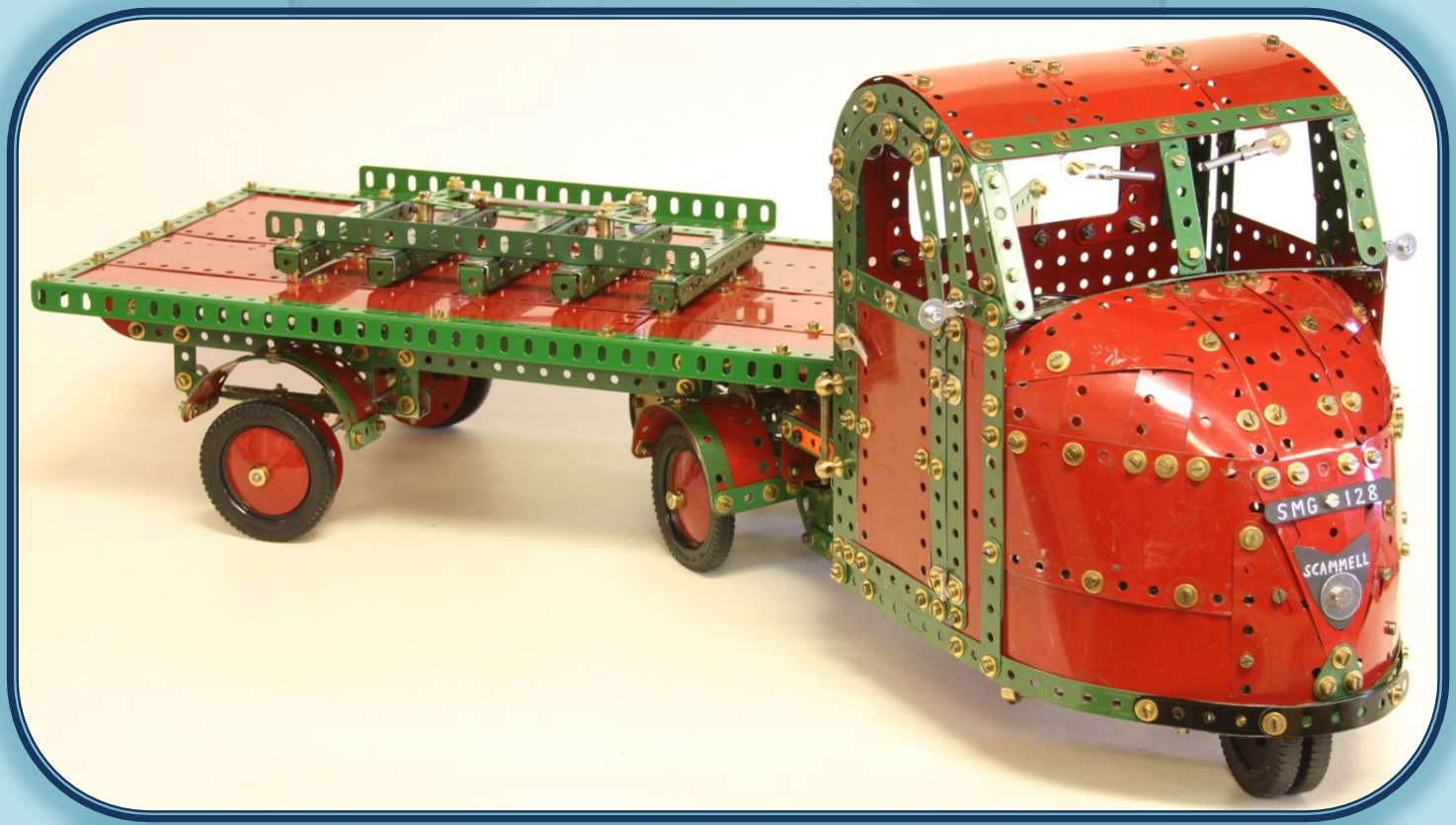
The Sheffield Meccano Guild



Journal No. 128, February 2017

The Sheffield Meccano Guild Journal No. 128, February 2017

The SMG Journal needs your support!

We welcome your reviews, news, reports, comments, building instructions, model descriptions, views, sales & wants, pictures (film or digital) or anything regarding SMG activities and Meccano in general; you will receive as much or as little support as you require. Submissions are welcomed as e-mail, scan, CD, memory stick (returned), Internet link, typed or by any other recognised form of human communication, even prehistoric pen & paper through the post.

Annual subscriptions become due each October: rates are UK junior £10, adult £15; Europe £18; rest of world £20.

Editorial 128

It is unfortunate that circumstances had conspired to add a further delay to the completion of the next episode of John Learman's 'Tyres' series but, with a following wind, we should be back on track in the June edition. The resultant gap, however, was soon plugged by efforts from several directions, some a direct result of the Laughton meeting in October. Such was the scale of attendance with new models galore and the efforts of eager writers and photographers, the report (beginning opposite) is of unprecedented proportions with most of its nineteen pages given over to pictures with almost everybody having a picture of their handiwork. As well as having plenty of material to draw upon, your Ed is also pleased to present Stuart Weightman's article about his remarkable robot arm that wowed CAM at Calais then repeated the performance at Skegex. Stuart isn't the only new contributor as, despite being a capable reporter and willing to write about his contest entries, we have John Wilson's maiden stand-alone article with imposing pictures taken by Stefan Tokarski. This edition also denotes a high point in colour content with twenty pages so treated, almost a third of the whole. In a more sombre mood, tributes to Meccano friends whom we won't see again are becoming far too regular and it is our unhappy obligation to note the deaths of Malcolm Booker, Bruce Laan and Tony Brown. *Rob Mitchell*

Contents

On the cover

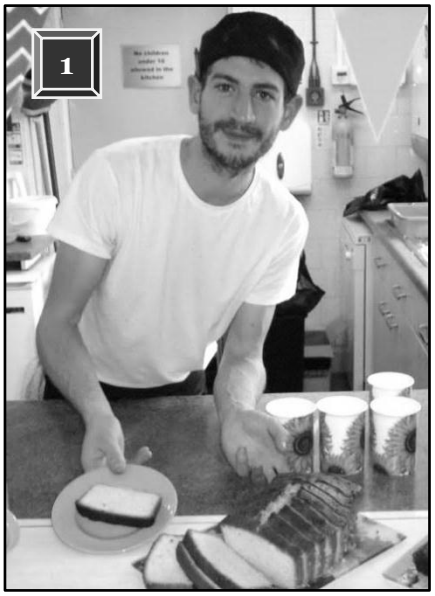
Our meeting on 15th October 2016 yielded many models on their first trip and one of them was **Roy Smith's** Scammell 'Scarab'. Based on the 1950s No. 9.1 Mechanical Horse, Roy had improved the model in several areas and, in particular, the trailer had been shortened as Binns Road went bonkers to ensure lots of the No. 9's complement of long parts were used. The 'Scarab' has been a popular Meccano subject; they would have been a common sight during Meccano's red & green era and that domed engine cover would have vexed many a keen enthusiast. The final *coup de maître* for Roy's work being delivered on page 1 was the registration number and did he plan it that way? Bet he did! (RM)

The Best SMG Meeting Ever?

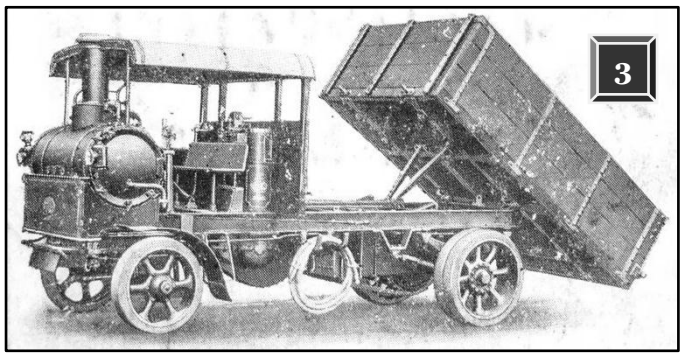
Laughton-en-le-Morthen, 15th October 2016
Reporters: John Bader, Russ Carr, Paul Robertshaw and Bob Seaton
Pictures: Mick Burgess, Hellmuth Kohler, Rob Mitchell and Bob Thompson

Get there early, I thought, to be ready for the now-normal 08:45 unlocking of the Village Hall then guide the table layout with regard to some special requests. Arriving at 08:30, we were too late! Those of a less nocturnal nature were already at work but, luckily, their efforts hadn't reached the point at which the adjustments couldn't be made before a Meccano tsunami would make matters slightly more permanent.

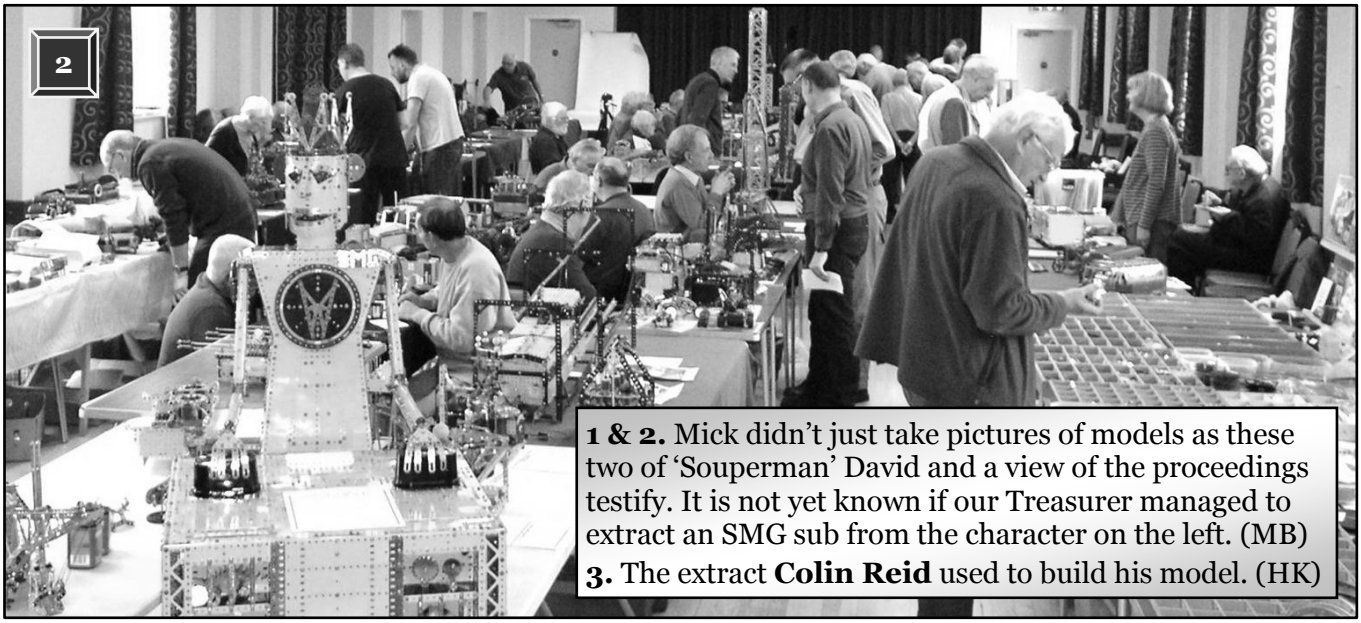
All were welcome although some are more so than others and topping that list was **David Miller** who swung into professional action in the kitchen. It wasn't long before the demand for his bacon butties then bread outstripped supply! Falling back on his proper sausage rolls and quiche was no privation and as for the hot soup… Many passed comment about the quality and they were directed to David's domain to tell him themselves! David married his fiancée Emile in France on 6th August but that proved to be no barrier for at least one further proposal as 'Laughton Day' proceeded; his catering was *that good*.


1

Breaking the write-up into discrete areas remains a good move to encourage reporters as covering the whole lot would be an ordeal best avoided. Of those invited to tackle a lump, Russ Carr selected the island nearest David's operation (typical!) then didn't hang around so he's away first.


3

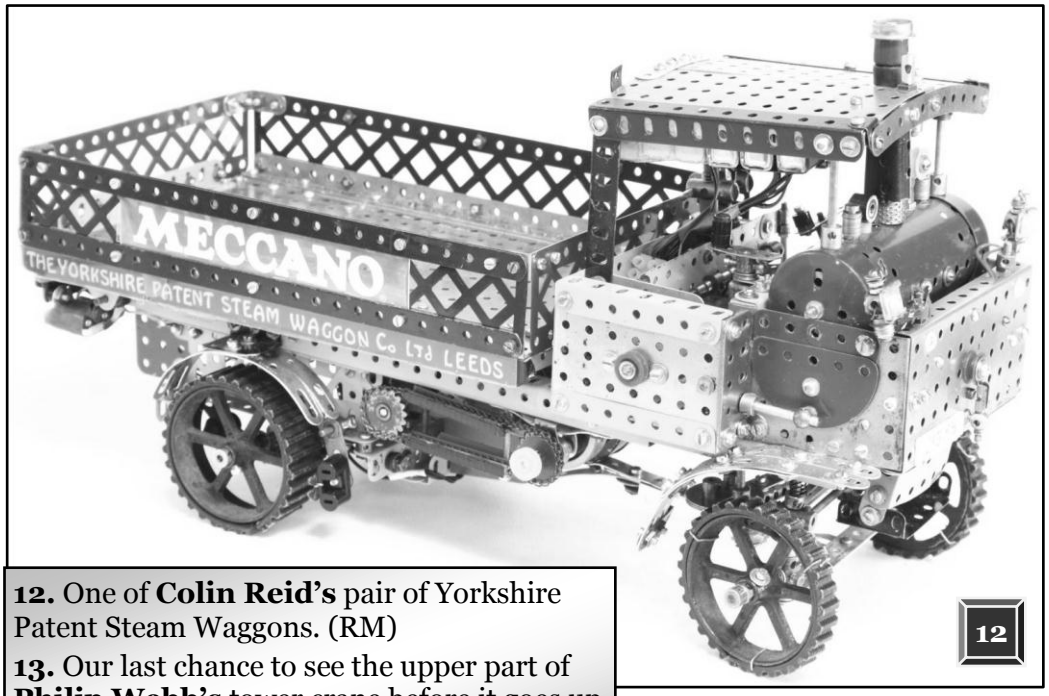
Colin Reid brought a pair of 1913 Yorkshire Steam Waggons in his customary unrestored parts. The lithographed frontispiece image, hugely magnified from an original Owner's Handbook - a rare item - provided the inspiration and information to build the models. Wheels came from a 'Ewbank' carpet sweeper (remember them?) Lots of detail on both models included lighting. The first was powered by a Ferguson camcorder focus unit and took two weeks to build; the second was driven by a re-imagined (!) Meccano RC 'Disco' car chassis shorn of its wheels. Colin also has a sideline in making 1929 Steam Engine burners using (whisper it) Meccano small parts tins for the fuel reservoir.


2

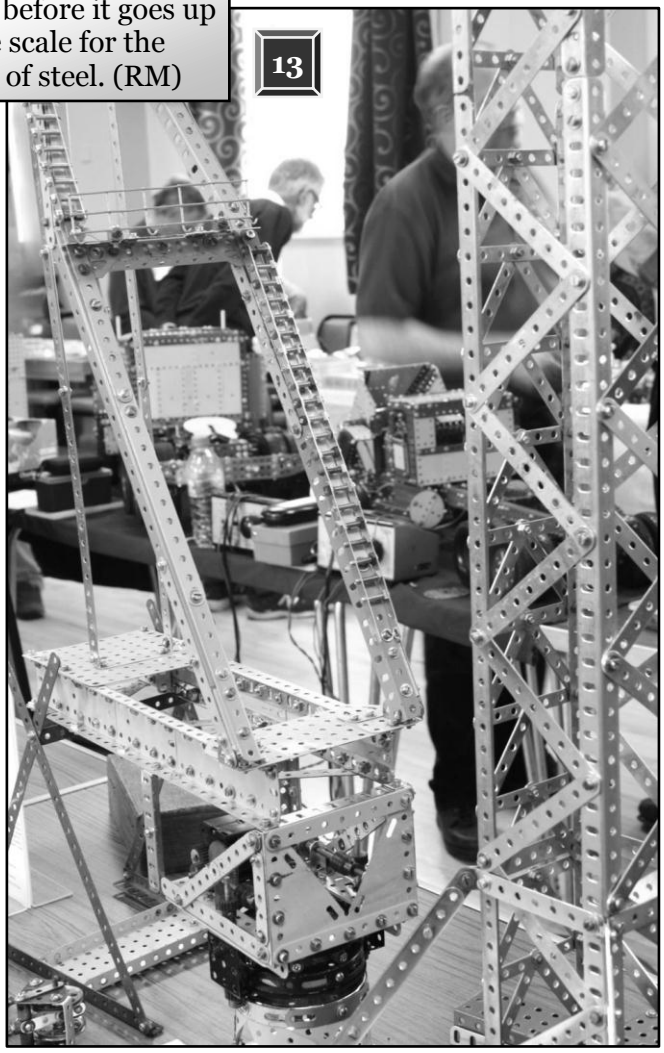
1 & 2. Mick didn't just take pictures of models as these two of 'Souperman' David and a view of the proceedings testify. It is not yet known if our Treasurer managed to extract an SMG sub from the character on the left. (MB)
3. The extract **Colin Reid** used to build his model. (HK)

Hellmuth's view of Laughton

Hellmuth claimed to have been short of inspiration but the outcome suggests otherwise!
4. Richard Bingham with **Frances Burgess**. **5. Dave Stanton's** wife **Sue** prefers knitting to Meccano! **6. Rob Miller** tends to his banana-starved monkey. **7.** Despite being bribed by Albert, **Rob Mitchell** tries not to drop Brian's model. **8. John Nuttall** with **Mick Burgess**. **9. Ian Brennand, Joe Etheridge** (just) and **Brian Harper**. **10. Russ Carr, Tony Seed** and his Dad **Brian**. **11. John Wilson** gives **Barrie McKenzie** a guided tour of his Newcomen Engine. (HK)



12. One of **Colin Reid's** pair of Yorkshire Patent Steam Waggons. (RM)
13. Our last chance to see the upper part of **Philip Webb's** tower crane before it goes up there? The laddering sets the scale for the fitters who must have nerves of steel. (RM)



We now know what **Philip Webb's** crane bearing (SMGJ126, page 5) was for - a counterbalanced luffing tower crane. Still under construction and with superstructure separated from the tower, it will surely be too tall for Laughton Village Hall when completed. Philip also showed an assortment of hook blocks.

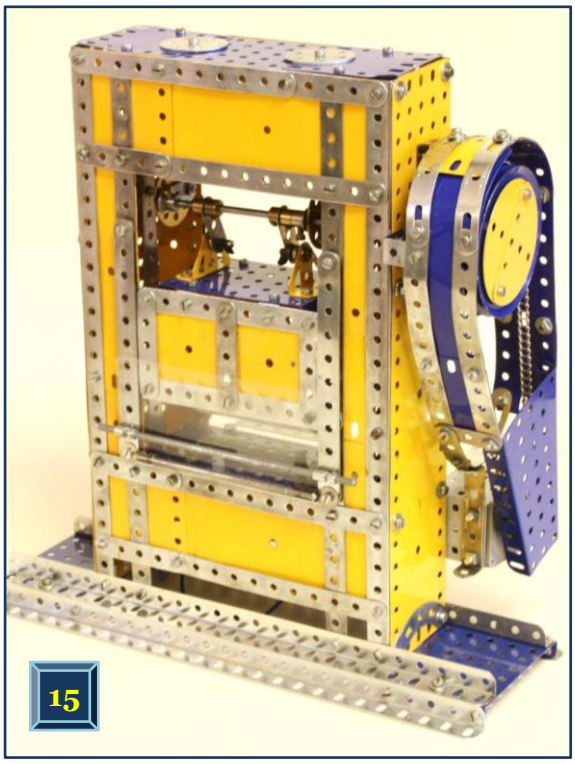
Alan Lovett clearly likes the No. 10 Modelplans! In yellow & dark blue, he had Tony James' No. 213 JCB 'Teletruk' and No. 225 for the Linde side-loader along with Tony Parmee's 'Aunt Sally'. A suitably large stash of 2p coins made for lots of fun. From the Land Rover he built for Meccanuity, Alan also had his own design of four-speed gearbox which will be featured in the next *SMGJ* so I don't need to say much about that except that I particularly liked the detent mechanism using a 14t Sprocket.

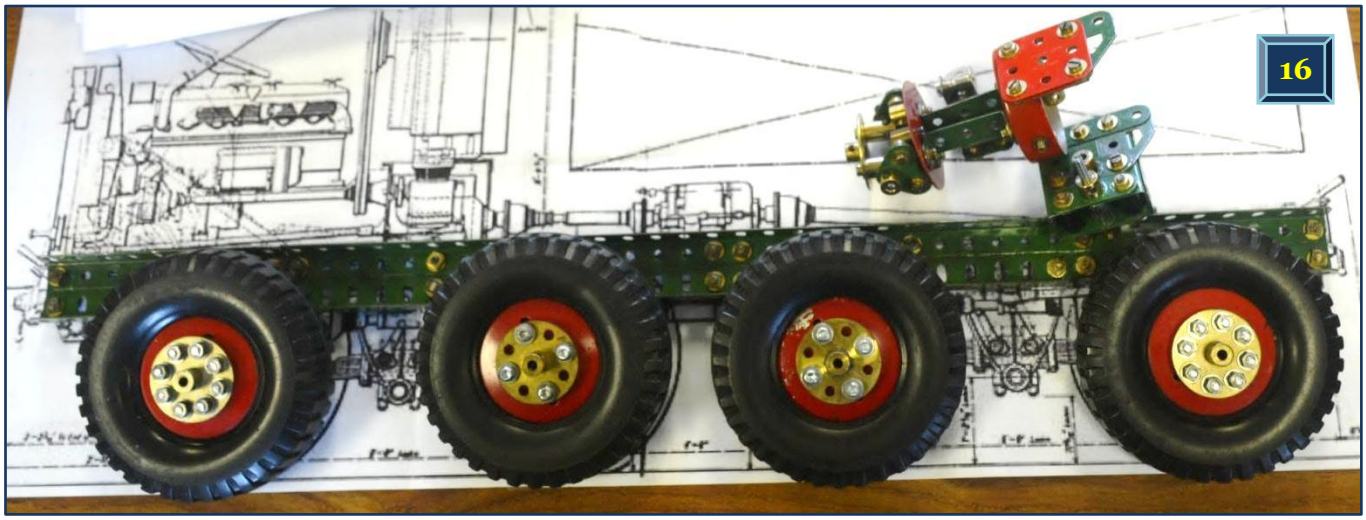
Under way by **John Hornsby** was an AEC 'Roadtrain' eight-wheel, 15-ton overseas tractor in medium red & green and based around 'Action Man' tyres. He also had a steam navvy powered by 1929 Steam Engine which was a much more workmanlike job than the prewar Supermodel.

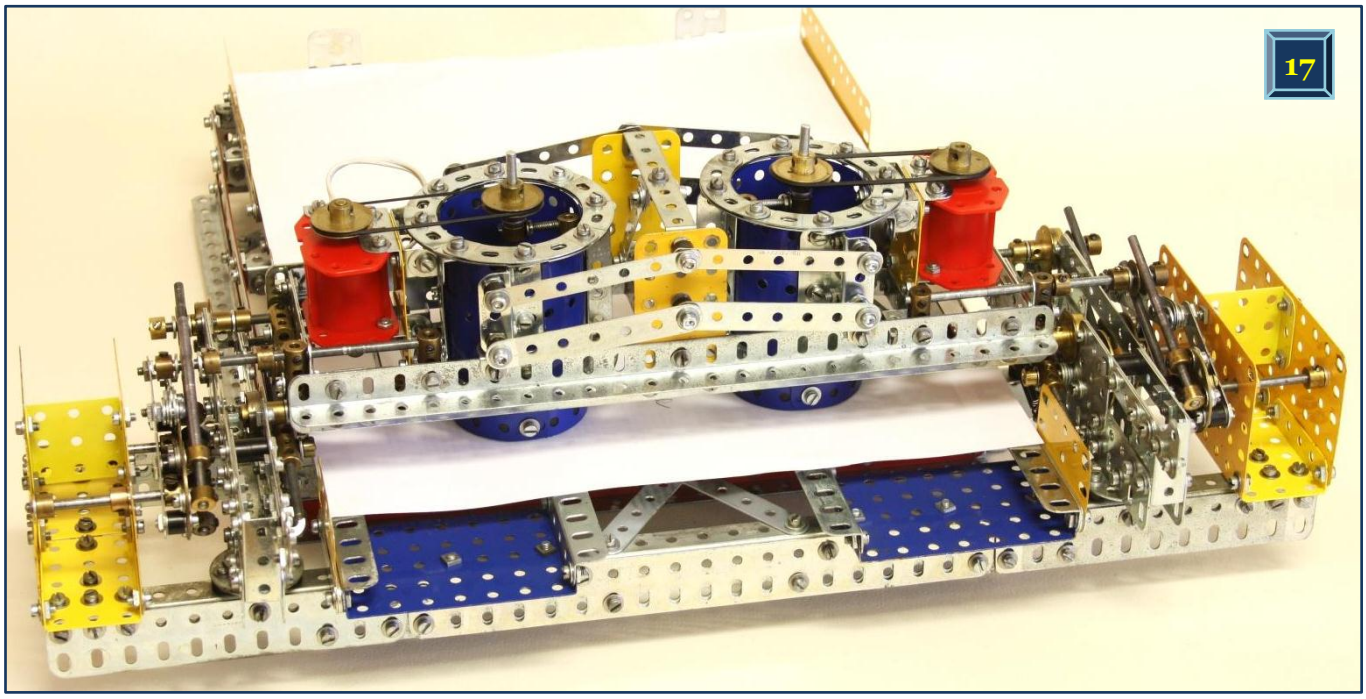
Mark Rolston had rebuilt Joe Attard's American ten-wheel tractor from CQ76 with his own touches. Using 'Watts' industrial tyres and realistic wheel centres, it has the power to pull its laden trailer. Detail modifications were bumpers, footplates, fuel tanks and towing hitches. Bob Seaton went overboard with this model at Skegex for SMGJ127!

With us on his first 'Laughton Day' was **Chris Harris** who had built the No. 8 Set Power Press and on his pet *Doctor Who* theme were three little models of a 'Cyberman', 'Dalek' and 'Bessie' the Edwardian car favoured by Jon Pertwee.


14


15


16

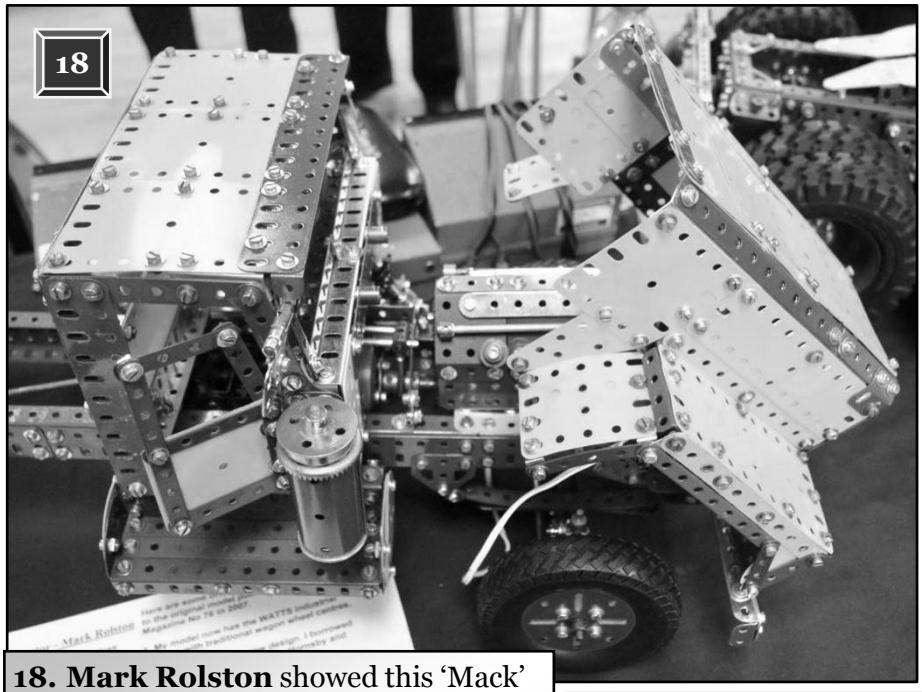

17

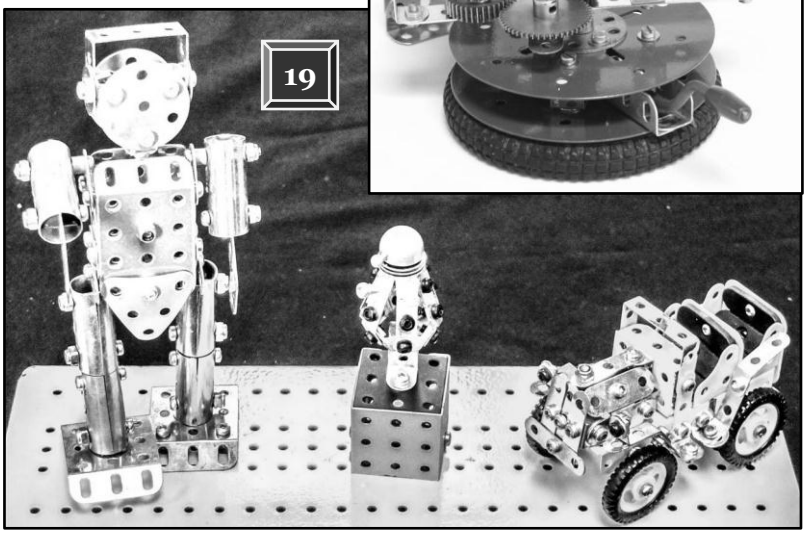
14. Linde side-loader from Modelplan No. 225 was one of a raft of models by **Alan Lovett**. (RM)

15. As the Binns Road factory was stuffed with machine tools, it should be no surprise that Meccano Ltd put some into the Manuals like this Power Press, made by **Chris Harris**. (RM)

16. John Hornsby enlarged some general arrangement drawings to be the right scale to form a template for his AEC 'Roadtrain' and by coincidence, John Ozyer-Key was building one too! (BT)

17. The purpose of this part-made contraption on its first trip out was kept under wraps by **Rob Mitchell** to spare embarrassment should it not work which is a fairly high probability... (RM)





18. Mark Rolston showed this 'Mack' tractor unit. (BT)

19. Completing the NWMG's role in a pincer movement on the SMG (NEMS being the other half!) was **Chris Harris** with this trio of *Dr Who* models. (HK)

20. This 'palmtop' Uranilabe with the first four moons to be found was built by **Rob Mitchell**. (RM)

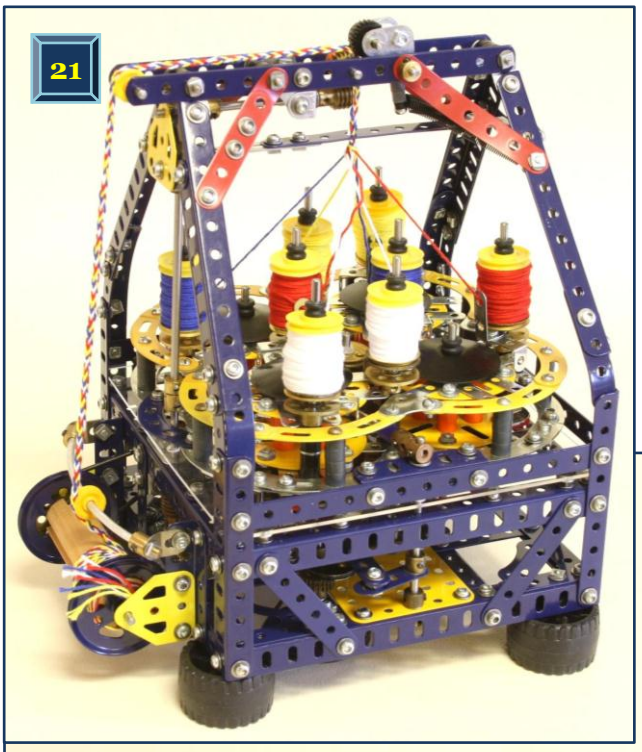
Rob Mitchell almost filled the end tables with the Servetti-designed 'Magician' (now named 'Michael' in memory of our late pal Michael Denny), yellow & zinc No. 8 Outfit ball roller from a Douglas Carson design in CQ112, a little Uranus & four moon orrery (after Michael Whiting, CQ83), No. 2 Clockwork Plutolabe from Pat Briggs' gearing layout in the November 2015 *Newsmag* and a selection of Bell Crank items. Rob's mystery object had a dual fan paper lift - what can it be for? We will know more in April - or will it be scrapped?

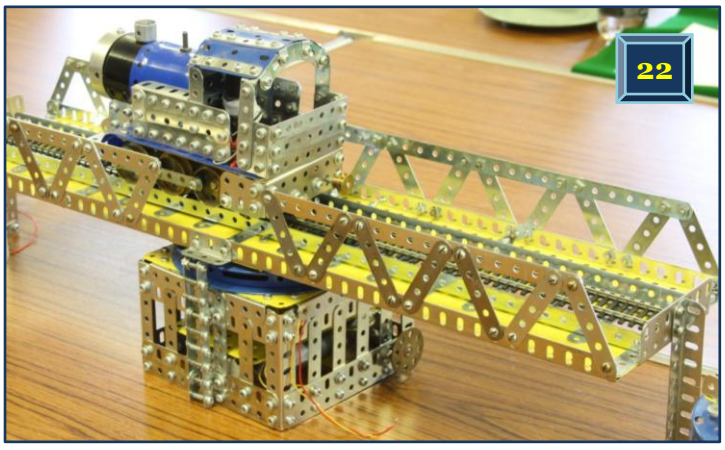
Sharing the end table hotspot was **Stephen Pashley's** little steam navvy in zinc & black with all movements working. See pages 52 to 54 for more on this outstanding model.

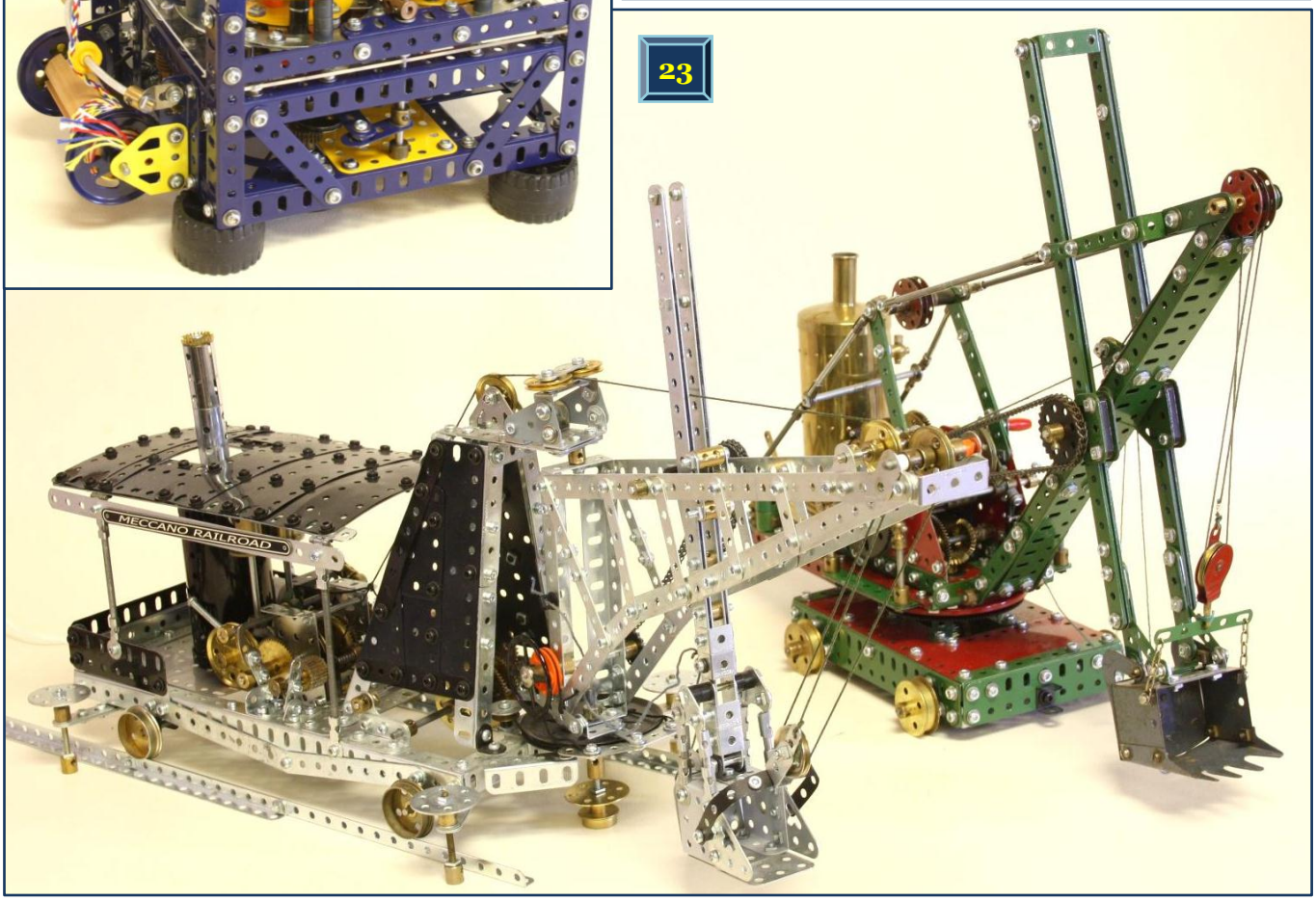
In the shadow of the end tables, **my own** efforts were largely derived from SMGJ126. Graham Jost's travelling braider, finished the previous evening, ran with a bit of prodding - there's a long way to go before I hit GJ's heights of reliability! I had also tackled Bob Seaton's table football game, eschewing the 'goalie on a stick' in favour of mounting them on a rod as per the other players. A tweak was to point the goalie's arms skywards so it looked like he was making an effort! My Hunslet Channel Tunnel rack loco made its first appearance after its trip to CAM at Calais.

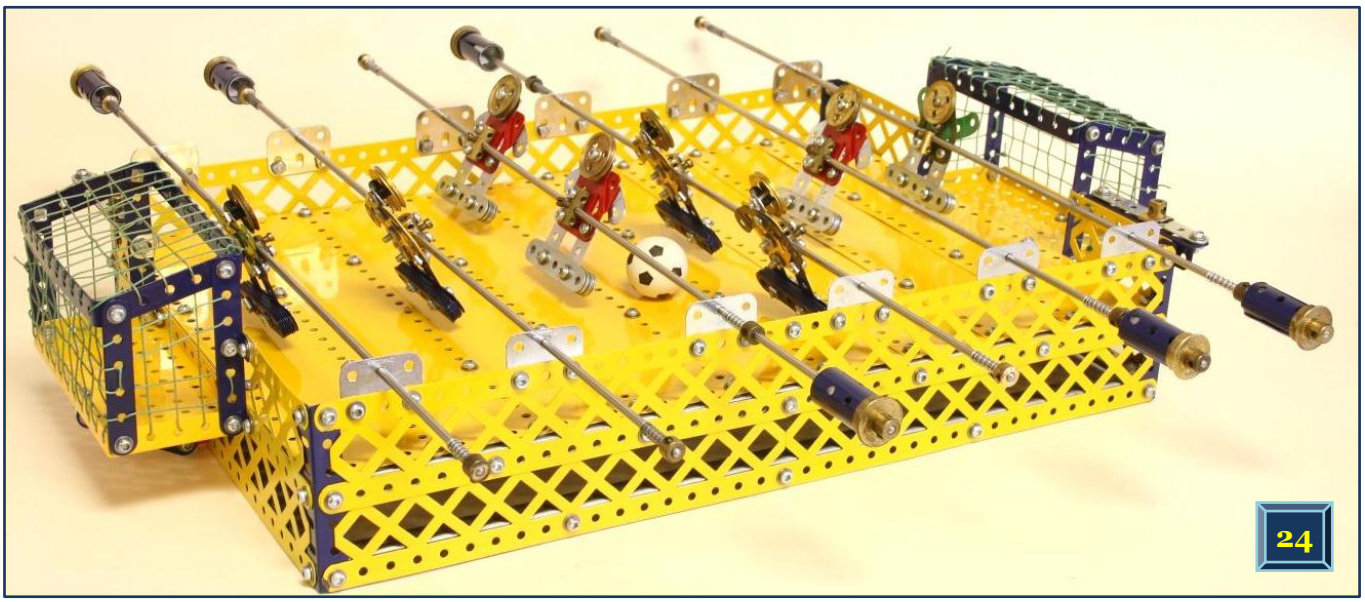
Russ Carr

Thanks Russ and now to John Bader who picked the other island.


