assumed to have disappeared. The radial axleboxes of the leading carrying wheels were also doubtless less punishing for the track but in 1892 Nord 701 was fitted with Alfred de Glehn's new Alsace sliding pivot block bogie (photos 46 and 47). As has already been pointed out, the fixed pivot bogie applied to the 1875-79

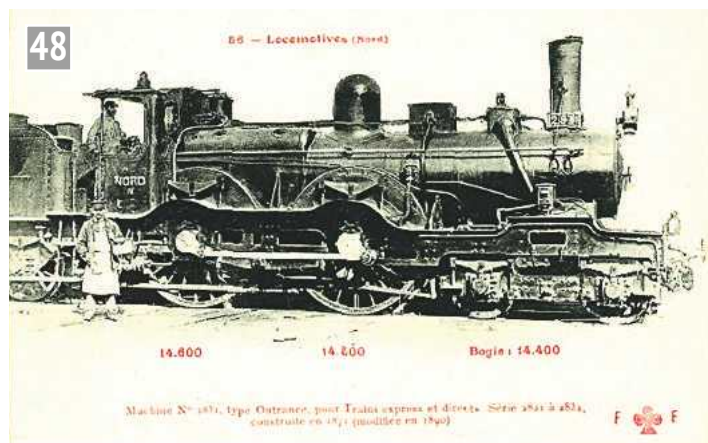
series 2861-2911 had not been successful but this form of bogie was already atavistic.

In 1865 William Adams, then engineer to the North London Railway, had introduced bogies with lateral traverse by inserting the bogie pivot into a bearing in a sliding block. The block was free to move laterally in machined slide ways within the bogie frame. The upper part of the pivot carried a horizontal, circular flange which made rubbing contact with the upper surface of the slide block. The flange carried the front end weight of the locomotive and was sufficiently large in diameter to provide some resistance to swaying. Rubber blocks in compression acting against the pin further stabilised the lateral movement. These rubber blocks were later replaced by counterposed laminated springs on either side of the pivot to give a centralising action. Adam's bogie side frames were external to the wheels and single, fore and aft leaf springs on either side provided suspension for the axle boxes. The internal frame supplanted the external one and the Adams bogie rapidly became standard in Britain (ref 12) but it was not until the Ouest built a pair of 4-4-0s in their Batignolles workshops in 1888 that it made its first appearance in France.

The sliding pivot concept was taken up by de Glehn who carried out considerable improvements. In the de Glehn version the circular centre pivot bearing flange was replaced by two hemi-spherical domes attached to the outer edges of the locomotive chassis. These sat in cups which were free to slide on curved surfaces

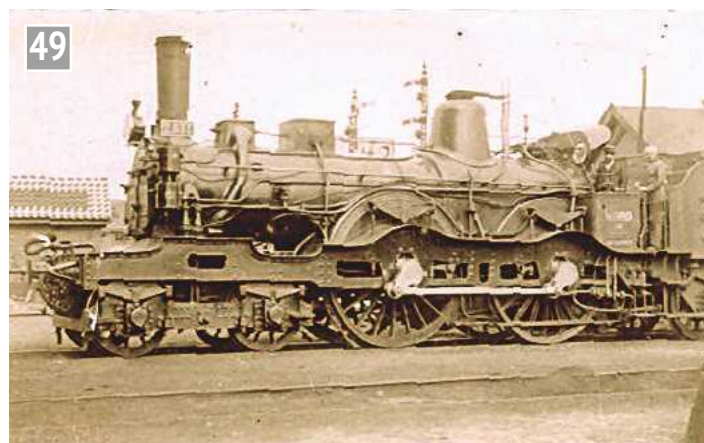


Bogie Alsacien. Coupe par le pivot. (Source: Sauvage et Chapelon 10e ed., fig. 401.)



Nord no. 2.831 one of the first to be rebuilt with Alsace Bogie.

(Source: collection Roelof Brettschneider.)



Nord no. 2.833 Fille de l'Air rebuilt with Alsace Bogie in 1890.

(Source: collection Roelof Brettschneider.)

set into the top surface of the bogie frame, the slide surfaces being diametral to the pivot. This greatly enlarged radius for the stabilising forces to work through brought a higher moment of stability. To obtain maximum clearance under the cylinders the side frames of the bogie were external to the wheels and the axle box journals were on the outer ends of the axles, each axlebox having its own over-mounted laminated spring. Side control force was applied by opposed helical springs acting on the pivot bearing with external adjustment of the compression loading (**photo 47**).

Several of the key features of this bogie, the use of outside frames and the hemisphere and cup side bearer, had been used in the fixed pivot bogie of the Delebecque/Banderali bogie Outrance class in 1873. In combination with the sliding pivot block development the Alsace bogie seems to have been first used on a locomotive built in the Nord's own La Chappelle workshops, Nord No. 2101. This machine entered service in April 1889 and was followed by a rather singular conversion of an 0-4-2 to a 4-2-2 using the bogie which took place in the same year. The first batch of the Outrances, 2821-2833 (**photos 48 and 49**), were converted to the Alsace bogie between 1890-92, with 2201-2212 following between 1891 and 1892. By 1900 the Outrances were all 4-4-0s with Alsace Bogies.

●To be continued.

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1. The Compound Locomotive, J. T. van Riemsdijk. *Transactions of the Newcomen Society* vols. 93, 94 and 95 1970/71, 1971/72 and 1972/73. Compound Locomotives. J. T. van Riemsdijk. Pub. Atlantic Transport Publishers 1994.
2. The Compound Locomotive, J. T. van Riemsdijk. p. 21.
3. L. M. Vilain Le Material Moteur et Roulant des Chemins de Fer de..... l'Oeust. p. 93, is, unusually, misinformed about this machine. It was built by Sharp Stewart & Co., of Manchester, their No. 3203 of 1883, order E. 855.
4. The central role that reducing crankshaft stresses played in the introduction of compounding has been insufficiently emphasized by recent commentators. It was invariably mentioned by nineteenth-century writers, for instance Maurice Demoulin's *Traite Pratique de la Locomotive*, Tome Premier, 1898, pp. 66 and 69. Writing three years later Edouard Sauvage in *Record of Railway and Tramway Progress in France*, *The Engineering Times*, Vol 5, No. 5, May 1901, pp. 249, 305 and 309 again makes the point explicitly. In contrast the majority of later twentieth century commentators either fail to refer to the matter entirely or reduce it to peripheral importance. The exception was Denis Allenden who, in his article *The Compound Locomotive in France*, *Model Engineer*, 5<sup>th</sup> October 1973, p. 967, refers to specifically to the role that crankshaft failures played in the design of Nord 701. More recently, Ian Jowett touches upon the issue in his article *Fitting It In*, published in the *SNCF. Society's Journal*, Number 157, March 2015, p. 35.
5. *Engineering*, June 3<sup>rd</sup> 1898, p. 705.
6. The Compound Locomotive, J. T. van Riemsdijk.. p. 51.
7. *Express Steam Locomotive Development in Great Britain and France*. Col. H. C. B. Rogers OBE. Pub., Oxford Publishing Co./Haynes Publishing Group, 1990. p. 15.
8. In this he only slightly anticipated Henry of the PLM.
9. The latter was not completely new in France but only a handful of mixed traffic and shunting locomotives had previously employed it. The Nord had fifteen 2-4-0s built in 1874-75 and twenty three 0-6-0s built in 1875-76 which used Walschaerts' valve gear but all of these locomotives had been inherited from the Lille-Valenciennes and had been constructed by the Belgian firm Tubize. The Ouest had been running five 0-6-0s with the valve gear since 1881.
10. The boiler pressure has been variously stated. I have used van Riemsdijk's figure of 11bar or hpz.
11. It is worth noting that the number 701 was never part of the conventional Nord numbering series which was usually a first digit describing the number of driving axles followed by the fleet number, hence 2.831. Even the very curious single wheeler, cum 0-4-2 Nord No. 2.301 was twisted into conformity. There remains the question of when 701 became Nord stock.
12. *The British Steam Locomotive 1825-1925*. E. L. Ahrons, *The Locomotive Publishing Company Ltd*, 1927 p. 157 and 212.

# Making Chuck Jaws

**Jacques Maurel**

describes a simple way of making chuck jaws (both hard and soft) and how to hold them for machining in the lathe.



*Machining a jaw blank to exact width.*



*Using a Woodruff cutter to machine the guide groove.*

**M**ethods have already been described for making chuck jaws (refs 1 and 2) but the aim of this article is to describe an easier and quicker method which, although not so precise, yields quite acceptable results, using stiffer cutters and no jig. As an example, we will machine a set of soft jaws for an 80mm diameter three jaw chuck (fig 1).

We will use a medium grade steel (0.4% carbon) as 'soft jaws' must nevertheless not be too soft for effective work holding.

## Machining the guiding surfaces

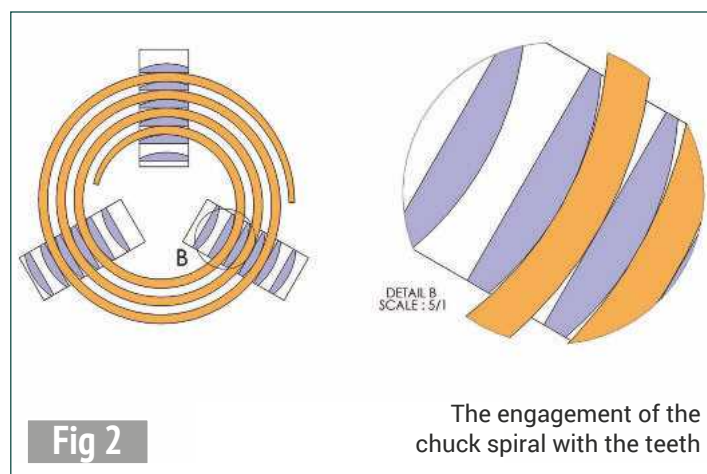
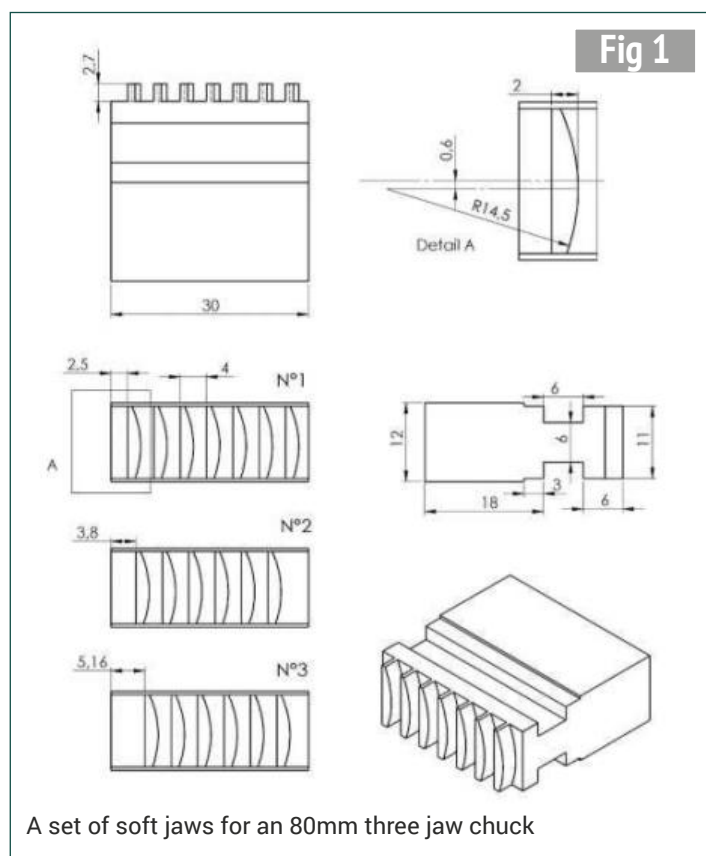
These surfaces are the sides of the jaws and the grooves machined into them (photos 1 and 2). The three jaws are machined at the same setting in a plain vice from a blank of dimensions 100 x 30 x 12mm. The blank is 12mm wide and needs to be reduced precisely to a width of 11mm, which I did using a 35mm diameter end mill.

The side grooves are machined using a 4mm wide Woodruff cutter. This cutter is stiff, compared to a small end mill, allowing the grooves to be machined accurately and

quickly. The blank is then sawn into three parts and trimmed to length for machining the rack. The reference numbers (1, 2 and 3) should be punched onto each jaw before doing this.

## Machining the rear rack

The teeth in the rack must have a curved surface (a cylindrical arc) to match the chuck spiral. The outside tooth radius must be smaller than the smallest spiral radius – I chose 16.4mm, which is just less than the internal scroll radius (it was quite simple to derive the formula for the spiral radius of curvature) - and the tooth offset to accommodate the spiral pitch. **Figure 2** shows the spiral with the three jaws superimposed and detail B shows the fit between the spiral and a jaw for the smallest diameter. Choose an outside





The set-up for machining all the teeth at one setting.



A complete set of teeth.

radius near  $0.9 \times$  (the smallest scroll radius) - I chose 14.5mm. A 3D CAD system is a great help in determining the offset but a large-scale drawing works just as well (fig 3).

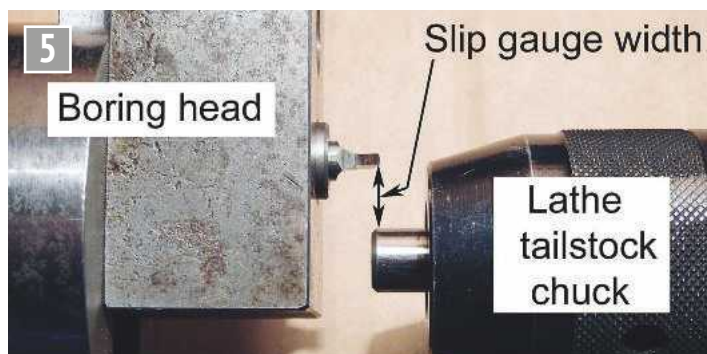
The fig 3 scale is 10/1 on an A4 page. First, draw the vertical line AB (B will be the contact point between the spiral and the rack tooth), and then draw a circular arc at the inside scroll radius, limited to the jaw thickness (points C and D). Now we need the two spiral points C' and D', which relate to C and D as follows:

$$CC' = DD' \approx [(BC / AB) / 2\pi] \times P$$

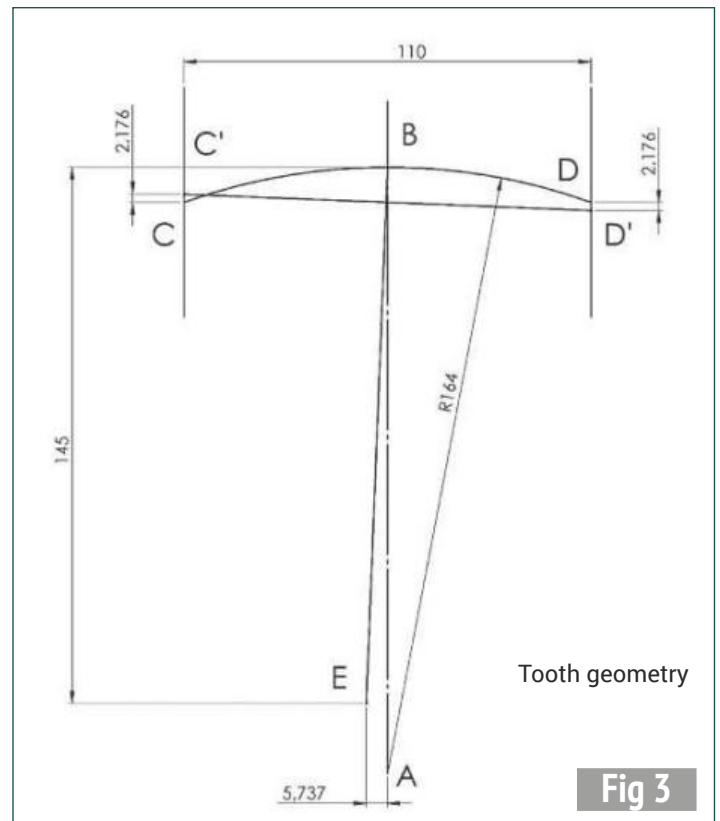
where P is the pitch of the spiral - 4mm in this case.

Draw the line C'D' and then draw the line BE (BE = the outside tooth radius, which is 14.5mm) perpendicular to C'D'. The tooth offset is the distance between point E and line AB; this was 0.573mm so I rounded it to 0.6mm. A method is given in ref 1 for measuring this offset on an existing jaw using a square and a felt pen.

The inside tooth radius must be greater than the greatest spiral radius so a plain straight line was chosen (infinite radius) which greatly simplifies the machining as the rack teeth can be roughed out (and the inside tooth surface finished) with a 2mm slitting saw in one setting for all three jaws

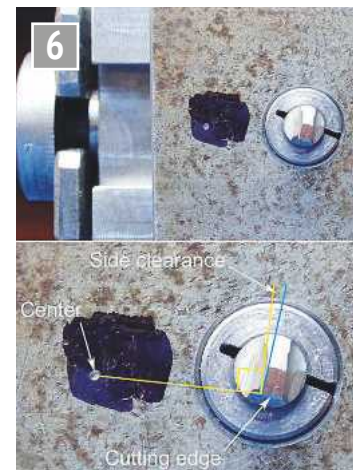


Setting the tooth cutter to the correct radius.



(photos 3 and 4). Jaw No. 2 is offset by 1.3mm (use a 1.3mm drill or a slip gauge as packing) and jaw No. 1 by 2.6mm, so take careful note of the jaw reference number when setting in the vice. Of course, using a flat inside tooth surface weakens the teeth slightly and the contact pressure is increased but this has worked well for me over many years (more than thirty for my 165mm diameter chuck) and pushing the jaws outwards is not done very often.

The machining of the tooth outside radius is then carried out on a milling machine, using a boring head with a narrow cutter, in this case with a width slightly less than 2mm as the pitch is 4mm. This is possible as fortunately the outside tooth diameter (twice the radius, so 29mm here) is greater than the rack length. Here also the cutter, although small, is far stiffer than a small end mill with a diameter less than 2mm would be. Use your lathe for adjusting the cutter to the correct radius (photo 5). The boring head is held in the chuck, a 10mm diameter piece of rod is held in the tailstock



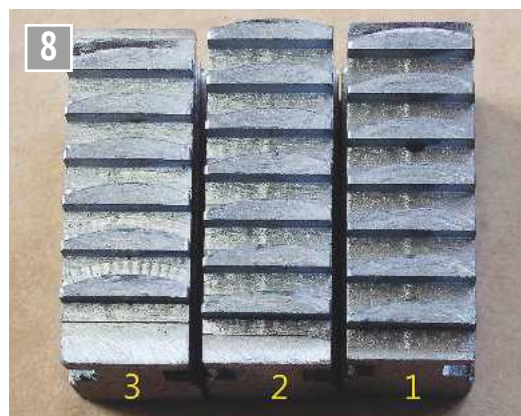
Marking the centre on the boring tool and checking the side clearance.

and a 9.5mm packing piece (a slip gauge or 9.5mm drill) set between the trepanning tool edge and the rod (for 14.5mm radius). While on the lathe, mark a black spot with a felt pen on the boring head slider and then mark the actual centre with a centre set in the tailstock. Remove the boring head from the lathe and clamp it upside down in your bench vice to verify that your trepanning tool is in the right position (photo 6) to achieve sufficient side clearance. If not, correct it and go back to the lathe to repeat the radius

adjustment. **Photograph 7** shows how to achieve the correct depth of cut on the first tooth by blackening the tooth side; the machining should just remove the black and then the following teeth may be machined in turn, shifting by the pitch (4mm here). The same method is used for the other jaws. **Photograph 8** shows the finished and trimmed racks and **photo 9** shows the jaws installed in the chuck.



Mark on the first tooth to be machined away.



The rounded edges of the teeth after machining.

### Using hexagonal tips as soft jaws (ref 2 and photo 10)

This time the jaws will be machined as jaw soles for the hexagon tips to be set on (figs 4 and 5). Start with a blank of dimensions 100 x 25 x 12mm. The 25mm height is necessary for holding the blank snugly in the vice and will be reduced to 22mm after machining the racks but before machining the holes. Three locations are provided on the jaw sole for the hex tip and a pin is used for indexing, although this is not absolutely necessary. It's not required at all for the first position as the jaws can be closed until contact is made, setting the tips in the right position before tightening