21


22


23
MECCANO RAILROAD


24

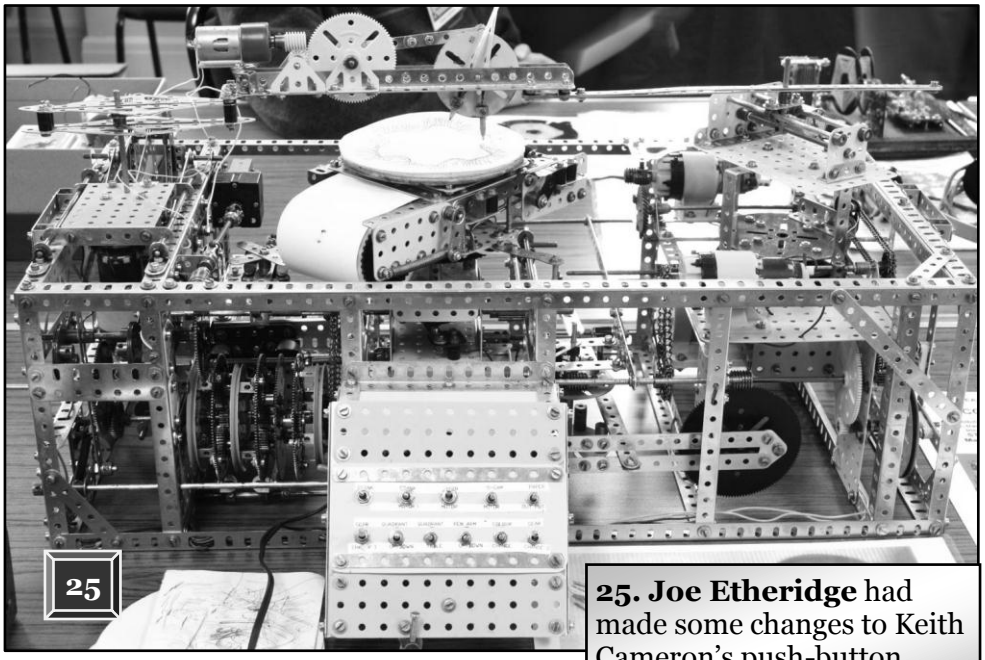
21. Graham Jost's article in SMGJ126 wasn't intended to be a constructional item but was of sufficient detail and quality for **Russ Carr** to build his own without too much fuss (page 54!) although a somewhat lumpy initial performance was transformed by a touch of oil. (RM)

22. John Rodgers seems to have reworked his Breydon Water Viaduct more often than the real thing had rivets! Not a simple model by any means with the automation he's included. (RM)

23. It was **John Hornsby's** idea to pose his own steam excavator (on the right) alongside **Stephen Pashley's** small-scale Dunbar Ruston machine (on the left). (RM)

24. Russ Carr failed to resist (a) building his way through SMGJ126 and (b) copying Bob Seaton's novel footy game while, oo-er, correcting some major design flaws in the process… (RM)

Having been excused model reporting for ages I thought it was time to redress the situation and do my bit so without further ado let's get started.



25. Joe Etheridge had made some changes to Keith Cameron's push-button Meccanograph. (RM)

John Rodgers had his work-in-progress model of Breydon Water Viaduct, a now-gone type of swinging bridge which was first raised before moving. I was rather taken by the little blue 0-6-0T engine reminiscent of 'Thomas' which ran across the bridge and could be turned round for its return journey by means of an automated turntable at either end. Between the Meccano rails was some 'oo' track with a Hornby 0-4-0T.

In the NEMS area was **Joe Etheridge** with a multi-motored Meccanograph. All the usual movements plus a few more were powered and controlled by a switch panel at the front. An Elektrikit-operated epicyclic gearbox provided four different table speeds and an interesting mechanism could present a different coloured pen into position for use.

Albert Howe seemed rather preoccupied with a plate of sandwiches but still found time to explain his Bell Crank Engine of 1799 by William Murdock who worked for Boulton and Watt. The model was to a design by the late Brian Rowe and Albert built his in pristine yellow, dark blue & yellow with some red; it ran very smoothly and quietly.

Alongside was Albert's chum **Brian Chaffer** who was also enjoying ham sandwiches. He demonstrated his latest model of a Caterpillar skid-steer loader which looked very prototypical in yellow, black and zinc. The model was remote-controlled and all its functions were operational.

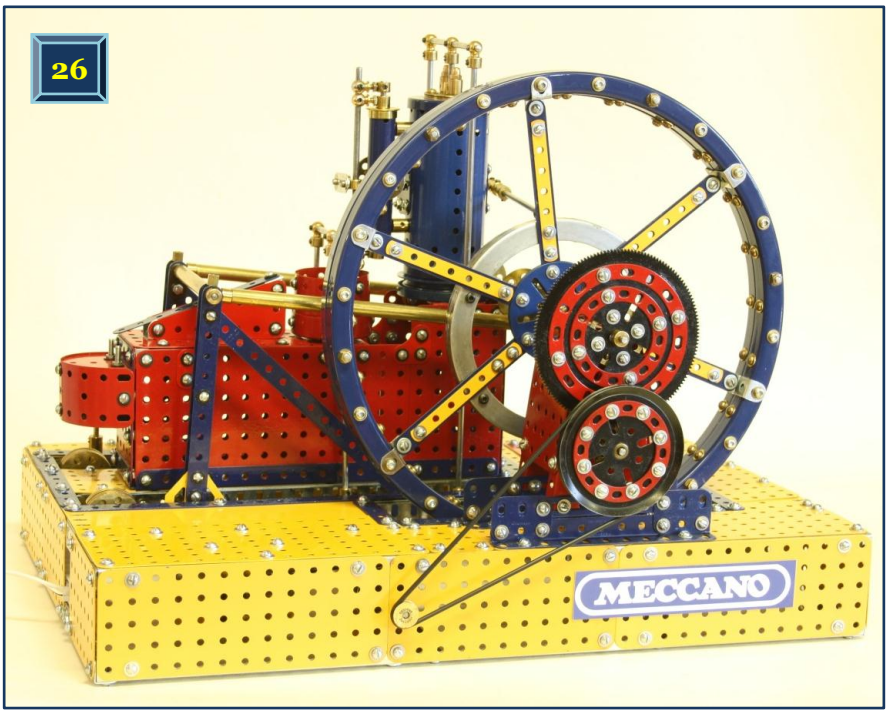
Colin Milne, caught between his soup and a bun, showed me his 'Tintin' seaplane and Jeep and his 'Red Arrows' jet. He had a small engine modelled in zinc and green parts too.

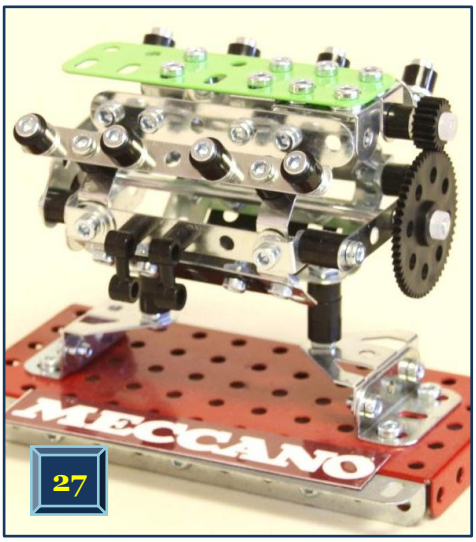
Completing the NEMS contingent was **Barry Richardson** (who had decided on a 'meal deal') with the 19th Century Kientz single-cylinder oscillating engine attributed to David Whitmore. This model was resplendent in a variety of colours and was described in CQ18.

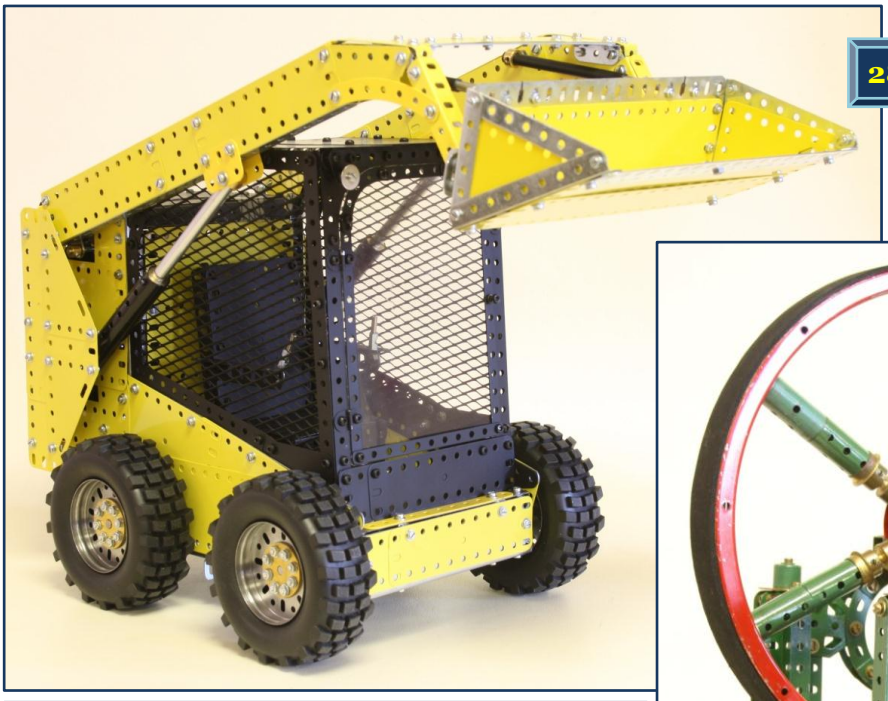
Tea-break over, **David Wilkinson** busied himself with the tower crane from one of the recent sets. Various modifications had reduced the slewing speed and improved trolley travel reliability. David also had Konkoly's centrifugal intermittent motion mechanism from a 1975 *Meccano Engineer*.

Who's next? It's **George Roy** with a zinc and blue car from a 2016 five-model set. He said the plastic Strips seemed to be quite durable for repeated use although, strangely for a set designed to build cars, there were no seats or steering wheel amongst the parts. George also had a four-wheel drive vehicle with the new geared Motor from a 25-model set.

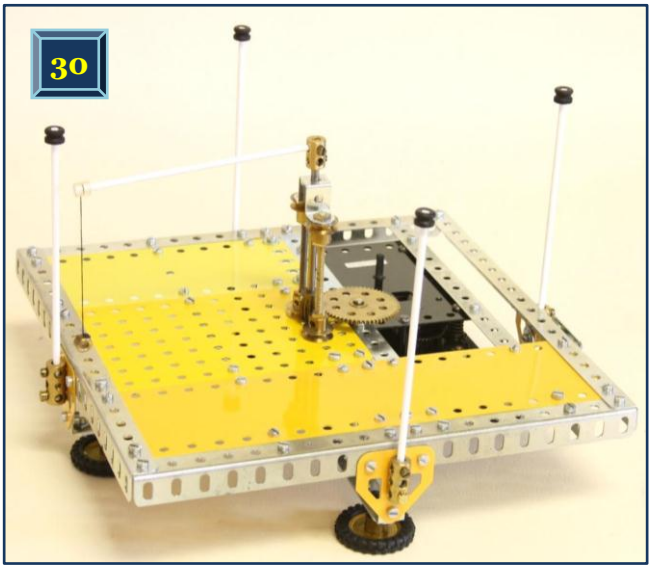
I didn't see **Roy Smith** but his medium red & green Mechanical Horse with Trailer from the 1955 No. 9 Manual was very smart. He had added a few


26
MECCANO


MECCANO
27

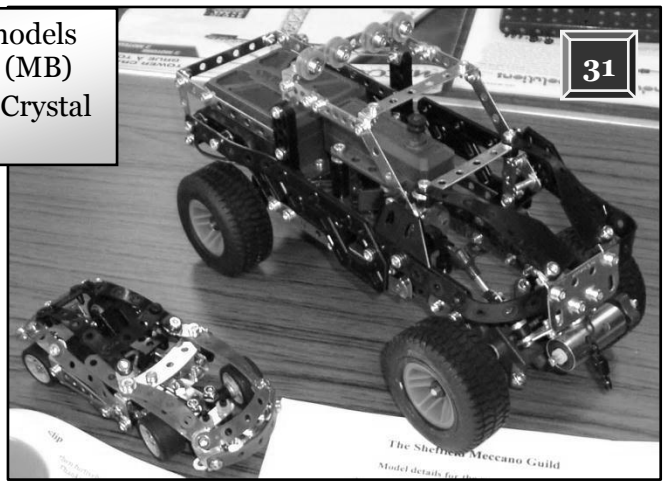

28

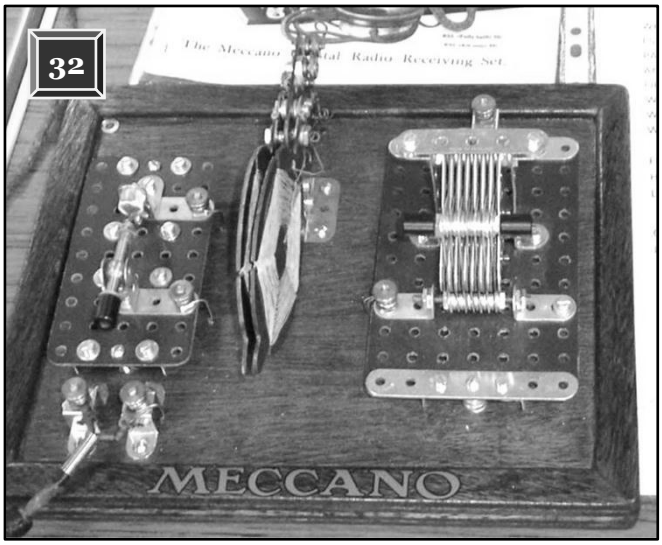

29
MECCANO


30

26. A pioneering steam engine from **Albert Howe**; is there a motor in the base, Mr Howe? (RM)
27. This skeletal V8 engine was one of several models presented by **Colin Milne**. (RM)
28. Two views of **Brian Chaffer's** latest constructional exploits and as he also included remote control, he was happy to put it through its paces. (RM)
29. Dr David Whitmore should be pleased with the number of times his model has been replicated since publication in *CQ* and one of the latest to tackle it was **Barry Richardson**. (RM)
30. Also enjoying continuing popularity is Andreas Konkoly and surely one of his most-built works has to be the centrifugal intermittent motion; **David Wilkinson** had a go too! (RM)

31. Two just-in-from-China models swiftly built by **George Roy**. (MB)
32. Brian Harper's replica Crystal Radio really works! (MB)





embellishments and provided a door on the cab nearside as well as arranging both doors to open the right way round. How careless of Binns Road!

Paul Furness showed a freelance and mean-looking 'Hot Rod' in zinc and light blue parts, the latter from various newer sets. The independent front suspension was very rugged and efficient.

Ken Ashton must be having a change from building large and complicated steam plant. His model of steam-driven tilt hammers was based on a 5½" x 2½" Flanged Plate, although I spotted various Helical, Bevel and Contrate gears in use.

Brian Harper's home-grown Crystal Radio Set (SMGJ124) was back on air again after necessary repairs due to a mishap. It can receive a few programmes from the lower end of the medium waveband and is now kept in a stronger box!

Another Bradford lad is **John Wilson** who demonstrated his latest work, a splendid recreation of a Newcomen Engine complete with all the pipework and valve events for which he... [Ed. Expurgated for now!] ...and is featured in a grand scale elsewhere in these pages.

John Bader

Good work John and the reins are now taken over by your pal, Paul Robertshaw.

Right, my turn and I covered the row from stage to entrance door.

At the end was **Ian Brennand** who always has something of interest. The model was a 1933 Citroën 'Petite Rosalie' which broke 132 international endurance records to prove the quality of Citroën's products. The model was mainly from reclaimed Meccano and looked stunning with lots of detail which included steering and period friction suspension; it was then painted in the correct colours with decals to match. Ian's display was finished by a stand showing the history - a pity the builders were not there to see it.

Bob Watson had his 'ever-expanding wares' and you can't help wondering - is he a builder or dealer? (I was tempted until I saw the price - sorry Bob). His nickel omnibus was similar to the one on the March 1979 *Model Engineer*. I liked this model, especially as it used wooden Primus parts for seats. Lots of detail had been added to the cab and interior and an open stairway to the rear made you want a ride on the top! Mounted on a polished wood base, it had a button to make the Spoked Wheels go round. Another interesting model was his minibus from a 60s Manual and Bob made it his own by painting it a two-tone light blue and white.

My next Meccanoman was **John Sinton** with a table of eye-catching medium red & green models. Two of them were a Slotting and a Shaping Machine. I have seen these many times in the Manuals but John brought them to life with a

➔➔ A Bevy of Bell Cranks: 1 ➔➔

We enjoyed a respectable response to the just-for-fun subject of making novel use of Bell Cranks, parts which tend to languish unloved at the bottom of many a Meccano collection. With the dust wiped off, they caused your writer less angst than Girder Frames in 2015. Some, however, pushed their luck by pointing at a 128 buried in a model and working as an 'L' lever in flagrant violation of the blatantly unenforced rule against their obvious use! More round-the-bend models can be found on page 64.

BC1. No contest was involved which was just as well because **Russ Carr's** 'Belle Cranks' would have ra-ra-raised the bar! Four Obtuse Brackets and Slide Pieces later, these lasses even wore high heels.

BC2. The Internet states Laughton-en-le-Morthen and Bentleigh East to be separated by 10510 miles (16914 km) but that didn't stop **Graham Jost** chucking this Bell Crank mechanism into the fray; this is the 'escapement' in his bell er, ball roller which despite its provenance, worked very bell er, well.

BC3. Tucked between the 1" Triangular Plates on the legs of **John Rodgers'** automatic turntable is a vertical 128 (arrowed) acting as the naughty 'L' lever in the limit switch!

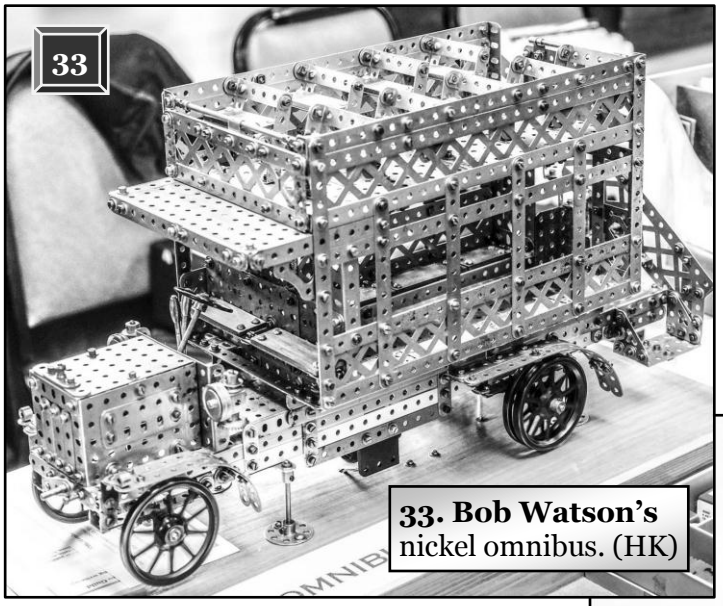
BC4. With a pair of WRI replica Simple Bell Cranks (and three bossless Pawls), **Rob Mitchell** had managed to cobble together a somewhat underfed, two-dimensional and deformed rhino.

BC5. Adorning the flat bed of **Roy Smith's** gleaming No. 9-based 'Scarab' was another rule-mangling application of two ganged 128s.

BC6. Bob Seaton was also inspired by two WRI 127s to build a two-dimensional animal, in this case an emaciated camel made to gallop flat-out by a Magic Motor, the only animated model in the theme.

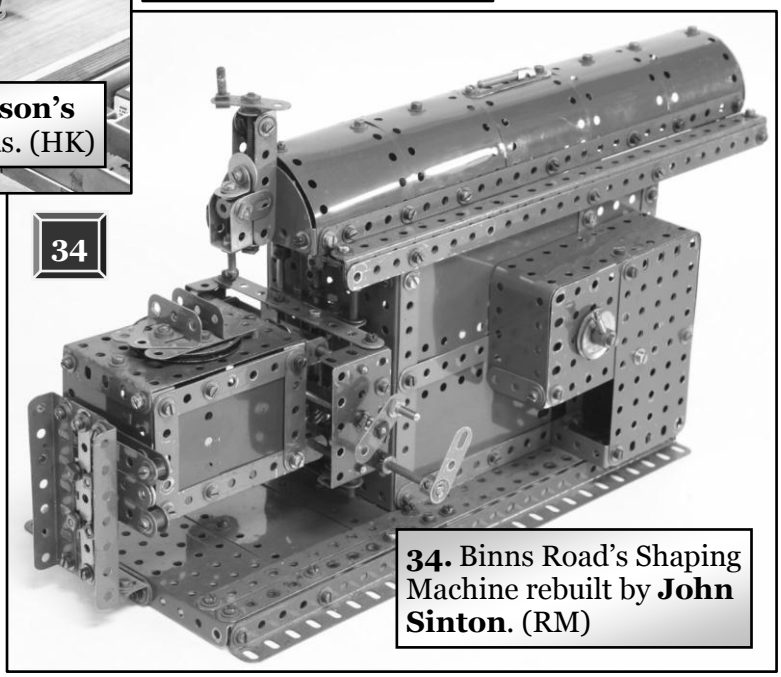
BC7. Ding-ding, dinnertime! **John Wilson** must have been so consumed with hunger that he 'forgot' to not use a Bell Crank as Meccano originally intended...

BC8 (below). Hmm, there must be a way of using those 'root two' end holes thought **Rob** and after, a 20t Pinion at the heel was engaging a 50t Gear via a 56t idler to yield 2½:1 with vintage parts; by adding two more 2:1s, the enthusiast of a century ago had 10:1. Add a 25t Pinion and the ratio is 1¼:1.



33. Bob Watson's nickel omnibus. (HK)

Guided by a 1:18 die-cast model, his scale was 1:4.2 and, as usual, was determined by the wheel diameter. Looking closely at them, they were dog chews! Never mind those expensive ashtray tyres which take for ever to motor and it is surprising how much more interesting a model looks when working. Another was the 1951 No.7 Refuse Vehicle with the roll-on & off container which had been made to work better as is the norm with Meccano's own models! A further model was a No. 8 Road Sweeper; he may rebuild it with improvements. John's next loco was also taking shape; one of the boxy electrics that used to ply the Woodhead line.

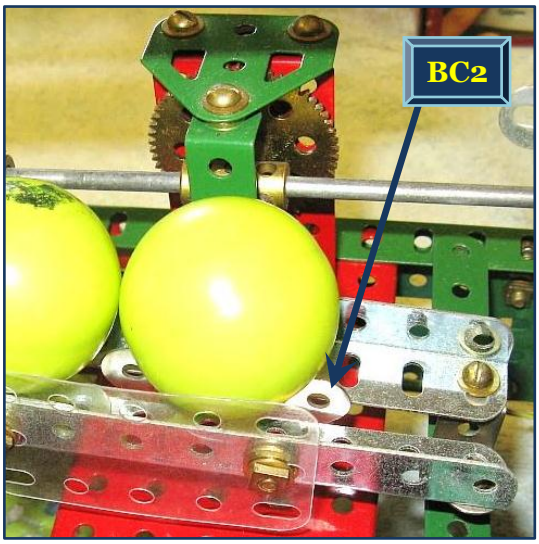


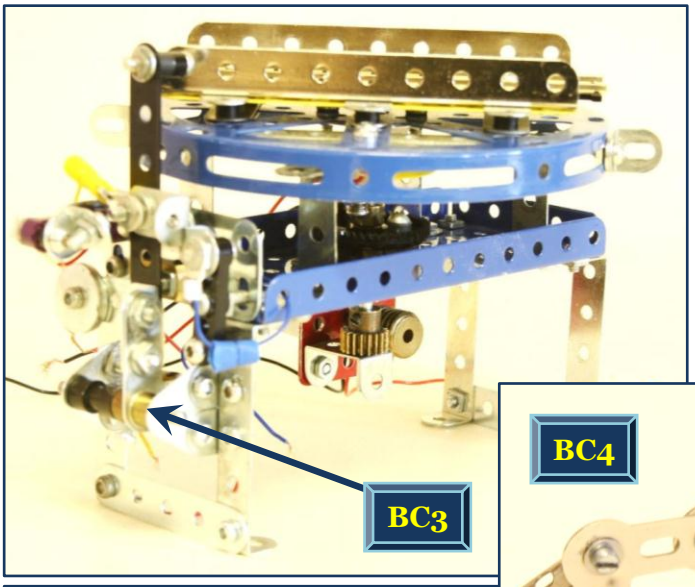
34. Binns Road's Shaping Machine rebuilt by **John Sinton**. (RM)

Gregg Worwood's 'Defender 110' Land Rover was stunning with its red, green and yellow setting off the model perfectly.

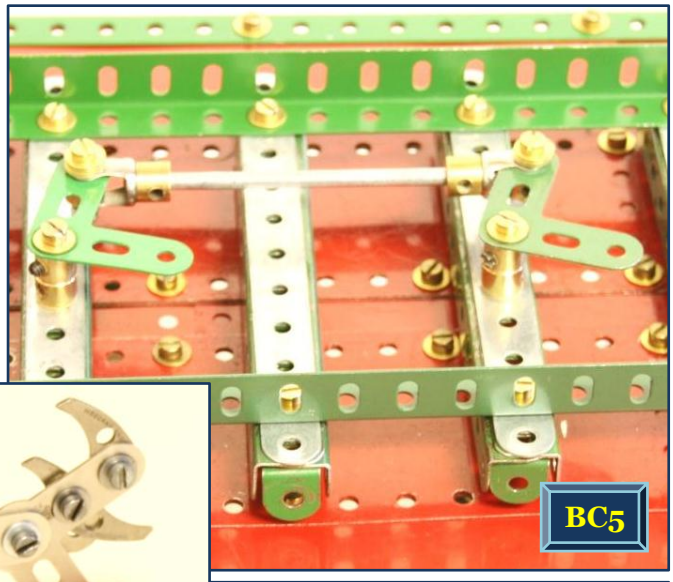
A Bevy of Bell Cranks: 1

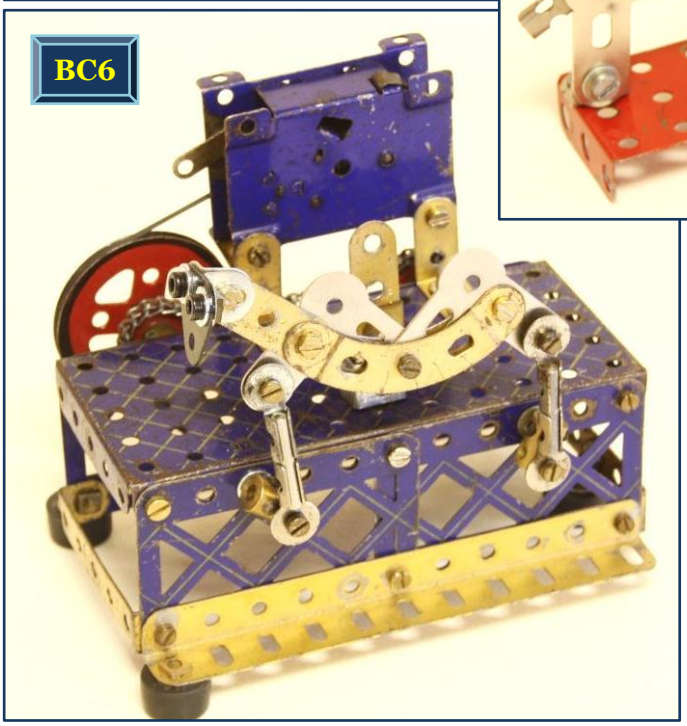
BC1

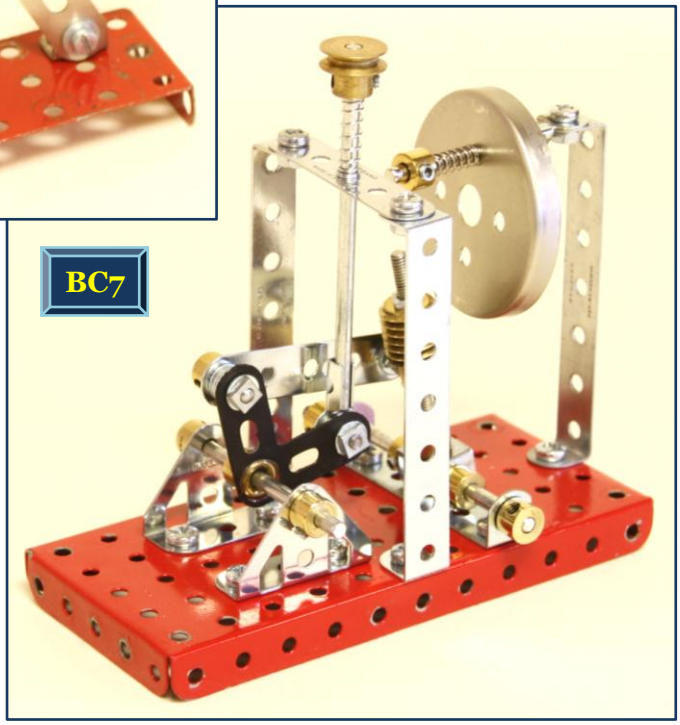

BC2

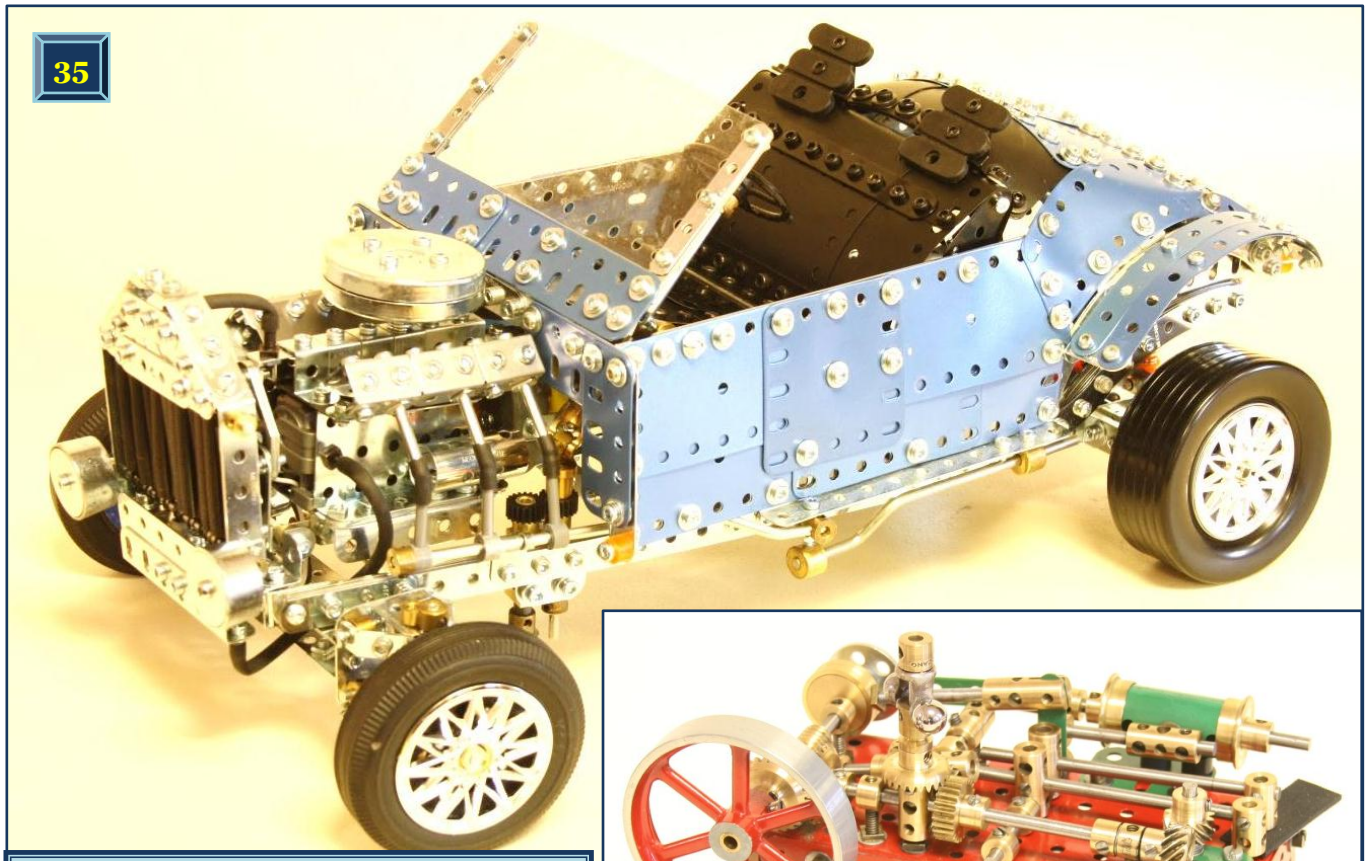

BC3

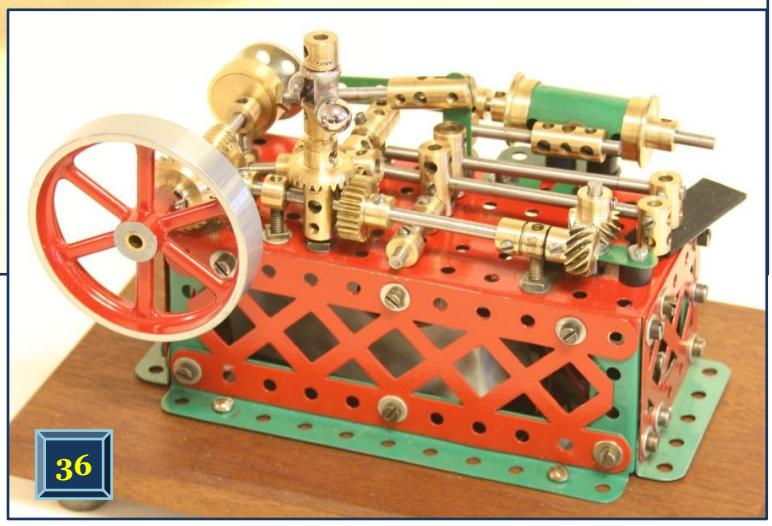

BC4


BC5


BC6


BC7

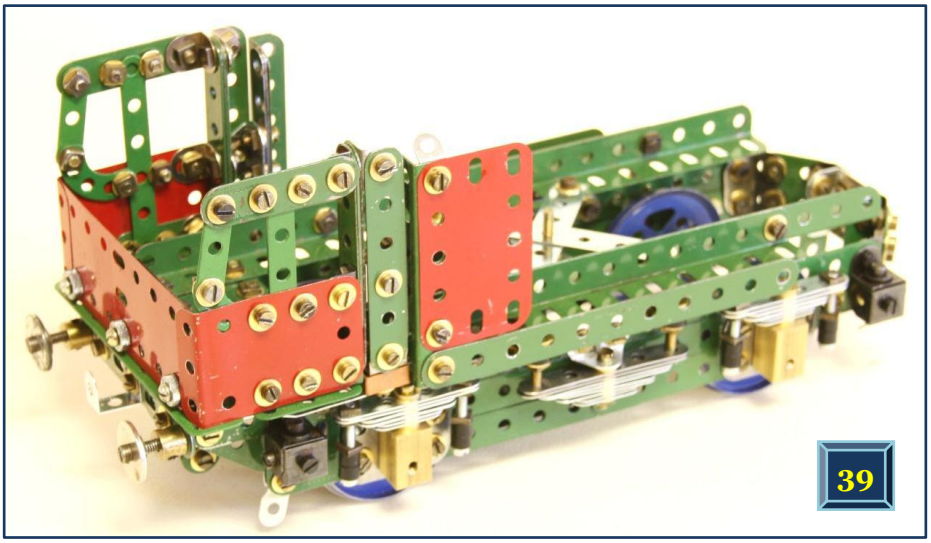


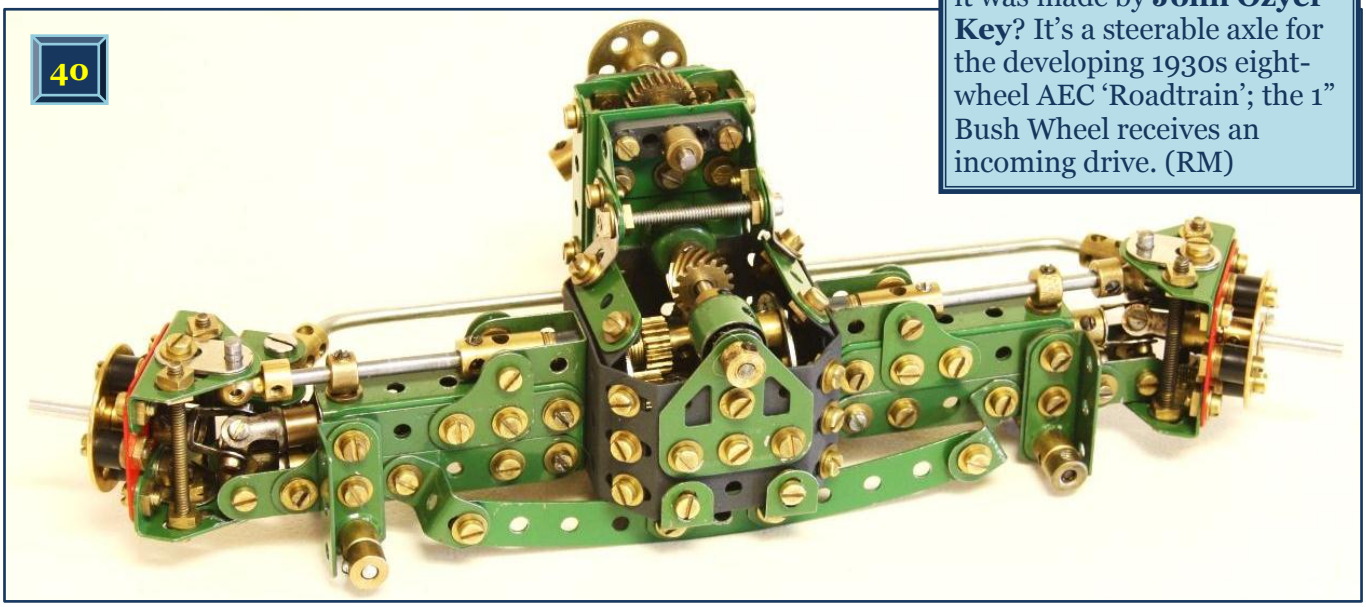


35. A 'Hot Rod' from **Paul Furness** who had combined time-honoured methods with new parts such as those funny-shaped Flexible Plates. (RM)

36. Ken Ashton's self-confessed 'Coffee Table Nonsense' saved him from staggering into Laughton Village Hall under the weight of his usual fare! (RM)

37. Ian Brennand's 'Petite Rosalie' certainly created an e-stir in the wake of her debut at Laughton. (RM)



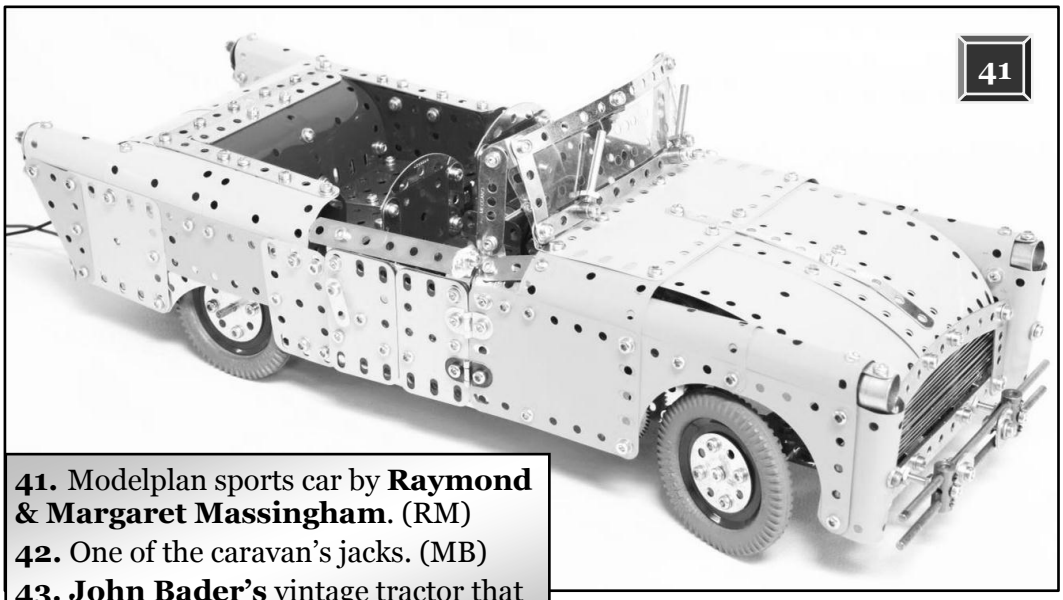


38. A commanding view of **Gregg Worwood's** Land Rover 110, complete with a set of chewable tyres. (HK)

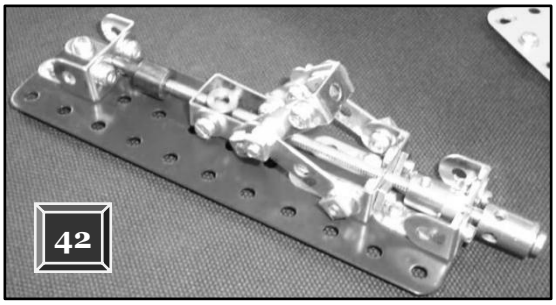
39. The twin-axle bogie shows **John Sinton** to be tackling an LNER EM1 (later BR Class 76) as used for mixed traffic and freight trains on the Woodhead route between Sheffield, Wath and Manchester. Passenger locos had three axles and were EM2, Class 77. (RM)

40. With this standard of construction and subject matter, do you need to be told it was made by **John Ozyer-Key**? It's a steerable axle for the developing 1930s eight-wheel AEC 'Roadtrain'; the 1" Bush Wheel receives an incoming drive. (RM)

collect - bang on some tyres with bone treads. It brimmed with detail and included a driver to put the model through its off-road paces. Gregg added that it had been built in conjunction with the commemoration of 68 years of Land Rover production, the final one leaving the factory in January.



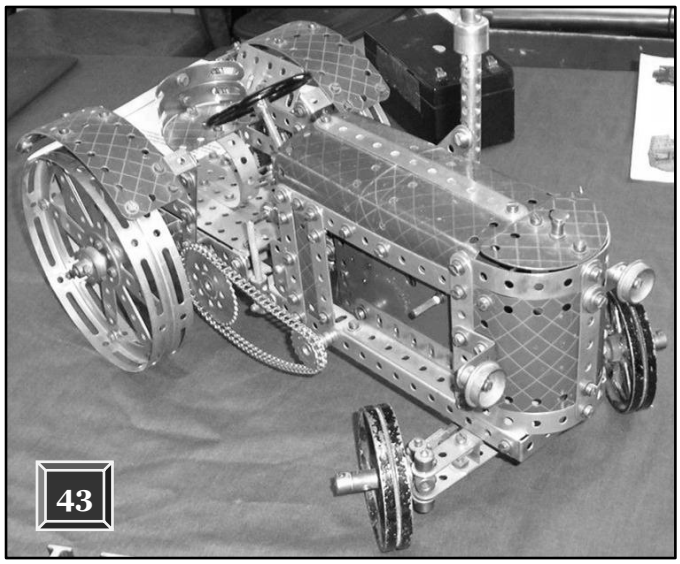
41. Modelplan sports car by **Raymond & Margaret Massingham**. (RM)
42. One of the caravan's jacks. (MB)
43. John Bader's vintage tractor that Paul found to be so captivating. (MB)



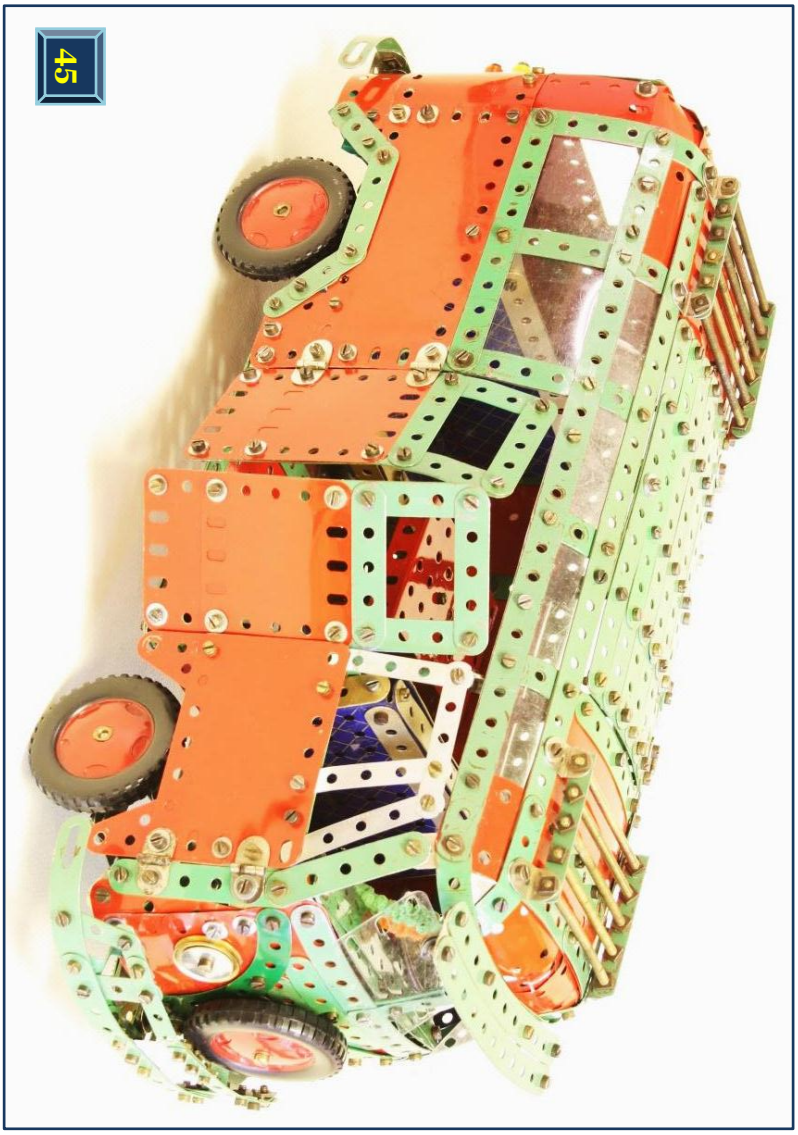
John 'big model' Ozyer-Key showed his Tatra 8x8 Pipe Carrier and as usual for John, it all worked beautifully. Steering, eight-wheel drive, crane... it had the lot and if he were writing this then he could tell you much more about the workings than I could. This model is complicated to say the least and I always like to point to some obscure bit in the depths and ask "What does that bit do?"; John then laughs and says "It's the gangle pin push rod" or something. I have seen this model before and it is fascinating to watch the pipe-lifting malarkey and see the gears whizzing; far too complicated for me but a brilliant model. Did John say it took three years to build? Better not take it apart! One drawback - he forgot the pipes but had some sales so I had a rummage.

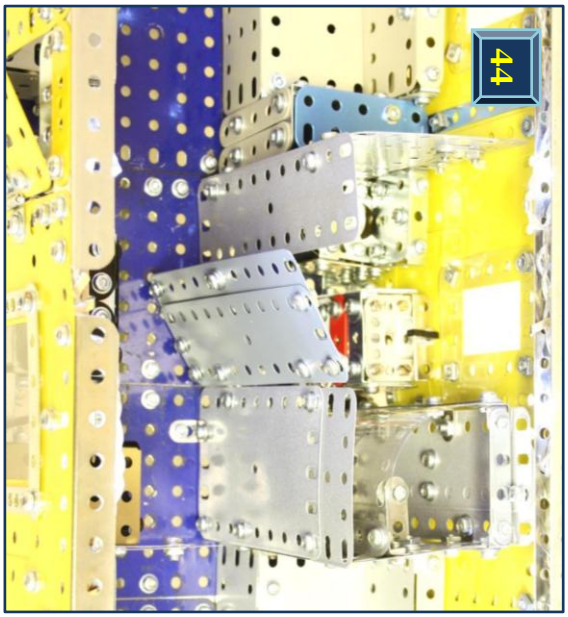
Raymond & Margaret Massingham were next with a sports car and caravan. The latter was in light yellow and had loads of detail; stabilizers, torsion bar suspension and a coupling for the tow hook. Inside was the Coachman 'Vision 570' layout with shower room, washbasin and loo. The swivel taps were guns from the 'City Police' set and they looked very swish! It also had lighting, a kitchen, seating and all the caravan luxuries. A certain J Bader remarked how well the cludgie looked - I think this is Scots for loo... [Ed. Meccano can be so informative!] Moving to the car, it was based on Modelplan No. 216 by Alex Barker which, I think, is an update of No. 10.29. It had a clutch, three-speed & reverse gearbox, differential and brakes. They made an attractive combination which was photographed by many including myself.

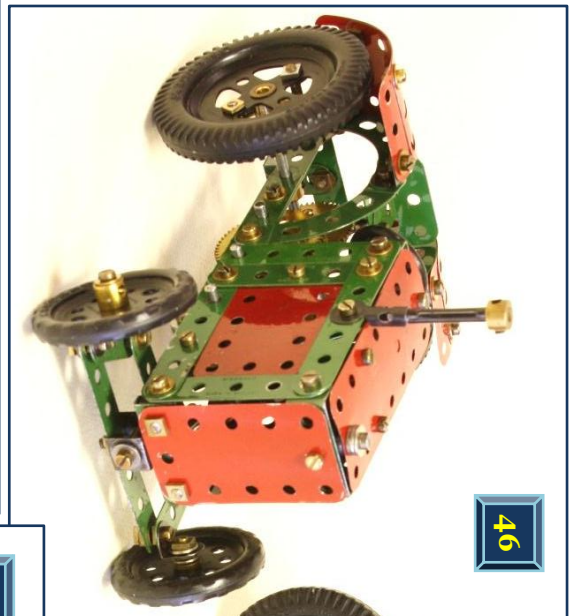
After the Massinghams was my mate **John Bader** with his tractor - not any tractor but one examined by everyone. It had a combination of nickel with blue 1930s Plates which go together really well. Front wheels were Flywheels which looked the part and were a good scale. Back wheels were four (yes, four!) nickel Hub Discs - that's showing off as how many decent nickel Hub Discs does anyone have? The tractor drove itself via a nifty thin differential tucked inside a rear wheel.

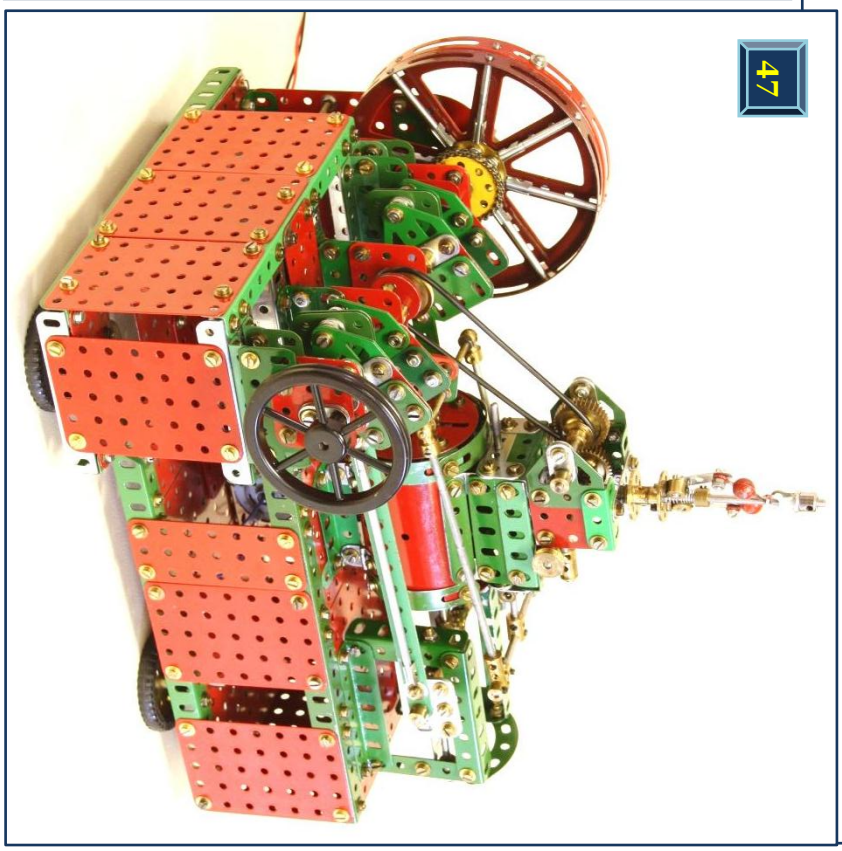


44. Some of the creature comforts in **Raymond & Margaret Massingham's** caravan. (RM)
45. Paul Robertshaw was so taken in by Philip Webb's VW minibus that he nicked oops, er, borrowed it, built his own as a 'Samba' camper then handed back the original. (RM)
46. Two 1950s *MM* models, a momentum-driven tractor and motorcycle, by **Mick Burgess**. (RM)
47. Brian Rowe's model of a Bray side-rod engine was built by **Les Nightingale Snr**. (RM)


45


44


46


47

48. Dave Stanton was clearly smitten by one of Bert Love's alternative models for the 'Army' Multikit which was published in CQ16 as part of Bert's *Tanks a Lot!* Series. (RM)

49. This unassuming little model of a Blackpool Tram on Hornby track was one of your Ed's favourites at Laughton; **Iain McKenzie** was the one responsible for its construction. (RM)

50. Probably the least-seen of International Rescue's equipment has to be 'Thunderbird Recovery Vehicle 1' and its builder, **Tony Seed**, wrote *It was seen in only one episode, 'Pit of Peril' from the first series of the original TV show where it was used by Virgil Tracy to rescue the crew of the 'Sidewinder' army vehicle. The Virgil model is a 'Matchbox' figure.* To Tony's mirth, one of our number thought it was International Rescue's emergency drain blaster… (RM)

51. Tony said that his model involved no gearing although this detail of the bulbous rear definitely shows a 26t Bevel in the centre! (RM)

52. Doreen McKenzie keeps an eye on **Barrie's** collectible-festooned dredger. (HK)

Steering was light and a black 2½" Steering Wheel finished it off; I do like a nice tractor so next time, bring another key, JB… It was in SMGJ119 with the complications of building and lots of photos; a very tidy model.

Last was **yours truly** with two models, the first an AEC single-deck bus in red & green. This has been to several meetings and is a good example of an *MM* model. It had all the usual stuff like seats and steering while a 'Powerdrive' under the bonnet drove the back wheels via a differential. I like half-cab buses as the entrance and steps remind me of the rides to school when I was a lad. My second model was a VW camper in light red & green, representing a 1960s 'Samba' with windows along the roof. It had an engine compartment, opening doors, seats with table, steering and a motor at the back to drive the rear wheels. Credit goes to Philip Webb who designed then loaned his model to help build mine. Sorry for keeping it so long, Philip!

Paul Robertshaw

Thanks Paul and you were tons better than the preceding reporter! Bob Seaton has our finale.

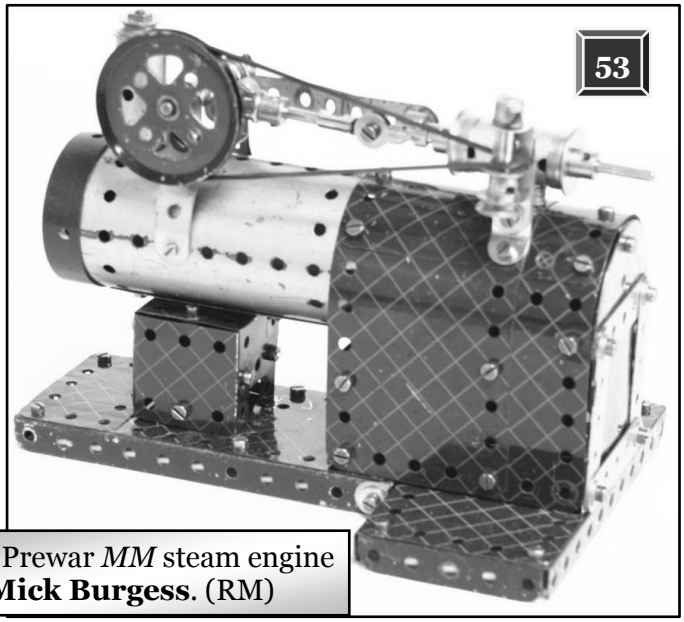
I will begin at the left-hand corner with the **LMS** proprietor and her sumptuous array of all things Meccano. It would appear that the location is no accident, being extremely handy for customers queueing for refreshments and who are easily distracted as I found to my cost (more blue & gold!) Always a pleasure, especially the haggling…

Mick & Frances Burgess had a fine collection of smaller Outfit models and, for sale, an attractive blue & gold No. 6 in its original box. In no particular order, Mick's models were: an ocean-going tugboat in yellow & zinc from a Bert Love model in the January 1977 *MM*; a blue & gold Overtype Steam Engine (April 1938 *MM*); a Motorcycle & Sidecar (July 1952 *MM*); Momentum Tractor (August 1953); Delivery Van (November 1964); Observation Coach (1962 No. 3.6) in yellow, black & silver; an Army green Jeep (1962 No. 1.6); a blue & gold Horizontal Steam Engine (1937-67 No. 4.22) and, in a range of blue parts from all ages, a Saloon Car (April 1948 *MM*).

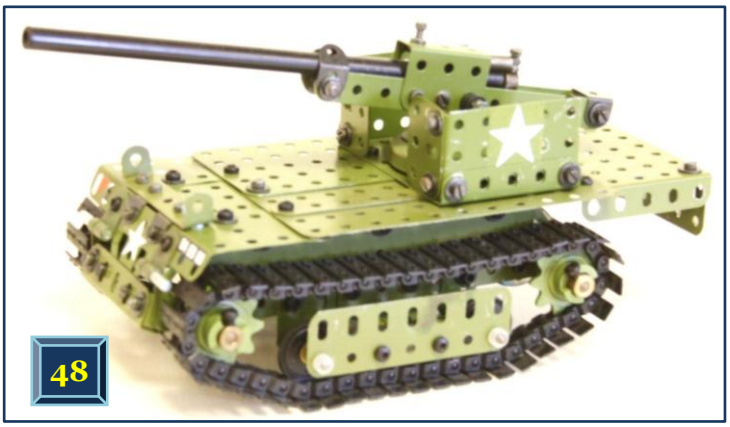
Next were the **Nightingales**, **Anne**, **Les & Les Jnr**, the renowned and capable family of modellers and demonstrators. In pole position was a rebuild of a Konkoly No. 1 Meccanograph, controlled by Anne to produce designs previously requiring three machines. Les Snr had a Bray side-rod engine from drawings by the late Brian Rowe and Les Jnr had a four-plank railway wagon from Modelplan No. 109B.

Now to the **McKenzies**: our President **Barrie**, **Doreen** and **Iain**. They had three models: a bow well dredger in 1920s red & green and sporting at least two dozen Dredger Buckets and an even rarer Standard Lamp from a Lighting Set, a motorized Blackpool Tram with overhead pick-up in yellow & silver and a Jeep using 'Army' Multikit parts.

To the left of the McKenzies was **Dave Stanton**. Dave showed a current model of an excavator in black and yellow parts and utilising the latest version of the plastic Caterpillar Tracks; a non-motorised self-propelled assault gun (should that be hand-propelled?) built from an 'Army' Multikit

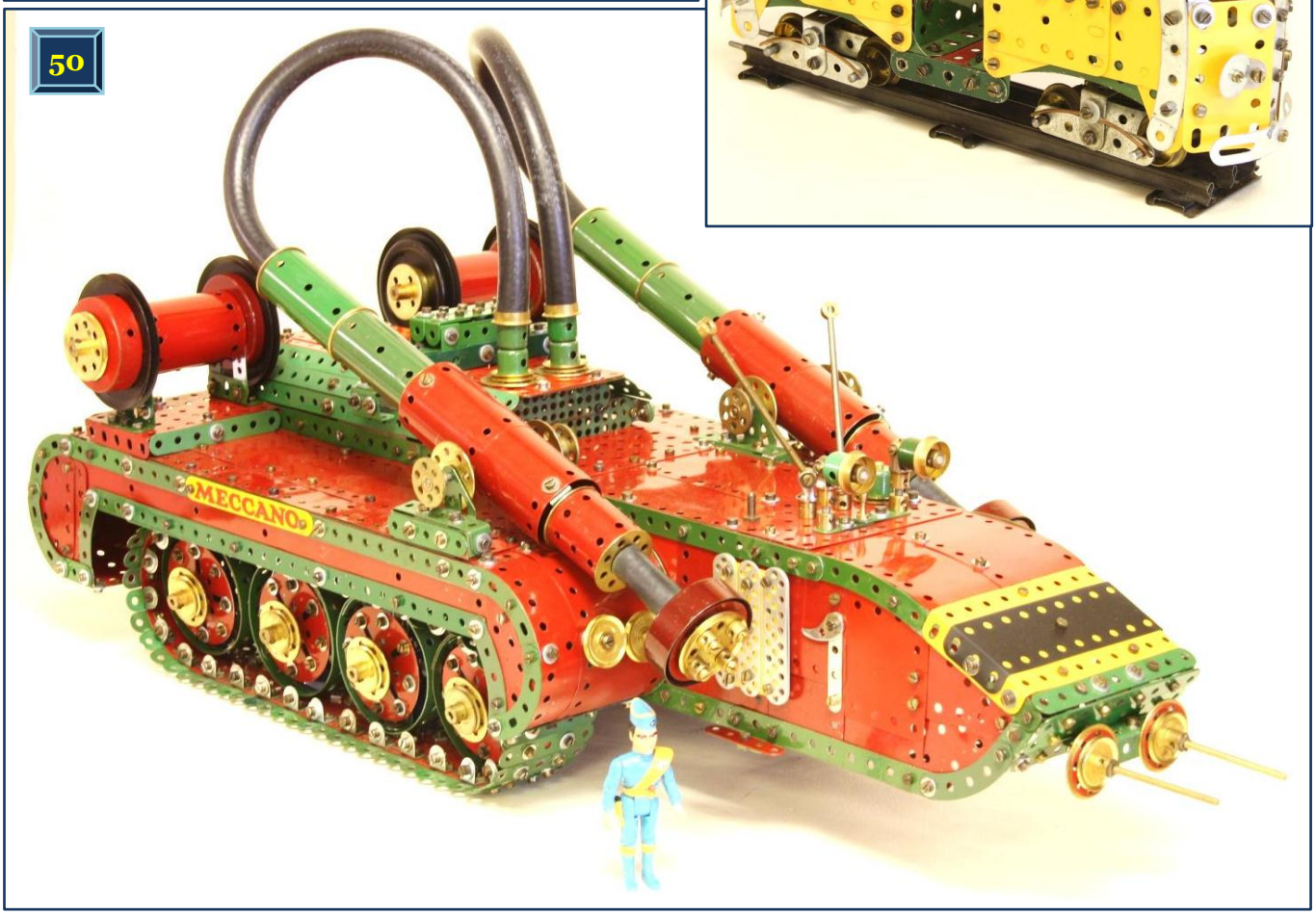


53. Prewar *MM* steam engine by **Mick Burgess**. (RM)



48

49



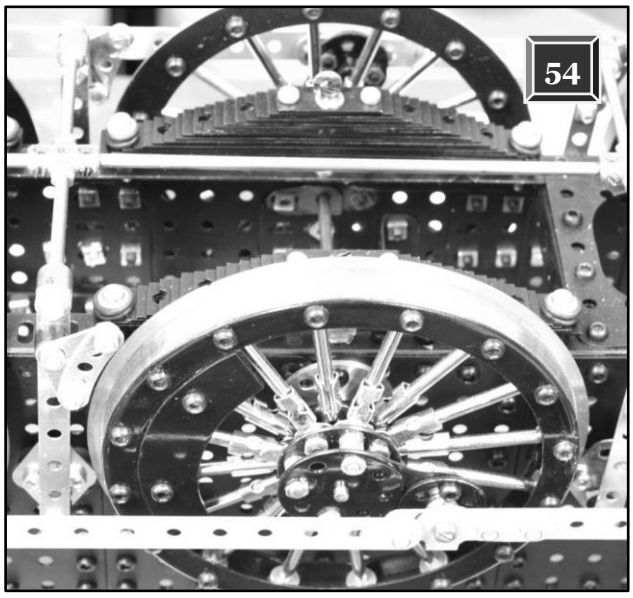
50

51

52

and a low-loader with Boiler load. This model was based on one in a *Newsmag* and was first shown in incomplete form at Laughton in 2015.

Next was **Rob Miller** with his 'Hanging Monkey' from NMMG Constructorproject 49 where the unfortunate primate desperately tried to reach a bunch of mouth-watering bananas hanging at the opposite side of the frame. Hand over hand, he inched forward on a string only to end up where he started as the string also moved! [Ed. Rob is pictured on page 4 (picture **6**) feeding his pet with 'AA' batteries. About halfway through the morning, a whiff of burning was sensed which was traced by John Rodgers to shorted batteries - probably that lot scattered on the table!]



54. One of the driving wheel axles on **Bob Seaton's** inverted 9F shows that he has recently fitted springs and brakes, the latter from wantonly hacked modern parts… (RM)

On Rob's left was **Tony Seed** whose eye for detail is his trademark. Inspired by the original TV model of 'Thunderbird Recovery Vehicle 1' (and involving the purchase of a Dinky Toy to copy), this model was a serious attempt to capture the aesthetic and scale of the 'prototype' which was carried in a 'Thunderbird 2' pod. Tony said "I feel using Meccano has added a powerful military feel to the actual craft. I suspect the 'Thunderbirds' were never expected to represent realistic vehicles - those hoses [looking remarkably like Morris Minor heater hoses] would have been massive in reality! As a child I cared not and present another static model that hopefully captures the spirit of the original. Now, do I build Thunderbird 2 at the same scale?" The answer to that is, of course, "Yes!" and you have only yourself to blame…

In Tony's shadow were **my** offerings: a 'work in progress' model showing the frames and driving wheels of *Evening Star*, presented upside-down to reveal the springs, brakes, linkages and other constructional details. Also present were the Portly Robot family, now complete with dog and fresh from starring at Skegex (!); an office chair from a 1950s *MM*; a blue & gold lawnmower by grandson Joe, also from a 1950s *MM* and a blue & gold Magic-powered 'Man digging up the road'.

Bob Seaton

Our huge model tour is now complete; cheers Bob.

Oh no - the 2016 AGM!

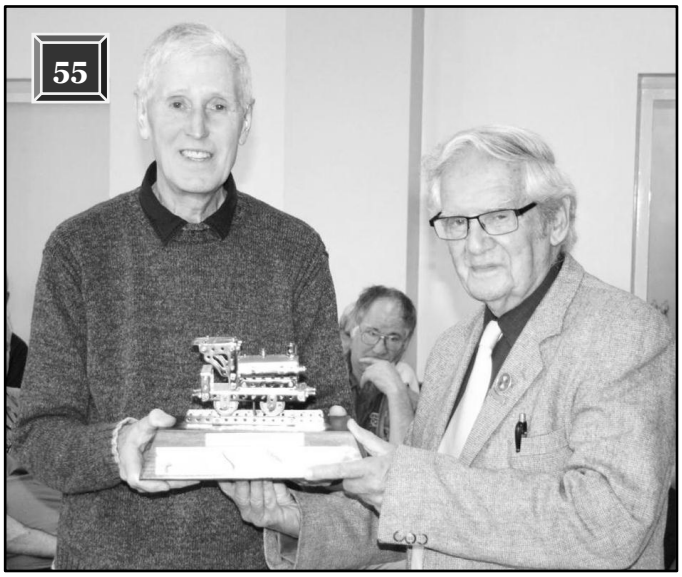
After noting the huge attendance then apologies, each Committee member spoke; Russ needed more booby-traps to find in early drafts, John confirmed that the finances were solid and Bob was keeping an eye on changes at Barrow Hill. Rob added detail to the financial matters and was perturbed that nobody appeared concerned by the sizeable reserves (over £5600) and attempts to provoke a query were in vain! Our annual accounts were accepted by a forest of skyward arms; a summary is on page 49. Membership remains at about 170 and all *SMGJ* contributors were left in no doubt about their efforts being appreciated. On a more sombre note, we remembered our pal Frank Singleton; Geoff Brown then spoke eloquently about Tony Brown; the loss of Malcolm Booker was news to many and it was swiftly agreed that we would write to June Booker to convey the SMG's condolences. In the event, Lesley did the deed on our behalf and tributes to Tony and Malcolm are in this edition. Start to end: 25 minutes.

With their year complete, the Committee stood down and with no nominations, were reinstated by another forest of arms before anyone could shout "Fire the lot!" With the current year thus under way, notice of the April contest placated our ardent combatants. David Miller's antics in the kitchen gained roof-raising applause and he made the rare offer of edible requests in time for April. There are no promises of lobster thermidor and ideas via the Chairman (page 2) please. Other events were NEMS's Darlington show, TIMS, Abbey Pumping Station then Skegex 2017 (page 48). Regarding Skegex, the matter of an SMG banner was raised and at a guide price of £65, all present were happy for the unplanned spend. Working in an associated industry, Russ got stuck into this within 24 hours. As the AGM progressed then ended, Philip Webb then Geoff Brown were responsible for making the Committee's cheeks glow bright red with further kind comments then applause; thank you gents.

Prize time

With the AGM done, Barrie presented our two awards. First was his President's Trophy, the recipient decided on the day by any standard he saw fit. After leaving all dangling for a few seconds,

the winner was revealed as… **John Wilson** for his outstanding Newcomen Engine.



To the SMG Members' Award. Voting forms had been collated by Anne Seaton and Sally Etheridge then, results in paw, Barrie gave the countdown:

Fourth, 20 votes: **Margaret & Raymond Massingham** for their sports car and caravan.

Third, 24 votes: the quite outstanding Tatra pipe-carrier by **John Ozyer-Key**.

Second, 57 votes: built for the Meccanuity 2016 topic was **Gregg Worwood's** Land Rover.

First, 85 votes: back on your feet **John Wilson** and again for your Newcomen Engine!

55 & 56. It was a good day for John Wilson, Barrie presenting him with the President's Trophy (top) and SMG Members' Award (above). (RM)

Both awards going to the same person by different means was an unexpected result. Barrie had chosen before voting began in earnest and when under way, a sporadic stock-take showed John was ahead. This was furtively discussed then decided that there was no valid reason to bar a single recipient; our President then everybody else had concurred independently so well done John and twice in five minutes. With his contest victories, that trophy shelf extension will have to be a biggy…

Auction

Russ swiped your Ed's 'call to order' screwdriver to make an impromptu gavel then rattled off 27 lots. Quality was as variable as ever, ranging from dog-eared Manuals to a good No. 9 box, recent parts by the ton and a complete-looking 'Meccanisms' set. A Meccano-ready programmable logic controller, these were not cheap when new but like most tech, were swiftly superseded then killed off by 'Arduino' which has found favour in Meccanoland. It went to a new owner for a paltry £17. Much was to club funds and when done a further £73 had been added to the buffer against those ever-rising costs.

More pictures and acknowledgements

Like greased lightning, Mick Burgess, Bob Thompson and your Ed had placed 160 pictures at:

www.nzmeccano.com/image-106207

Following the finest Meccanofest to ever grace a 'Laughton Day', it would be remiss not to mention those who helped, either when lightly leaned-on or being happy to assist at short notice. More than boosting the Committee's efforts and in random order were: Roger for interrogating the accounts, spotting an error then signing only when satisfied; David for superb catering with Wendy assisting; reporters John and Paul; Anne and Sally for counting votes; photographers Mick, Hellmuth and Bob; Paul, Les and Les (others too) for table-setting then clearance; Lesley who helped make the auction happen and her LMS ad is earned by playing a crucial part of delivering your *SMGJ*; Bob and Mick for pictures in the New Zealand Gallery; wheel-to-collar donors Mick and Roy (LMS immediately buys these from the SMG before conversion); all who contribute to our club mag regardless of scale from encouragement to major features. With apologies for inadvertently skipping anyone, without you we wouldn't have an SMG - it's as simple as that. RM

Steam Power for Industry

Part 1: Thomas Newcomen's Atmospheric Engine

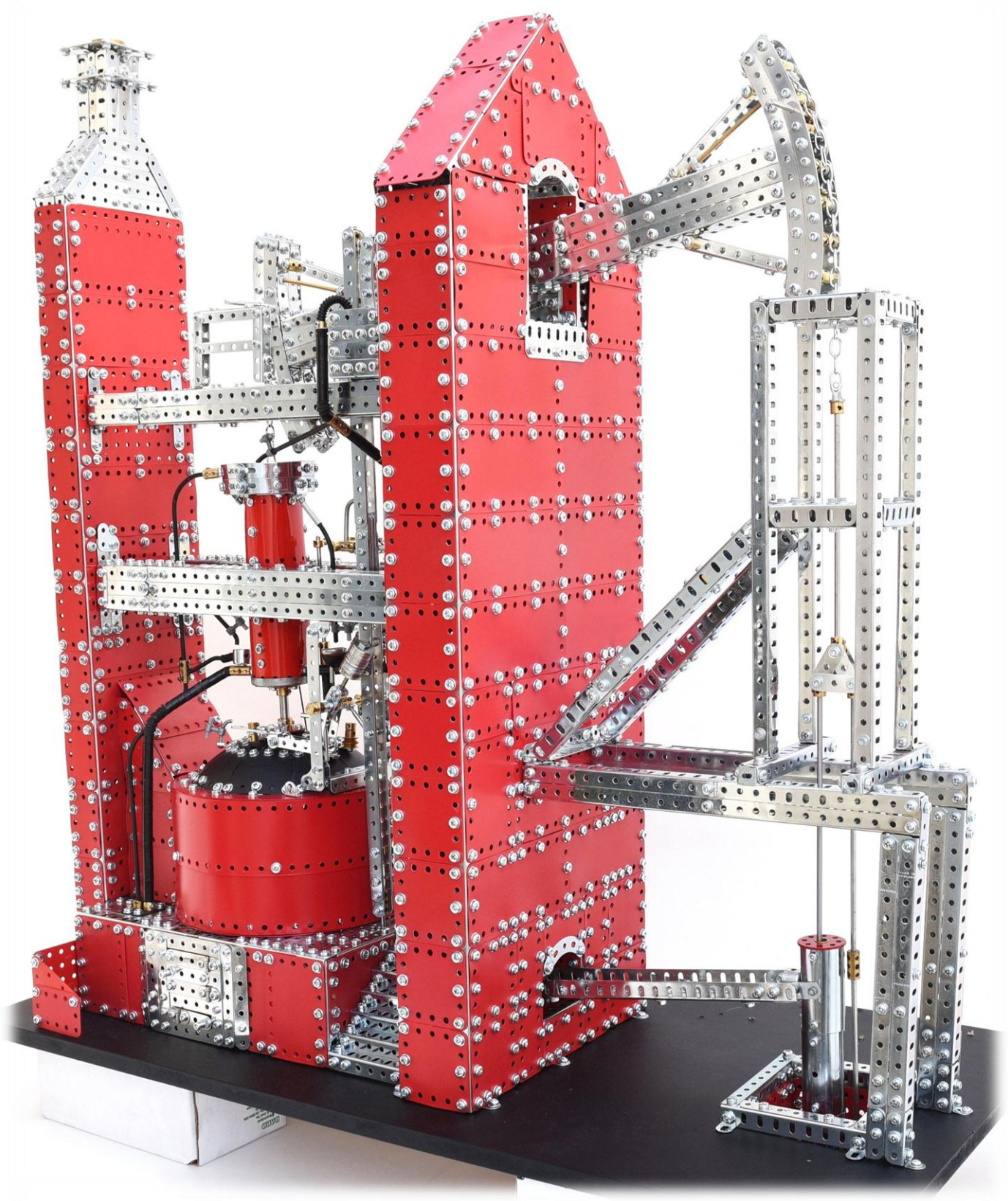


Fig. 1. Thomas Newcomen would have been honoured to have clapped eyes on John's handiwork.

John Wilson examines then builds his way through the landmark machinery that propelled the industrial revolution
Photos by Stefan Tokarski, illustration by John

Way back in 1712, a desperate colliery manager had negotiated the building of a strange structure at the pithead. The pit was about to be closed because water was coming in faster than it could be emptied by teams of horses. As a last throw of the dice, he had agreed to allow a Devon man, Thomas Newcomen, to erect this massive device. After months of work a fire was lit and the machine began to move. A few days later the pit was dry enough for mining to proceed unhampered by water.

The engine worked at this colliery, about one mile from Dudley Castle, for many years and was eventually moved to two other pits and later may have been used elsewhere to drain a lake. Although heavy on coal consumption, it was economic in a coal mine because there would be plenty of low-grade coal at the pithead, good enough for use in the engine. By any measure, this installation was a resounding success.

Who was Thomas Newcomen?

Living in Dartmouth, Newcomen was an ironmonger. In those days an ironmonger took orders for anything made of iron and made it in his own workshop. Very little is known about him but it can be deduced that his workshop would have a forge and men skilled in various trades. A man called John Calley worked there as an employee or perhaps as a partner. A skilled worker in lead, he probably made plumbing products and no doubt items used in mines and other industries. Newcomen himself travelled extensively in Devon and Cornwall, calling on the copper and zinc mines and taking orders for a wide range of products including tools and pump components. Pumps, driven by oxen or horses, had started to replace buckets for removing water which was as much a problem in these mines as in collieries further north.

Being aware of the problems of the local mines, Newcomen and Calley tried to build a mechanical device for pumping water from a great depth. Probably working in their spare time over several years, they struggled to build a model without success. There was no precedent to copy. Others had experimented with cylinders and steam for scientific purposes but it is unlikely that Newcomen would have learned of their work. His experiments would have been based on common sense and improvisation, not book learning, as science was only investigated by gentlemen and little that was known filtered through to the public.

How does a Newcomen engine work?

Referring to **Fig. 2**, the steam outlet from the top of the boiler is controlled by the steam valve **A**. Mounted directly over the boiler, an open-topped cylinder is held by a pair of massive beams **B**. The piston is suspended by chain from the arch-head at one end of the 'great lever', a beam made of one or two massive timbers. The lever is mounted by trunnions on a substantial wall **C**. An arch-head on the other end of the lever is connected by chain to the pump rods which lead down the mine shaft to a series of pumps. The Dudley Castle engine has two pump rods **D**. One pump at the bottom of the shaft pumps water halfway up the shaft to a cistern. There a second pump lifts the water to the surface. Some of this water is used to work the engine and the rest is channelled away.

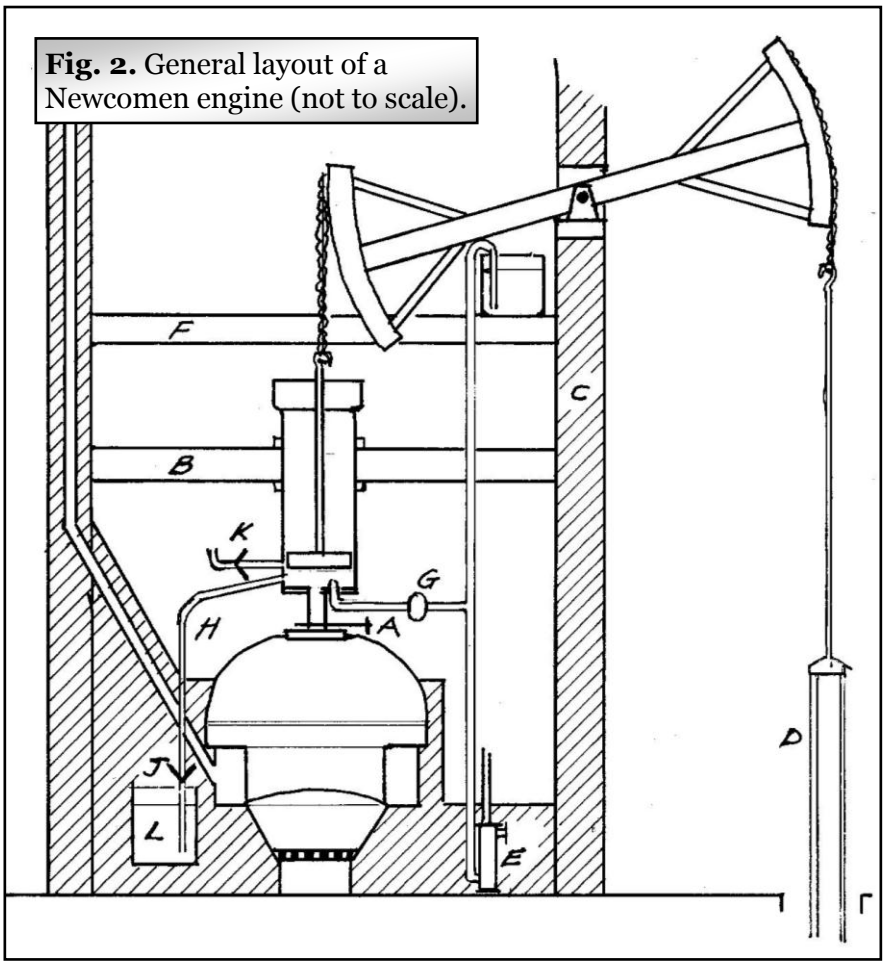


Fig. 2. General layout of a Newcomen engine (not to scale).