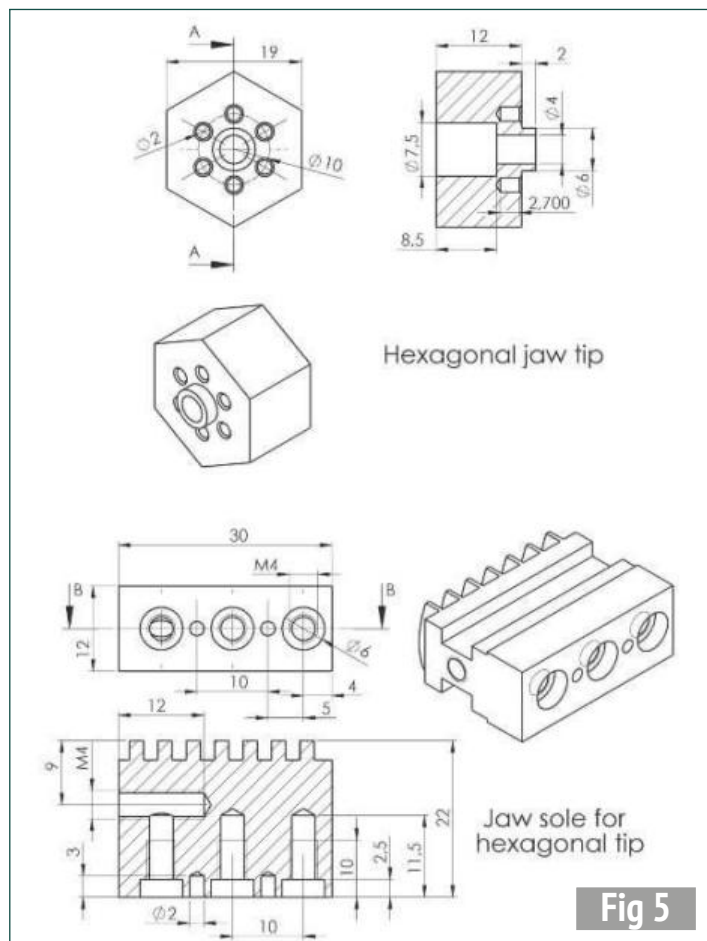
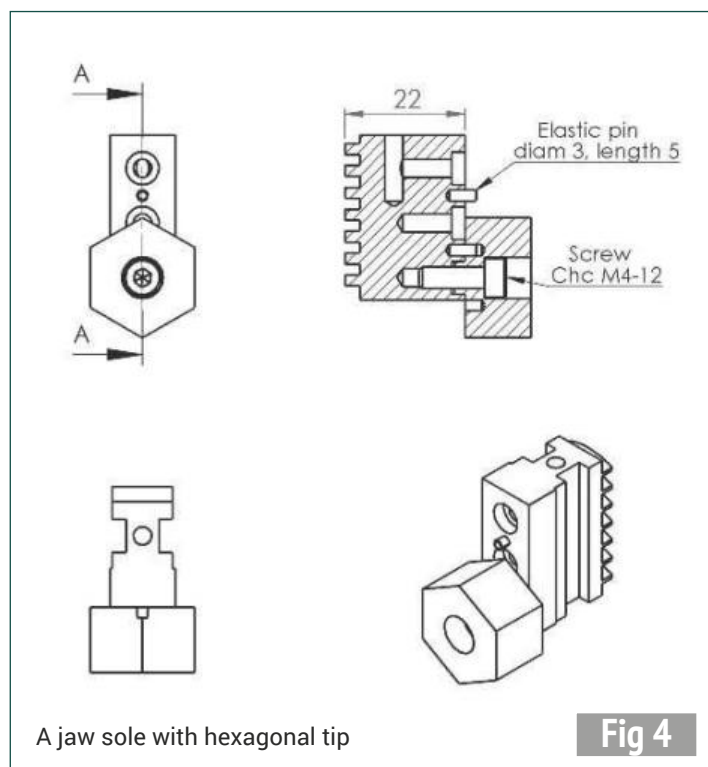


A set of hard jaws installed into the chuck body.



A set of hexagonal tips mounted on the jaw soles.

the locking screws. This is not the case for the second and third positions and, if there is no pin, the hex tips have to be positioned 'by eye'



before locking; furthermore, the machining forces are most often in the unscrewing direction. The fourth tapped hole (at right angles to the others) is used for locking the jaws while machining them on the lathe (see later).

**Photograph 11** shows a 165mm diameter chuck fitted with hex soft jaws that have been machined many times for both inside and outside settings.

These hex jaw tips are easy to machine, apart from the indexing holes, so it's worth making a template that will be used only for drilling these holes (**photo 12**).

### Making hard jaws

I've made a set of three hard jaws with internal steps (**photo 13**) for my 165mm diameter chuck and three sets of soft ones. The same method was used for machining these as for the soft jaws. I used a special tool steel giving low deformation when heat treated: 0.9% carbon, 1.9% manganese and 0.1% vanadium. It was quenched in oil after heating to 850°C and then tempered to 300°C.

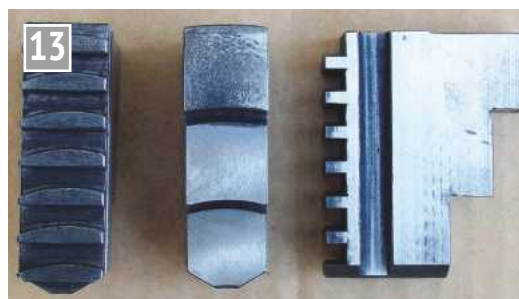
The steps are milled after machining the rack teeth and they are turned to final size after setting in the chuck. They are then hardened and reset in the chuck for grinding with a small grinding wheel (diameter 25mm) set in a router (**photo 14**) to get the right speed (25000 rpm) for the grinding wheel, the chuck speed being 250 rpm. The jaws are locked simply by



A well-used set of hexagonal soft jaws.



A hole drilling template for hexagonal soft jaws.



A set of hard jaws with internal steps.



Grinding the steps on a set of hard jaws.

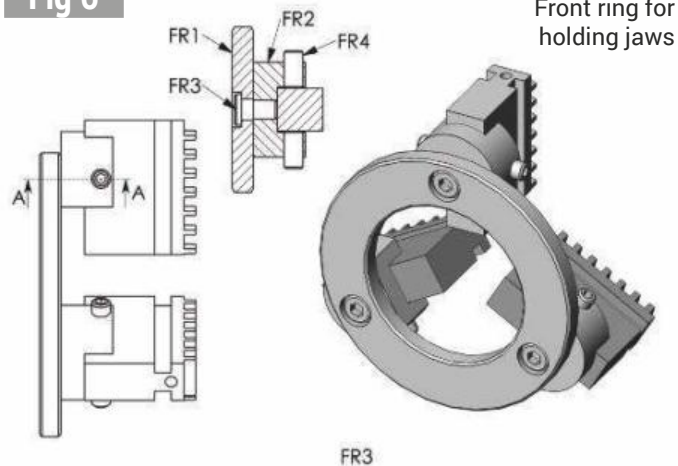
clamping them on a 30mm diameter plug as the smallest diameter is left unmachined. The wheel must be dressed - more details of which will follow.

●To be continued.

### REFERENCES

1. Making Chuck Jaws, Ken Thornton, *Model Engineers' Workshop* No. 116.
2. Making and Using Soft Jaws, Harold Hall, *Model Engineers' Workshop* Nos. 145 and 146

Fig 6



Front ring for holding jaws

No.259

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# The Midlands Federation Rally 2017

**Terry Dell** reports on this well-attended summer rally which featured a wide range of visiting steam and diesel outline locomotive types.

**T**he Burton-upon-Trent Model Engineering Society hosted the 2017 Midlands Federation Rally at their track and facilities on Bass Meadow (yes, that Bass - it is a brewery town!), an attractive river-side site on the outskirts of Burton-upon-Trent, itself an area steeped in railway history.

The Burton Society was founded in 1947 so this rally was held in its 70th Anniversary year; a celebration to mark this important milestone in the history of the society is being planned for later this year.

The Society might be a small club in terms of numbers of members but it has impressive facilities with an 850 feet ground level track for both 7½ and 5 inch gauge locomotives as well as a raised track for 3½ and 5 inch gauges, approximately 775 feet long. These are supported by ground level steaming bays and turntable and raised,



*John Dutton with his highly detailed 5 inch gauge Baby Deltic D5901 on the raised level track where it runs alongside the River Trent at the far side of Bass Meadow.*

level, covered preparation bays along with stations and clubhouse facilities.

## A fair weather day!

Everything came together on Sunday 11 June to make the 2017 Midland Federation Rally a successful and most enjoyable day. Unusually for a Sunday in June the weather was kind, warm and mostly sunny. From early morning, a steady stream of visitors arrived with locomotive owners outnumbered many times over by visiting members of other societies who came to enjoy a day in the company of like-minded model engineering enthusiasts. This excellent attendance made the effort of organising the rally well worthwhile.

## Visiting variety

Fortunately visiting locomotives were divided between gauges and track preference so drivers were able to spend as much time on the railway as they wished. Only a limited amount of control was needed on the raised track to ensure everyone had a reasonable run.

First out of the ground level steaming bay was John Ward with his extensively modified 5 inch gauge Sweet Pea 0-4-2 Alicat. What makes John's locomotive unique is that the frames, cylinders, cab, saddle tank, connecting rods, buffer beams and the firebox cladding are all aluminium! Alicat ran well on both the ground and raised tracks with visitors trying their hand at



*Bob Daniels at the raised track water point with his superb 5 inch Midland Single No 2603 ... with admirers.*



*Jim Smith passes the walkway approaching the raised level station with his impressive 3½ inch gauge Stanier Mogul.*

driving this most unusual and particularly well engineered locomotive. *Alicat* was the first locomotive to run in the morning and the last to leave the track in the late afternoon!

Following closely behind from the ground level bay was Mike Edmonds with his 5 inch gauge Class 15 Bo-Bo diesel outline D8234, *Arlees* in BR green livery, complete with digital sound system. Mike is a prolific diesel outline locomotive builder, having previously built a finely detailed and weathered Class 50 as well as a Western Hydraulic Class 52. Bob Daniels brought his magnificent 5 inch gauge Midland Single 4-2-2, No. 2603 which he built in 1990 and this performed particularly well for most of the day on the raised track. Bob is well known as a very skilled model engineer. We suspect he had

difficulty deciding which of his superb collection of hand built locomotives to bring to the rally!

George Moore, grandson of Rugeley Chairman, Derek Moore drove his 5 inch Class 08 0-6-0 D8402. In a hobby where the age profile is quite high it was a pleasure to see George and other young enthusiasts attend the rally and enjoying the day.

One of the 3½ inch gauge visiting locomotives was Bryan Wilson's *Katherine Anne*, a 2-8-0 Canadian Pacific locomotive, loosely based on the Martin Evans Buffalo. This locomotive has a reputation as a particularly good hauler having been known to pull five fully loaded passenger trolleys at its home track, performing much more like a 5 inch narrow gauge locomotive. Bryan has built several excellent models including a highly detailed 5

inch gauge 9F, 92220 *Evening Star* and his current project at an advanced stage is a 3 cylinder 5 inch gauge rebuilt Merchant Navy.

Another good 3½ inch performer was Jim Smith's black 2-6-0 Stanier Mogul 42980, which he finished building in 2016, to a design often referred to as a Princess Marina.

Another special visitor was David Brownjohn with his modified 5 inch gauge Polly 6, *Gillian*. Although based upon an original Polly design, David has carried out extensive modifications and a lot of additional work on his locomotive, which steamed well all afternoon.

John Dutton powered up and ran his highly detailed 5 inch Bo-Bo Baby Deltic class 23 diesel electric D5901. Along with installing both a sound system and smoke generator,

(yes, it exhausts artificial fumes!) John has put a lot of work into detailing this locomotive and it is finished in a prototypical BR deep bronze green with a late BR crest, exactly as would have been seen on the Kings Cross suburban services in the early 60s.