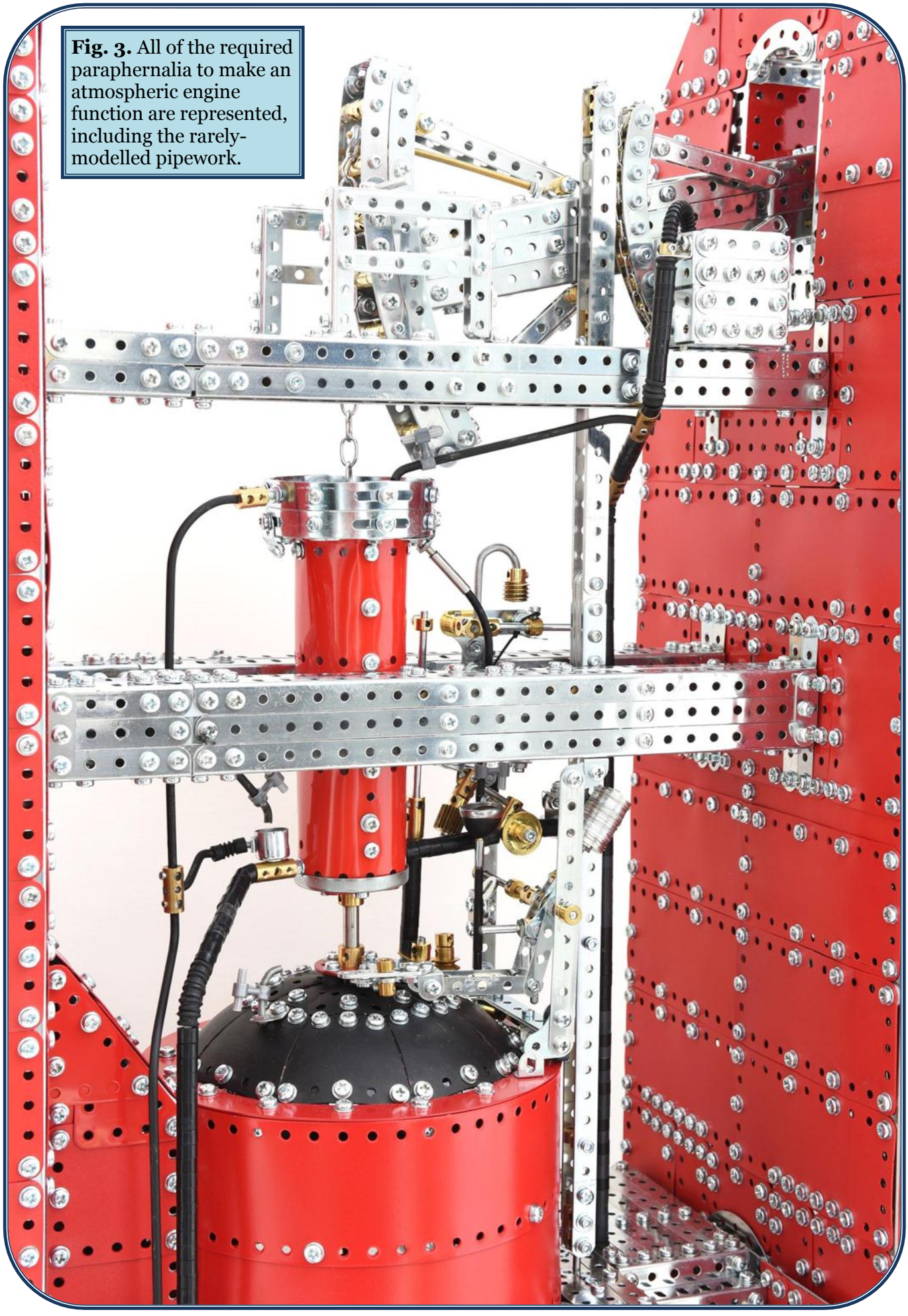


Fig. 3. All of the required paraphernalia to make an atmospheric engine function are represented, including the rarely-modelled pipework.

A small force pump **E**, working from a third arch-head (not shown) on the great lever lifts some of this water to a cistern, mounted high on two more wooden beams **F**. A pipe leads some of this water to the bottom of the cylinder via the induction valve **G**. The weight of the pump rods is enough to lift the piston to the top of the cylinder, helped by the pressure of steam from the boiler at 1 to 1½ pounds per square inch, psi. (This is very low compared with atmospheric pressure which is about 14 psi). When the piston is near the top, the steam valve is closed. The drama begins when the induction valve opens. Cold water under pressure from the overhead cistern squirts upwards inside the cylinder, causing some steam to condense. When condensed, steam volume is reduced by a factor of about 1000 so a partial vacuum now exists underneath the piston. Newcomen got the pressure down to about 6 psi, so the pressure drop across the piston was nearly 8 psi. This powerful force across the piston pushes it down, pulling on the chain, tilting the great lever, and lifting the pump rods. Water is thereby raised out of the pit.

It is essential to remove the hot condensate, as well as the air, from inside the cylinder. Air enters the cylinder with the steam and, if not removed, the engine will slow to a halt after only a few strokes. When the steam valve opens, the vacuum is destroyed and pressure suddenly rises to about 1 psi, which is enough to push the condensate out of the eduction pipe **H** at the bottom of the cylinder. On the eduction pipe is a 'clack valve' **J** which is a simple one-way valve with leather flaps. Atmospheric pressure holds these closed while cylinder vacuum exists but they open freely when the vacuum is destroyed. At the same time air exits through the snifting valve **K**, so-called because of the noise it makes ('snift' being the word for sniff in those days). The hot water produced by these processes enters the hotwell **L** (yet another cistern) and is used later to feed the boiler.

The final pieces of the jigsaw make the engine work automatically. Attached to a third arch-head (not shown in the diagram) by two chains, is a long Meccano-like member called a plug rod which moves vertically. A series of holes allows the insertion of plugs which trip levers attached to the steam and induction valves. The two mechanisms look Heath-Robinson at first glance but they worked well. Later engine-builders tried their own systems but soon came back to the Newcomen design. The vital point of the steam valve is that it must be opened quickly to destroy the vacuum before the piston smashes into the bottom of the cylinder. The induction valve also needs to open suddenly. Newcomen fitted tumbling lever systems which achieved this beautifully.

Numbers

The Dudley Castle engine achieved a force at the piston of about 1.2 tons and delivered a ton of water every two minutes, round the clock, lifting the water through 153 feet. The downside was that efficiency, measured as work done divided by the calorific value of the coal, was about 0.5% so a huge amount of coal was needed. The cylinder was 21" diameter (presumably internal diameter) and the engine ran at twelve strokes per minute. If these figures are fairly accurate, the engine worked at about 5½ horsepower.

Did he make a fortune from the engine?

Almost certainly not. Newcomen made only a few engines and had to pay royalties for the privilege. Thomas Savery, also of Devon and with knowledge of the miner's problems, was at the same time trying to build a pumping system using changes in pressure in a closed vessel to suck water out of a

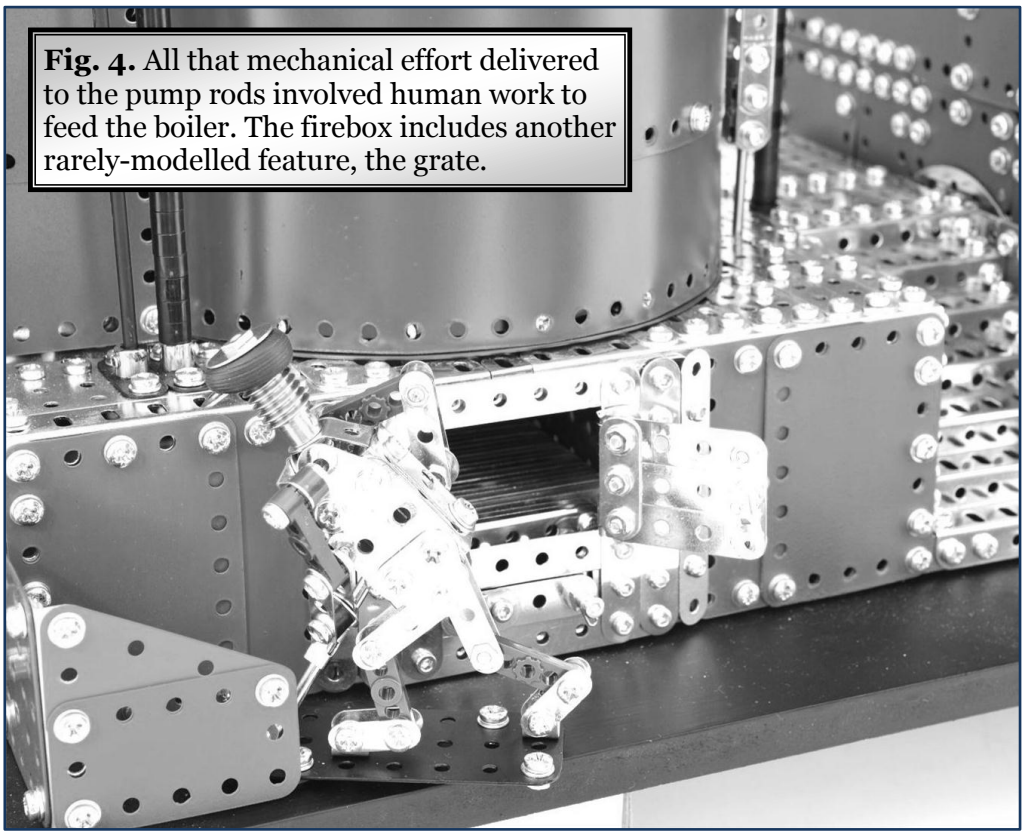


Fig. 4. All that mechanical effort delivered to the pump rods involved human work to feed the boiler. The firebox includes another rarely-modelled feature, the grate.

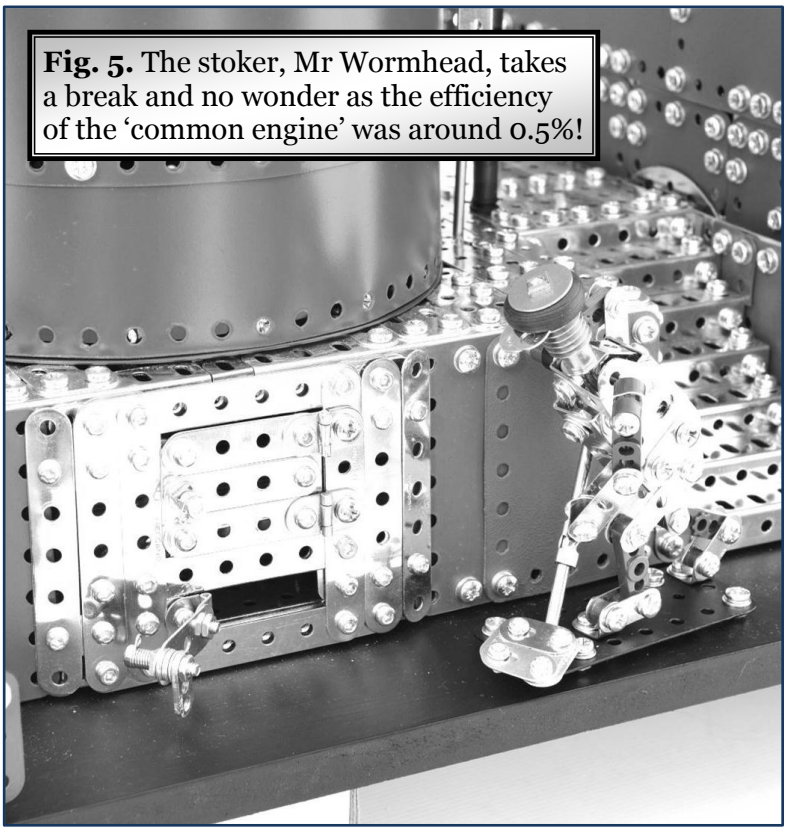


Fig. 5. The stoker, Mr Wormhead, takes a break and no wonder as the efficiency of the 'common engine' was around 0.5%!

mine and blow it to a height. The system was never going to work in a colliery but he did build a small number of machines used mainly to provide spectacle in aristocrats' water gardens. Alas, he obtained a patent for 'Raising water by the impellent force of fire'. Although vaguely worded, the patent trapped Newcomen. Savery abandoned his project in 1705 and seems to have made an agreement for Newcomen to build another type of 'fire engine' but at a price.

Newcomen's income came from his ironmongery business which probably subsidised his engine building. When he died the only reference in a local newspaper briefly mentioned him as 'ironmonger' not 'engineer'. Prophet without honour in his own country!

Was it a steam engine?

Because pressure never rose above 1½ psi, some argue that this was not a steam engine. Only when high-pressure steam came into use 90 years later should we talk about steam engines. This device must only be called an atmospheric engine.

My own view is that Newcomen used a crucial property of steam; that when condensed in a closed vessel it achieved a drastic reduction in pressure. Without this property a condensing engine would provide no power. You could not run the engine, for example, using air. In addition, water is freely available; it also condenses at a convenient temperature, about 100°C. So I have no doubt that it is right and proper to use the words 'steam engine' and that the Dudley Castle engine was the first successful application of steam power for industry in the world.

What should we call this type of engine?

In Newcomen's time it was always called a 'fire engine'. Now, you can best call it a 'Newcomen engine' or an 'atmospheric engine'. Preferably not a 'beam engine' which is too vague as rocking beam systems were still being used in much more advanced engines well over a century later. Some called it a 'Savery engine' because a licence was needed from the patent holder (this confuses some historians who think that Savery installed engines himself). By the 1780s, when more efficient engines were being built (but were too expensive for many applications) the term 'common engine' was used for a basic Newcomen engine. I prefer 'Newcomen engine' in honour of the great man.

Was the Dudley Castle engine Newcomen's first?

Historians have unearthed only the briefest hints of two earlier engines by Newcomen, both in east Cornwall, not too far from Dartmouth. The circumstantial evidence is more convincing; that, thanks to work done on earlier unsuccessful engines, the Dudley Castle engine worked well from the very start. Its overall configuration stood the test of time and the automatic valve gear worked so well that it can only have been the result of months if not years of development.

How did Newcomen hit on the idea of water injection?

It seems that Newcomen and Calley were working on their model. A brass cylinder was being used; open at the top, containing a piston. The cylinder was filled with steam and cold water caused a partial vacuum, similar to the process used at the time by Savery (though it is unlikely that either man knew of the other's work). A lead water jacket had been fitted round the cylinder for this purpose. Results were for a long time very poor and there is a suggestion that they were on the point of giving up. The story goes that a hole in the cylinder had been repaired with soft solder. One day it failed, and cold water squirted into the cylinder. With the resulting partial vacuum below the piston, the atmosphere pushed the piston down with devastating force. The chain to the overhead lever broke and the piston smashed down, destroying the bottom of the cylinder and the top of the boiler; hot water everywhere! After the initial

dismay at losing their model, Newcomen and Calley must have been impressed that massive forces were possible and (probably over several more years) were able to develop a full-sized engine. The accounts written years later are unreliable but this story may have the ring of truth.

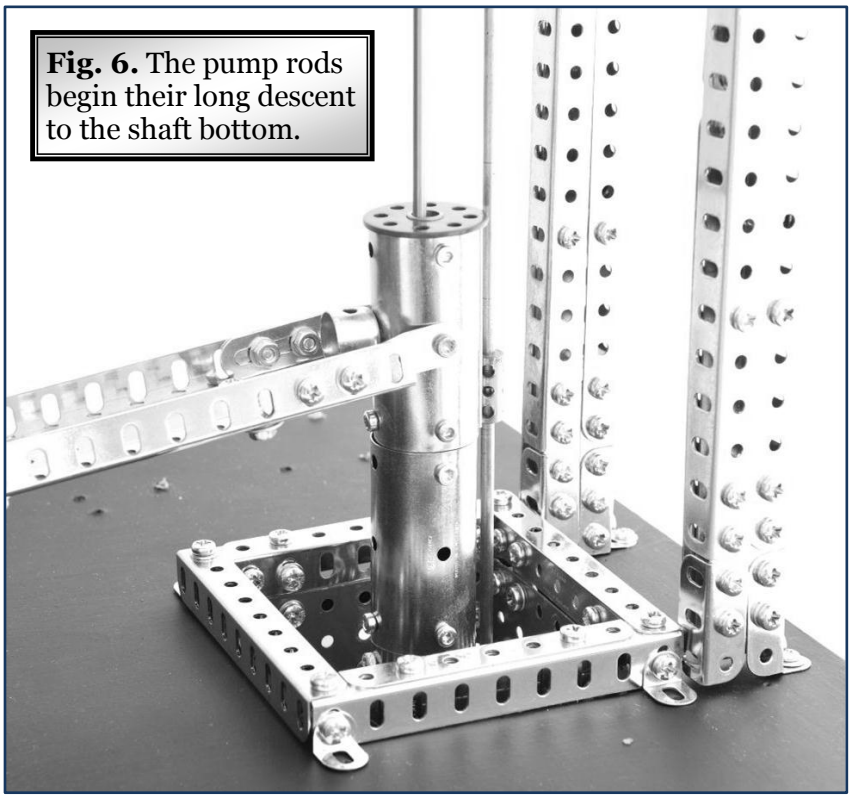


Fig. 6. The pump rods begin their long descent to the shaft bottom.

English society in 1700

It is hard for us to imagine the divisions in society at the time. Some gentlemen were interested in science and did great scientific work. Charles Boyle had established the relationship between pressure and volume but it was not taught in schools or universities and would not have been known to Newcomen. It was beneath a gentleman's dignity, though, to develop something of practical use in industry.

The Nonconformist churches played a vital part in the industrial revolution. Newcomen was a Baptist. There was little contact in those days between religious groups. Their group would be very tight and their qualities made them ideal for success in trade. They were sober, thrifty, moderate in their habits and hard-working. Many would be successful in business. Because they were such a close community, advice and encouragement would be available to the young men. Even finance might be available to the right youngster. Contacts between Baptist groups in other towns were to be vital to Newcomen. The Dudley Castle engine came about through introductions via the Baptist group in Bromsgrove.

It is no surprise that the other great inventor, also working around 1700, was a Quaker. Abraham Darby achieved the smelting of iron using coal instead of charcoal. This success allowed the large-scale manufacture of cheap iron goods for the first time. It also made practicable the casting of large items. Newcomen and Darby were the first two giants of the fledgling industrial revolution and to them both we owe a great debt.

Was the Newcomen engine a success?

A gauge of its success is that when Savery's patent expired in 1733, 110 Newcomen engines are known to have been built. After that date no royalties needed to be paid so more and more were built and even the advent of more efficient engines did little to dent the popularity of the common engine. Over 1400 are known to have been built by the end of the century. Most were in England, with some in Scotland and Wales and some on the continent. The last common engine was built in 1906. Originally designed to pump water from mines, it was especially suitable for coal pits. Later, even before the introduction of rotary motion from atmospheric engines, the Newcomen engine found other vital uses.

Eventually the Cornish miners (who had to rely on expensive coal brought by sea from Wales) had to install them. They had huge incentive to improve efficiency and Cornwall plays an important part in the later development of the steam engine.

A sober historian (L T C Rolt) calls it 'a stupendous advance upon anything that had gone before… The wonder is not that Newcomen spent anything from 10 to 14 years on his invention before he achieved success but that such a staggering advance could have been made by one man in a lifetime… We can scarcely fail to regard his achievement with a wonder akin to awe.'

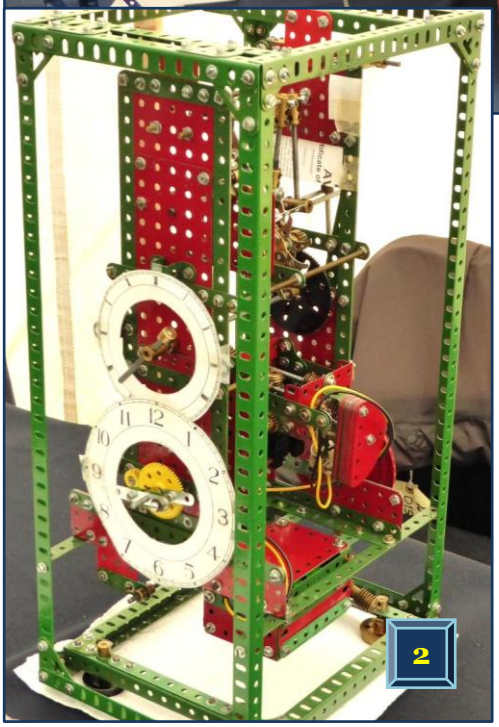
Further reading

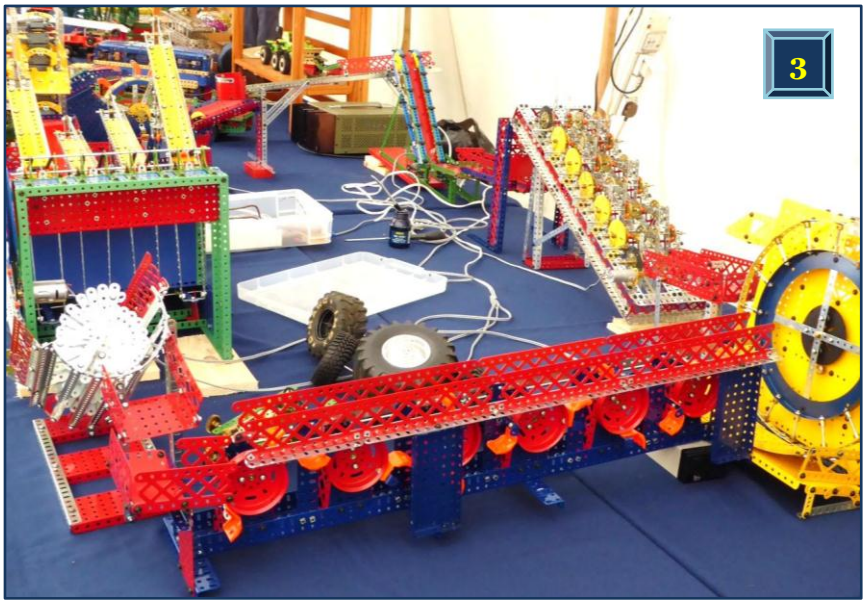
Rolt has written several books about Newcomen. He practised as a mechanical engineer for many years so his opinions on the way things worked are particularly valuable. I especially like *The Steam Engine of Thomas Newcomen* which he wrote jointly with another historian, J S Allen. A little bit pricey even second-hand but it has a wealth of detailed illustrations (99 in all). There are even some photographs, as Newcomen engines were being built way into the era of photography.

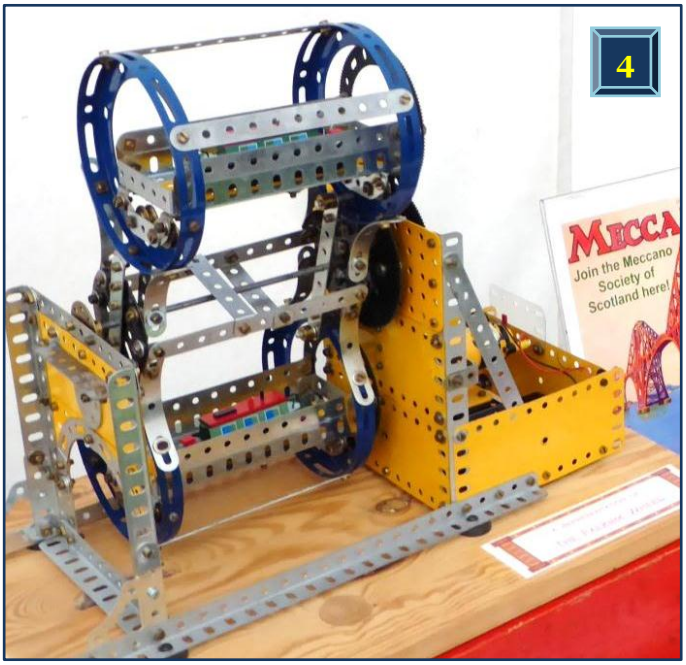
John Wilson

MSoS at Scone Palace 2016

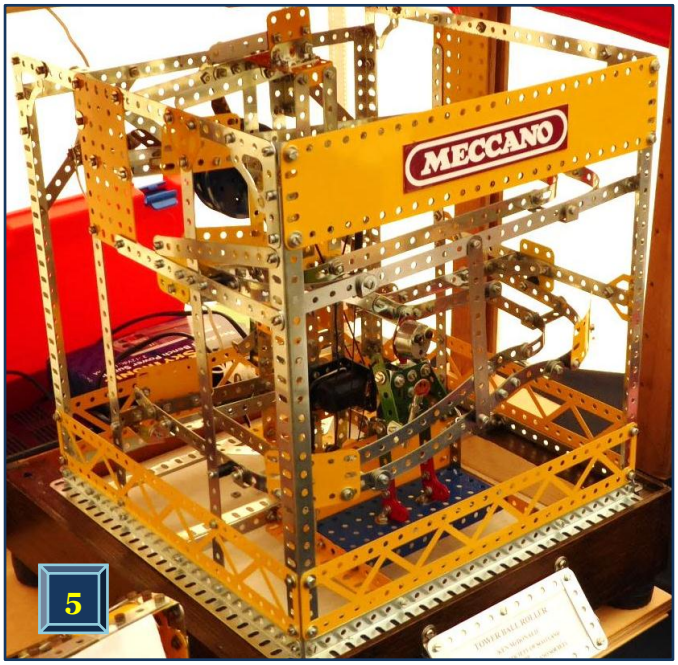

1


2


3



4



5

Ken McDonald writes about the Meccano Society of Scotland's annual show
Pictures by Dave Stanford

On Saturday 10th and Sunday 11th September 2016 the weather was good and on the Sunday, when open to the public, the crowds streamed into the showground to enjoy The Scottish Vintage Tractor and Engine Club's magnificent 39th 'Farming Yesteryear' rally, many of whom visited the marquee housing the MSoS's annual exhibition. They were rewarded with a splendid display of models ranging from the small and simple to the large and complex.

From south of the border

We were delighted to have **Ian & Christine Mordue** with us. They had the impressive Grange Ironworks crane as seen at Skegex 2016 and his gleaming version of John Sharp's forklift attracted much interest and admiration. The long square drive shaft of the crane had a 3D-printed gear with the necessary square hole which proved to be very satisfactory; the wonders of modern technology.

Equally welcomed were **George & Marion Roy** who had brought a fine collection of models including his car chassis with external pedals and gear shift to demonstrate functions of brake, differential, clutch and gears. He also showed a small beam engine and an immaculately constructed Bray side-rod engine with twin connecting rods, working valve gear and governor, plus various models from the current range.

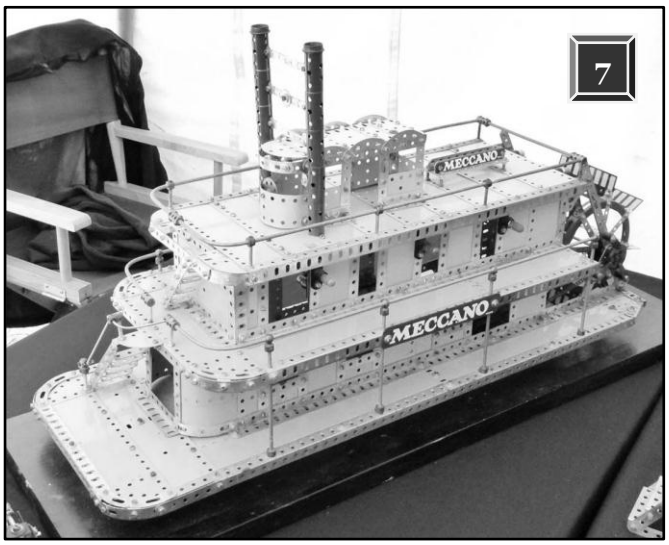
Bob & Anne Seaton displayed Bob's exquisite Stanier Pacific 6249 *City of Sheffield* along with his 'work in progress' 92220 *Evening Star*, the last steam locomotive built for BR in 1960. In complete contrast was his table football game in prewar blue & gold as seen in SMGJ126. Around midday, Bob generously dispensed tots of malt whisky to those who wished to partake and your writer could not resist. [Ed. Outrageous conduct while on duty!]

1. A viewer's aspect of **Andy Knox's** huge ball-rolling plant - but where are the balls?!
2. **John Sharp** added his own touch to the Modelplan Grignion clock.
3. Dave Stanford moves his camera to another part of **Andy's** ball machine, a blend of Meccano and Metallus.
4. Modern canal engineering and a prototype pounced on by many Meccano enthusiasts was the Falkirk Wheel; **Douglas Carson** built this portable version.
5. Oh no, not another ball roller! Being our reporter, **Ken McDonald's** model really deserved a more respect-laden caption…
6. The MSoS's marquee soon became packed with Meccano-hungry clientele.
7. Paddle steamer donated to the MSoS and shown by **Alan Macdonald**.

John Sharp had his Grignion clock based on a Modelplan by Michael Adler but modified to be constructed entirely with standard Meccano parts and, always seeking purist perfection in the two weeks prior to the exhibition, had replaced the tilt switch with the addition of a mechanical linkage to actuate the switch that is part of the M.0 Motor battery pack. It kept perfect time over the weekend which is quite an achievement after a lengthy road journey from Leighton Buzzard.

From north of the border

Among the 'home crowd' was our Chairman and Secretary **Douglas Carson** with his miniature Falkirk Wheel, Jones KL44 Mobile Crane based on a 1960s Tri-ang toy and a selection of 'Evolution' models. Treasurer **Alan Macdonald** showed a model Empire State Building and a Mississippi paddle steamer that had been donated to the club.



Our past President **Jim Berrie** with his water wheel and water pump fearlessly demonstrated that powered Meccano and water can be mixed safely. He also had a petrol engine and a large mobile crane making possibly its last appearance as Jim was endeavouring to sell it.

Angus Plumb covered a couple of tables (could have been more) with his large range of interesting models, many from the early days of the system, such as his blue and gold *HMS Rodney*, a 1918 tram in nickel and a flight of vintage aeroplanes along with many examples of attractive models.

Not surprisingly, the most popular exhibit and persistently drawing a large group of admirers was **Andy Knox's** amazing array of inventive ball rollers, comprising eight mechanisms linked in a sixteen-foot long circuit to provide a continuous rolling and tumbling of table tennis balls. The brightly coloured and imaginative units had plenty of action to entertain the viewers and were the result of clever thinking, expert building and a seemingly unlimited parts supply.

One of our members exhibiting for the first time at Scone, **Dave Stanford**, created a splendid display of small models all nicely built with pristine parts, some manual models or from published articles and some of the recent sets. His 'nodding donkey' oil pump had a press button to allow visitors to operate it which is a good provision at a public exhibition.

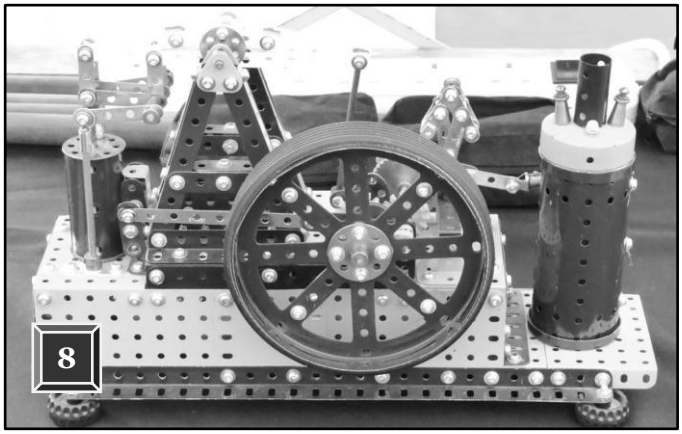
Bert Hutchings as always provided hands-on experience with his hand-operated cantilever crane in nickel which many seized. He also showed his No. 6 Manual steam lorry in red & green and steam roller from the same period as well as a range of modern models. His trays of goodies for sale drew grateful purchases both from the exhibitors and visitors.

Our President and exhibition organiser **Alan Blair** had his triple-expansion ship's propulsion engine in pristine red & green which always attracts informed interest and his south-facing chariot once again puzzled many. **Your writer** had a ball roller, a farm tractor with disc harrow, a motor breakdown crane, a wee Magic Motor-operated blacksmith and a demonstration model of Walschaerts valve gear.

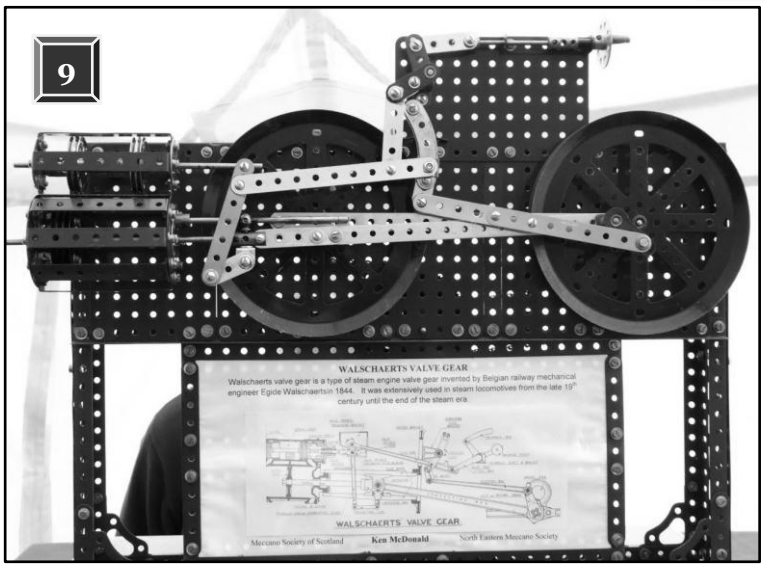
Prizes

First prize and the Club Shield were again awarded to Andy Knox for his ball roller complex, second to Ian Mordue for his crane and third to John Sharp for his clock. The Jim Finlayson Memorial Trophy was presented by last year's winner, Bert Hutchings, to Andy Knox for his crowd-pulling display. It was another enjoyable weekend thanks to our exhibitors and the untiring efforts of organiser, Alan Blair.

Ken McDonald



8. George Roy's blue & yellow beam engine.
9. Steam valve gear from **Ken McDonald.**
10. MSoS boss **Douglas Carson** (left) presents **Andy Knox** (right) with their top - and huge - award!



Malcolm Noble Booker, 1936 - 2016

Of all the antipodean Meccanomen, few will have been better known than the lifelong enthusiast Malcolm Noble Booker. He succumbed to cancer on 13th October, three weeks short of his 80th birthday.

Before retirement, Malcolm was a mining engineer - a career which must surely have been influenced by Meccano. He amassed a truly colossal collection, possibly one of the largest 'down under' from which 138 (!) substantial models were completed with several donated to the Museum; his benevolent exploits with a Spanner often featured in his local paper, the *Manly Daily*. 'Mister Meccano's model output barely wavered and he appears to have tackled every newly-published model with gusto, which included the Modelplan railway crane in SMGJ127. Malcolm wasn't merely a collector and unstoppable builder; he was also a co-founder then a driving force in Sydney's Meccano Modellers Association, an organisation he co-founded in 1982 then quickly became their President, a post he occupied for 34 years. Malcolm would host meetings at his own home and arrange their annual exhibition in April so the MMA's members will sense the loss as keenly as Malcolm's family.

He had been one of our own members for several years and often wrote after receiving his *SMGJ*.

Those who were at Skegex in 2014 will have met Malcolm, he being one of the large entourage from 'down under'. Excitedly zooming around the Embassy, he was in his element! Our accompanying picture of him with his wife June was taken at the time. Being a member of the team that constructed the huge Runcorn Transporter Bridge, Malcolm as good as attended Skegex 2016 too.

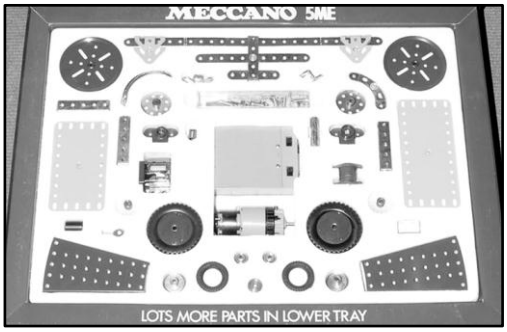
Malcolm's funeral was on 19th October and plenty of his Meccano pals were there to see him off. Our sympathies are with June and their family; on behalf of the SMG, 'bye Malcolm. You will be remembered by us all when we tighten the first 37 in our next model.

News received at a late stage of 128's preparation was that we have also lost Bruce Laan of Ardross, Western Australia; he died on 9th June 2016 aged 64. An accomplished constructor and generous to a fault, he was looking forward to retiring from his business and concentrating on Meccano. Our sympathies go to his wife Sue, their children and family; on behalf of the SMG, 'bye Bruce. RM

The Illustrated Meccanoman's Dictionary: P

Polymer to Port

Polymer. A long chain molecule man-made material commonly referred to as 'plastic'. Can be either **thermosetting** or **thermoplastic**.
Polynomial. Literally 'many numbered'. An **equation** of at least **second order**, i.e. contains an x^2 or higher **index**; x^3 = third order. You can work out fourth order etc for yourself! Equations having these terms can be solved by a difference engine which can be built from Meccano if you're clever enough.
Polystyrene. A **plastic** and **Binns Road** sold great big white blocks of this stuff in its expanded state with a handful of Meccano parts plopped into it, below.



Pontoon. A large floating box and well-known in Meccanoland as the base for a **Supermodel** crane.
Pony axle. The undriven trailing axle on a **steam locomotive**, usually under the cab, above.
Pony motor. A comparatively small electric **motor** to keep a larger motor spinning when off load. It reduces the **current** surge on start-up proper and is a form of **soft start**.
Port. To the **LHS** of an aircraft or ship and is the opposite of **starboard**. RM

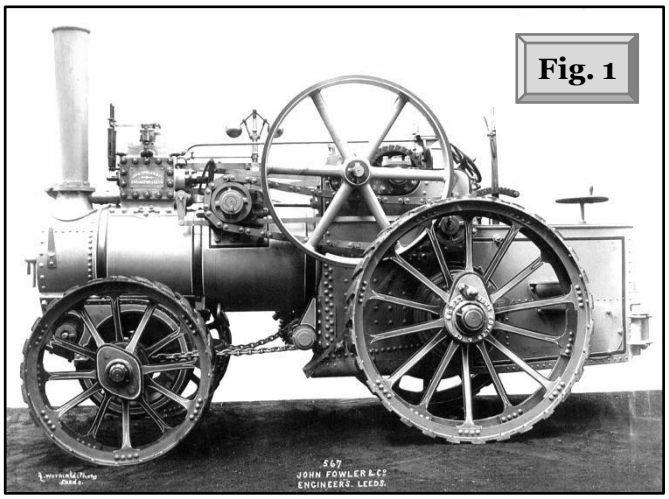


Fig. 1

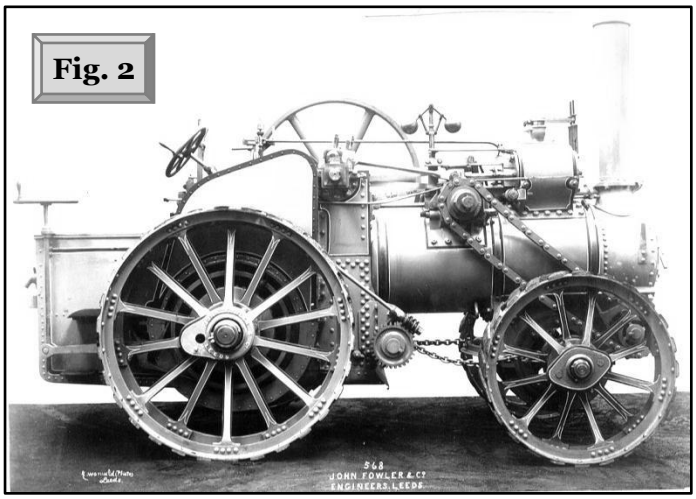


Fig. 2

Fowler Four-Wheel Drive Traction Engine

Designed, built, described and photographed by Ken Ashton

Introduction

John Fowler & Co of Hunslet, Leeds developed some four-wheel drive traction engines using a Whittingham patent front-wheel drive mechanism. The model is based on the single-cylinder Fowler engine no. 4920 and features differentials on front and rear axles, a dual chain drive to the front axle and a winch realistically operated by a pin on the rear axle. As in the prototype, the front wheels are free on their axles and front-wheel drive is obtained only by inserting drive pins in the hubs. Otherwise, the machine could operate as a conventional rear-wheel drive engine. The gearing incorporated has taken into account the differing axle speeds required due to the different diameters of the wheels. It is claimed that no. 4920 was reconstructed from no. 3271, the 'Steeplechaser' (SMGJ123) in 1885.

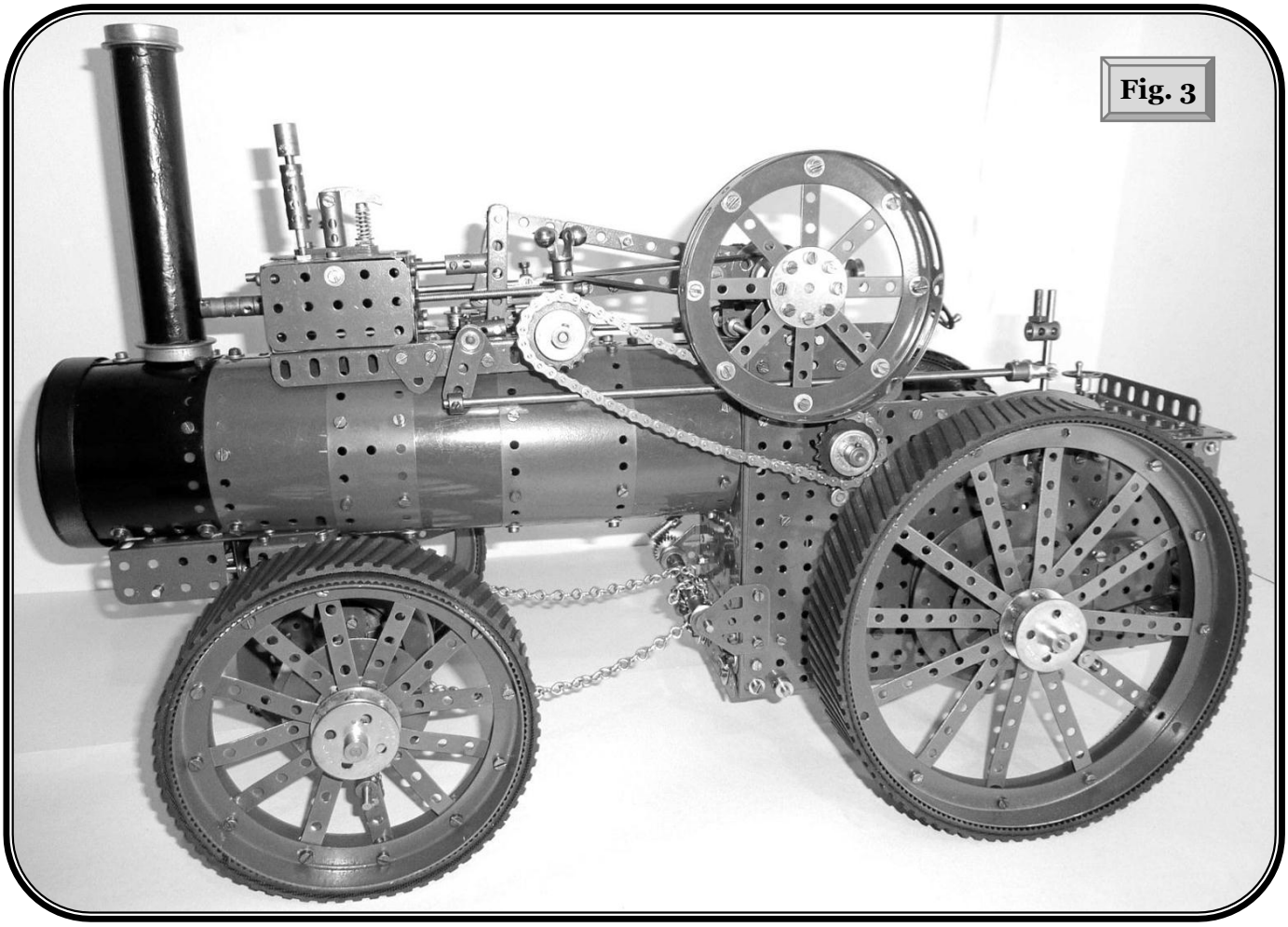


Fig. 3

Figs. 1 & 2. The engine poses for Fowler's photographer where it looks to be an orthodox machine in Fig. 1 but not in Fig. 2!
Fig. 3. Ken's model from the left…
Fig. 4. …and from the right side.

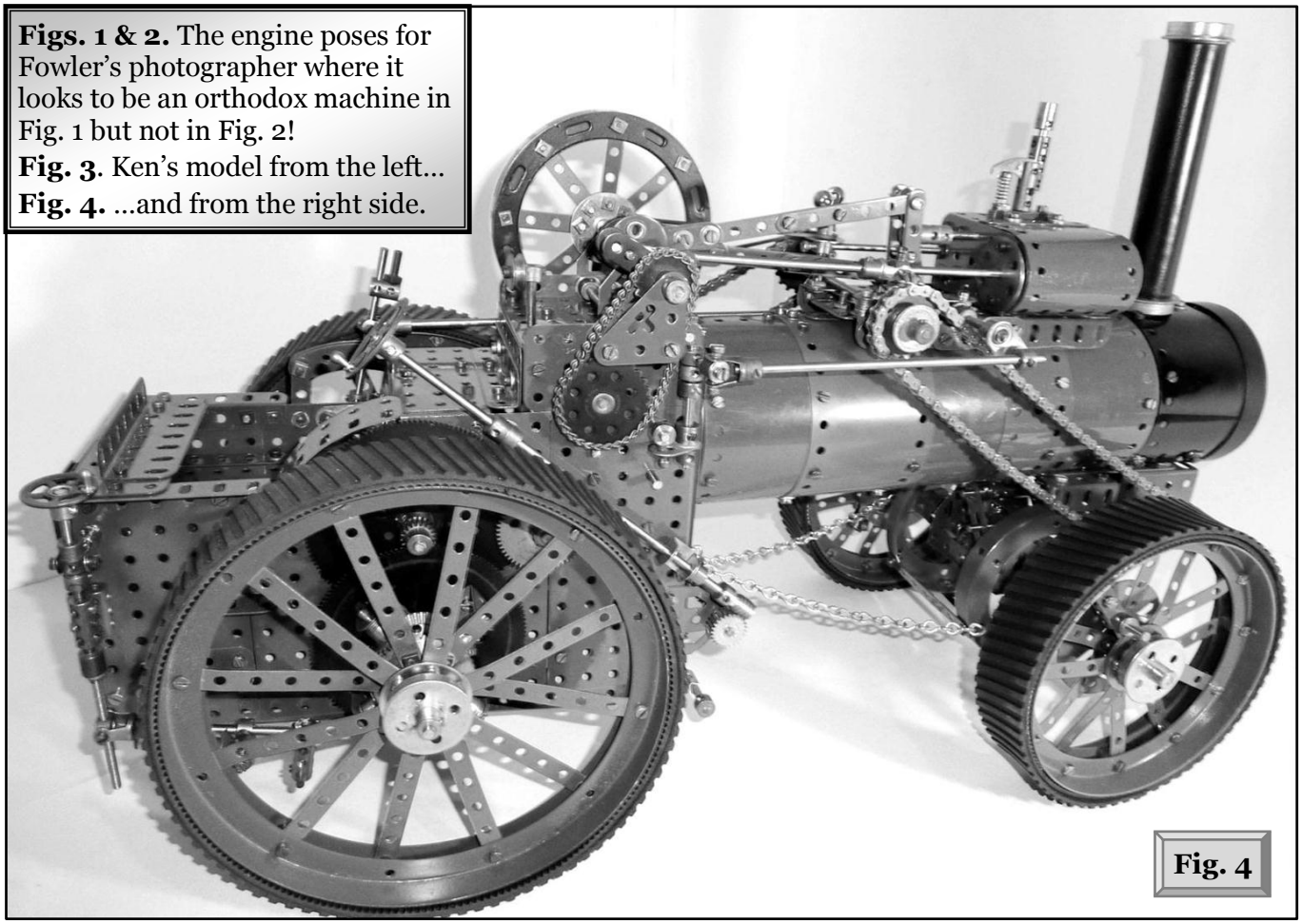


Fig. 4

The model is powered by a 12V motor and carries its own battery within the tender. It was demonstrated at the Sheffield Meccano Guild meeting in October 2014. Two views of the prototype are shown in Figs. 1 & 2 and general views of the model are given in Figs. 3 to 5.

Tender, motor drive and crankshaft

The tender is 10" long and 3½" wide as shown in Figs. 6 & 7. Each side comprises two each 4½" × 2½" and 5½" × 2½" Flat Plates, the latter extended upwards by a 3" × 1½" Flat Plate at the front. The front-sloping tender bottom is provided by a 9½" Angle Girder on each side and these are connected by a 5½" × 3½" Flat Plate at the rear which acts as the tray for the Yuasa NP2.3-12 battery. At the front a compound 7" angle girder on each side is connected by a 5½" × 3½" Flat Plate and a 3½" Flat Girder. Below this, a 3½" Strip on Hinges represents the ashpan access flap: a short Rod with Collar is fitted in a Rod & Strip Connector to act as the handle. The footplate, a 5½" × 3½" Flat Plate is supported by two 9½" Angle Girders (Fig. 8). The removable rear of the tender comprises a central 4½" × 2½" Flat Plate bolted to two 4½" Flat Girders and, on each side, a 1½" Angle Girder (Fig. 6). A 1½" × 1½" Flanged Plate and 1½" Angle Girder represent the water filler and a Double Bracket and Collar provide the towing hook. The rear is held in place by two Rods with Collars which pass through the Angle Girders and are held in place by a Coupling on the other side of the tender (Fig. 7).

The motor (approximately 600 rpm) is located under the footplate, a 14t Sprocket driving by Chain an 18t Sprocket on a Rod journalled in a 2½" × 1" Double Angle Strip. A 25t Contrate at the front of this Rod provides engagement with either a 25t × ¼" or a 25t × ½" Pinion on a sliding cross-shaft. A Crank on another sliding shaft above the reversing shaft has its arm located next to the long-face Pinion by a Collar. This second shaft's movement is restricted by Collars acting against the tender sides and, outside the tender, carries a Collar with long Bolt (Fig. 7). The long-face Pinion drives a 60t Gear on another cross-shaft with a 38t Gear driving another 38t on a cross-shaft directly above it. This latter shaft carries a 25t Pinion and, outside the tender, a roller chain sprocket (Fig. 8). This is the 'reference shaft' from which the drive gear ratios are calculated. The Pinion drives a 50t Gear on a shaft directly above and this shaft carries a 28t Sprocket outside the tender.

The long section of the crankshaft is supported in two Flat Trunnions which are located by Collars carried on two cross-shafts held in place by Cranks bolted to the tender sideplates (Fig. 9). Between the Flat Trunnions, the crankshaft carries two

Single Eccentrics and a 1" Pulley. Outside the Flat Trunnions it carries a crank web with ¾" Bolt and, on the other side, a Collar and a flywheel. The latter is made up from a 4½" circular girder, a 4½" circular strip and eight spokes of 2" Narrow Strips. These are attached to a Bush Wheel and a Wheel Disc forming the hub. The short section of the crankshaft is journalled in two 1" Corner Brackets spaced apart and fixed to the tender sideplate. The short section comprises a Rod with crank web engaging in the ¾" Bolt on the other section, an 18t Sprocket between the brackets and a Collar outside. The 18t Sprocket is Chain-driven by the 28t Sprocket.

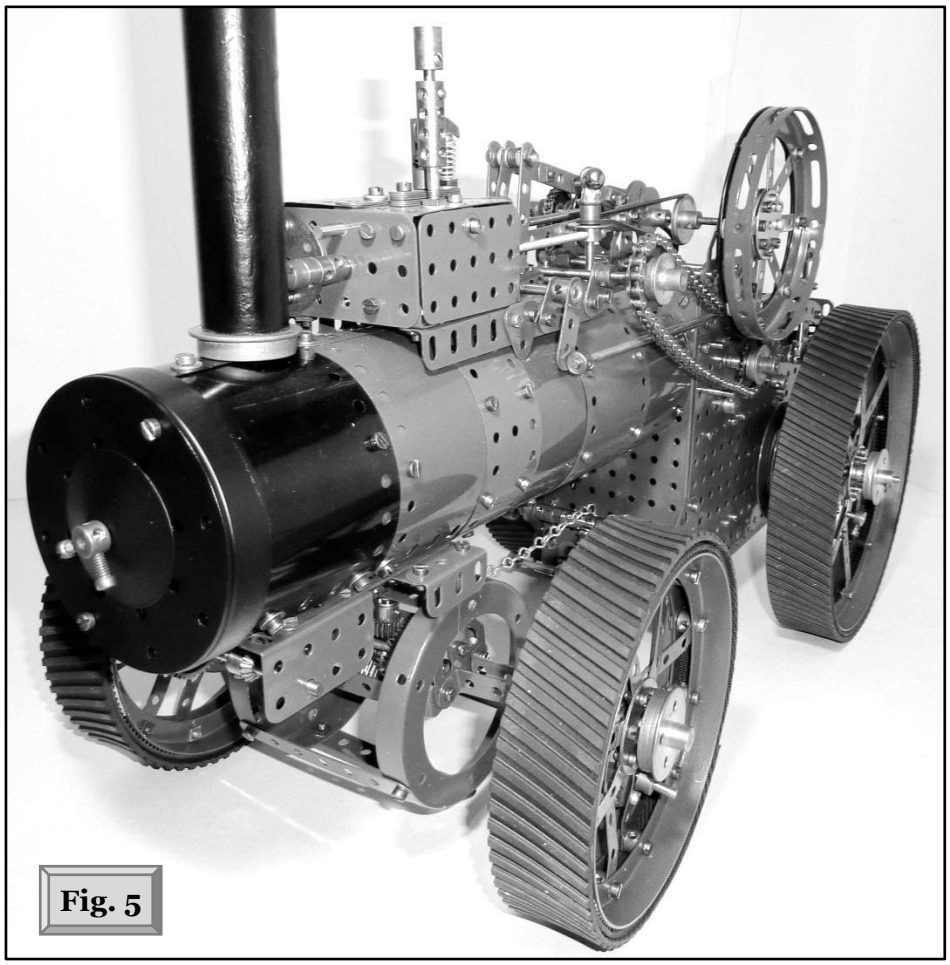


Fig. 5

Below the crankshaft, the drive gearing is covered by the plating shown in Fig. 9, a 3½" × 1½" flat plate with a 2½" × 2½" Flat Plate and two 1½" Flat Girders attached. Behind and below this, two 1½" Angle Girders (Fig. 8) support a 3½" × 1½" flat plate a 3½" Angle Girder and a vertical 3½" Flat Girder (Fig. 9). A vertical 3½" × 1½" flat plate with 3½" Strip is attached centrally to the horizontal plate by a Bolt in a ½" square collar acting as a captive nut. This plate also carries a Wheel Disc and Hinge to represent the firebox door (Fig. 6).

Boiler, cylinder and valve gear

The boiler is formed around a series of 3½" circular girders and a centreline long rod fixed in a Double Arm Crank on the tender front 5½" × 3½" Flat Plates at the same level as the reference shaft. It is 12" long and of conventional rigid construction from curved Flexible Plates as shown in Figs. 3 & 4 apart from the front nine holes which accommodate the front-wheel drive platform (Fig. 10). The cylinder and valve gear are built on a framework which is bolted to the top of the boiler. Each side is made from a 5½" Angle Girder connected by two 2½" Angle Girders which also support the front and back plates of the steam chest (Figs. 3, 4 & 5). These are 2½" × 1½" flat plates carrying Wheel Discs to represent the cylinder ends and are connected by a 2½" × 1½" Flanged Plate extended by a 3½" × 2½" Flexible Plate curved to Wheel Disc radius. The steam chest also carries representations of the safety valve, whistle and exhaust pipe to the chimney. A 1" Triangular Plate is attached to each of the Angle Girders pointing downwards and stabilises the whole framework. The governor is free-running on a Collar on a long Threaded Pin attached to the framework (Fig. 5). A Screwed Rod in the Collar extends to the steam chest and the governor is belt driven from the 1" Pulley on the crankshaft. Added after the photographs was the regulator rod: a long rod from the steam chest back to a dummy lever on the footplate.

The crosshead slide is a 2½" Strip spaced from the Angle Girder so as to give a horizontal piston rod (Fig. 9). A Slide Piece bolted to a Swivel Bearing with four-hole Collar provides the connection to the connecting rod with a Rod & Strip Connector on the crankpin bolt. The Eccentric straps are extended by compound 5" narrow strips to my now conventional Stephenson's reversing gear representation. The upper strap rocks two 2½" Narrow Strips carried on a bottom pivot Rod in two Couplings: the lower strap rocks a slotted 2" Narrow Strip with a Strip Coupling with long Grub Screw carrying the valve rod which slides in the steam chest. The two Couplings are carried on a transverse Rod journalled in two 1" Triangular Plates. On the driver's side, a short crank carries a Collar pivoted on a Bolt shank with a Rod extending rearwards to a Swivel Bearing. The

Bearing rotates a short vertical Rod via a ¾" Bolt in a Collar. The vertical rod rotates in Collars attached to Bolt shanks and carries a short crank which engages the Bolt in the reversing cross-shaft. On the other side of the transverse rod, a Crank carries a long Rod back to the reversing lever in the cab. The lever carries a Short Coupling which pivots on a short Rod fixed by a short crank on the tender side and is held in place by a Collar (Fig. 6). A quadrant of two 2½" Curved Strips spaced apart to just nip the lever is fixed to the tender side. Adjustment of the motor direction, reversing cross-shaft and the valve cross-shaft gives a pleasing control by the lever.

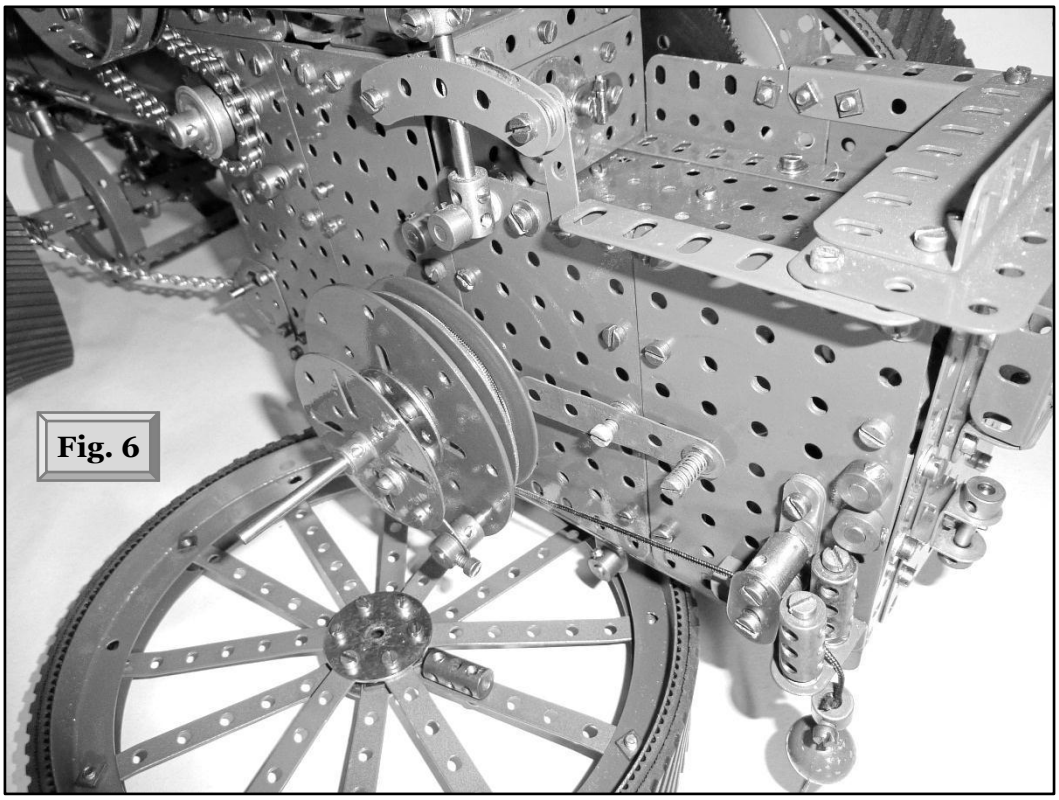


Fig. 6

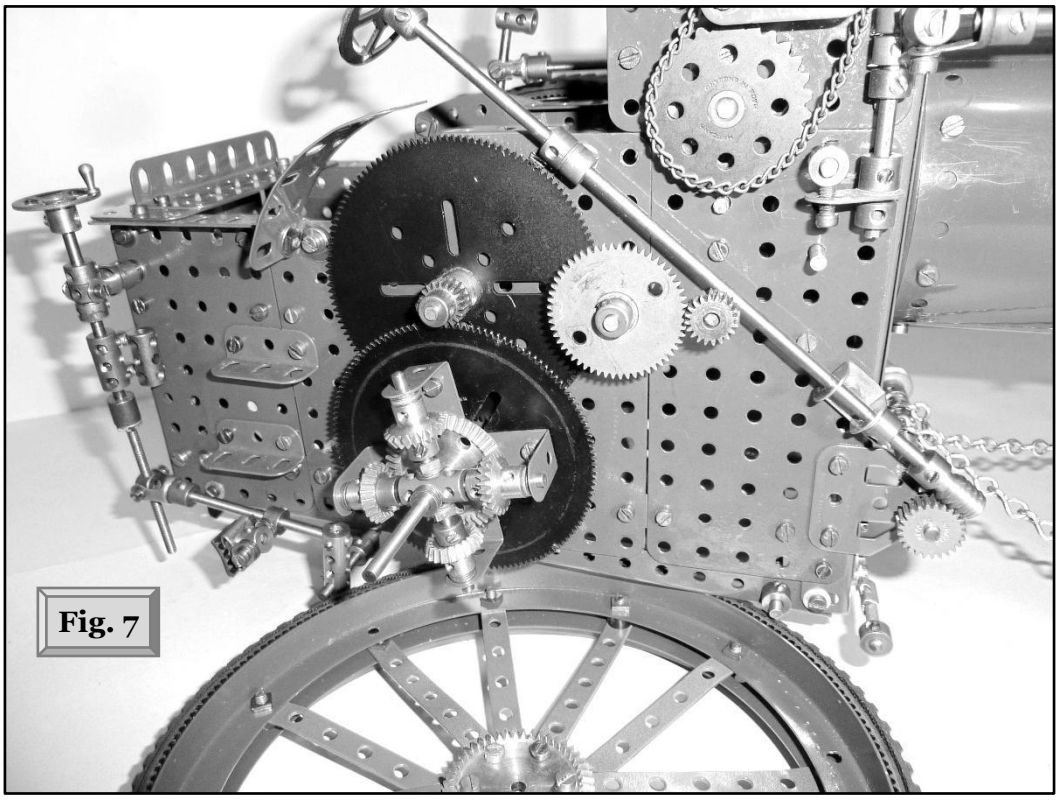


Fig. 7

Rear wheels and brake

The 60t Gear shaft carries a 20t Pinion which meshes a 56t Gear on a second shaft (Fig. 7). This shaft carries a 19t Pinion which meshes with a 133t Gear on another cross-shaft which also carries another 19t Pinion. This meshes with the differential gear, a 133t Gear carrying a cage provided by four 1" × 1" Angle Brackets. This Gear is loose on the shaft and is held in place by a 48t Bevel fixed to the axle. The cage carries two short Rods journalled in a Coupling free on the axle and two long Threaded Pins screwed into the Coupling. The planetary gears are four 21t bevels meshing the fixed bevel and held in place by Collars.

The wheels are 7½" circular girders spaced apart by Collars with 3½" Narrow Strips forming the twelve spokes and a rubber sheet is cut to form the tyres. On the driver's side, the wheel hub is formed from a six-hole 48t bevel gear and a Wheel

Fig. 5. With the similar-sized wheels and strange metallic concoction under the boiler, this is clearly not a common-or-garden traction engine.

Fig. 6. Removing the rear left wheel exposes the winch and guide rollers.

Fig. 7. Removing the rear right wheel reveals the all-bevel differential and its high-reduction gearing from the engine above.

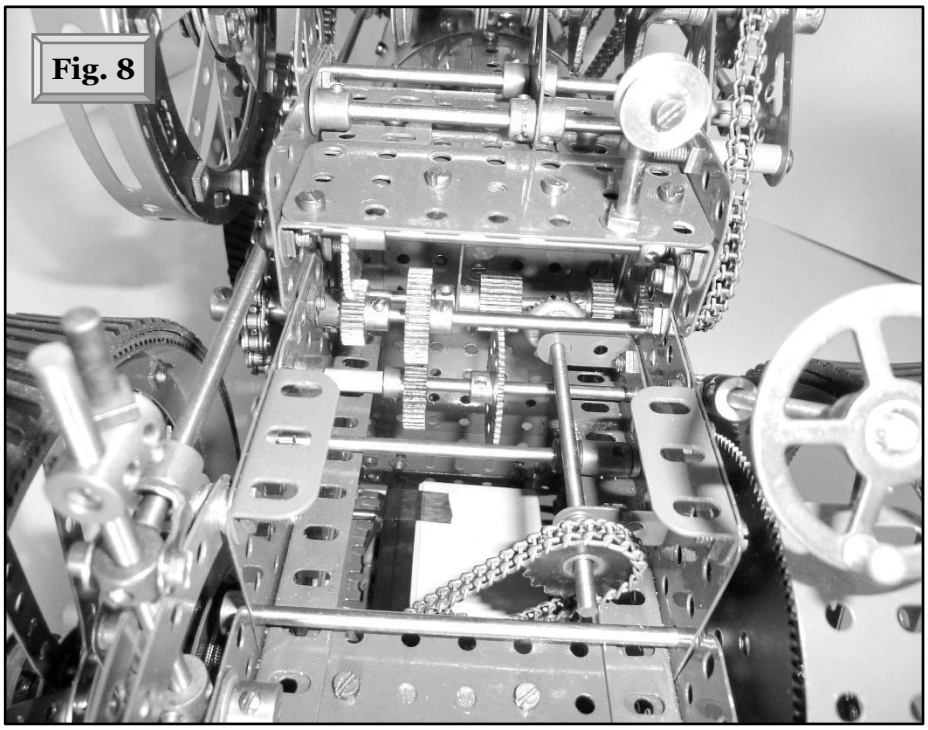


Fig. 8

Disc. The wheel, free-running on the axle, is held in mesh with the 21t bevels by a Collar and a 1⅛" Flanged Wheel.

On the other side, the wheel hub is provided by a six-hole Bush Wheel and a Wheel Disc. The axle on this side carries a free-running winch comprised of two 3" circular plates spaced apart by a Wheel Flange and a 3½" circular plate with Bush Wheel spaced from the drum by Collars (Fig. 6). A length of Cord is attached to the winch drum and it is held in place by a Face Plate fixed to the axle. The drum is prevented from uncontrolled movement by a 2½" Strip lightly sprung against it. The Face Plate carries a Crank which can allow a short Rod with Collar to act as the winch pin to be pushed through to engage in one of the outside holes in the 3½" circular girder as shown in Fig. 6. The Cord passes through a fairlead comprised of two long collars and two Couplings free on long Bolts on a small frame attached to the tender side prior to the hook being attached. The wheel carries a Coupling bolted to one of the inward-facing spokes which also allows the same short Rod (winch pin) to pass through the spoke and engage the Face Plate in one of its slotted holes once the wheel, free-running, is placed on the axle.

With the pin in the wheel spoke, normal rear wheel differential drive is obtained. With the pin out,

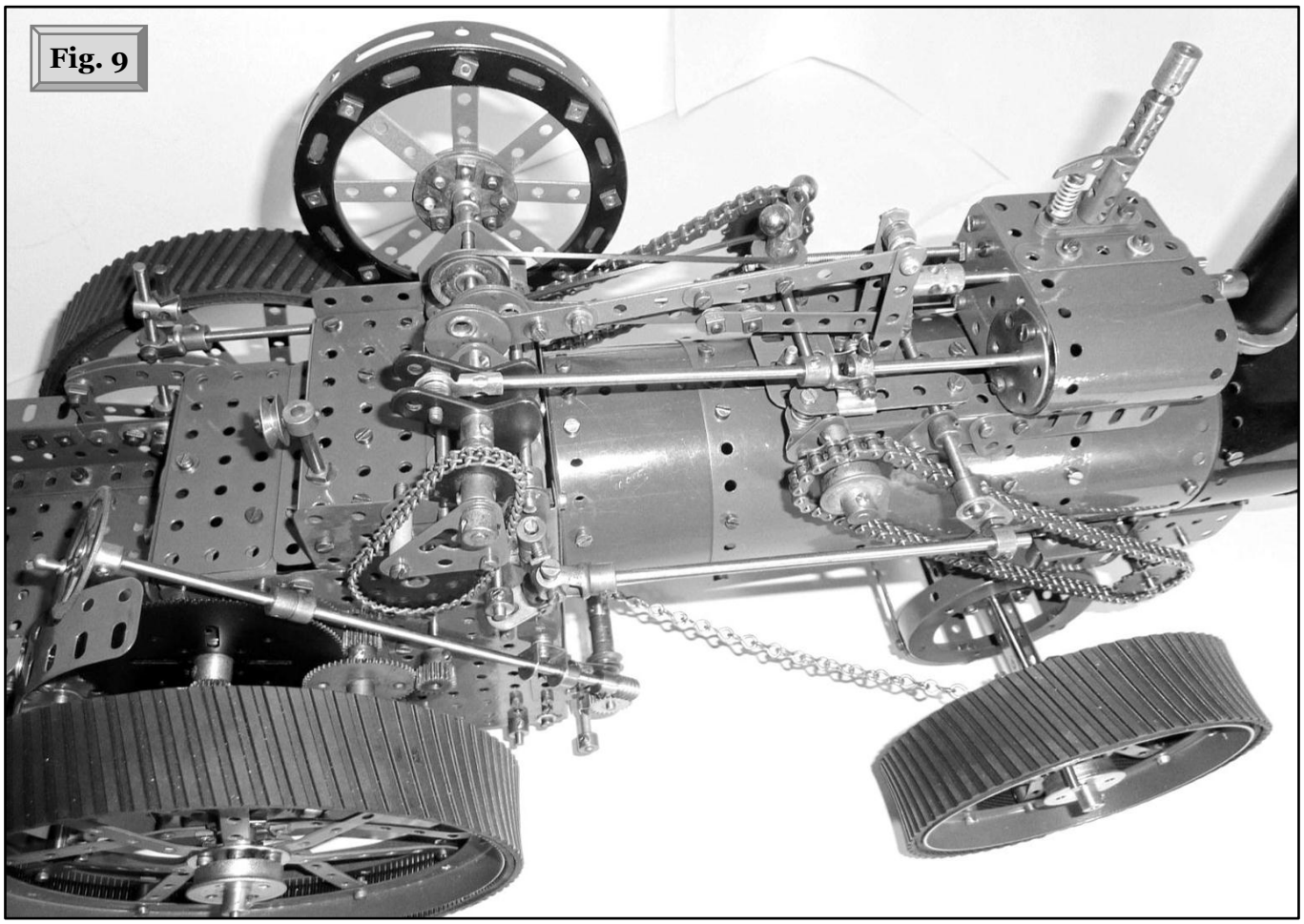


Fig. 9

there is no drive from the engine to the rear wheels. However, when the pin is pushed through to the winch drum instead of the spoke, then the winch becomes power operated by the engine. Good practice dictates that, in this mode, the brake on the driver's side should be applied. With the pin out of the winch drum, the winch cord can be manually paid out.

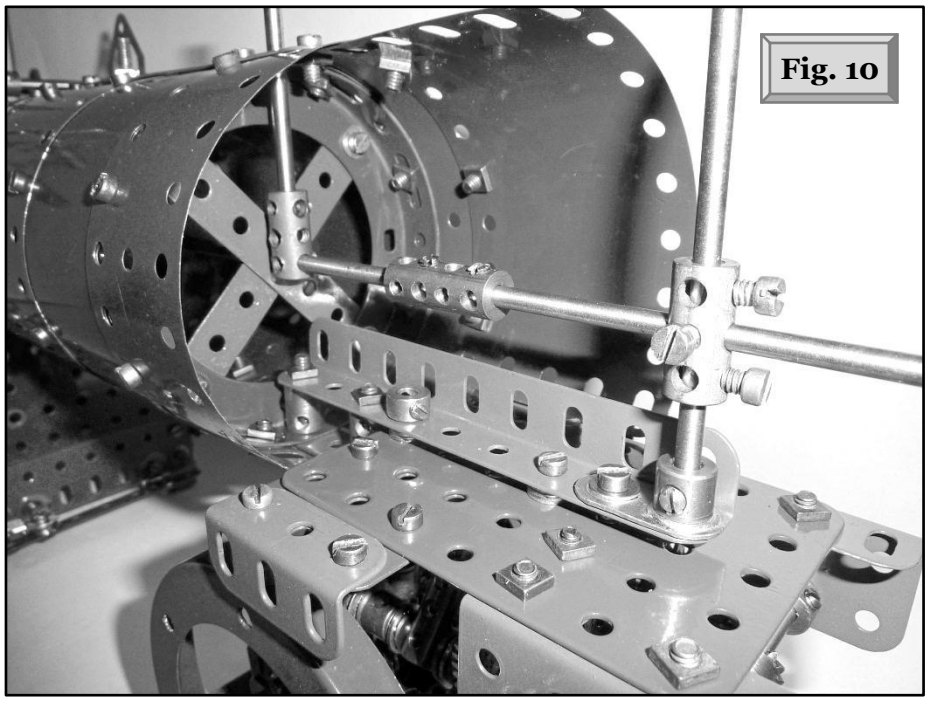


Fig. 10

The brake arrangement is shown in Fig. 7. A 3½" Double Angle Strip is bolted under the tender and a Rod held by Collars on each side carries a Coupling. This in turn carries a Rod with Swivel Bearing which engages a vertical Screwed Rod fixed firmly in a Screwed Rod Adaptor extended by a Coupling and short Rod. This passes through another Swivel Bearing which is lock-nutted to the tender side and carries a small handwheel. The brake shoe is a Slide Piece with rubber insert tightly screwed to a Collar which can be adjusted to provide braking to the inner rim of the wheel. Also to note in Fig. 7 are the access steps, the gear guard and the driver's seat.

Front-wheel drive and steering

The reference shaft carries a 17t roller chain sprocket which chain-drives an identical sprocket on a cross-shaft journalled in two 1" Triangular Plates (Fig. 5). On the other side, an identical sprocket roller chain drives a 17t sprocket on the front subframe (Fig. 4). The mounting of this subframe is shown in Fig. 10. It consists of a 3½" × 2½" flat plate with a 4½" Angle Girder firmly bolted to the boiler bottom and connected as shown to the centreline long rod. At the rear the flat plate is extended sideways by a 3½" × 1½" flat plate and two 1½" Angle Girders. The prototypical large differential case comprising two 3½" circular girders connected by 3½" Strips is spaced from the subframe by long collars (Figs. 5, 11 & 12). At the back of, and centrally below the 3½" × 1½" flat plate, a Double Arm Crank carries a short Rod with narrow collar (Fig. 12). At the front of the subframe, two Girder Brackets are fitted at each side (Fig. 5).

A Channel Bearing is bolted centrally under the subframe three holes from the front (Fig. 11). This carries a short Rod with 19t Pinion and a 12t bevel which meshes with another 12t bevel on a cross-

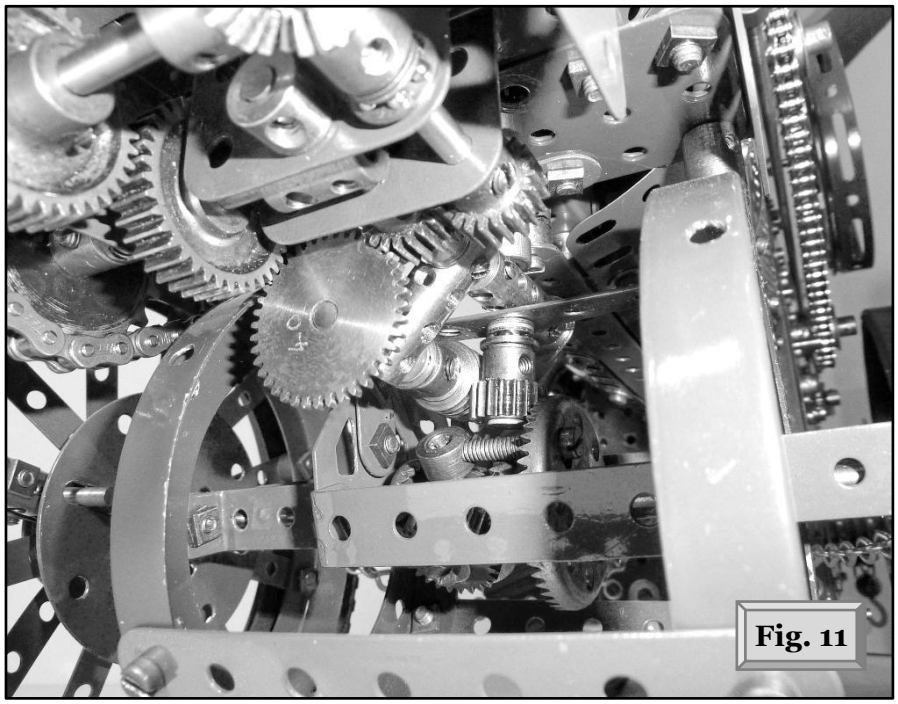


Fig. 11

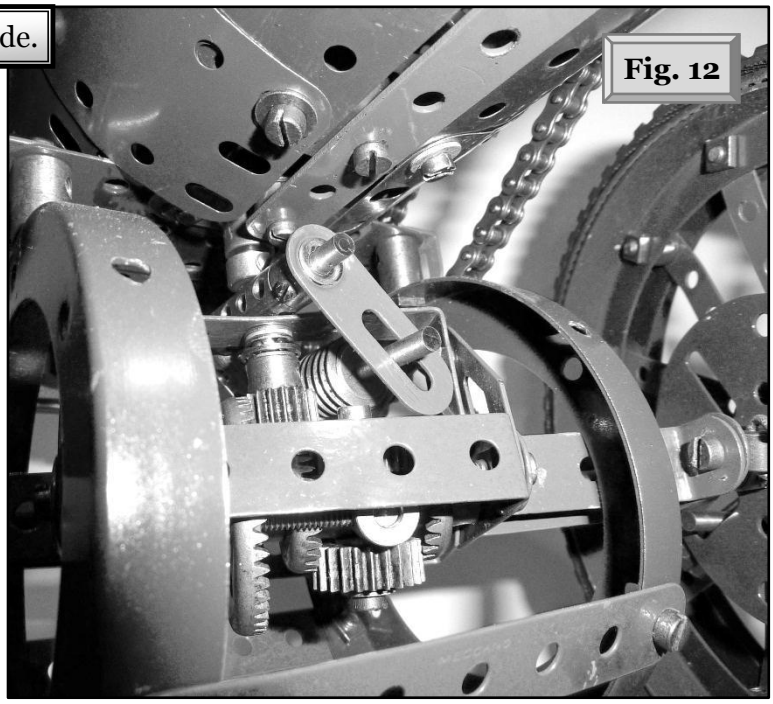
Fig. 8. With the firebox plating removed, the initial gearing from the motor is seen.

Fig. 9. The single-cylinder steam engine is remarkably conventional by Ken's standards!

Fig. 10. Partial dismantling of the smokebox shows the internal Rods and a robust mounting for the driven front wheels.

Fig. 11. The gearing slung under the boiler to transmit drive to the front axle of an all-wheel drive traction engine; this is beneath the smokebox, the drive entering by the chainwheel on the left.

Fig. 12. As for Fig. 11 but from the firebox side.



shaft carrying a 38t Gear. This Gear meshes with another 38t on the roller chain sprocket driveshaft which is journalled in the Girder Bracket and a Short Coupling free on the longer shaft running rearwards. This longer shaft carries a free-running 20t Pinion, a four-hole coupling tightly fitted which carries the Worm shaft and extends only two holes into another four-hole coupling which bears against the thin collar under the rear of the subframe. The Worm shaft in the end hole of the coupling carries a narrow 40t gear in constant mesh with the 20t Pinion with the Worm on the other side of the coupling and located by a slotted crank on a short Rod in the last hole of the four-hole Coupling. The Worm meshes with a 19t Pinion on a Pivot Bolt which also carries a 2½" × 1" Double Angle Strip. The Pivot Bolt has a flattened head and is bolted into the third hole of the four-hole coupling on the long shaft. It should be noted that small thrust bearings are used throughout to counteract end thrusts and their location is clear in the photographs.