A regular Mid Fed Rally attendee was John Ollerenshaw with his modified 0-4-2 Sweet Pea, *Sweet Sue* looking very nice in Caledonian Blue. Unusually for Sweet Pea owners, John always prefers to run his locomotive on ground level tracks.

Well known NW Leicester member, Dave Waldren decided to bring his 5 inch diesel outline Co-Co 47091 to the rally on this occasion. After some frantic searches for a replacement fuse, the Class 47 eventually ran flawlessly for most of the afternoon.



David Osborn's very finely detailed Vale of Rheidol coaches (and passengers) along with the Midland Federation cups for presentation in the afternoon.



With a young enthusiast looking on, David Brownjohn prepares his modified Polly 6 ready for the off.



With a much lighter passenger load than he is accustomed to at his home track, Bryan Wilson approaches Bladon Halt on the raised level track with his powerful 3½ inch gauge Buffalo.



There is time for conversation as Maurice Bennett waits for the all clear to depart Bladon Halt with his Class 15.



*John Ollerenshaw steams his lovely example of a 5 inch Sweet Pea out of the low level station and across the steaming bay trailing pointwork.*



*Now on the raised track, John Ward passes alongside the River Trent with his unique aluminium 5 inch gauge Sweet Pea, Alicit.*



*Drivers wait to enter the station during a busy spell on the raised track during the afternoon of the rally.*

Although arriving later in the day, there was still time for Maurice Bennett to drive his 5 inch D Class 15 Bo-Bo diesel outline. Maurice began constructing this locomotive from a kit in 2016 and it is still 'work in progress'. Although mechanically, the model runs well, Maurice still has detailing work to do before he can call it finished. (Are any of our models ever finished?) Maurice has visited several previous Mid Feds with his 5 inch Meter Maid and 7¼ inch Sweet William.

Visitors were well looked after with food and drinks during the day by the very capable Burton catering team of Chris, Wendy and Roy.

### Competition results

During the afternoon, judging of the competition for the

Midland Federation Trophies took place. The Campbell Cup for the best finished locomotive was awarded by John Godfrey, Vice President of the Midland Federation and Keith Bloor, Chairman of the Burton-upon-Trent Model Engineering Society, to Bob Daniels of Rugeley MES for his Midland Single.

The Addenbrooke Cup was presented to David Osborn of Sutton Coldfield MES for his Vale of Rheidol coaches.

Highly recommended certificates were awarded to John Ward of Rugeley MES for *Alicit*, David Brownjohn of Birmingham MES for his modified Polly 6, John Dutton of Rugeley MES for the Baby Deltic and Jim Smith also of Rugeley MES for his Mogul.

Next year's Midland Federation Rally has been



*Keith Bloor, Chairman of Burton-upon-Trent Model Engineering Society, presents the Campbell Trophy for best locomotive to Bob Daniels of the Rugeley Power Station Society of Model Engineers.*

provisionally booked to take place at the Northampton Model Engineering Society.

Details will be published on their website and the Midland Federation website (**ref 1**). ME

A collection of photographs taken by Burton members at the 2017 Rally can be found as a link from the NEWS page of their society's website: [www.burton-upon-trentmes.org.uk](http://www.burton-upon-trentmes.org.uk)

### REFERENCE

Northampton Model Engineering Society:

[www.nsme.co.uk/index.html](http://www.nsme.co.uk/index.html)

Midland Federation website:

[www.midfedmodeng.altervista.org/index.html](http://www.midfedmodeng.altervista.org/index.html)

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■ SIEG SX2P Hi Torque Mill, brushless motor, R8 spindle taper. Upgrades include gas strut counterbalance, brass gib strips, thrust bearings fitted to X & Y axes. £500. T.01536482916. Northampton.

■ Alexander tool and cutter grinder model 2CGC, on maker's cabinet, 11 collets, wheel dresser, 2 wheels, buyer collects. £450. M&W toolmaker's cabinet, like new £40. M&W 2-3" micrometer as new, £15. Steel trammels by Benson 12" with 12" extension, new £20. Machinery's Handbook, twenty-fifth edition, £30. All plus postage and packing. T. 01235 847516. Abingdon.

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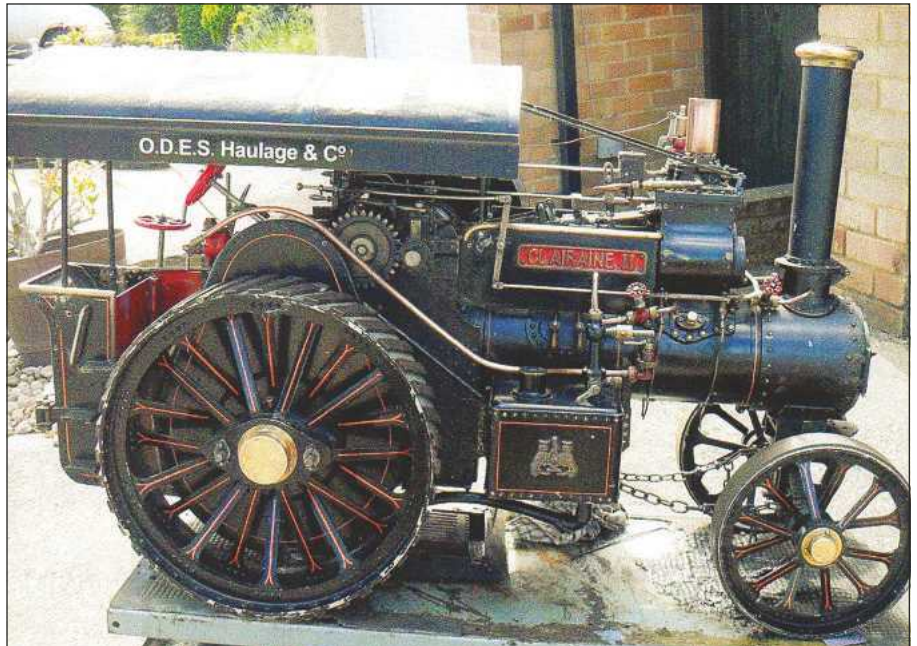
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■ Myford ML7R. 3/4 jaw chucks, tailstock chuck and die holder, steady, faceplate, catch plate, 4-way toolpost, cross-slide DRO, live centre plus other bits. £600 ono. T. 01430 879479. Market Weighton.

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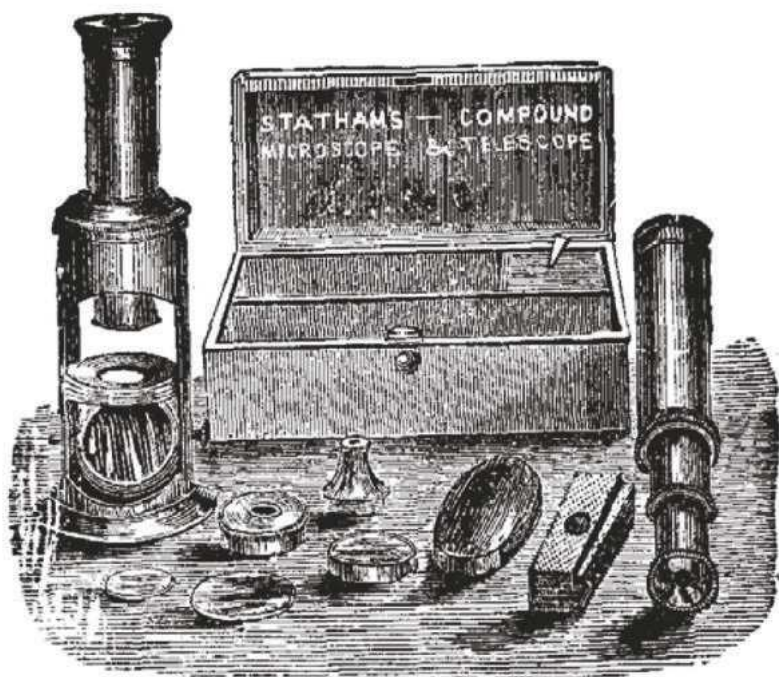
■ 2" Fowler Road Loco. Boiler certificate, driving trolley etc. £10,500 ono. T. 01797 864687. St. Albans.

## Parts and Materials

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■ Wanted, Hardinge lathe and/or big metal turning lathe with big hole through the head stock. T. 01642 321537. Middlesborough.

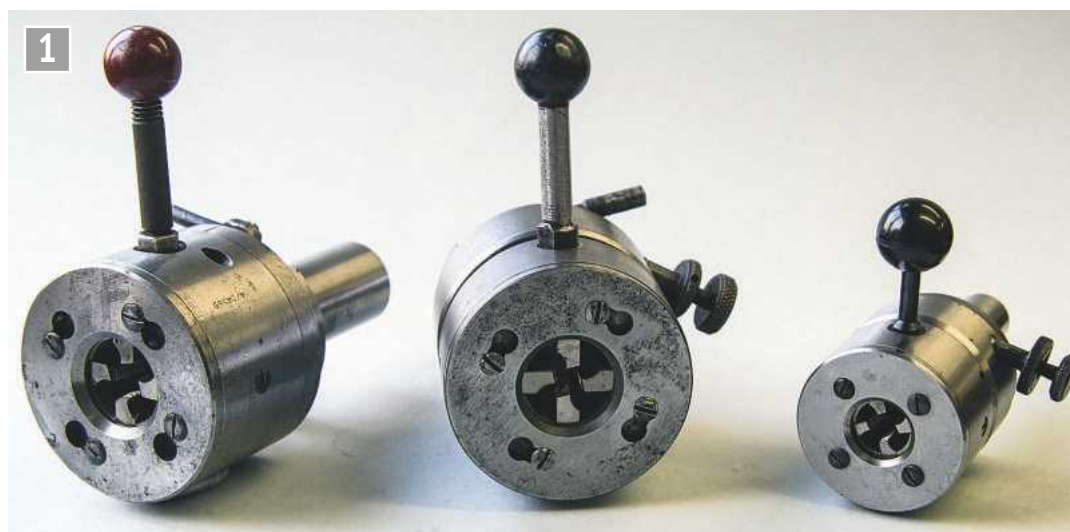


# Using Coventry Dieheads

David Earnshaw explains his interest in these industrial attachments.

Continued from p.319  
(M.E. 4567, 18 August 2017)

In this article I have shared my personal experience of using these fascinating tools in my own workshop and I offer a design for an adapter.



Three variations of Coventry Dieheads.