The Double Angle Strip carries two Flat Trunnions and two 2½" × ½" Double Angle Strips. The Flat Trunnions are bolted to two 1½" × ½" Double Angle Strips which are joined by 1½" Strips to form the axle supports. A conventional Contrate differential is enclosed within the frame except that the 25t Pinions are without bosses (Fig. 12). The Contrate meshes with the 19t Pinion driven by the Worm. The half-shafts each carry a fixed Face Plate and a free-running wheel. The wheels are made up of two Circular Girders spaced apart by Collars and have twelve spokes of 2½" Narrow Strips with a Wheel Disc and Bush Wheel forming the hub. Each wheel has a Coupling bolted to one of the inward-facing spokes which can accommodate a short Rod with Collar to pass through a slot in the Face Plate as seen in Fig. 11.

The above mechanism allows full steering by pivoting the differential cage around the modified Pivot Bolt since the Worm and the Pinion always maintain mesh and hence drive. Similarly, significant tilting is allowed by rotation of the long shaft within the Channel Bearing. In this case, the 40t gear 'runs round' the 20t Pinion and so also maintains mesh and drive. The differential on the axle itself allows the wheels to effectively rotate in opposite directions when steered whilst standing without straining the drive.

The steering chain is attached to Collars on the outside of the 1½" Strips (Fig. 6) and wrapped around Couplings on the steering shaft. This is journalled in Flat Trunnions bolted to the front of the tender (Figs. 3 & 4) and a 25t Pinion is driven by a short worm on the steering column. This is journalled in a Double Bracket and a Collar loose on a Bolt shank (Fig. 7). Once the front-wheel drive framework is attached, the boiler's smokebox end can be completed with Flexible & Plastic Plates and the chimney located around the vertical Rod shown in Fig. 10. The smokebox front consists of a 3½" circular girder and circular plate with a Conical Disc held in place by a four-hole Collar with two Bolts.

Construction notes

Whilst I could not find any details of the Whittingham patent and after trying many alternatives, the finished front-wheel drive mechanism worked perfectly, albeit with some very tight clearances and allowed much more steering lock and tilt than necessary in the model. The wheel speeds also worked out fine. The wheel diameters were 5.8" and 8.0" giving a speed difference requirement of 137.9% between front and rear. Since the front wheel drive was a 100:1 reduction, then the rear wheel reduction ratio from the reference shaft given by the 20t Pinion, the 56t Gear and two 7:1 reductions was 137.2:1 - very close indeed.

My thanks go to John Thorpe for the non-standard circular girder blanks: these can easily be drilled to suit the twelve-spoke model requirements. Thanks also to Frank and Tricia at Meccano and Compatible Parts for the roller chain and to Stuart Borrill for the thrust bearings, bevel gears and short worm.

Ken Ashton

Tony Brown, 1963 - 2016

We lost another respected Meccanoman when Tony Brown died suddenly from an aneurysm in early October; he was aged a mere 53. As well as a multitude of other clubs, Tony had been an SMG member for several years and although he never actually managed to attend a 'Laughton Day', would occasionally send an appreciative message after receiving his *SMGJ*. Meccano gatherings closer to his Cambridgeshire home were his usual domain and he was always in demand to add interest at his local fairs and events. Being passionate about traction engines, steam rallies were another favourite place to display his handiwork with a Screwdriver. Many will know him as a regular and level-headed contributor on the New Zealand Forum.

Tony with Meccano and Märklin Chaseside loaders at Skegex 2016; photo by Roelf Valkema.

Subjects for Tony's models covered a broad spectrum but they were dominated by vintage excavating machinery (especially steam-powered), traction engines and seemingly anything from his cherished immediately postwar 'export' No. 10. One of his models, a Burrell road locomotive, was published as Modelplan No. 100 and his marble-bouncer became a local legend amongst the show-goers. Constructional interests covered more than Meccano as he was keen on extolling the virtues of its rivals, particularly Märklin and early Erector; his work in all three systems studs the Forum and associated Gallery. Alongside his wife Marie, Tony was part of his family-run funeral directors in Soham where he maintained their computer system and performed the unseen organisation without which many a final journey would not have progressed smoothly.

The last time we met Tony will have been at the Lincoln steam rally in August 2016 then the NMMG's September meeting at Oxton, the latter a mere three weeks before his death, where there was no indication of anything amiss - he was his usual Meccano-mad self. It is therefore unsurprising that the New Zealand Forum contains many tributes to Tony, all with a stunned tone due to his unexpected demise; they are an indication of how firmly he was regarded as one of our own. His steam-hauled send-off was on 24th October and plenty of his Meccano mates were there. Sincere condolences are extended to Marie and their family and on behalf of the SMG, 'bye Tony. *RM*

Coming up in SMGJ129

The SMG's April meeting at Laughton and the comedy contest

Alan Lovett's four-ratio & reverse gearbox

An SMG look at Meccanuity 2017

Two Part 2s: *Steam Power for Industry* and *Building Servetti's Magician*

More offbeat steam by Ken Ashton - the Law & Downie Road Locomotive

Lots of other good stuff is in the pipeline but if you're quick, there may be room for *your* contribution!

A Six-Axis Robotic Arm

Designed and built then described and photographed by Stuart Weightman

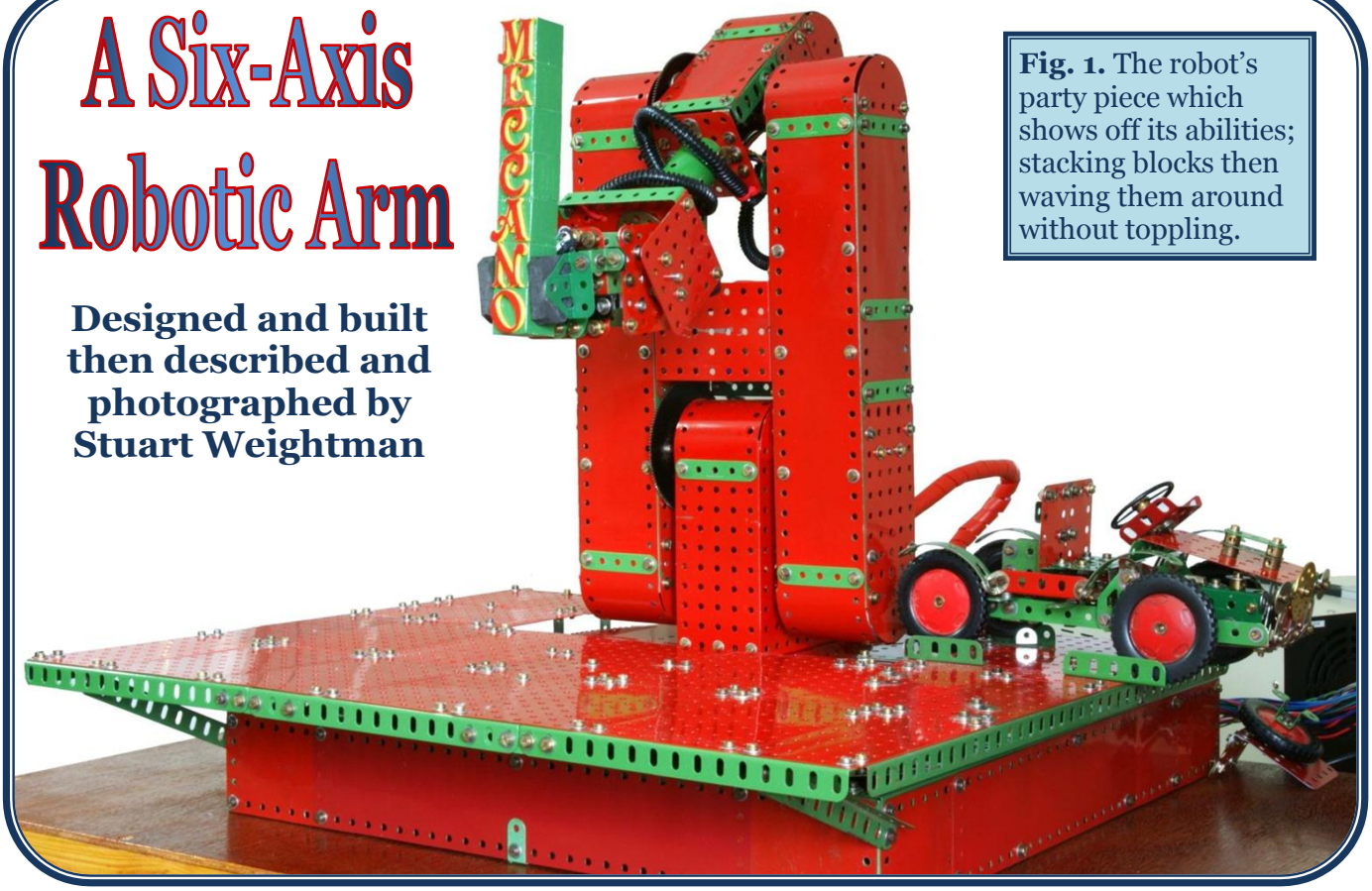


Fig. 1. The robot's party piece which shows off its abilities; stacking blocks then waving them around without toppling.

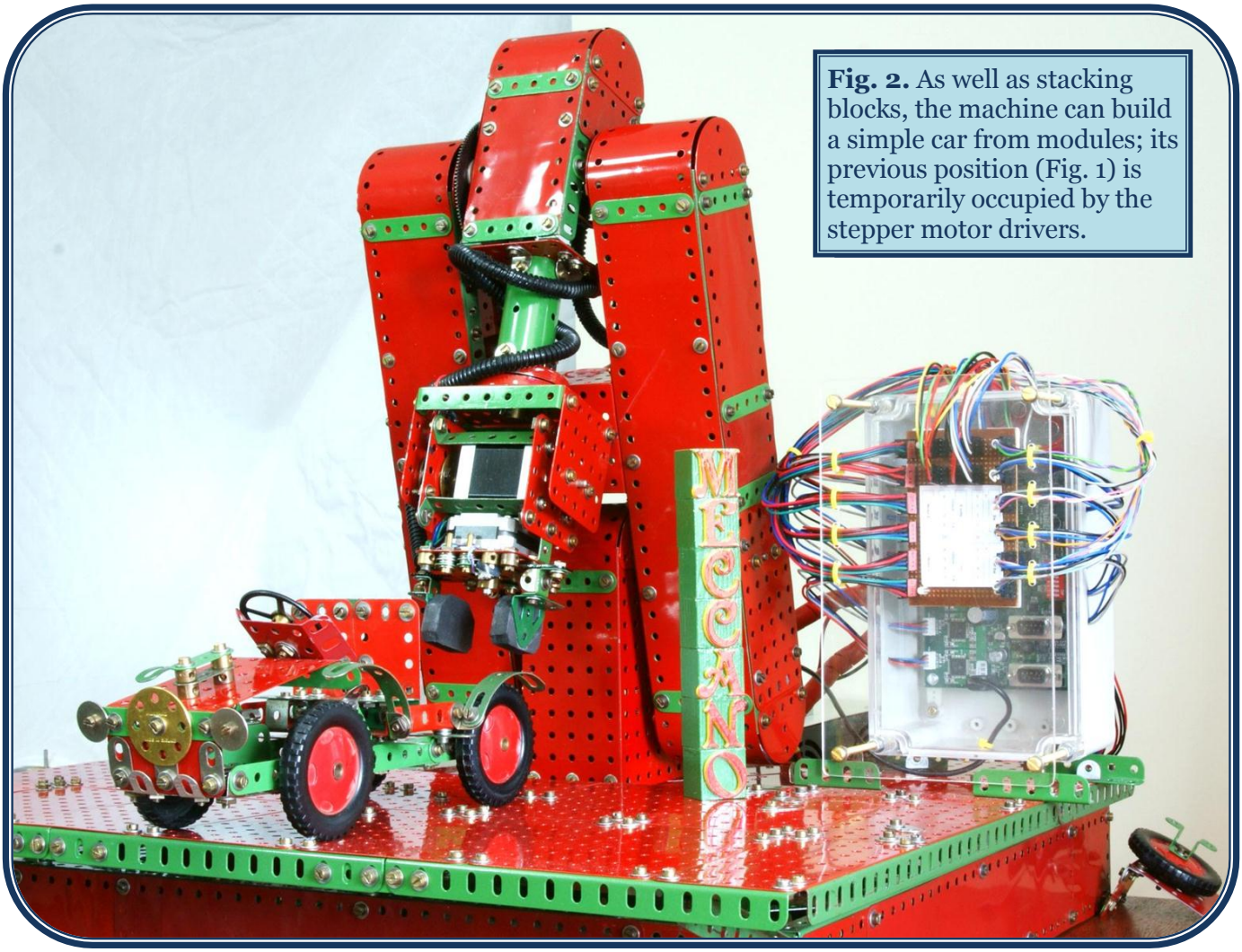


Fig. 2. As well as stacking blocks, the machine can build a simple car from modules; its previous position (Fig. 1) is temporarily occupied by the stepper motor drivers.

Editorial foreword

It is with pleasure that we feature Stuart's remarkably precise model. After it grabbed first prize at CAM's Calais Exposition, Stuart provided an article for CAM's Editor Jean-François Nauroy and it appeared in CAM Magazine No. 135. The SMG is indebted to Stuart and Jean-François for their approval of the SMG's presenting an English version. *RM*

Background

I think I was eight years old when I got my first Meccano set and have added to it over the years. It has had a few long spells of non-use but not any more! I have lately refurbished many old rusty parts, some of which have been used on this robot. I have built several robotic-type projects over the years, some using Meccano and some not, an example of the latter being a working underwater remotely-operated vehicle (ROV).

Many years ago I made a robotic arm but this had an inferior home-made control system based on relays driving DC motors and potentiometer feedback. When all six motor positions had a small error they combined to make it practically unusable. For example, the robot would lay down an object and on return to pick it up the positional error could be as much as 40 mm.

My aim was to build a precision Meccano robot which would reliably go to the exact position required every single time. This robotic arm is the product of several designs, modifications and many hours of experimentation. To avoid positional errors I used:

- A strong wide base with a 12"-diameter Geared Roller Bearing as the turntable so the arm was stable when at its long reach position.
- Rigid box frame to minimise twisting.
- All axles ran in bushed bearings to avoid excessive play.
- All gears meshed tightly to minimise backlash.
- An accurate electronic positional zeroing procedure.
- Use of stepper rather than DC motors.

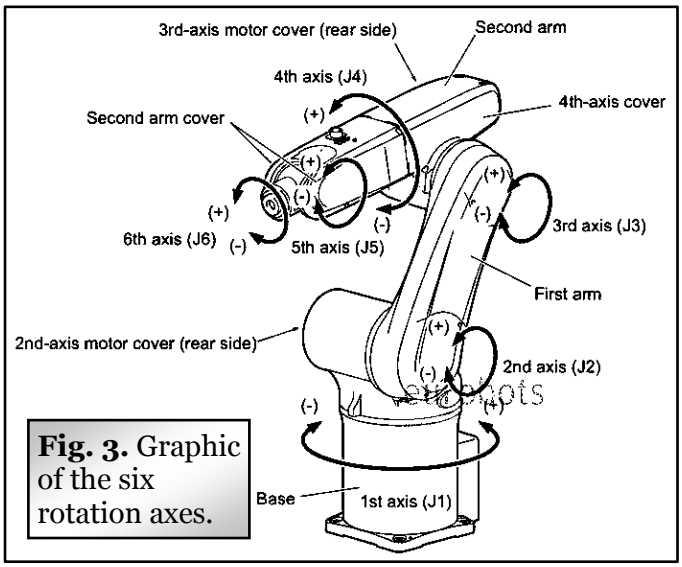


Fig. 3. Graphic of the six rotation axes.

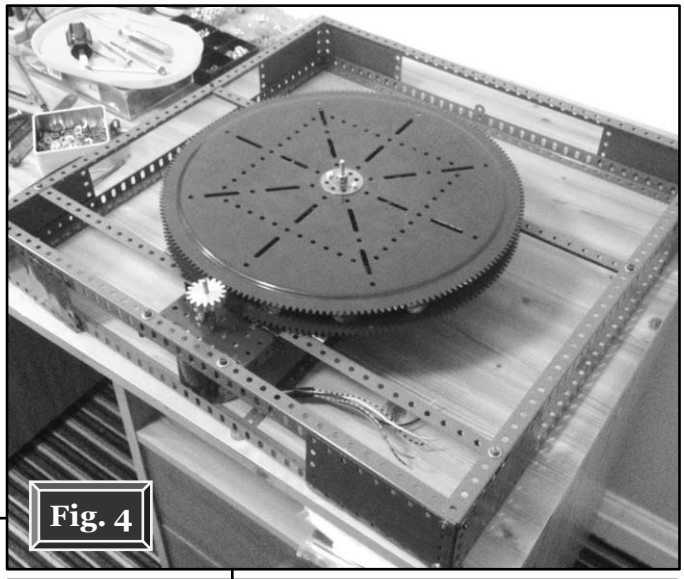


Fig. 4

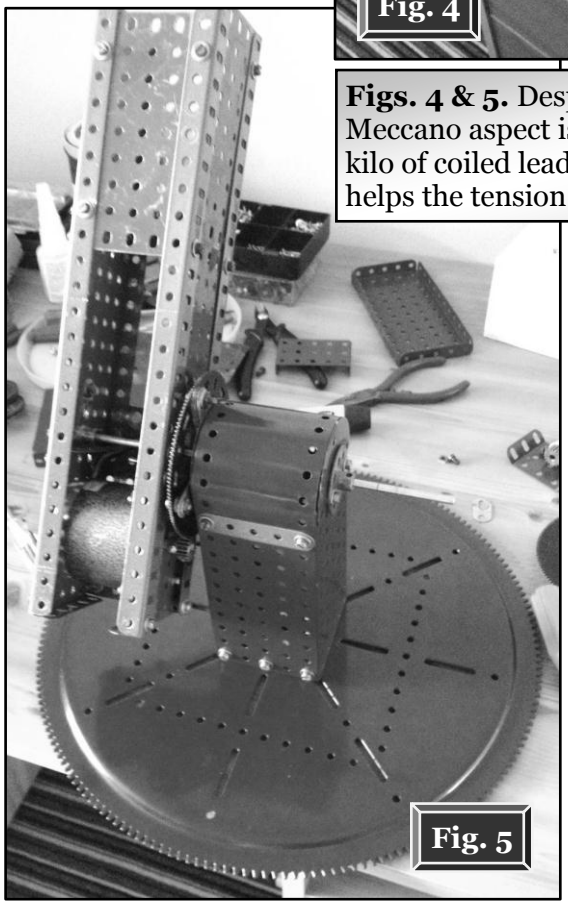
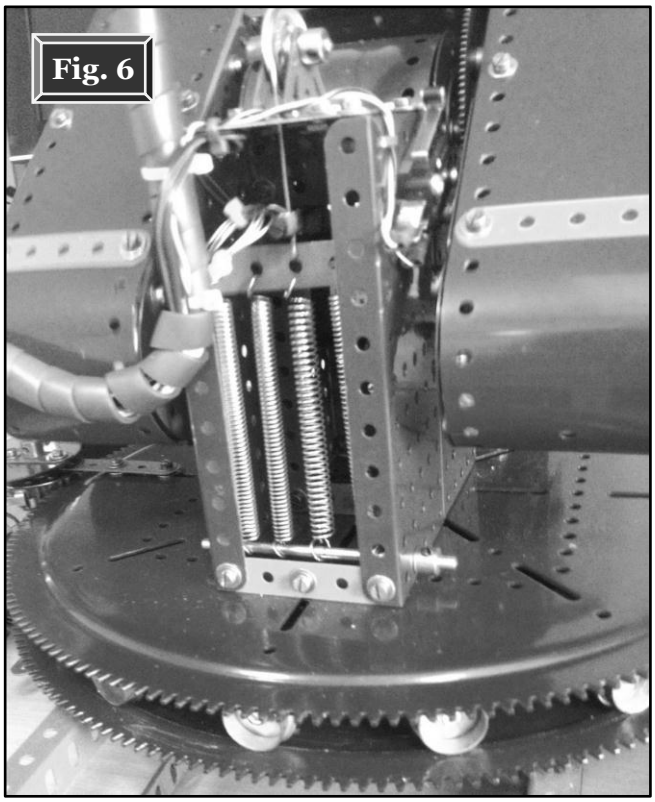


Fig. 5

Figs. 4 & 5. Despite the electronic wizardry, the Meccano aspect is as traditional as it gets. Half a kilo of coiled lead roof flashing in each lower arm helps the tension springs with primary balancing.

Practical matters

When the robot is picking up an object at its longest reach there is a great deal of mechanical stress on the gear train and motors. To alleviate this, two 0.5 kg (1.1 lb) counterweights were placed in the lower side frames and five non-Meccano tension springs attached to a Bowden cable at the rear to take the majority of the weight. This successfully reduced the motor power required and torque through the gears. The number of springs was adjusted to keep the Bowden cable as short as possible, make the robot more compact and avoid it looking like a luffing crane. The motor in the second part of the



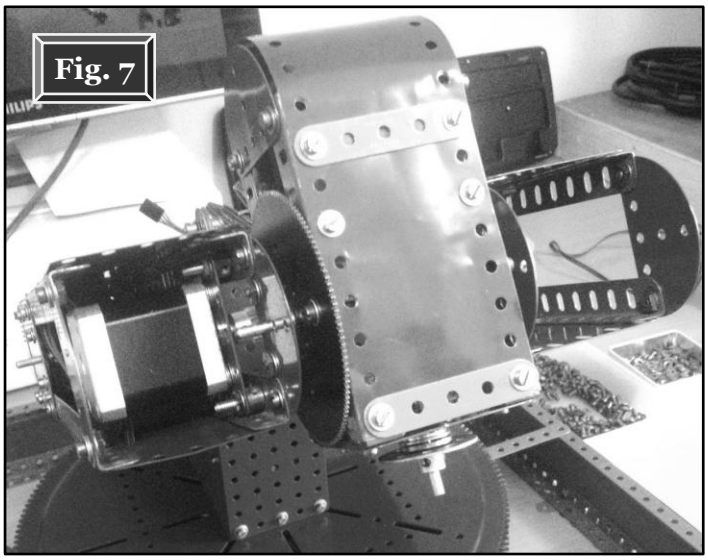


Fig. 6. Four of the five springs handle much of the cantilevered load and reduce brute force from motor No. 2.

Fig. 7. Stepper motor No. 3 for the upper arm.

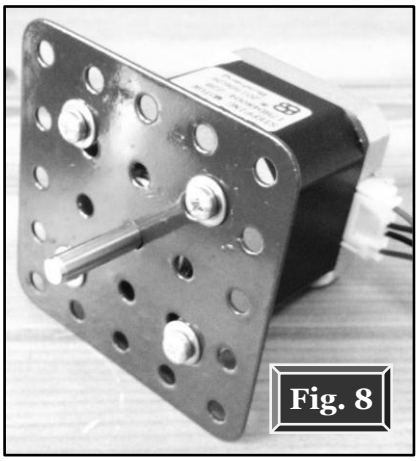
Fig. 8. Each stepper is made Meccano-friendly by being fixed to a Flat or Flanged Plate.

arm was situated as far from the gripper as possible to act also as a counterweight. A smaller, lighter stepper motor was chosen for the gripper to further reduce the cantilevered weight when at the long reach position.

Stepper motor duties and drives

The robot is driven by six stepper motors as follows.

Motor No. 1 has a Large Tooth Pinion which directly drives the Geared Roller Bearing.



Motor No. 2 has a 19t Pinion driving a 133t Gear; this is probably doing the most work on the whole robot. This drives the two vertical upright parts forwards & backwards. When reaching forward and with the upper arm extended, the counterweights and tension springs are needed as the motor does not have enough torque.

Motor No. 3 moves the upper arm and again has a 19t Pinion driving a 133t Gear.

Motor No. 4 has a direct drive through the Cylinder which turns the hand a full 360°. I considered modifying this and fitting an electrical slip ring to enable unlimited revolutions. This motor is also a counterweight to aid motor No. 3.

Motor No. 5 is also direct drive. The motor shaft is fixed to a Bush Wheel to move the hand up & down through 180°.

Motor No. 6 opens and closes the gripper and consists of a 19t Pinion driving two 3½" Rack Strips. Two rubber pads enable it to grasp objects. During testing, the grip position was increased gradually until the object no longer slipped.

The gripper

Several gripper designs were built and considered: scissor, Worm-driven and long offset finger types. Some became very heavy and had too much play as there were too many working parts. I was pleased when I developed a fairly simple, lightweight, fast and compact design which worked well.

Control system

The main difference from my other Meccano projects is that the robot arm did not use standard DC motors but stepper motors. Steppers can be instructed to move one step (this particular type is 1.8°; some are 3.6°), many thousands of steps or, with a more sophisticated controller, a fraction of a step. When the motor has stopped it is held in that position awaiting the next instruction. The controls consist of:

- 1x stepper motor controller (six-axis); TMCM-6110.
- 5x Nema 17 12V 1A stepper motors; 17HD48004-22B, 1.8° per step.

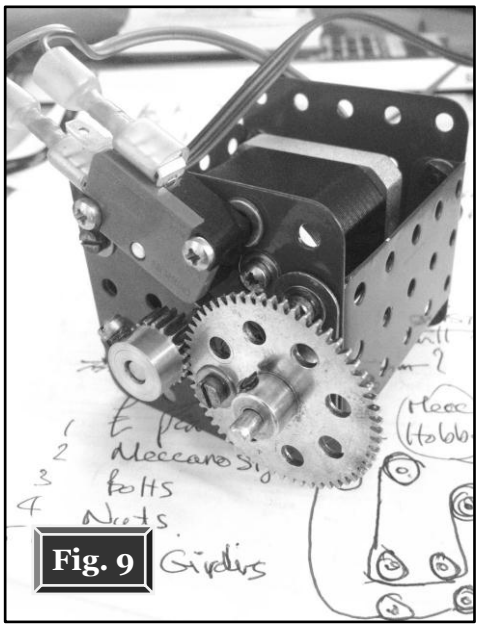


Fig. 9

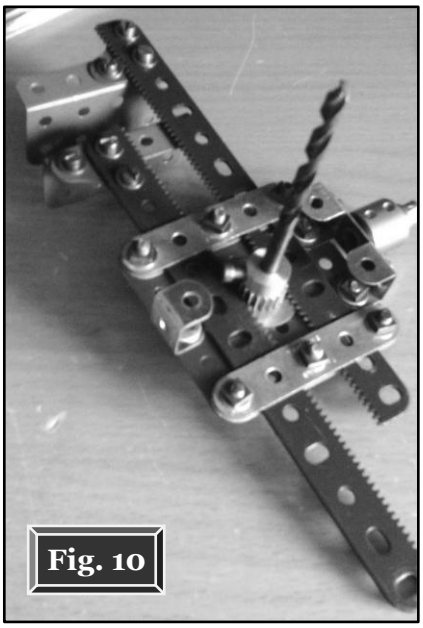


Fig. 10

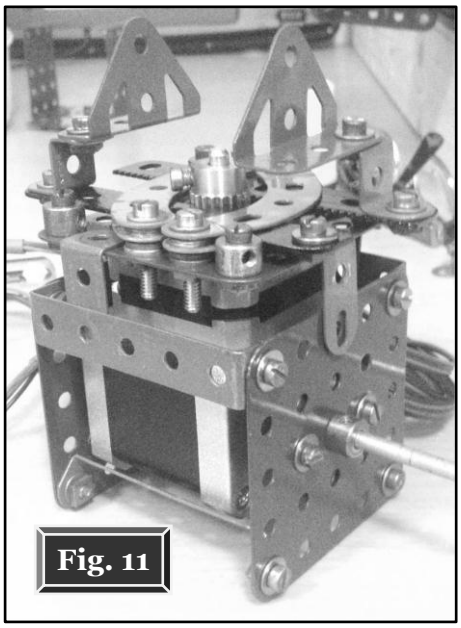


Fig. 11

- 1x stepper motor 17HS08-1004S; smaller type for gripper.
- 6x microswitches.
- Power supply; 12V 5A.

I searched online for a long time to find the motor controller. I normally use the Parallax Basic stamp BS2 for robotic projects and I do have several other stepper motor drivers but they only drive one motor at a time and cannot match the multiple functions that the TMCM-6110 offered.

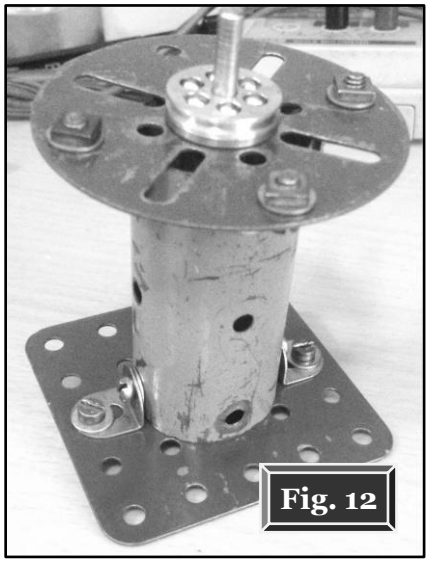


Fig. 12

Fig. 9. A reference microswitch to zero the stepper motor and arm position before starting a task routine.

Fig. 10. One of the earlier gripper designs was an offset type using two 6½" Rack Strips.

Fig. 11. The compact and final gripper with 3½" Rack Strips.

Fig. 12. The completed 'wrist' with a bearing allowing the gripper to rotate relative to the upper arm section.

The first thing I did was to install the driver board inside a box to prevent any Meccano Nuts & Bolts falling on the board and causing electrical damage. An external connection board was made to allow the motors and reference microswitches to be plugged in.

The TMCM-6110 stepper motor controller is a very sophisticated yet inexpensive controller which has the follow advantages:

- A microstepping mode which can move the motor position 1.8°/256 = 0.007° and, with additional gearing, down even smaller increments - too small for any application I can think of!
- Can control all six motors simultaneously.
- Control of motor acceleration, deceleration and speed.
- The current can be changed to any motor at any time.
- Free software can be downloaded from the manufacturer's website and 'Virtual Mode' can be used to actually programme and learn prior to considering purchase.

To ensure accuracy when the robot is first powered up, the initial subroutine performed is a calibration. All motors are slowly driven in turn towards a reference microswitch. When the switch is actuated, the software 'remembers' the position as zero.

The programme code is written on a PC then uploaded to the control board. A sample of code is shown below; it may look confusing at first but it is fairly easy to learn.

```
CarAssembleFront:
MVP ABS, Motor2, 140000//pick up engine
WAIT POS, 2, 0
WAIT TICKS, 0, 50
MVP ABS, Motor3, 5350//move motor 3 to position 5350
WAIT POS, 3, 0 //wait until motor 3 has stopped
MVP ABS, Motor5, 20000
WAIT POS, 5, 0
WAIT TICKS, 0, 50
MVP ABS, Motor0, 200000
WAIT POS, 0, 0
MVP ABS, Motor2, 83000
```

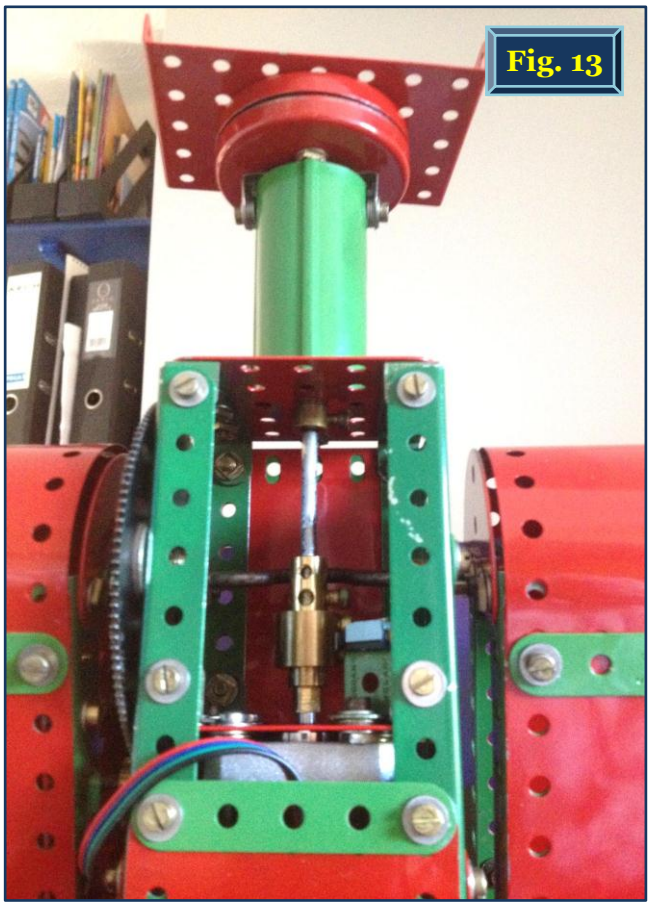


Fig. 13

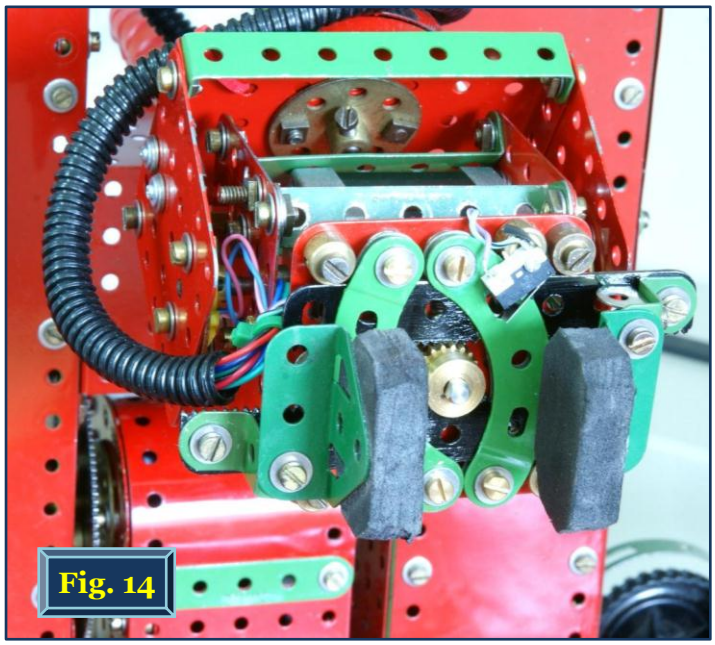


Fig. 14

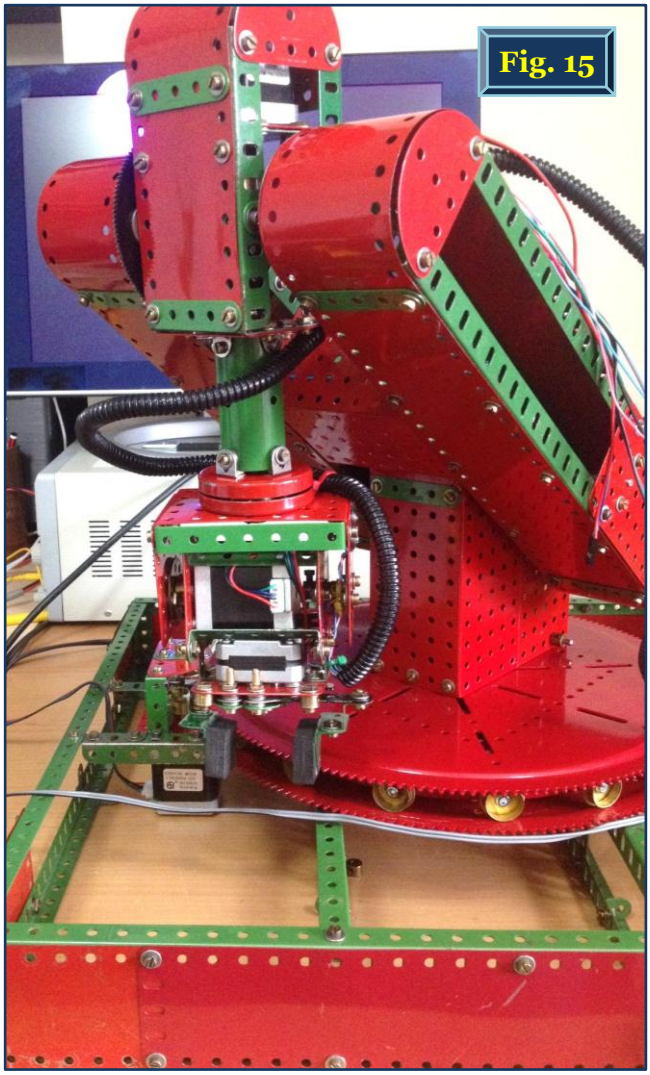


Fig. 15

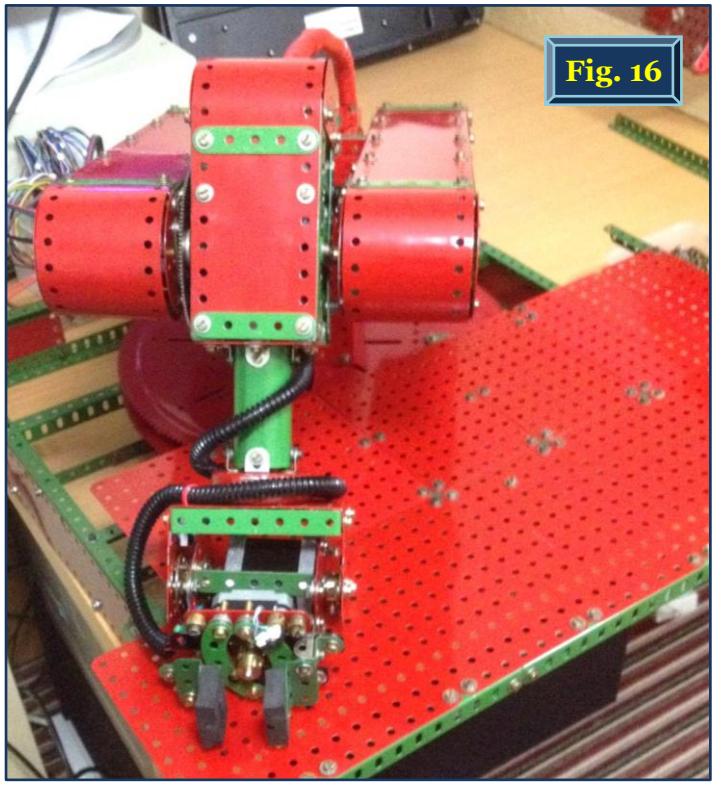


Fig. 16

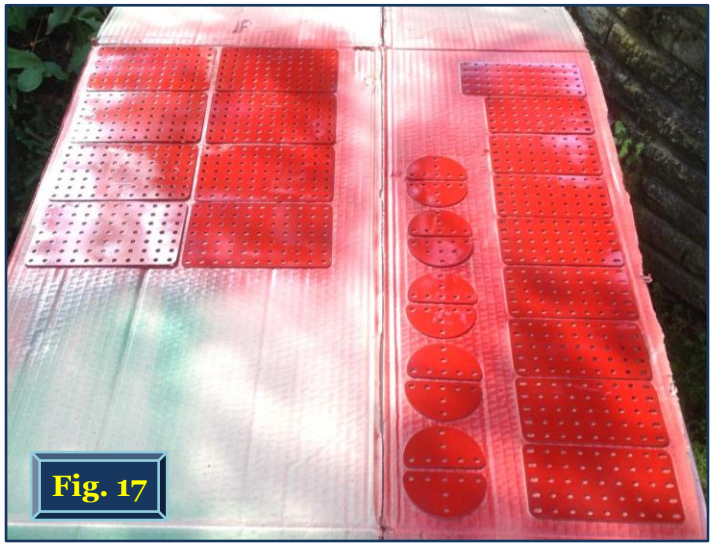


Fig. 17

Fig. 13. Preparation for the gripper included a rotary drive from stepper motor to the 'wrist'.

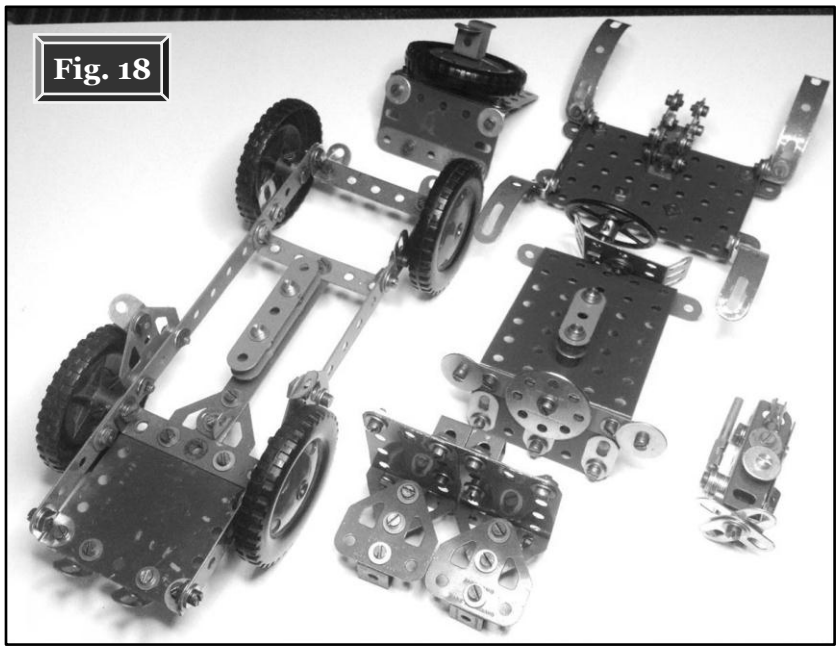
Fig. 14. The installed gripper.

Fig. 15. A demonstration of the machine's mobility.

Fig. 16. The robotic arm shows off an ability to reach the remotest corner of its work area.

Fig, 17. The refurbishment line!

Fig. 18. A six-piece kit car and left to right: wheeled chassis, boot lid, seats, engine cover with steering wheel, mudguards and engine block.



Robot task routines

Robots are normally designed to carry out limited but specific tasks and having six movement axes allows greater versatility whilst assembling, for example, the six car modules of a Meccano car. This had to be built as lightweight modules, each with a 'handle' to ensure the gripper could get a firm hold so it could easily be taken apart and reassembled by the robot. A program was written and adjusted to place each module in the exact position when assembling the car.

I bought the wooden blocks to ensure they were perfectly flat and square as one routine is to stack and lift them. The blocks were painted and I attached the letters to spell 'Meccano'.

The robot moves to each position then the motor co-ordinates are entered into the program. The program then sequences each position in turn. It can be seen in action in a YouTube video:

www.youtube.com/watch?v=O4FOxDvADiw

Another of my robots, an ED-209 from the *Robocop* films, can be seen at:

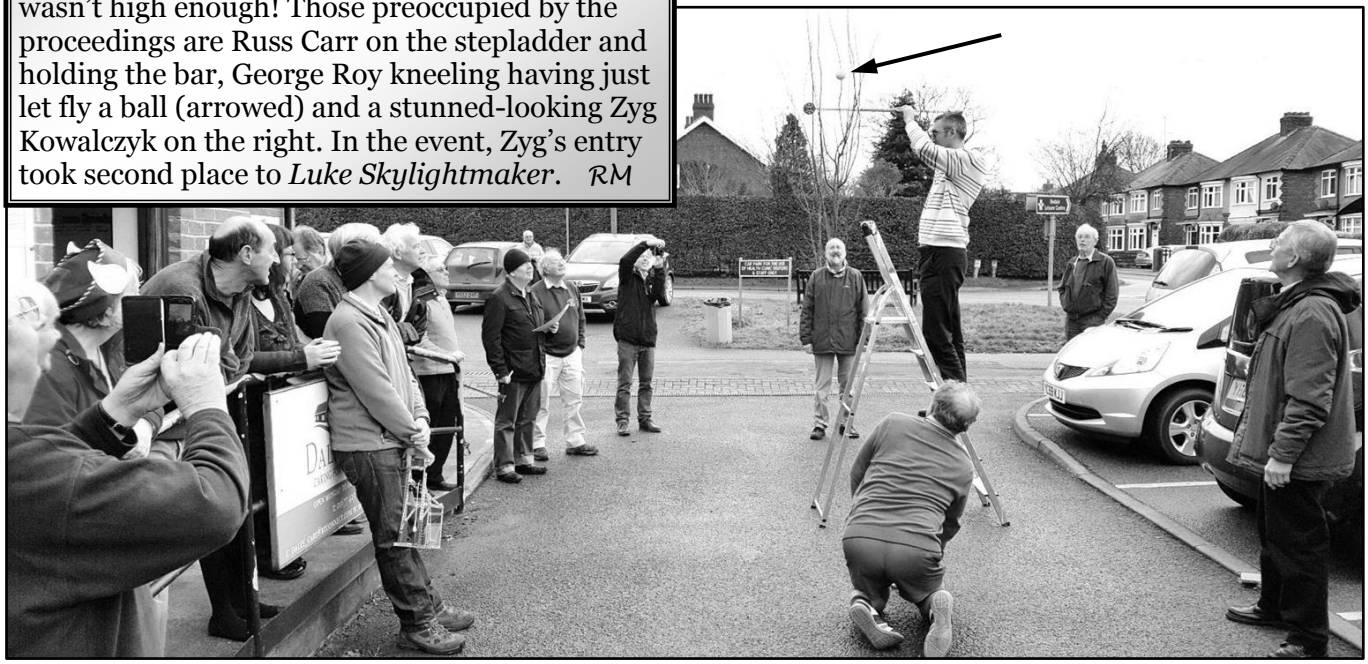
www.youtube.com/watch?v=Q7u6F87cHbo

I hope you have enjoyed reading this article. I would be pleased to answer questions about any aspect of the robot. [Via the Ed in the first instance please.] You can build almost anything with Meccano as long as it doesn't have to fly or float!

Stuart Weightman

Leaving Bedale on a High Point

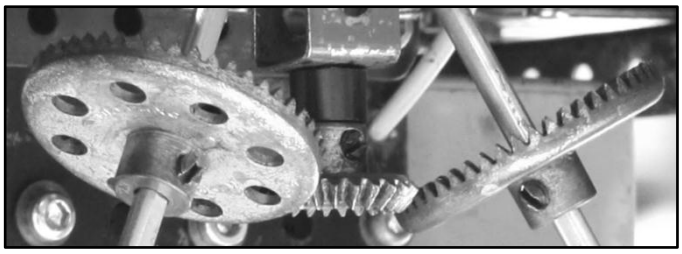
Our NEMS chums have had to move out of their regular venue at Bedale and as if to mark the final meeting on 3rd December 2016, the climax was a tennis ball lobbing contest hatched by Tim Roylance. **Paul Robertshaw** pictured the unfolding drama out in the cold as the room wasn't high enough! Those preoccupied by the proceedings are Russ Carr on the stepladder and holding the bar, George Roy kneeling having just let fly a ball (arrowed) and a stunned-looking Zyg Kowalczyk on the right. In the event, Zyg's entry took second place to *Luke Skylightmaker*. *RM*

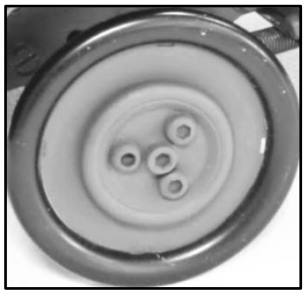


Miscellany 128

An unhappy engagement?

A peculiar mesh between a 26t Bevel and two 50t Contrates in the drive train of Peter Goddard's crane in SMGJ127's Skegex coverage raised an eyebrow at Wakefield Meccano Works from where **Russ Carr** wrote *I actually cringed at Peter's gearing on page 42, picture 8! That was until I read the text as I thought outer gears were Bevels, not Contrates. However, surely reversing the centre 26t Bevel (teeth up) and meshing with a pair of 57t or 50t Gears would be closer to the ideal of tooth intersection at a common point? I have tried it but I couldn't get the Contrate-Bevel to mesh as described though a Gear will at the inner end of Bevel teeth where the pitch is smaller*. On closer inspection, Peter used the early Contrate type with shorter teeth (below) and surprisingly, this variant is ignored in the NZ Meccano parts survey. From the chronology, the change of tooth form coincided with the start of double-tapping or immediate postwar production and the 25t Contrate was similarly affected.





Also, *Ian Brennand's Citroën three-bolt wheels are worth a second look, each a tinplate Road Wheel minus the conical disc and boss* [right]. *My guess is a 1" Pulley (fast) was drilled using a 1" Pulley (loose) as a pattern and opening the holes to Meccano size to replace the missing boss.*

Lots looked back to 127

A handful of recipients (four!) were kind enough to report the layout glitches on pages 53 & 54 where caption boxes had sneakily resized themselves. This seemingly random habit of 'Word' is normally nabbed but these occurred after the final checking so evaded detection. Fortunately, they obliterated your Ed's work rather than Les' or Bob's. To set the record straight, caption 44 on page 53 was *One of the boarding sections; a tower base at the far end contained the carriage drive. (KR)*. The top three lines of the left column were *…Michel also showed his tiny - by Meccano standards - model of a Liebherr excavator. Fully motorised, he put it through a stunt sequence…* Similarly for the right column *…Warwick Lewis) who built it from a mix of original and reproduction blue & gold. Yes, that's correct - this 1:50 scale monster model was built in Sydney…* On page 54, the cropped caption 47 was *Two prewar Supermodels for the price of one by **Ken McDonald**! (RM)*. Pictures 45 & 46 also had their numbers transposed. For a self-print replacement for the affected pages, e-ask the Ed or download from the NZ Forum:

www.nzmeccano.com/forum/showthread.php?tid=2816

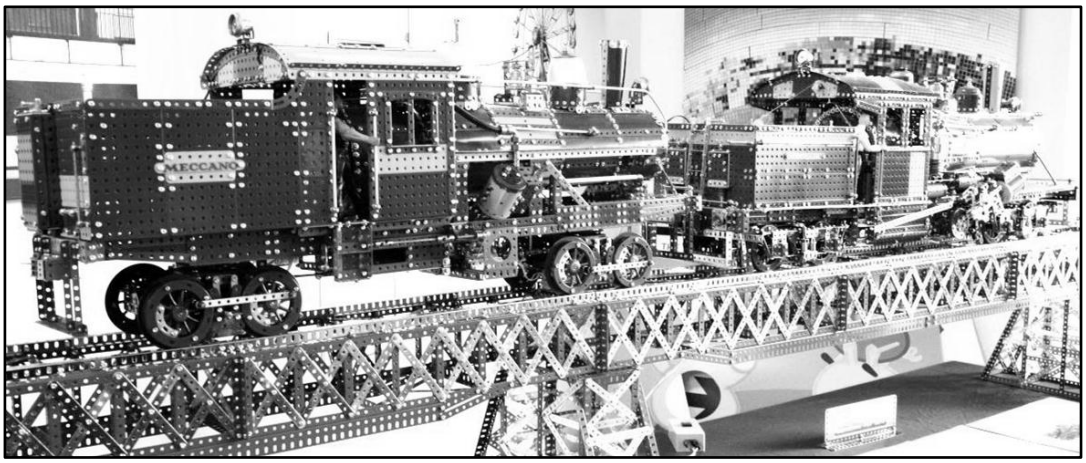
More generally, some of the pics could also have been lightened a touch more. Horrors laid to rest, the fevered brow was soothed by **Geoff Brown** (who was smitten by Ken Ratcliff's *Journey to Laughton*), **Brian Chaffer**, **John Ozyer-Key**, **Alan Lovett** (*a cracking Journal with interesting coverage of Skegex 2016 for those of us who didn't get there*), **Ken McDonald**, **Frank Myers**, **John Sinton** and **Andrew Wallace**.

Mick Burgess e-mailed *Journal 127 received, another spiffing read, well done. Page 57 photo 4; the chap in glasses is Frank Palin, the Holy Trinity MC's Secretary and much else besides. He died some years ago. Photo 5; I believe the chap to front left next to Rod Rich is Richard Stevens of the West London MS and I have not seen him for years. You are probably correct with the 1988 date as I think I was there and have some more photos somewhere*. It indeed appears to be 1988 as a picture of Rolando Piazzoli's (not 'Piazolli' as stated - another correction) 'Crocodile' is in the NZ Meccano Gallery's Skegex album for that year.

From **Ken Ratcliff** who was a substantial contributor to 127 therefore may be ever so slightly biased. *Super stuff! You are attracting a great variety of articles and pictures then writing and photographing so much yourself, with just the right touch of humour and irony where appropriate. It makes a splendid read.*

John Wilson e-mailed *There was a loud and satisfying thud the other day as something struck the doormat. "Ah!" I said. "That can only be a 64-pager from the SMG stable." Was it the best edition yet? Somehow the models get better. The photography too seems better and the chat is right up to standard. Good general articles too.*

From **Kees Trommel**. *As always, SMGJ is an enjoyable way to pass time. I appreciate very much what the SMG team do by making this excellent magazine. Regarding the pictures from a late 1980s Skegex, I can confirm that the two Dutchmen on photo 7 are correct. In addition, Maurice Sijnja passed away on 18th August 2006.*



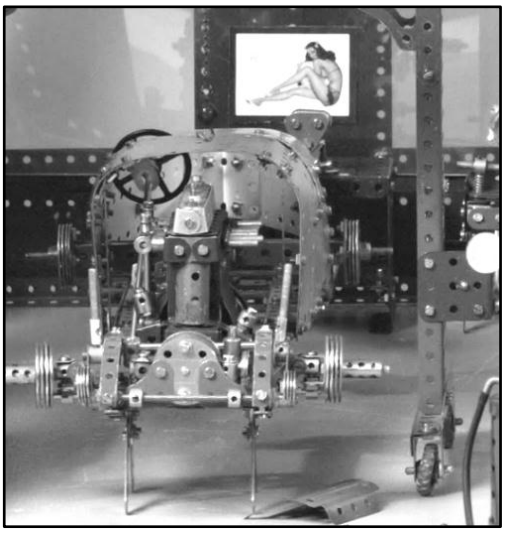
Joining those who can pen a comical complaint was **Gregg Worwood**. *Many thanks for another excellent Journal which I read from cover to cover. Please do not quiz me on the contents as my memory is not as good as it used to be. I thought I went to Skegex in July with a model so large I had to split it into two separate units to fit it in the foyer at the Embassy Theatre. However, I must have dreamt it. There was no mention of me or my models in the Skegex report. In old age the memory does play tricks.* Sorry Gregg but we didn't try to cover everybody which would be impossible and instead picked models which took the reporter's fancy. We can confirm that you were there as Ken Ratcliff ventured to the foyer and took the picture (above) plus your Ed was roped in to help remove them on Sunday evening, gaining bolt heads deeply imprinted in soft flesh in the process! Luckily, Gregg enjoyed some 'retail therapy' before writing which must have mellowed his mood. *I thought I was dreaming last Sunday when I went to a car boot sale at Castle Combe in Wiltshire. I was on the lookout for bargains in Meccano, Bayko and Dinky Builder. I found two blue, yellow & zinc sets in tatty boxes and apart from the Sector Plates, the parts were well used, the zinc tarnished and the Flexible Plates mangled. The seller was asking £30 & £40 so he kept them. I came across another stall with a wooden tray (it could have been a drawer out of a Meccano cabinet) containing a large number of 1950s red parts. They were all in reasonable condition, some unused and still strung to yellow cards. I wondered if I was going to have enough cash on me to buy them if they were reasonably priced. The dealer said "I have no idea what they are. They look as if someone has dismantled some sort of machine but I cannot imagine what it might have been. There are also these rods, some formed into handles. You can have it for £3". He was even more pleased when told I didn't want the tray which he thought he could sell for another £3. I don't think it was another dream as I have the evidence in front of me as I write. I had acquired over £180 of parts and now have the problem of finding somewhere to keep them. I felt somewhat guilty for not telling the seller that he was grossly underpriced but that's what car boot sales are about. If there was not the chance of a real bargain they would not happen. My purchase contained 1× 6" Pulley, 2× Face Plate, 4× Wheel Flange, 2× Circular Girder, 1× Circular Strip, 4× 6" Circular Plate, 2× 4" Circular Plate, 4× Boiler End, 1× Chimney Adaptor, 2× Flanged Ring, 1× Flanged Disc, 1×Toothed Disc, 1× Flexible Coupler and 4× Conical Disc.* That's a decent haul for a measly £3 and it's a shame Gregg wasn't beaten to the loot by the LMS Chief Buyer…

Ken Ashton e-mailed with *Very sorry to hear of Frank Singleton but still a great Journal!* This is a timely point to say **Tree Singleton** was pleased with our tribute and Ken's sentiments regarding Frank were shared by many. Frank's absence from Laughton on 15th October was acutely obvious.

From **Graham Jost**. *Another great read in the latest SMGJ, received here earlier in the week. No prizes for guessing my favourite model article though… it has to do with NZ! Yes, I had seen it already online but in hard copy it is better and I really look forward to seeing it in the flesh in Christchurch at Easter 2017. It's a lovely model altogether. I enjoyed the donkey stabbers entries details too - folk really take these contests seriously and come up with some very effective ideas! It is good to get several different views of the Greatest Show on Earth, too - you all enjoyed a particularly effective one by the look of it.*

As revealed on 127's page 2, **Les Megget** was duped after the approval of his mini Healey article. *What a surprise when the latest SMG journal arrived: my mini Healey on the cover, wow, looks great! One thing not mentioned so far about the Issy-winning Brooklands Garage was the pin-up girl on the back wall. Shirley noticed that before me; my eyes must be failing and maybe not PC to mention it. I hate to tell you this but Figs. 1 & 2 were back-to-front on page 31. Fig. 2 is the Richard Payn gearbox and Fig. 1 is Alan's. I promise to stop being a pain (pun intended) about this. Yet another excellent magazine, just a pity that all the images aren't in colour but I know what that costs from our own experience.* Agreed

about the naughty pin-up so it won't be mentioned and the picture (right, extracted from a Nigel Barker picture and filched with permission of *CQ*) is purely coincidental; CQ114 features Pete Evans' work in extravagant style. Self-flagellation was applied regarding yet more swapped Fig. references…



Bob Seaton was his usual effervescent self. *With regard to SMGJ127, it's another cracker! I particularly enjoyed the trawl through perpetual motion devices - I might have a go at one of my own as they appear fairly straightforward! The tribute for Frank was very apt.*

From **Philip Webb**. *Looking again through 127 - another excellent production - I mused over the photos on pages 56 & 57. Lots of old friends there, not least Paul and Nick on photo **3**. In **4** the bald gentleman in the middle is Frank Palin, then Secretary of the HTMC. He passed the role over to me fairly rapidly on my arrival in 1989 but sadly died about a year later. In **5** I am sure I recognise the man far left as from one of the south east clubs but neither I nor Greg can put a name to him.*

An arithmetical oddity

With apologies for wandering off the beaten Meccano track, our more mathematically-inclined members (there are several) should like this curious cubic coincidence:

$$166^3 + 500^3 + 333^3 = 166{,}500{,}333$$

Does that sum of three cubes contain some deep hidden meaning or is it merely a fluke?

Patently obvious braiders

E-more from **Graham Jost**. *I've attached a US patent drawing from 1989 - that's **1989** - in spite of looking like something drawn a century earlier* [right]. *Its tracking scheme is **precisely** that used in the Travelling Braider in SMGJ126! How about that? Great minds thinking alike perhaps? I wish!* Indeed Graham and your Travelling Braider certainly made an impact, page 54…

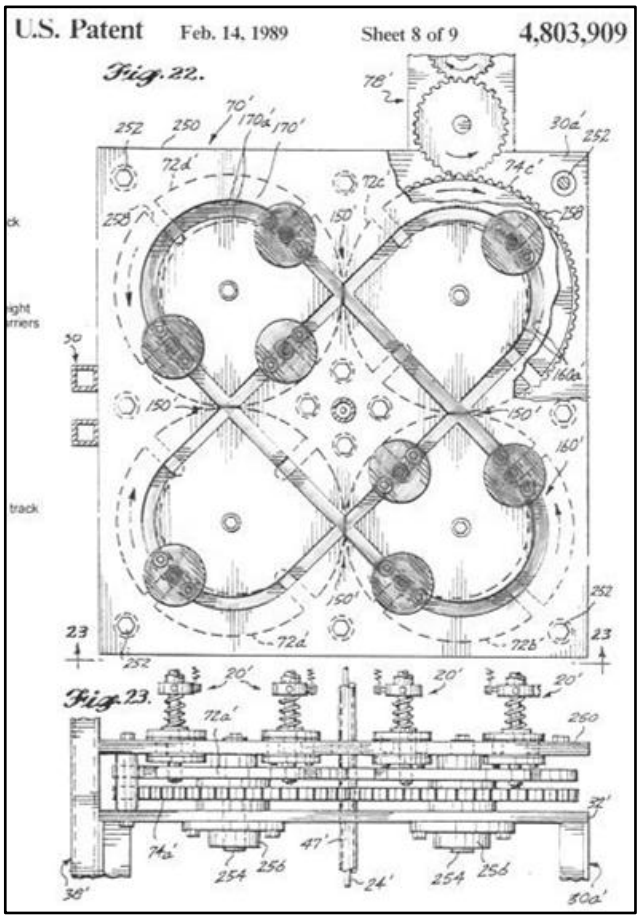

U.S. Patent Feb. 14, 1989 Sheet 8 of 9 4,803,909

Fig. 22.

Fig. 23.

Skegex 2017

Geoff Brown writes about the UK's premier Meccano show.

Skegex 2017 will be on the weekend previous to that normally-assigned, viz 23rd - 25th June with set-up on 22nd. We have weighed up the operating costs and the fact that Skegex 2016 made a modest profit, we have decided that the capitation fee per exhibitor will be reduced from £15 to £10. Those who like to book your accommodation ahead should proceed with these dates.

It should be understood that the contract agreement is for the same space: auditorium, stage and a dressing room for Wendy Miller's activities. Reflecting on 2016, the weekend footfall was the worst ever at just under 500; a combination of weather and little passing traffic? I was informed that the show was by no means the worst and I do know this - from countless conversations with modellers - that you all want the show to go on so we are doing our bit for you.

Those with long memories may recall the 'dayglo' posters that Mike Cotterill had made and which we used to put up on likely lamp-posts two weeks before when the council was looking the other way! Although I can't see us getting away with that again, one thing that Geoff Wilson and I did was to deliver shedloads of handbills around the area, concentrating on places where happy or bored campers were to be found. Now we have lost Geoff, it would be nice if I had a volunteer or two to prowl the area for a day distributing the good word - especially from people who claim they saw nothing in the town.

Now is their chance to make a difference. Let me know nearer the time [page 63] *and in the meantime, you may start planning as above.*

The SMG's 2016 cash

Rounded to the nearest quid, we turned over £3359 during 2016 and the list below shows where it came from then where it was frittered away. Figures for 2015 are added for comparison and the percentage change with respect to 2015 are rounded to 5%.

Income	**2015**	**2016**	**%**
Subscriptions	£2740	£2565 [1]	95%
Advance subs	-/-	£174 [2]	120%
Donations	£56	£108 [3]	195%
Machining service	£20	£23 [4]	115%
Auctions x2	£217	£173	80%
Advertising	£100	£100	100%
Back issue sales	£40	£79	200%
MWMO royalties	£32	£11	35%
Sundries	£5	£126 [5]	-/-
Total	**£3209**	**£3359**	**105%**

Expenditure	**2015**	**2016**	**%**
Hall hire x2	£160	£160	100%
Printing	£1779	£1485 [6]	85%
Postage	£765	£846 [7]	110%
Trophy & engraving	£20	£23	115%
Stationery	£25	£21	85%
Sundries	£0	£19	-/-
Gift for Pauline	-/-	£101 [8]	-/-
Total	**£2748**	**£2655**	**95%**
Income - expenditure	£462	£704	150%
Cash in bank	£4937	£5513	110%
Cash in hand	£17	£4	25%

Assets	**2015**	**2016**	**%**
Stationery	£3	£2	65%
Unused postage	£14	£4	30%
Back issues	£40	£96 [9]	240%
Total	**£57**	**£102**	**180%**

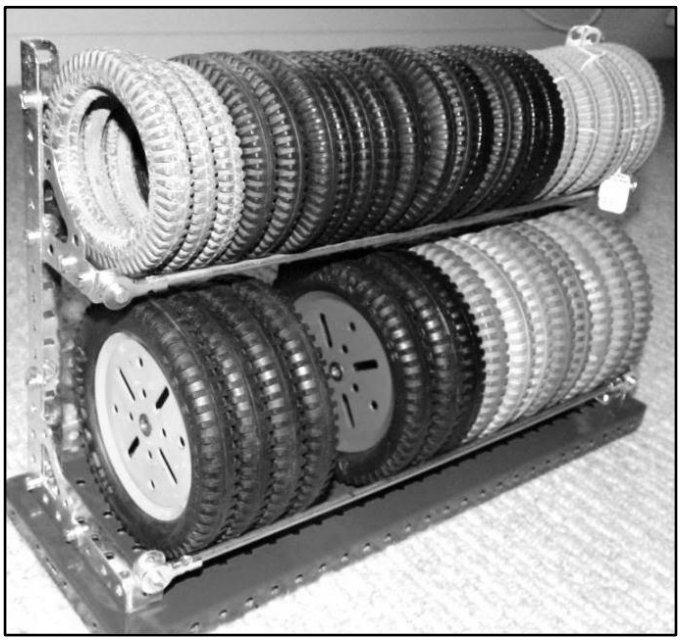
Notes

1. A small fall despite a growing membership, most new recruits taking a part-year subscription which expired at the AGM.
2. Now a separate entry to improve clarity. To leave intact the 2015 numbers, it has not been applied retrospectively.
3. From several sources; small renewal overpayments, wheels to the Machining Service and LMS selling a donated item. Thank you to all.
4. The Machining Service slowly returns to action.
5. Two major components were the October 2015 kitchen honesty box and the whip-round for Pauline Ozyer-Key as detailed in SMGJ125 and **8**, below.
6. There were four bills in 2015 (as explained in the financial summary in SMGJ125), three in 2016.
7. This could have been £1000 but for a philatelist in our midst selling us stamps with a face value of £130 for £90 plus hand delivery when the occasion and the grace of our fellow clubs allowed.
8. Taken from **5** above; easy come, easy go!
9. Some restocking plus the SMG was gifted a run.

Adding cash in the bank (£5513), cash in hand (£4) and assets (£102) yields a value at the AGM of £5619, £608 more than for 2015. A 'thank you' is due to John for keeping us in a healthy state and to Roger Thorpe for casting a critical eye over the numbers then finally declaring them to be in order.

Tyre storage

Returning to **Andrew Wallace**, *I've built a Tyre rack over a weekend to my own design* [below]. *It won't win any prizes but what it will do is stop my cat from knocking all my Tyres onto the floor which he has taken a liking to!*



Handling hardened Tyres

Staying in 142 mode, it is well known that warmth eases manipulating solidified Tyres on or off Pulleys. This is **Malcolm Booker's** recipe:

Removal from a Pulley

1. Fit a 1" Axle in the Pulley boss.
2. Fit an old 1" Pulley to the other end of the Axle.
3. Rest the 1" Pulley on - but not touching - a tray.
4. Set an oven to 105°C and leave for ten minutes.
5. Using a cloth, take it out then quickly and carefully take the now soft Tyre off the Pulley.
6. The Tyre will soon cool and harden again.

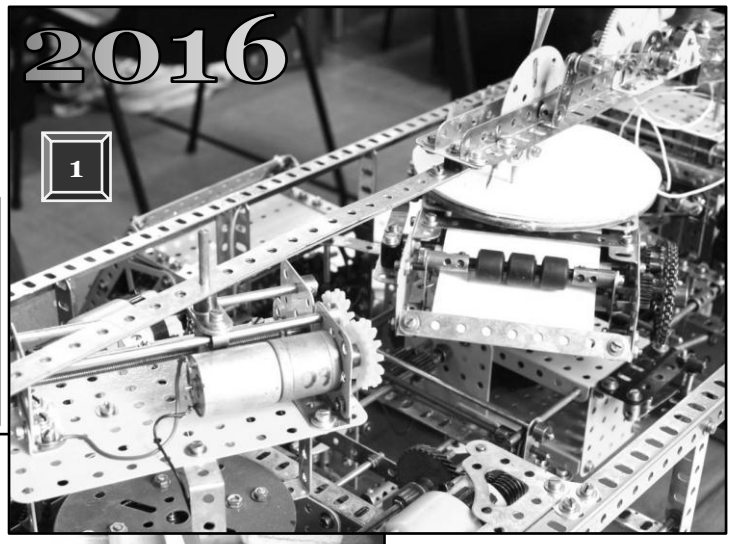
Fitting to a Pulley

1. Put the Tyre in a pan of cold water.
2. Bring to the boil and simmer for ten minutes.
3. Lift out the Tyre with, say, a fork.
4. Quickly dry the Tyre.
5. Holding the Tyre with a cloth, swiftly fit to the Pulley then mould to shape.
6. Leave to cool by sitting it on the 1" Pulley.
7. Do not try to use until the Tyre is cold.
8. If you are adept, it is possible to take a Tyre off one Pulley and put it on another.

We lost Malcolm about two weeks after he sent us these tips, page 31. *RM*

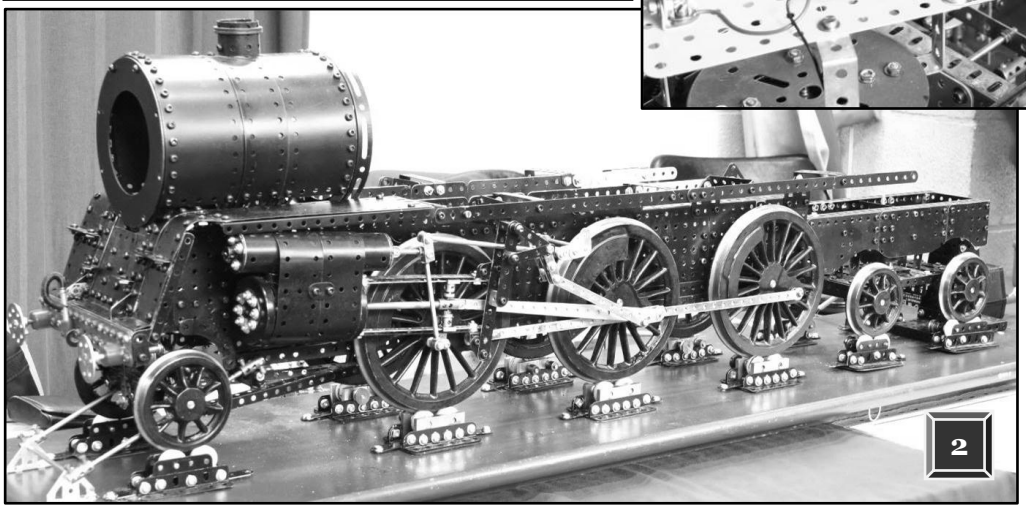
Darlington 2016

29th October, reported and pictured by Rob Mitchell



1. We saw **Joe Etheridge's** all-electric push-button Meccanograph at Laughton two weeks earlier; this is a detail of the remote-controlled pen lift and arm drive.

2. Alan Blair had made solid progress on his 2-6-4T, seen perched on its 'rolling road'.



All regular Meccano shows go through peaks then troughs with empty tables and low visitor numbers one year then cheek-by-jowl models plus forming an orderly queue the next. NEMS's annual Darlington show has never been the former and 2016 was definitely tending to the latter which made for a notable occasion that evidently pleased the Organiser, John Herdman. John wasn't the only one applying himself of course as the NEMS's Catering Squad - Linda, Sue and Vera - made the day worthwhile on their own (burp). To keep them busy, Meccano nuts converged from all over the UK's more northern areas with the SMG and MSoS well represented.

Before proceeding any further, an important matter! In SMGJ127's Shildon item, there was a scandalous picture of a harassed-looking Barry Richardson who was clearly having a no-fun time with his Kientz engine. In the interests of SMG-NEMS harmony, it can be reported that the same model ran all day at Darlington without a hitch.

At 16:00 it was time for the annual prizes presented by NEMS boss John H with their President Joe Etheridge assisting. Those for building are first then the others follow:

Juniors: **William Scott**, small-scale blocksetter.
Third: **Brian Chaffer**, skid-steer loader.
Second: **David Owst**, Christmas angel.
First: **Norman Brown**, Hitachi 50t crawler crane as seen at Skegex then in SMGJ127.

Bradley Cup for being indispensable to NEMS over the year: **Barry Richardson**.
Frank Beadle Memorial Trophy selected by last year's recipient: **David Owst** again.
'**Great Engineers**' special award: **Mike Gough**.

Well done chaps and thanks, NEMS! *RM*

3. There were two Konkoly-designed oscillating steam engines at Darlington and this one was **Mike Gough's** example.

4. An open-plan workshop with its energetic employee was presented by **Paul Robertshaw**.

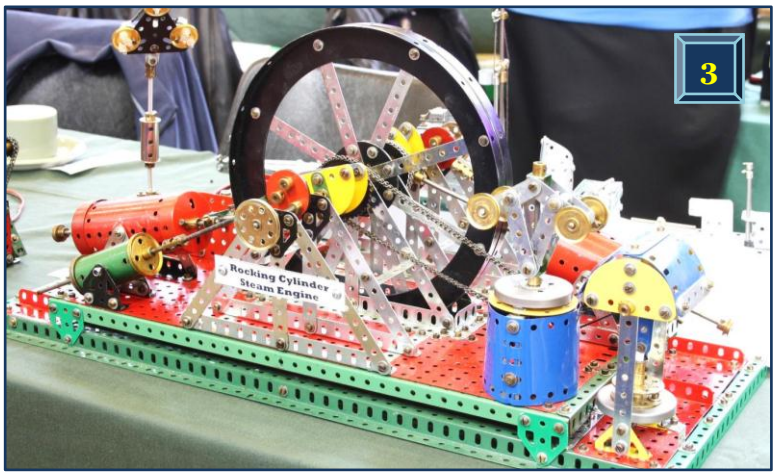
5. Chris Shute's fiendish Multiple Matchbox Manipulating Machine has defeated many but **David Owst** managed to get one working and running so well that he showed off by placing a digital timer nearby to indicate how long it had been going before something went awry!

6. An unexpected model for **George Roy** was Bert Love's No. 10 dockyard crane from a 1978 *MM*.

7. Timothy Edwards had the other Konkoly oscillating engine - plus this braiding machine.

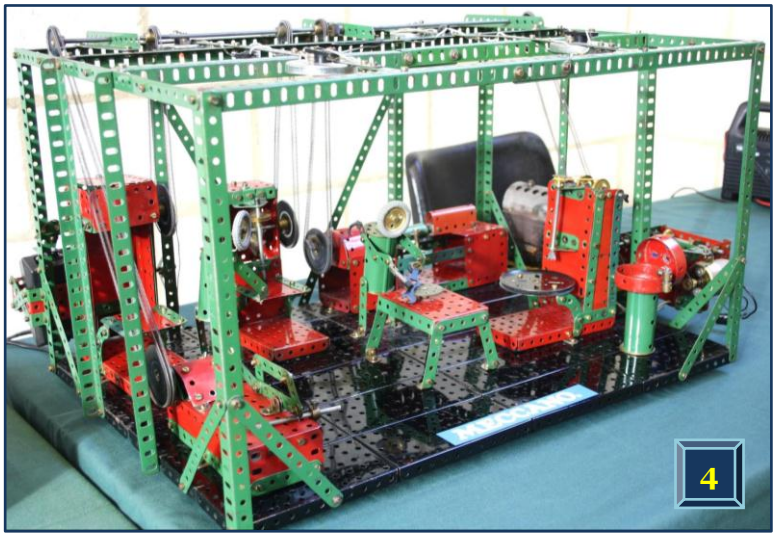
8. Allan Johnston's 'Timber Beast' meant business with that saw blade - part 159a?! It was blunt and rotated the wrong way by a weedy M.0 so couldn't sever too many fingers.

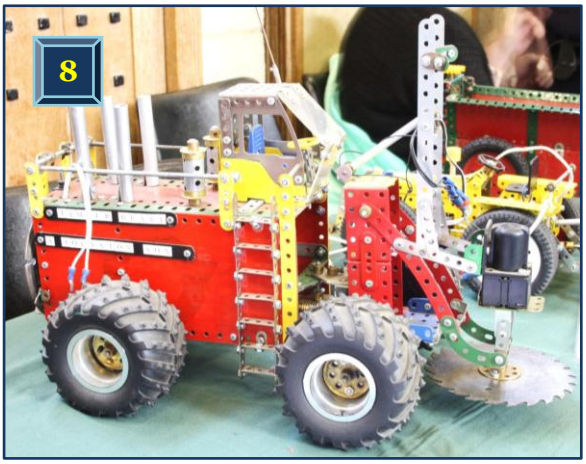
9. Didn't he do well? **David Owst** returned home with two of NEMS's trophies for his work: the animated angel he extrapolated from a Christmas decoration and the notorious 'MMMM'.

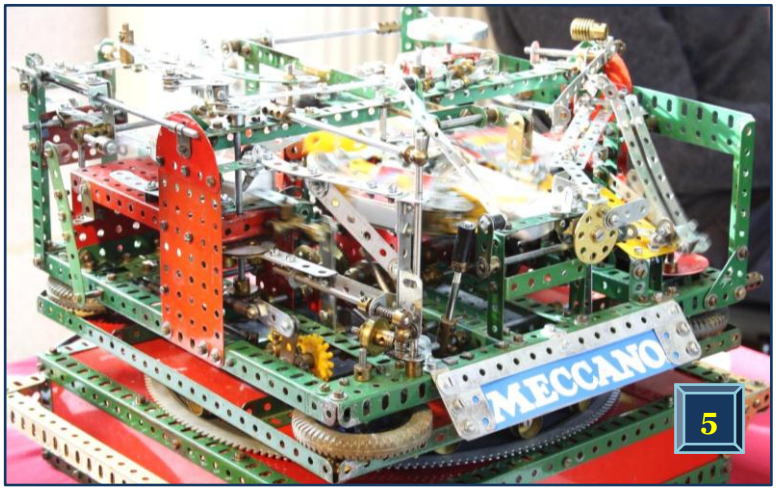


3

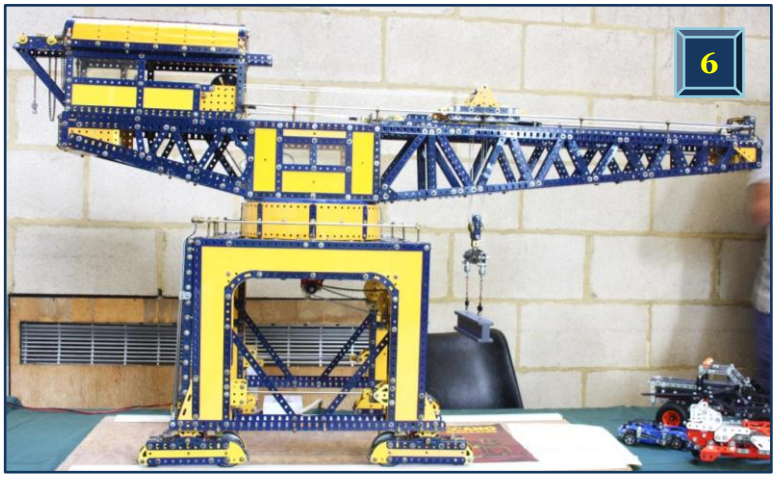

7


4


8



5


6


9

Dunbar-Ruston 10 hp Steam Navvy

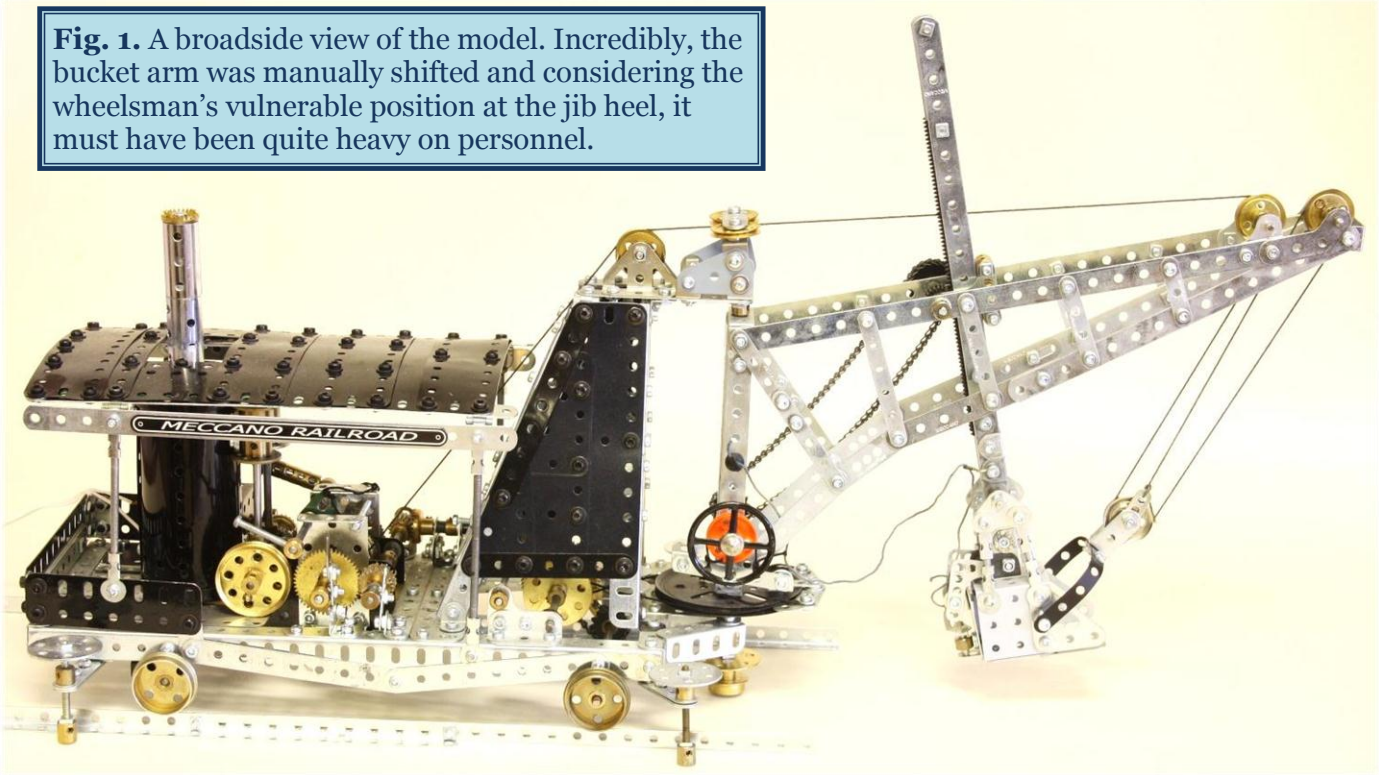


Fig. 1. A broadside view of the model. Incredibly, the bucket arm was manually shifted and considering the wheelsman's vulnerable position at the jib heel, it must have been quite heavy on personnel.