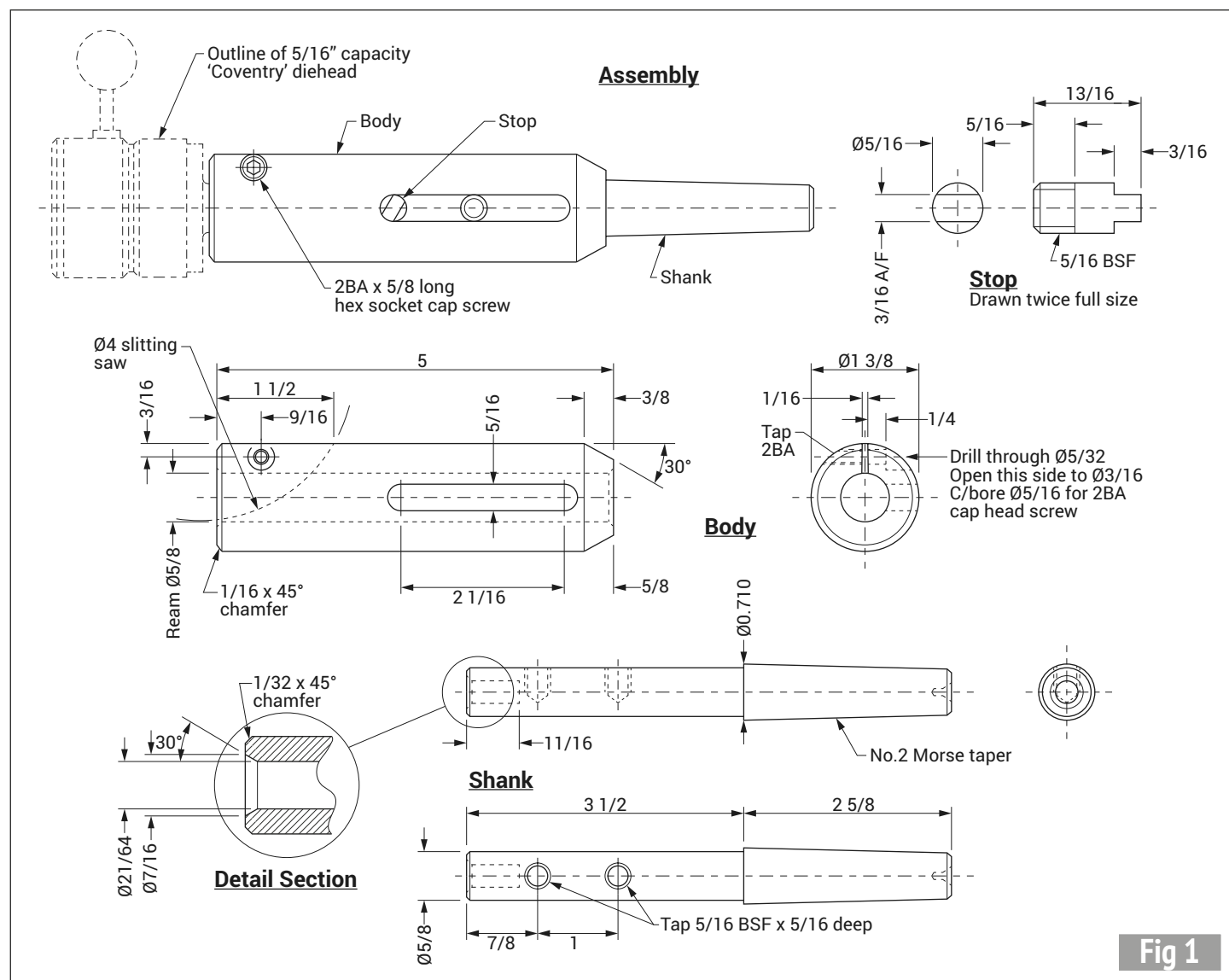


Fig 1

## Main Body

I decided to design and make the adaptor show in **fig 1** and **photo 10**. The best place to start is probably with the main body. For this a piece of mild steel, 1 3/8 inch diameter and 6 inches long is required. A fixed steady may be required to enable the bar to be faced off at each end and, at the same time, some thought needs to be given to how the 5/8 inch diameter through hole will be produced. As the original shank of the diehead was 5/8 inch diameter it was obvious that this would be the preferred dimension right through. A normal 5/8 inch diameter machine reamer is not long enough to go right through so the hole has to be bored and reamed from each end but the holes must be exactly in line to make the finished adaptor accurate. To do this the workpiece is held in a four jaw chuck and accurately centred using a dial gauge (a short piece of the same material may first be set up in the four jaw to run true so that the 'fingers' of a fixed steady can be set to touch the bar); the steady is then slid along the lathe bed to a position near to where the end of the workpiece will be and the setting piece removed from the chuck and replaced with the material to be used. Using the dial gauge again, the workpiece is then set to run perfectly true. It is important to get the material true at the chuck end and also at the outer end. Remembering to lubricate the steady fingers,

the work can then be faced off and chamfered on the outer edge, centre drilled and drilled out to about 1/16 inch diameter for a depth a little deeper than the length of the die head shank - in my case this was about 2 inches. (**Photograph 11** shows the process on a similar component.) The hole is then bored out to about 0.615 inch diameter to true it up and just enough material is left for the reamer to finish it to true size. The corner of this hole should then be lightly chamfered.

Once these operations have been completed the top portion of the steady can be opened, without moving it from the bed, and the material released from the chuck. The material is then turned end-for-end and remounted in the chuck, using the dial gauge again to ensure absolute concentricity at the chuck end. Once this is achieved the top of the steady can be closed and machining can commence on the new end, which is virtually a repeat of the previous operations except that the hole from this end is deeper and must be taken right through to meet the first hole. Boring to this depth will require as stout a boring tool as possible but should be possible with a reduced speed and careful feed using plenty of cutting fluid, finishing with the reamer as before. Of course, if anyone has a 5/8 inch long series reamer, the hole could be completed right through from one end.

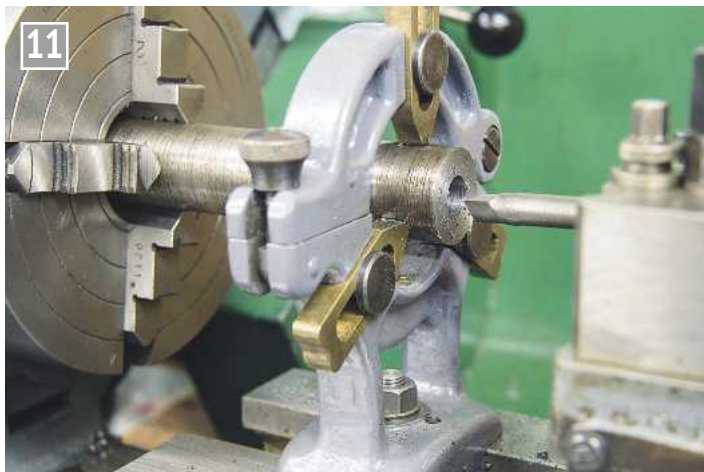


Adaptor unit.

If a milling machine is available the slit and the hole for the clamping screw can be done quite easily but if a milling machine is not available it is just possible to complete these two operations on the vertical slide on the lathe. **Photograph 12** is a posed photo showing the set-up. The body of the adaptor is clamped to the face of the vertical slide using the bottom Tee slot to give location and some alignment to the body. The vertical slide was fitted so that sliding table of the slide overhung the edge of the cross-slide to allow the table to be lowered as much as possible. A slitting saw 4 inches diameter by 1/16 inch thick was set on a 1 inch diameter arbor having a No. 2 Morse taper shank. The shank was secured into the lathe spindle nose using a drawbolt through from the back of the spindle. The outer end of the arbor was supported on a revolving centre fitted in the tailstock. The leadscrew nuts were then engaged so

that the whole saddle and vertical slide could be moved under precise control of the leadscrew handwheel. This was then used to set the slitting saw central to the diameter of the workpiece. To achieve this the work was brought up to just touch the side of the slitting saw. To centralise the saw over the work then meant that the work was moved a distance equal to half the body diameter plus half the cutter thickness.

Cutting the slit requires care. With the work below the cutter, the vertical slide is carefully raised into the revolving cutter thus giving the correct direction of rotation for milling and avoids 'climb milling'. The whole slot was not attempted at one cut - many small cuts taken using the cross-slide to increase the depth until a slit about 1 1/2 inch long on the top of the workpiece was achieved. Cutting lubricant was used throughout and care was taken to make sure that the cutter did not touch the opposite side of the bore at each pass.



Showing the use of a fixed steady for boring and reaming operations.



Use of a vertical slide for slitting the main body.

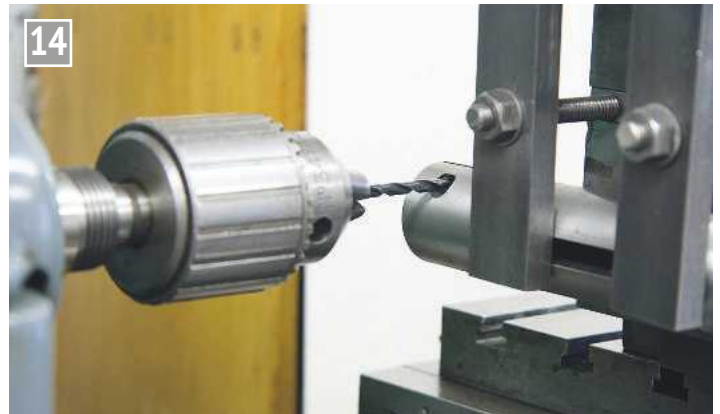


*Producing a pocket with a slot drill to start the hole for the clamp screw.*

With the slit completed, and without disturbing the set-up on the vertical slide, the hole for the 2BA clamping screw was drilled and tapped. The arbor was removed from the lathe spindle and replaced with a drill chuck. A short piece of  $\frac{1}{4}$  inch diameter silver steel was clamped in the drill chuck to act as an edge finder. Lowering the vertical slide so that the top of the workpiece was below the edge finder, the slide was then carefully brought back up until the underside of the silver steel just touched the top of the workpiece and the reading noted on the vertical slide micrometer dial. The workpiece was then moved sideways using the leadscrew handwheel and the workpiece then raised a further  $\frac{5}{16}$  inch ( $\frac{1}{8}$  inch for half the diameter of the edge finder and  $\frac{3}{16}$  inch to bring it up to the position for the centre of the clamp screw hole). A similar method was used to achieve the  $\frac{5}{16}$  inch dimension from the end of the workpiece.

After locking the cross-slide, a  $\frac{5}{16}$  inch diameter slot drill was used carefully to cut a pocket with a flat bottom to give a good start for a centre drill (**photo 13** - posed). The centre drill was followed with a 2BA tapping size drill right through to the other side of the material and then a clearance size drill used to drill out the first side of the workpiece, through only as far as the slit (**photo 14** - posed). A 2BA tap was then fitted in the drill chuck and the thread started, by hand. Finally, the slot drill was replaced in the chuck and the pocket/ counterbore for the cap head screw deepened until there was  $\frac{1}{4}$  inch of metal left between the end of the slot drill and the slit.

The large  $\frac{5}{16}$  inch slot in the side of the body can then be tackled using the same set-up. The clamps holding the body to the vertical slide will need to be repositioned by slightly angling them to allow enough room for the cutter to cut the length of slot specified. (Note,



*Drilling the clamp screw hole.*

in photos 12, 13 and 14, the slot has already been cut, and so has the large chamfer at the rear end. This is because the photos were taken, as indicated, some time after the unit was made.) It is important to get this slot exactly central on the body and also to achieve the best possible finish on the sides of the slot. This was done by taking the 'meat' out of the slot with a  $\frac{1}{4}$  inch slot drill and then finishing it with the  $\frac{5}{16}$  inch slot drill.

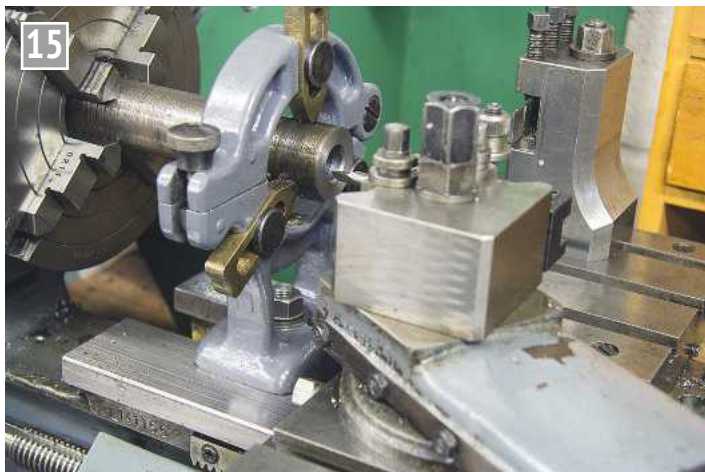
This completes the work on the body except for the large chamfer at the rear end. This chamfer is really only cosmetic and I suspect that it was put there to hide an unsightly score mark caused by the fingers of the fixed steady, but it does make it a little more comfortable to hold when in use. To cut the chamfer, the body was simply held in the three jaw chuck and the opposite end supported on a revolving centre in the tailstock, topslide set at 30 degrees and the chamfer machined in light cuts.

## Shank

Free machining mild steel is a good choice of material for this part but there are those who may consider that the steel body and the steel shank are not a good combination in terms of bearing surfaces but for the amount of sliding likely to take place there will be very little wear, especially if the unit is kept well lubricated. Concentricity is important with this component so it is best turned between centres. The maximum diameter is

for the large end of the No. 2 Morse taper which should be about 0.710 inch diameter so a piece of  $\frac{3}{4}$  inch or 20mm diameter steel should be faced off to the length shown. Each end requires a centre hole, the one at the end where the Morse taper will be formed is simply a normal centre drilled hole. The other end of the material is firstly centre drilled in the normal way but is then drilled  $2\frac{1}{4}$  inch or 8.2mm diameter for a depth of  $1\frac{1}{16}$  inch. This is to allow a little extra space for longer threaded components to pass some way into the shank after it has passed through the dies. Before finishing with this end of the material, a centre cone should be cut on the edge of the hole to allow a good fit on the centre. This can be accomplished either by a) using a large centre drill (BS5 -  $\frac{7}{16}$  inch body size) or b) by setting the top slide to 30 degrees and boring a small chamfer at the edge of the hole; this chamfer needs to be no more than  $\frac{1}{16}$  inch long. The enlarged section on the drawing (fig 1) and **photo 15** which shows the same set-up on a similar component illustrates this.

To turn the shank, a catch plate is fitted to the spindle nose - instead of the lathe chuck - and a centre placed in the headstock spindle bore. To digress slightly, it is essential to clean the Morse taper bore in the spindle before fitting the centre as particles of swarf or other dirt will cause the centre to fit incorrectly and the centre point will wobble



*Boring the 30 degree chamfer on the edge of the hole.*

slightly. This in turn, will cause the end of the workpiece to be carried in a slightly 'orbital' motion. A hard centre, a half centre or a revolving centre (whichever is preferred) is then fitted into the tailstock taking, the same precautions as for the headstock centre. A carrier is fitted on the end of the workpiece which will later be the Morse taper, a couple of drops of oil put in the larger centre hole at the opposite end and the work mounted between centres. The material is then reduced to  $\frac{5}{8}$  inch diameter for  $3\frac{1}{2}$  inches long. A good finish is required and the size should be an easy, but close, sliding fit in the reamed hole in the body. The topslide of the machine then needs setting to the correct angle for the Morse taper. My preference for this setting is by using an existing Morse taper shank, set between centres on the lathe, and a dial gauge then clamped on to the topslide/ toolpost and the slide adjusted until a reading of zero has been achieved when the topslide is traversed over the Morse taper. The probe of the dial gauge must be set at centre for this to be accurate. This method has been described several times

recently in this magazine. A carrier is then fitted to the recently turned end, using a scrap of soft metal under the clamp screw to prevent damage to the surface, and the workpiece placed back on the lathe centres. The un-turned material is then first turned parallel to a diameter of 0.710 inch, just a shade over the maximum diameter of the No. 2 Morse Taper. The taper can then be turned using the topslide, taking light cuts to arrive at the correct size and achieve a good finish (**photo 16**). Note that an extended toolholder is being used on the toolpost. This is very useful as it allows the topslide casting to be further away from the tailstock and the topslide ball handle has more room to move whilst turning the taper.

The two tapped holes are then required to finish off this component. At the initial design stage I was only going to have one of these holes but quickly realised that, when in use, the adaptor would always be working at its longest limit and that would create a lot of overhang. This cannot be avoided when cutting threads to the maximum length of 2 inches, but as I expected that most threads would probably



Turning the Morse taper between centres.

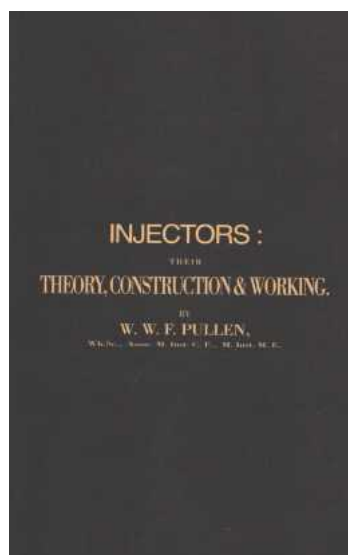
be less than 1 inch in length, the second hole was put in as an option to keep the adaptor slightly more compact when in use. In fact, all the work done so far has been with the stop pin in the hole nearest to the Morse taper. The holes need to be on the centreline of the shank and perpendicular to it so the best way to do these would be by setting the shank horizontally in the vice of a vertical milling machine, if available. If not, a similar set-up in the vertical slide can be used, similar to that used for cutting the large slot in the main body as described above. A drill chuck or collet chuck is then fitted in the machine spindle and centred over the

workpiece in the vice. The holes should be started with a centre drill, followed by the tapping size drill for the thread, taking care not to drill more than half way through the shank. Before removing the shank from the vice, a second tap should be started in the hole so that it cuts a true, vertical thread. The second tap will be required in this situation as the shallow depth of the holes will probably be too shallow for a taper tap to take any bite. This is then followed by a plug tap to finish the threads to the bottom of the hole. Using a fine file, the burrs raised by the tapping action should then be lightly filed flush with the surface of the shank.

●To be continued.

## Book Review

### INJECTORS: THEORY, CONSTRUCTION AND WORKING By W. W. F. Pullen



**T**his is a reprint of an original publication dating from 1893 by The Technical Publishing Company Ltd.; the text and illustrations are reproductions of the original pages and have not been typeset/drawn anew.

The workings of the steam injector and its sister, the ejector represent, to many, something of a mystery. This little book, despite its age, is probably the definitive work on the subject to date, particularly on British made apparatus. There is little or no reference to American types due to the impossibility of obtaining drawings or (at the

time) researching contemporary patents.

The book covers the subject thoroughly, beginning with an explanation of the working of injectors followed by the mathematical investigation of the velocity of efflux of the steam jet. Over 100 original diagrams are included, as are, interestingly, a few hand-written notes by previous owners of the book from which this copy has been taken. This book clarifies the workings of the injector and will help those who wish to make their own injectors or who have responsibility for repairing or maintaining them.

ISBN 978-0-9519367-5-7

200 pages, perfect bound (4¾ x 7½ inches).

Published by Camden Miniature Steam Services, Barrow Farm, Rode, Nr. Frome, Somerset BA11 6PS. (First reprint: 1997. Second reprint 2017.)

£12.50 + £1.95 postage to UK.

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**Geoff Theasby** reports on the latest news from the Clubs.



**D**rones! Now then, drones are becoming intrusive and sometimes a danger, around airports, for instance. They fly silently with good cameras or other facilities. So, if you have a favourite spot for, say, nude sunbathing in the woods, or practicing the Dark Arts, or you have contracted exclusively with *Telephone Exchanges of Yesteryear Magazine* to cover your daughter's wedding and then a rival's drone appears, perhaps from *K6 Collectors of Abergavenny*, it would quite spoil your day. You would be irked, vexed, nay miffed. Bemused, mithered and bewildered, no less. However, if you take direct action, crossbow or shotgun, perhaps, to defend your privacy or lifelong bliss/daughter's peace of mind/relationship with Beelzebub, you are out of order. Even hacking into its electronics/guidance is illegal. Mad and stupid drone fliers also have rights, you see. That said, maybe there is a case for arming airliners with laser guided weapons. Big red button on the flight panel, 'Droneseeker!' Or use the Spanish company, *Cast a Net SpA* which fires a strong, lightweight net over the drone to discombobulate it.

Last year I bought a Gauge 1 diesel-outline 0-4-0 locomotive but had to provide my own wheelsets, motor and gearbox. Not wishing to foul up some perfectly good castings, I made temporary wheels from plastic. Good job I did, since inexperienced as I am in making wheels (or sliced bread (see Great Inventions...)) I made several before I got them even to keep to the rails, not to mention all four in contact simultaneously. The G1 track standards require 6mm thick wheels, so, rather than try to cut off slices from a rod, then face both sides and turn the tread/flange somehow, I bought a hole saw and a 6mm sheet of Acetal. The pilot for the hole saw is such that a 6mm bolt and nut



Peter Targett's axle weighing gauge, Hutt Valley & Maidstone Model Engineers' Society. (Photo courtesy of Peter Targett.)

can be used as a mandrel. A tapped, radial hole from the tread to the centre then allows use of a grub screw to hold it to the axle and the tread and flange can then be turned to the correct form and diameter. Making a profile gauge from a bit of Plastikard helps and part of the same piece can serve as a check for the wheels' correct back to back dimensions. I designed my own gearbox, without success, so I am trying a Tamiya version. Watch this space!

In this issue: a 'Railweigh' station, a 'Polly Dolly', driving a Black Five at night during a solar eclipse in fog..., publicity, equal pay, a Morgan, tugs, locomotives from Holland, SPADs, Bulleid rebuilds, rotating pistons and unfinished projects.

Pete Targett of **Hutt Valley & Maidstone Model Engineers' Societies** writes with pictures of his locomotive weighing machine, as mentioned in *M.E.* 4564 (photo 1). His electronic readout is very clear and understandable. We went on to discuss electronics and article writing, which may yet bear fruit.

**W. [www.hvmes.com](http://www.hvmes.com)**

*B&DSME Newsletter*, from **Bournemouth & District Society of Model Engineers** says the lathe training courses are proving very popular. Further courses may be offered, silver soldering perhaps. The Polly Owners Group held their Spring Rally at the Littledown Railway (see *M.E.* 4565). 'When is a Polly not a Polly?' 'When it's Dolgoch! Look, it's written on the side...

(sorry). Events at Hereford and Southampton were to take place as I write this.

**W. [www.littledownrailway.co.uk](http://www.littledownrailway.co.uk)**

**Bradford Model Engineering Society's Monthly Bulletin** had only one entry for the rubber-powered locomotives but the simultaneous event using, not rubber batteries but chemical ones, produced some varied models (see Introduction). The twist is that John Copping's solitary rubber entry had three runs, each better than before, winding on more turns each time so he was declared the winner. The electric-powered competition produced John Shelton's ducted fan machine, recently exhibited at the Doncaster Show. Derek Round's propellor-driven locomotive was phenomenally fast and consistent over the three attempts but the idea was to get all the way round, not test the Armco at every corner. The highlight of the following week was the Committee Meeting (cough) and the Open Day, after which was the Friends of Northcliff Big Lunch which wasn't too busy but 'wiped its face'. The cost of hiring in lavatory facilities has led to suggestions that the clubhouse facilities be used for small events, if not big ones. David Jackson's Road Vehicle News observes that modern children have no idea why a driver puts coal in a locomotive or Traction Engine. Fire and boiling water, coal merchants and pungent smoke just aren't part of their lives any more. A report from

Doncaster Show features the Hunslet DH60C mentioned by many but the name of its builder is at variance with the show catalogue. Oh Calamity!

W. [www.bradfordmes.co.uk](http://www.bradfordmes.co.uk)

**Wauashakum Live Steamers'** *Journal* features Jim Davidson's GE Dash 9 mentioned in *M.E.* 4568 (photo 2). I am impressed with the livery of this Norfolk & Southern locomotive.

W. [www.wauashakumlivesteamers.org](http://www.wauashakumlivesteamers.org)

**Stockholes Farm Miniature Railway**, June *Newssheet* reports that although there are 20 or so willing helpers (and 'Thank You', says Ivan), there were previously 30+ and now there are three circuits not two. In May, the railway hosted a private visit by a photography group, which was well spent and well received. Best attended meeting of the year? Bacon butt night! (Getting the priorities right, I see – Geoff) The newsletter ends with what is claimed to be a very rare photograph, Ivan driving a Black Five. So rare, in fact, that it did not appear in my e-mailed copy.

W. [www.sfmr.co.uk](http://www.sfmr.co.uk)

**Norwich & District Society of Model Engineers'** *e-Bulletin*, June, says the Maxitrak Day was a great success and also spotted, on the Burnley & Pendle Miniature Railway Society website, a two-car, articulated multiple unit inspired by the Swiss *Furka Oberalp*. The Burnley & Pendle,

which is located in Thompson Park, is hosting the 7¼ inch Gauge Society AGM in September <http://www.bpmrs.org.uk/> (Pendle witches...? Oh dear) A local 7¼ inch gauge private railway is holding an Invitation Day.

W. [www.ndsme.org](http://www.ndsme.org)

A special 'Canada 150' issue of *The Whistle* from **British Columbia Society of Model Engineers** has been put together by Editor, Paul Ohannesian and several others, to celebrate the founding of the Canadian Federation in 1867. A series of items aims to set out how steam power has been so important in the development of the country. The thoughtful Timeline layout differentiates between the club history, the country's history and steam technology/railways as each contributed to the whole. Bill Mellors writes on steam engines, not just locomotives, that were made in Canada, mostly Ontario. An extensive collection of postage stamp photographs, courtesy of Canada Post, is most informative. An 1898 issue, now controversial, suggests that we Europeans expanded into unoccupied land. Of course, it wasn't and the indigenous people were poorly treated. However, we can't go back and change it. The history of the BCSME is not neglected. Today it is one of the world's best model tracks, so long that visiting



Norfolk & Southern Dash-9 from Wauashakum Live Steamers. (Photo courtesy of Editor, J B Mentzer.)

drivers may get lost in it! A comprehensive bibliography completes the issue.

W. [www.bcsme.org](http://www.bcsme.org)

**Vectimod**, Summer, from **Isle of Wight Model Engineering Society** states that the Society is not so well known as it might be. Editor, Tim Ostley suggests a word of encouragement to the Publicity Officer would not come amiss. Oh! Hang on, who is the PO? Some bloke called Tim, isn't it...? The 2017 Rally went very well, broke even too! Thanks to all who assisted, not forgetting the catering team, who often go unremarked. In view of the current furore over equal pay at the BBC, IWMES, along with, I think all their fellow societies, already operate an equal pay policy... Nothing! A Morgan V-Twin three-wheel car was

present, owned for 50 years by the same man. Martin Everitt noted the two brake pedals. The rear one stops the car in a straight line. The front ones? Well, er ... The steering is half a turn, lock to lock like a Kart, I think, but it's a long time since I drove one. Amongst the boats was this gorgeous, electrically-powered stern-wheeler riverboat, *Delta Queen*, owned by Gerry. She has a Calliope (an MP3 recording of the original). Check out YouTube and the DQ website for how they sound. The original *Delta Queen* dates from 1927 and is 285 feet long, above the hull and deck is made mostly of wood and she weighs 1,650 tons. Built by Denny's on the Clyde, it was shipped to the USA in pieces and has a 2,000 IHP cross-compound engine (photo 3). The club site electrical installation has been checked and pending problems remedied/improved where required. The 'Ally Pally' show was of great interest to John Palmer as he found a model tug, *Irishman*, with a comprehensive radio system, independent control of the three engines, lighting and sound. John is building a sister (?) tug, *Yorkshireman* and picked up some useful tips in the six hours he was able to stay. Bill Wills draws our attention to Goat Canyon trestle bridge; check this one on Google Earth, whilst Gil Hughes assists we editors with some common ASCII keystroke ➤



Gerry's sternwheeler from IoWME's Vectimod. (Photo courtesy of Martin Everitt.)

codes for typing unusual symbols or text shortcuts on the computer. I have pinned mine on the wall, at Gil's suggestion.

W. [www.iwmes.org.uk](http://www.iwmes.org.uk)

**Halesworth & District Model Engineering Society**, Summer *Newsletter* has Kevin Rackham explaining the requirements for a boiler test. David Harbour admits to his GER T26 running off the steaming bay track end whilst being unloaded from his car, rather like that famous photo of a locomotive falling into the street from Paris Montparnasse station in 1895. The October Lowestoft Exhibition, LOWMEX is in preparation, intended to be bigger and better than before.

W. [www.lowmex.co.uk](http://www.lowmex.co.uk)

Malcolm High sent me details of the **G1 Model Railway Association** Yorkshire Group's involvement with the STEM event (Science, Technology, Engineering & Maths) at the NRM in York. The challenge was to build a clockwork-powered Lego train and to find ways of improving its performance over several timed runs, by selecting appropriate gear ratios, considering friction etc. and the effect of build quality. It was an excellent event and there is to be another in October half term..

W. [www.g1mra.com](http://www.g1mra.com)

**Ryedale Society of Model Engineers'** Monthly *Newsheet*, June, says that Doug Hewson was welcomed to the June Driver Training event. I am glad to hear that he is recovering well. Then, model engineers from the Netherlands visited, bringing with them four very



Where was this fine piece of railway scenery spotted?

well-made Dutch exotica (Exotica!...) a 14XX, Austerity 2-8-0, a 1903 Beyer-Peacock 4-6-0 of 1903 and a Y5. At a later date, Paul G. and his GWR 15XX were out with a long goods train. The engine performed very well, not so the driver who was suffering from the SPADs! A visitor one day told that he had once been a Woking fireman so was asked his opinion of Bulleid locomotives. Were the original Merchant Navies better or worse than the rebuilds? The gentleman said he preferred the originals but the rebuilds were less trouble.

W. [www.rsme.org.uk](http://www.rsme.org.uk)

A little mystery for railway plant and equipment spotters ... (photo 4).

**Model & Experimental Engineers Auckland's** June *newsletter* relates that Graham Quayle has obtained a simple steam model built by Don Hughes in which the piston rotates as it reciprocates, thus also acting as a steam valve. (Think of sleeve valve engines.) Murray began to build a machine on similar principles, as published in *M.E.*

November 1953. Ross Purdy has three Wankel-type engines by Graupner. Manufactured in the last 40 years, they are successively improved Marks of nominally the same 5cc engine; they are very rare and were expensive when found. Murray Lane has been fettling his Colchester Student so it turns parallel. This involves much work adjusting the position of the headstock. He also prepared a new Myford tailstock, the honing with which he was not satisfied. Making his own lap and using a car brake cylinder hone, success was finally achieved after many hours work.

Another peripatetic editor! (An Irishman abroad.) Terence and Ann Aston on their 'Tour de Royaume Uni' passed through Sheffield, so Debs and I had to go and spoil their holiday... (photo 5).

W. [www.mesni.co.uk](http://www.mesni.co.uk)

**Fareham & District Society of Model Engineers'** *Modelling Ways*, July, begins with brief details of Igor Sikorsky, the helicopter pioneer. An item on The Perpetual Project discusses the various ways of

never quite finishing a model. Either you are missing/cannot obtain/afford a vital part or you are not satisfied with one or more parts, therefore remaking them, or a similar part-built product is offered, or a new shed/machine tool/house is required. Some of us are further down this path than others but we are all on the same Long March! A long, illustrated article by David Ward covers the Darjeeling Himalaya for the Garden Railway, using a Roundhouse locomotive and coaches from Yatton Models.

Finally, here is Giff Gray's 7½ inch gauge, three-truck Shay at BCSME. It took 14 years to build and he also makes violins... (photo 6).

And finally, Norwegian warships are to have barcodes painted on the side. This is so that their MoD can keep track of them. Count them all out and, on their return, scan the Navy in!

Contact:  
[geofftheasby@gmail.com](mailto:geofftheasby@gmail.com)



Terence and Ann Aston from MESNI with Debs at the Garrison Hotel, Sheffield.



Giff's Shay at BCSME. Magnificent! (Photo courtesy of Paul Ohannesian.)

## SEPTEMBER

- 15 Rochdale SMEE.**  
General Meeting  
Castleton Community  
Centre, Rochdale. 7pm.  
Contact Len Uff:  
0161 928 5012.
- 15 Stockport DSME.** David  
Davies & Colin Hudson:  
Free Electricity?  
Contact Dave Waggett:  
0161 430 8963.
- 16/17 NW Leicestershire SME.**  
Autumn Gala 12 noon  
to 4pm. Contact Den  
Swain: 01530 412048.
- 16/17 Vale of Rheidol Railway.**  
Roaring Twenties and  
Thirties: 95 Years of the  
GWR. Contact:  
01970 625819.
- 16 Westland & Yeovil  
DMES.** Track running  
day, 11am - 4.30pm.  
Contact Bob Perkins:  
07984 931 993.
- 17 Bedford MES.** Public  
running. Contact  
07498 869902.
- 17 Cardiff MES.** Public  
running at Heath Park.  
1 - 5pm. Contact  
Rob Matthews:  
02920 255000.
- 17 Grimsby & Cleethorpes  
MES.** Public running,  
noon - 4pm. Waltham  
Windmill site.  
Contact Dave Smith:  
01507 605901.
- 17 Plymouth MSLS.** Public  
running at Goodwin  
Park. Contact Malcolm  
Preen: 01752 778083.
- 17 Rugby MES.** Public  
running at Rainsbrook  
Valley Rly., 2pm - 5pm.  
Contact Ken Eyre:  
01788 842709.
- 17 Tiverton & District  
MES.** Running Day  
at Rackenford track.  
Contact Bob Evenett:  
01884 252691.
- 18 Lancaster &  
Morecambe MES.** Geoff  
Martell: Drill and tool  
sharpening. Contact  
Mike Glegg: 01995  
606767.
- 18 Peterborough SME.**  
Cromwell Tools/  
Adhesives. Contact  
Terry Midgley:  
01733 348385.
- 19 Chesterfield & District  
MES.** A talk by David  
Charlesworth.  
Contact Ian Blackburn:  
01909 562458.
- 19 Grimsby & Cleethorpes  
MES.** General monthly  
meeting, 7.30pm.  
Contact Dave Smith:  
01507 605901.
- 19 Nottingham SMEE.**  
Andy Gillett MBE:  
The Chinook and  
Afghanistan.  
Contact Pete Towle:  
0115 987 9865.
- 20 Bristol SMEE.** Club  
auction. Contact Dave  
Gray: 01275 857746.
- 20 Leeds SMEE.** Keith  
Taylor: Sunbeam  
Racing Cars. Contact  
Geoff Shackleton:  
01977 798138.
- 20 Salisbury DMES.**  
Richard Ellam: Brunel's  
Bloomers. Contact  
Jonathan Maxwell:  
01722 320848.
- 23/24 Chesterfield & District  
MES.** Club running day/  
Public running (Sunday)  
12.00 - 4pm. Contact  
Ian Blackburn:  
01909 562458.
- 24 Grimsby & Cleethorpes  
MES.** Public running,  
noon - 4pm. Waltham  
Windmill site.  
Contact Dave Smith:  
01507 605901.
- 24 Lancaster &  
Morecambe MES.** Last  
public running day.

Contact Mike Glegg:  
01995 606767.

### 24/25 St. Albans DMES.

Club Exhibition  
(Mike Grossmith).  
Contact Roy Verden:  
01923 220590.

**24 Welling DMES.** Public  
Running 2 - 5pm.  
(Behind Falconwood  
Elec Sub stn.) Contact  
Martin Thompson:  
01689 851413.

**28 Sutton MEC.**  
Pressure Gauge  
Testing. Contact Jo  
Milan: 01737 352686.

**30 Saffron Walden DSME.**  
Four Wheel Wonders:  
event for visiting four  
wheeled locomotives of  
any kind. Contact Jack  
Setterfield:  
01843 852165.

## OCTOBER

- 1 Basingstoke DMES.**  
Public running at the  
Viabes Craft Centre.  
11am - 4pm.  
Contact: Austin Lewis:  
01256 764765.
- 1 Fornett Industrial  
Steam Museum.**  
Model Engineers' Day.  
Contact: billstarlingbs@  
gmail.com
- 1 Ellenroad Engine House,**  
Engines in Steam,  
11am - 4pm.  
Elizabethan Way,  
Milnrow, Rochdale.  
Enquiries:  
01706 881952.
- 1 Frimley & Ascot LC.**  
Public running, 11am  
- 5pm. Contact John  
Evans: 01276 34970.
- 1 Grimsby & Cleethorpes  
MES.** Public running,  
noon - 4pm. Waltham  
Windmill site.  
Contact Dave Smith:  
01507 605901.

- 1 NW Leicestershire SME.**  
Members and visitors  
steam up. Contact Den  
Swain: 01530 412048.
- 1 Plymouth MSLS.** Public  
running at Goodwin  
Park. Contact Malcolm  
Preen: 01752 778083.
- 2 Lancaster &  
Morecambe MES.**  
Informal meeting.  
Contact Mike Glegg:  
01995 606767.
- 2 Peterborough SME.** Bits  
& Pieces. Contact Terry  
Midgley: 01733 348385.
- 3 South Cheshire MES.**  
Ian Hughes:  
Millmeee In My Blood.  
Contact Stuart Daw:  
01782 767587.
- 4 Bradford MES.** Barrie  
yates: From Russia  
With Love. 7.30pm,  
Saltire Methodist  
Church. Contact: Russ  
Coppin, 07815 048999.
- 4 Bristol SMEE.** Roy  
Ackrill: Nailsea and  
Backwell Station from  
Brunel on. Contact Dave  
Gray: 01275 857746.
- 4 Chesterfield & District  
MES.** Club running day.  
Contact Ian Blackburn:  
01909 562458.
- 4 Leeds SMEE.**  
John Ives: Railway  
Matters. Contact  
Geoff Shackleton:  
01977 798138.
- 5 Cardiff MES.** Brain  
Davies: The Rhonda  
Coal Industry.  
Contact Rob Matthews:  
02920 255000.
- 5 Sutton MEC.**  
Bits & Pieces night.  
Contact Jo Milan:  
01737 352686.
- 6 North London SME.**  
Meeting t.b.a. Contact:  
Ian Johnston on  
0208 449 0693.

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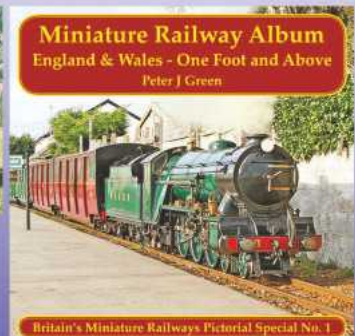
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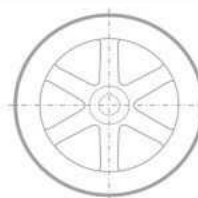
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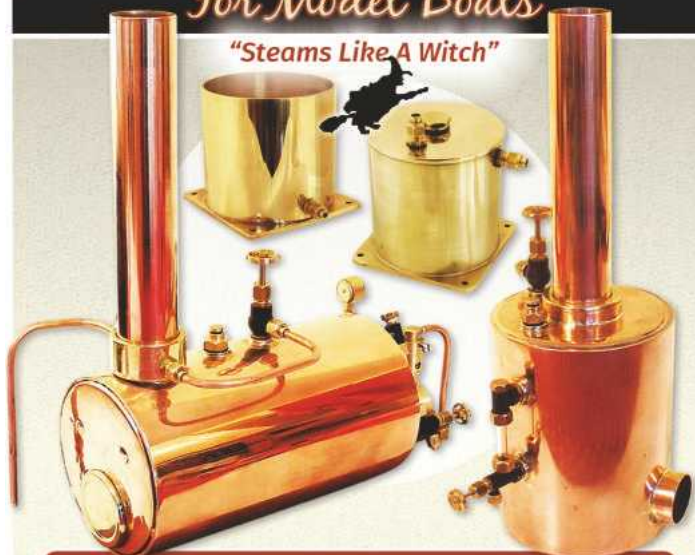
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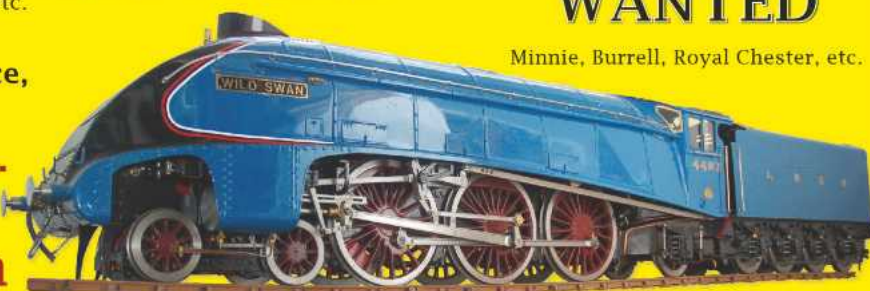


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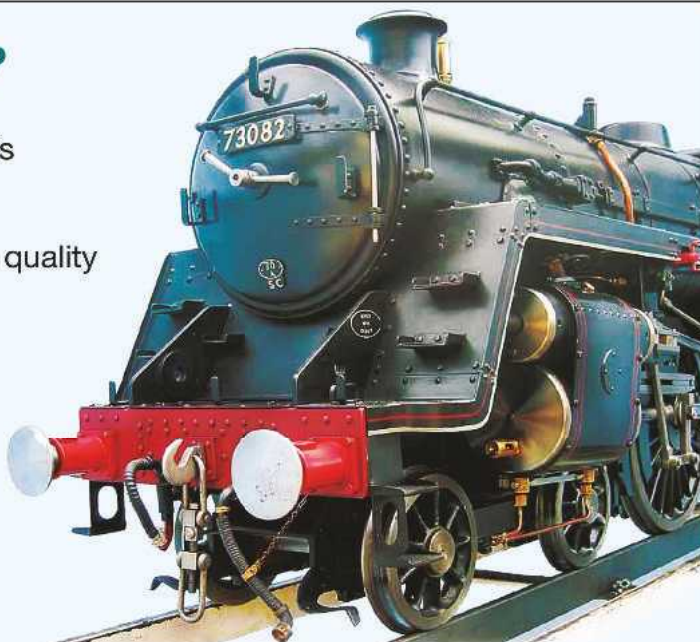
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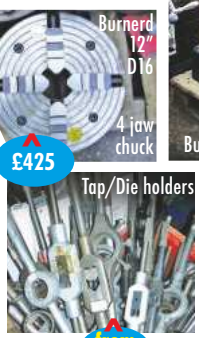
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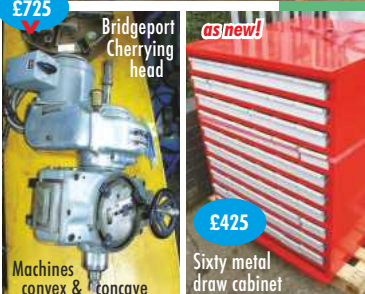
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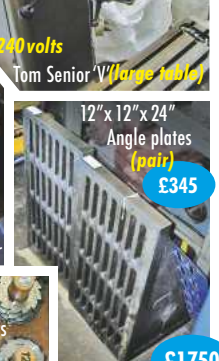
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