A small-scale yet fully-operational excavator by Stephen Pashley

Photos by Rob Mitchell

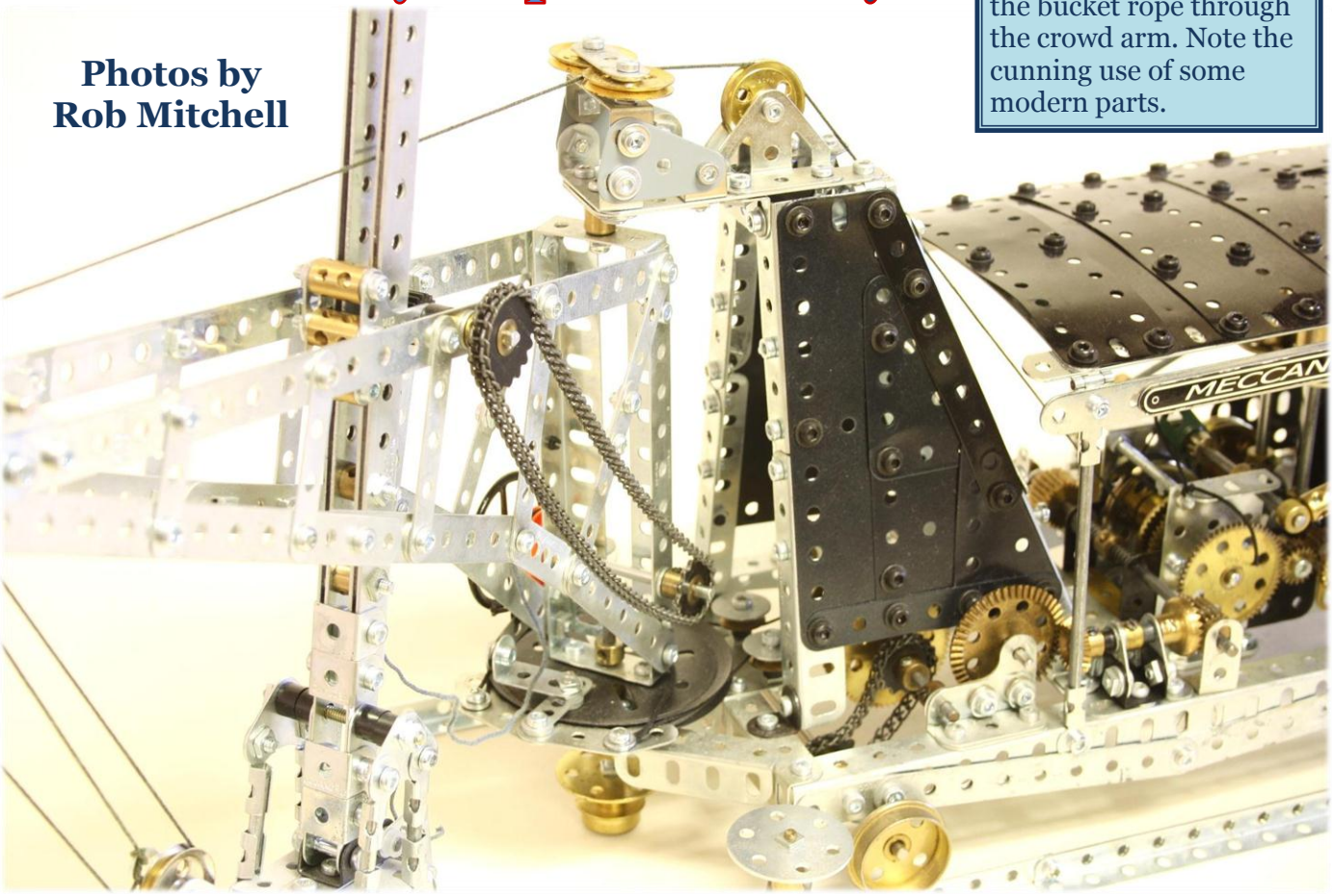


Fig. 2. From the front left showing much of the drive train to the leading axle and pulleys guiding the bucket rope through the crowd arm. Note the cunning use of some modern parts.

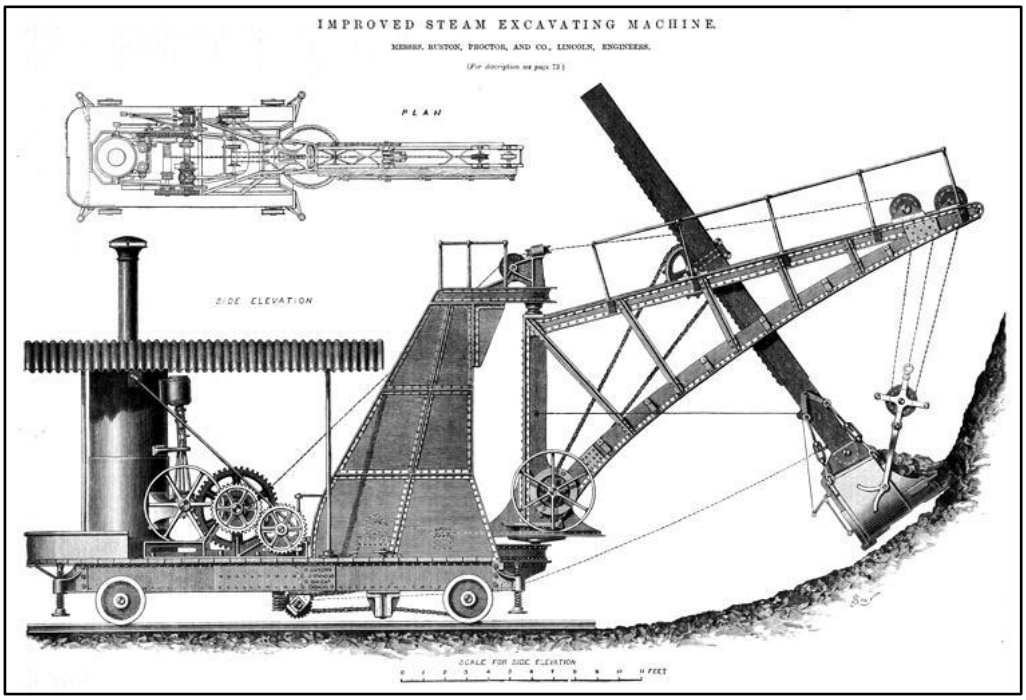


Fig. 3. The ever-reliable *Grace's Guide to British Industrial History* provided this drawing dated 1877. Appearing almost prehistoric with all those rivets, it makes an interesting comparison with Fig. 1.

In 1875, the first Dunbar-Ruston steam-driven excavator was produced after Ruston Proctor & Co purchased the patent from the Scotsman James Dunbar. This navvy design was referred to as a tower excavator and had a limited 180º slew. As with other excavator types of the time, a steam engine with a vertical boiler provided the power for the bucket, slew and travel. Crowd (linear movement of the bucket arm) and its retraction was done manually by a wheelsman.

The original machines weighed around 22 tons and had ten horsepower double-cylinder engines although, in later years, six and eight horsepower versions became available. Bucket sizes ranged from 1 to 1½ cubic yards for the ten horsepower excavator but were enlarged to 2¼ cubic yards.

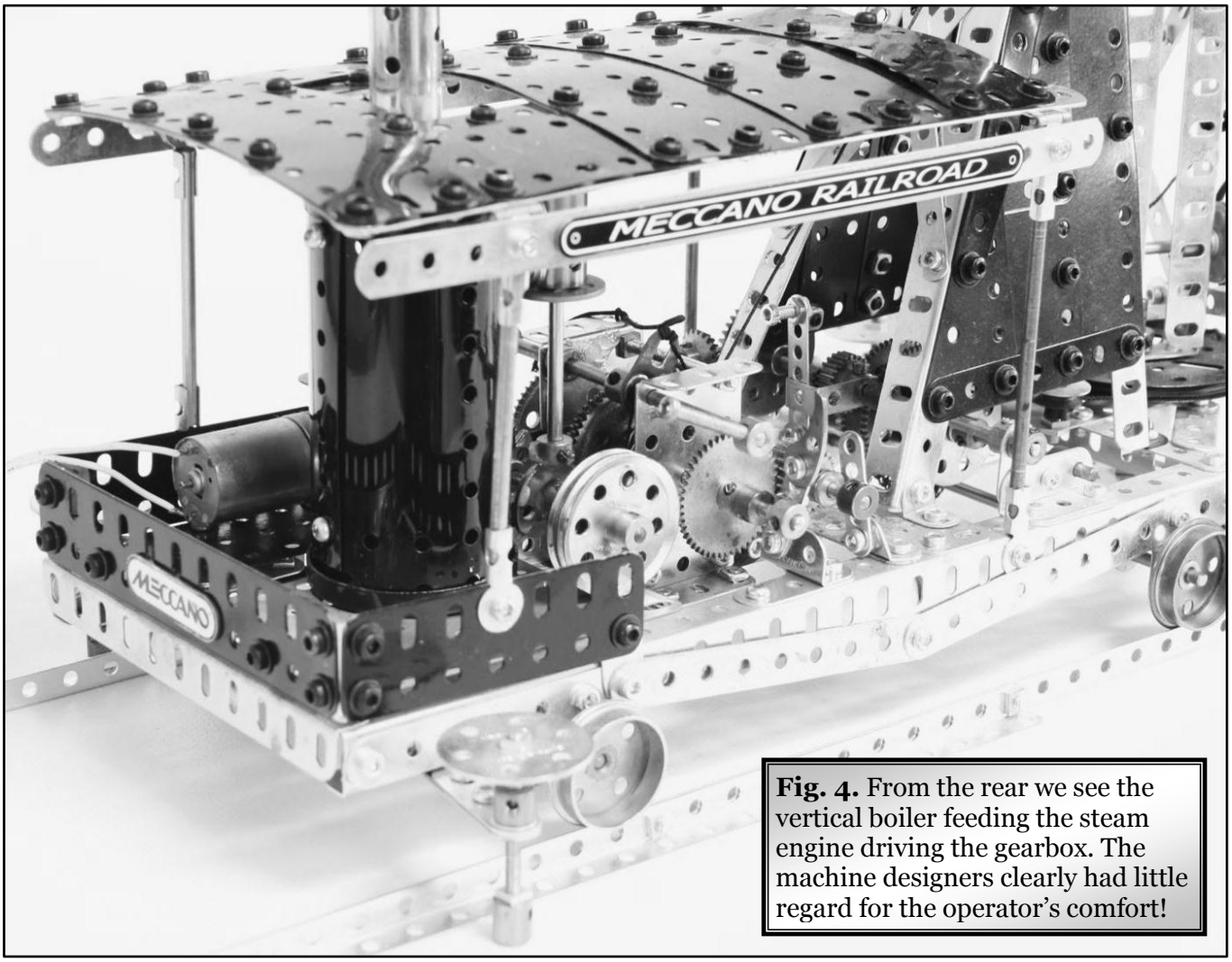


Fig. 4. From the rear we see the vertical boiler feeding the steam engine driving the gearbox. The machine designers clearly had little regard for the operator's comfort!

I built this model from drawings and text in the book *Lincoln's Excavators, the Ruston Years 1875-1930* by Peter Robinson. A Meccano Boiler was the starting point and I tried to build the model in proportion to this part.

Stephen Pashley

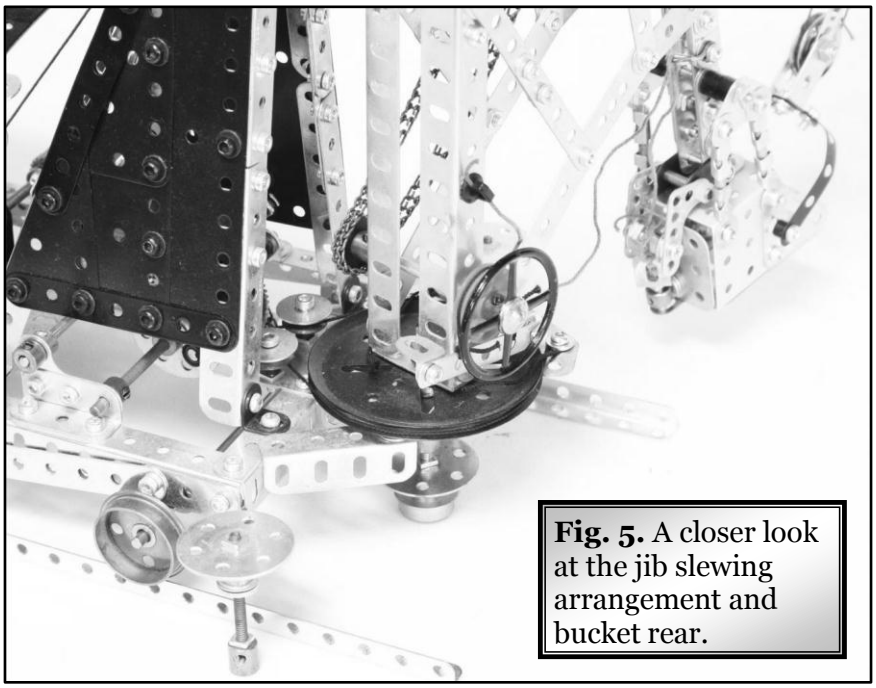


Fig. 5. A closer look at the jib slewing arrangement and bucket rear.

Tackling the Travelling Braider

Russ Carr shares his experiences of building a balletic braider

I was fascinated by Graham Jost's Travelling Braiding Machine (SMGJ126) and had to build my own. By carefully following the description, I was able to get close to completion but some details were not clear and correspondence with Graham was necessary to finish the machine. For the benefit of others who may wish to tackle this model I offer the following guidance.

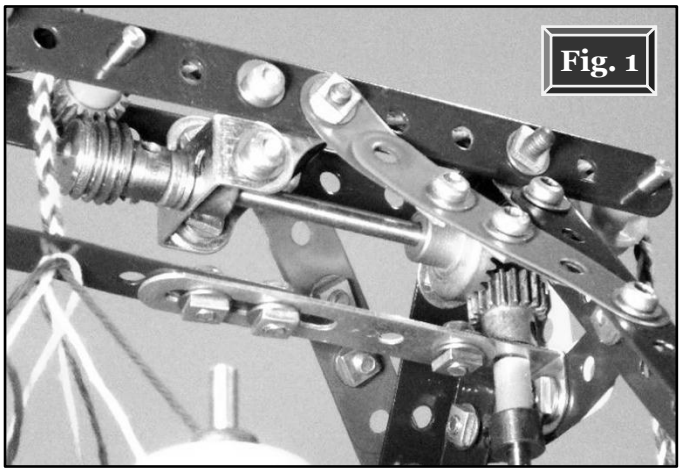


Fig. 1

It is obviously vital to build the frame square and ensure all axles pivot freely. However, it is the nature of a drive system using twelve rotating axles with Multi-purpose Gears that when under load the friction will be quite high; lubrication is therefore essential. I made the mistake of foregoing lubrication, intending to oil after the model had proved itself to avoid undue mess when adjusting or rebuilding and this resulted in inexplicable jamming.

I found 2.0 mm Perspex to be ideal for the platform. Drill four 4.3 mm peripheral holes for attachment to the frame by Threaded Pins and rubber Pulleys. Drill a central hole and four holes for the carrier rods, making all these 5.0 mm to allow for misalignment.

For the braiding spools, brass 1" Pulleys serve just as well as plastic. Note that four are left-hand and four are right-hand, the 1" × ½" Narrow Angle Brackets making the assemblies handed. Use short Grub Screws in the 1" Bush Wheels and half a 120b would probably serve for the spring but I cut some non-Meccano springs into short lengths to avoid mutilating rare parts...

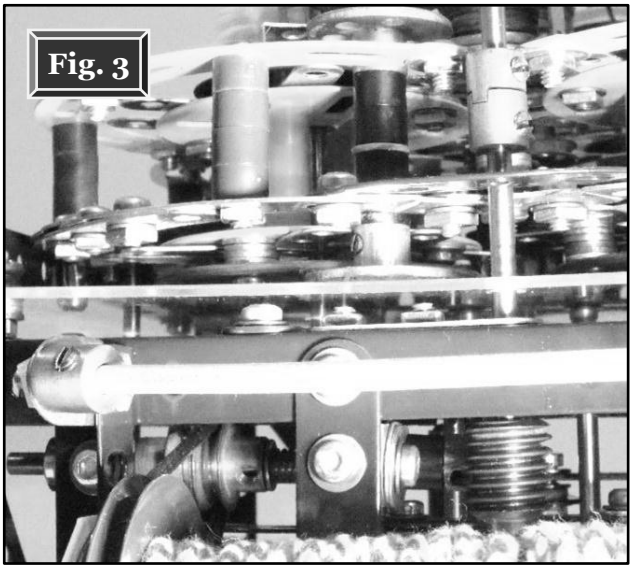


Fig. 3

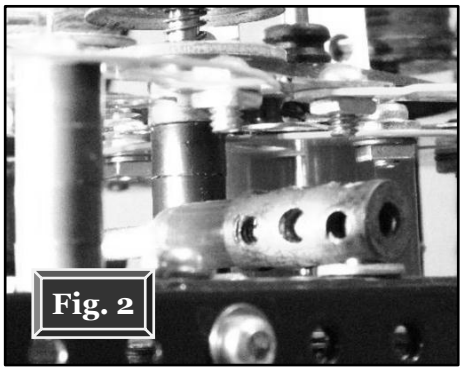
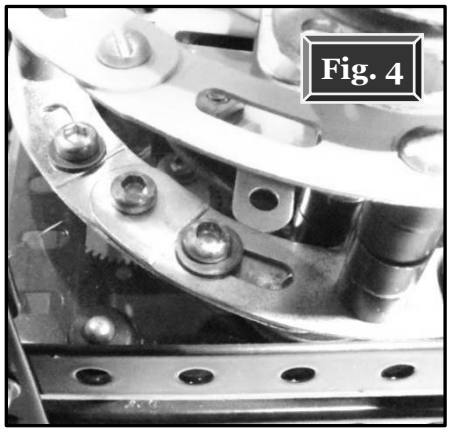


Fig. 2

Reinforce the lower track joints with overlaid 2½"

Curved Strips. Separating the tracks with four plastic Spacers allows the use of domehead 1⅛" Bolts without washers.



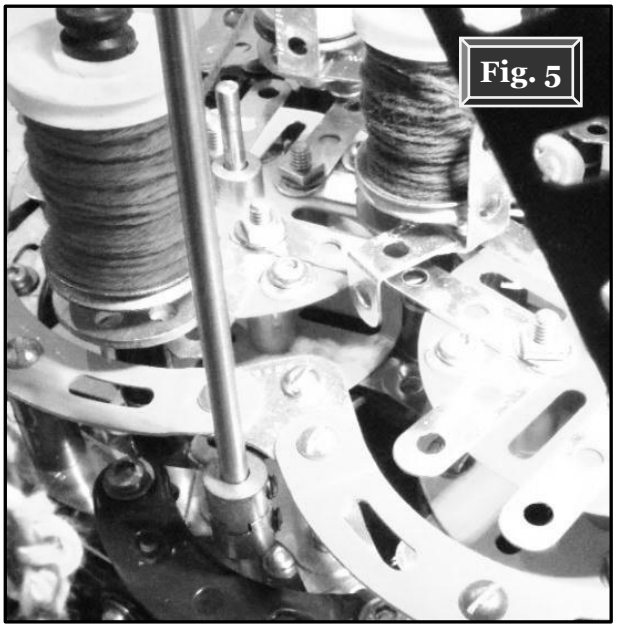
For accuracy, carrier construction demands some kind of jig be used. I spaced the Face Plates, both boss up, 1" apart (4× 38a) using 1½" Screwed Rods. Note that the overlapping 1½" Narrow Strips must be assembled such that, for adjacent carriers, low Strips meet together and the same for the high Strips. To the bottom of each carrier is bolted a bossless Face Plate: for two carriers space by five Washers and for the remaining two, space by seven Washers. This provides the height difference for a running clearance between adjacent carrier arms.

The outer switching rods are Flexible Coupling Units. First, taper one end of a 12 mm long piece of 8 mm OD plastic tubing, slip it over the FCU and push up to the Coupling; this helps to guide the bobbins. A pair of 1½" Axle Rods held in a Coupling form the centre switching rod. Fit a washer, three small Spacers, a 1" loose Pulley, Washer, switching rod, small Spacer, another 1" loose Pulley then a push-on Collar. With the carrier arms at 45°, the switching rods are straight (mid position).

If you do not own an appropriate motor to mount within the model, it should be straightforward to mount one with suitable gearing outside the frame - obviously screwing up the aircraft hand baggage compliance. Both left-hand worms can be replaced with the standard right-hand type by reversing the motor direction.

The upper 15t Pinion in the overhead drive (SMGJ126, Fig. 11) is best replaced with a 19t and note that the Double Bracket shown is an obsolete ¾"-wide style - it certainly confused me! I replaced it with a 1" x ½" Double Angle Strip (lugs outside) if the Corner Brackets are moved back one hole. The Flat Trunnion supporting the overhead drive is attached to the frame by a 2½" Curved Strip. There's a small error - the original article states a driven 25t Pinion with a spring-loaded plastic 19t, whereas both are 19t (I used 24t for the plastic Pinion). A Dog Clutch can be used in place of the non-Meccano Universal Coupling.

I found the slack O-ring drive to take-up roller sapped too much power so used a loose ½" Pulley spring-loaded against a driven ½" Pulley.



The overhead frame is vertical at the take-up end and leans slightly at the other end. For the diagonal bracing I used Flexible Strips which take the curve more easily and I'm not transporting mine on a 'plane!

The take-up curved rod needs to be <4 mm; Wickes 4.0 mm aluminium rod is actually ~4.3 mm therefore useless. A Wood Roller is suitable for the take-up roller if you do not have the long sleeve piece.

O-rings can be bought from technobotsonline.com and 2.5 mm is ideal but order a range of diameters above and below the size you think you need. I found I tended to underestimate the size required (or the belts were undersized). They are sized by diameter so multiply by π to get the length. Being less stretchy than Meccano Driving Bands makes them great for transmitting power but less forgiving on length.

Russ Carr

Fig. 1. The 19t drive with Worm shaft support and revised Flat Trunnion mounting. Flexible Strips brace the corners.

Fig. 2. Outer switching rod and Flexible Coupling Unit covered with plastic tube.

Fig. 3. A loose ½" Pulley is spring-loaded against a driven ½" Pulley; Dog Clutch drive to the vertical shaft; curved aluminium rod fitted in Sod Rockets attached by Obtuse Angle Brackets. 2½" Curved Strips are fitted under the lower tracks.

Fig. 4. Glimpsed is one of the 2½" Curved Strips fitted below the lower tracks; below, the Perspex platform is held by rubber Pulleys over Threaded Pins.

Fig. 5. Orientation of Narrow Strips on the carriers; the pair immediately in front of the furthest (blue) bobbin are fitted *above* those on the same fixings.

All pictures are by Russ

Building Giuseppe Servetti's Magician: Part 1

An accompaniment to GSM32 by Rob Mitchell

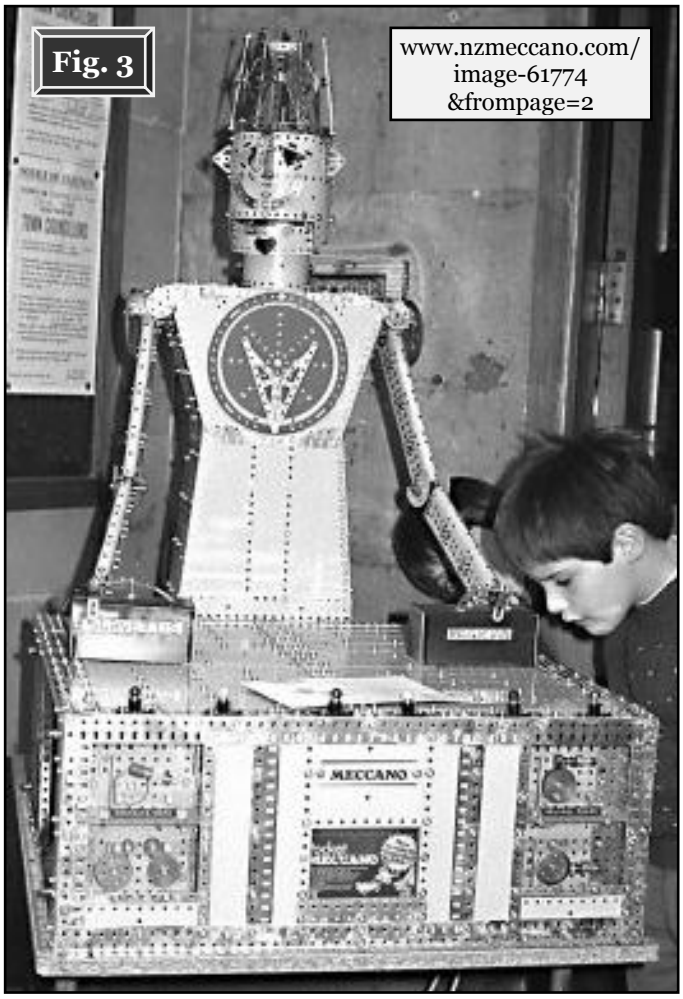
...la voilà! **Fig. 1.** Michael the Magician - an SMG member as he has a badge on his left shoulder - gives a toothless grin as he reveals a 1930s blue Magic Motor and a clockwork plastic Triceratops. His builder has no Dinky Toys...

In the beginning

Few Meccano nuts would argue that Giuseppe Servetti wasn't one of the most brilliant Meccanomen of the late 20th Century. He designed and built some of the most outstanding and inventive models of the period with some becoming part of the GMM Supermodels series. After the extensive input of Dr Keith Cameron and the small devoted team headed by George Maurice Morris, Servetti's Magician became the 42-page GSM32 originally published in 1972.

Enter a receptive youngster

Your writer recalls an edition of the evening BBC TV programme *Nationwide*. This was in the mid-1970s when Meccano Ltd was in turmoil and making the news and, to add some interest to yet another item about industrial discord, Servetti's masterpiece was plonked in front of the cameras. Memory didn't record if it was working or not but the impression was made! Despite being slightly beyond the scope of a black, yellow & silver No. 1 Outfit combined with a blue, yellow & zinc 4M, a Gears 'B' and a Magic Motor, the Magician was on the 'I want one' list. There it lingered for three decades as the requirements were slowly satisfied, mostly by luck: finding out about the GSMs then obtaining GSM32, improving Meccano know-how and procuring the parts, mainly the Elektrikit.



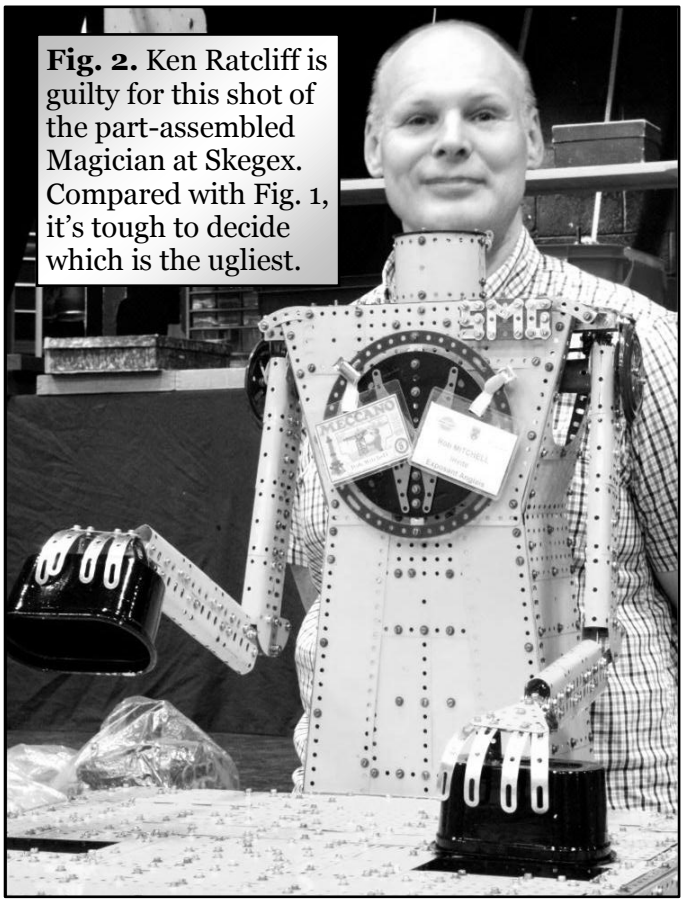


Fig. 2. Ken Ratcliff is guilty for this shot of the part-assembled Magician at Skegex. Compared with Fig. 1, it's tough to decide which is the ugliest.

Distracted by trolleys

Tackling the Magician was, however, overtaken by another Servetti *tour de force*, his Trolley Factory. With further involvement by Keith Cameron, this was published as a CQ Special in 1991 and a supplementary series appeared in *SMGJ*s 109 to 114 (October 2010 to June 2012) as a builder's guide. The reasoning behind such a guide was that the original instructions had dated; these days, even an amateur can produce then reproduce much better quality pictures, sometimes backed up with CAD diagrams. Also, the Trolley Factory as described and depicted showed some flaws:

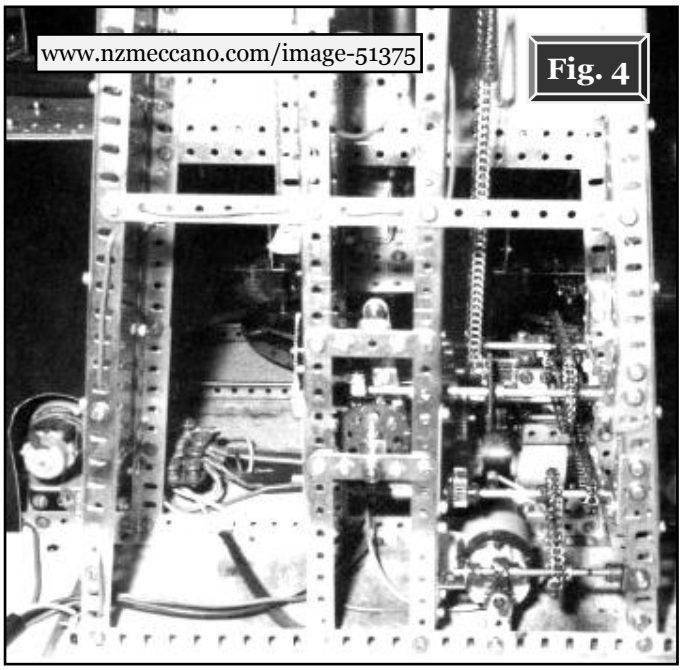
1. It was a cumbersome, large and fragile single entity. Keith Cameron was bound by geography so hardly ever took his models anywhere thus the larger examples didn't need to be designed for portability by being separable into manageable sections.
2. Extensive reinforcement was also needed to survive the rigours of being lugged around.
3. Modern motors are cheap, efficient and can replace ageing Meccano types. In the case of the 4M Outfit JPDU Mk1, rubbish types can be expunged too.
4. We now have new, useful parts to hand like the 38a Spacer and 48e 1" × ½" Double Angle Strip.
5. Keith Cameron seemed to have an endless supply of parts which are either expensive (Flat Girders, brass) and/or now tricky to find in quantity (Elektrikit).

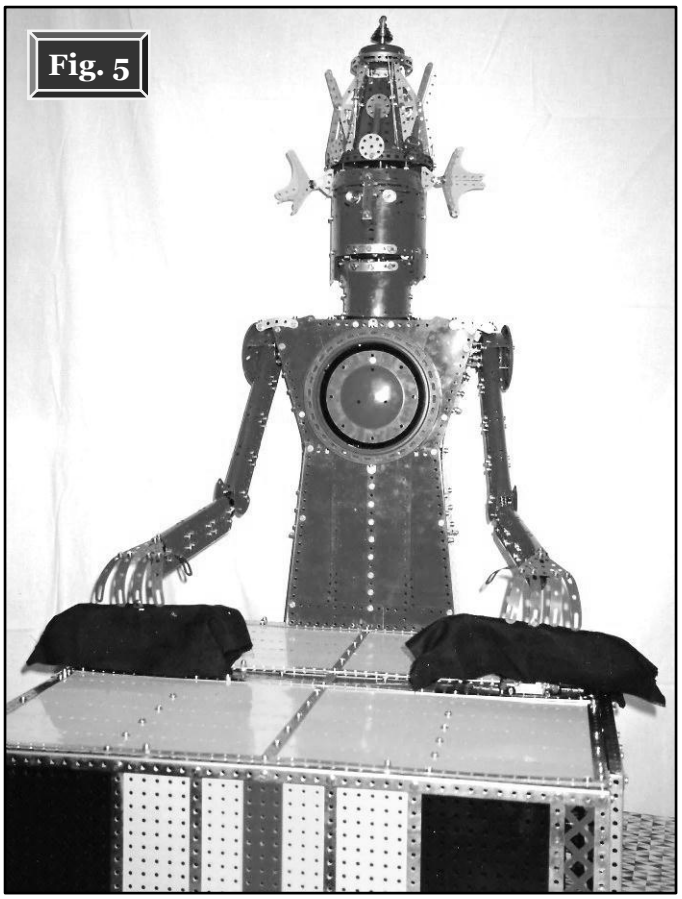
The above list applies equally to the Magician but a greater gulf exists between the production quality of the CQ Special and GSM32. Early GSMs are crude; being text-heavy they can be daunting; the illustrations are hand-drawn and clustered at the end; they are often printed in blue rather than black. Those comments may appear unkind but are tempered by the fact that the GSMs will have been produced using the best and most suitable method for the time and without them, Servetti's Magician would have been lost. GSM32 has also proved sufficient as others have had a go and they seem to have had problems no worse than those that can afflict modern instructions - no mean feat for a model of such intricacy and size. Maybe we have it too easy these days which is why your writer cannot recall seeing Servetti's Magician in the metal since that *Nationwide* programme.

Experiences of others

An e-search for Servetti's Magician in GSM form yielded a decent result in the Gallery of the well-known NZ website where David Guillaume showed his version at the March 1973 MMG meeting where it was photographed by Ken and Nicholas Wright. It is reproduced here as **Fig. 3** with its pair of baffled young admirers. A year later it had another outing to the SAMC (now the SBMC) where some internal shots were taken by David, **Fig. 4** of the torso lower rear being the best of a blurred bunch.

Joe Attard had a go in 1996 and found it was a good model to rekindle his interest in Meccano. He sent a scanned picture, **Fig. 5** and wrote *I think that mechanically I followed the plans very closely. I took some liberty with his chest, as I had just acquired the large circular Märklin parts and wanted to use them! I also remember that I incorporated easily-removable top and side panels. The model worked for long periods reasonably well though undoubtedly it did have momentary lapses. Like Keith Cameron's, my models do not travel outside my house so I doubt if my Magician was seen by half a dozen people besides family. I found that the original VHS video had been transferred to DVD and perhaps one day I'll put it on You Tube. The video shows not only the 'magic' as it would appear to viewers as there are plenty of close-ups of the clever Servetti mechanisms in motion.* Other than that, evidence of other Magicians has been anecdotal, one claiming - rightly! - "It's a pig!" so one can only assume that one was never finished. Also, the model's unwieldy nature prompted a smaller and faster-running type by the late Roger Wallis with an 18½" square stage (the original is about 24½") and further variants still surface from time to time. Servetti's original clearly inspired a factory-built shop window model as featured in CQ83.





Useful information and its application

As it will be a brave soul to tackle the Magician purely from this guide, a copy of the instructions is essential and it's certain that Howard at...

www.hsomerville.com/mwmailorder/

...would be happy to oblige; it costs £7.35 plus postage. For £5.20, MWMO can also supply one of the finest works regarding Meccano, Alan Partridge's *Techniques of Meccano*. Many methods described therein apply to all of my constructions, the Magician included. Two relate to Angle Girders

in frames and are aimed at tidy, square corners and preventing cumulative errors of thickness. If converging Girders are arranged with round holes overlapping slotted as in **Fig. 6**, it has a natural tendency to pull to a right angle in each direction. **Fig. 7** shows a joint where 5½" Strips overlay a discontinuous Girder and there's room to accommodate a branch; the round-holed flanges are all in the same plane and it's a much better method than overlapped Girders with Bolts wriggled or graunched through misaligned holes. For further rigidity, the Flat Trunnion gusset can be a Plate, especially Semicircular. Another top *ToM* tip is using Wheel Discs, specifically brass ones, as bearings for fast-running or well-loaded Rods, drive from a motor being a belt and the use of washers (38s and M4s) galore.

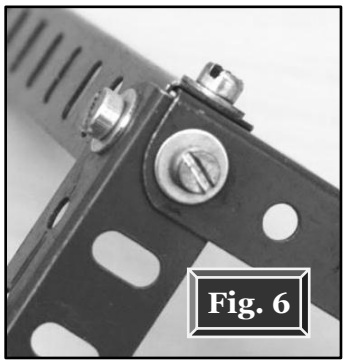


Fig. 6

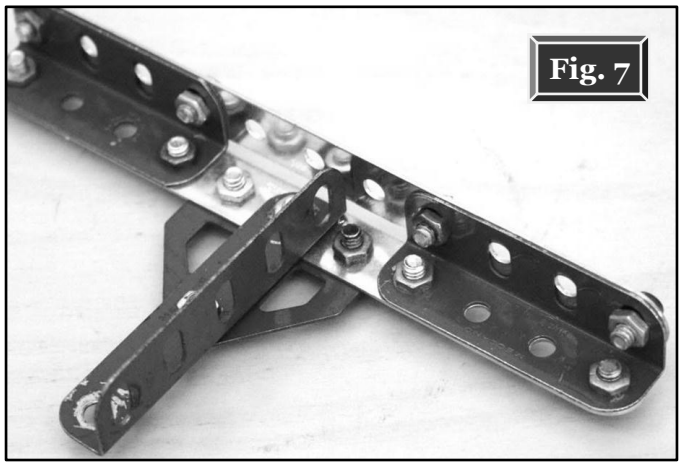


Fig. 7

Let's get cracking

As what follows is intended to complement GSM32, the Sections are numbered to match. All the changes from the GSM are aimed at avoiding potential trouble, access to the inner workings, reducing large forces and better handling of the rest, improving drive trains, easy adjustments when required, tolerating misalignments during operation, uniting the subassemblies with minimum tools, fault tracing and so on. Be warned that 'left' and 'right' in GSM32 are from the Magician's aspect and not from the front - your writer flopped head first into that and it caused some frantic unscrambling at a late stage! Also, where **bold** numbers are used, it refers to those in this article; if in plain text, it denotes those in GSM32. Now to work.

3.1 Table framework, Figs. 8 to 10

Setting outward the lowest Angle Girder flanges was abandoned as the main purpose was to make convenient the suggested screwing to a baseboard. That made the footprint even bigger and almost too big to pass through a domestic doorway! Bearing in mind **Fig. 7**, lengthening by 1" the four 24½" side members using overlapping 2½" Angle Girders were replaced by the corner arrangement shown in **Fig. 8** which is a mock-up of the front right seen from the inside where:

1: 24½" Angle Girder on the front (1) and rear (3) lowest edges.
2: 24½" Angle Girder on the side (2 & 4) lowest edges.
3: 5½" Strip on the underside of **2** to extend it by one hole and connects to **1**.
4: vertical 9½" Strip Plate (honest!) on each side.
5: 5½" Angle Girder across the corner to form the hypotenuse of a 3-4-5 (×2) triangle.
6: 3½" Strip to help align the Braced Girder with the slots; another 3½" Strip between the Braced and Angle Girder preserves a plane with **1**.
7: 7½" Angle Girder ready for the front 'pockets'.

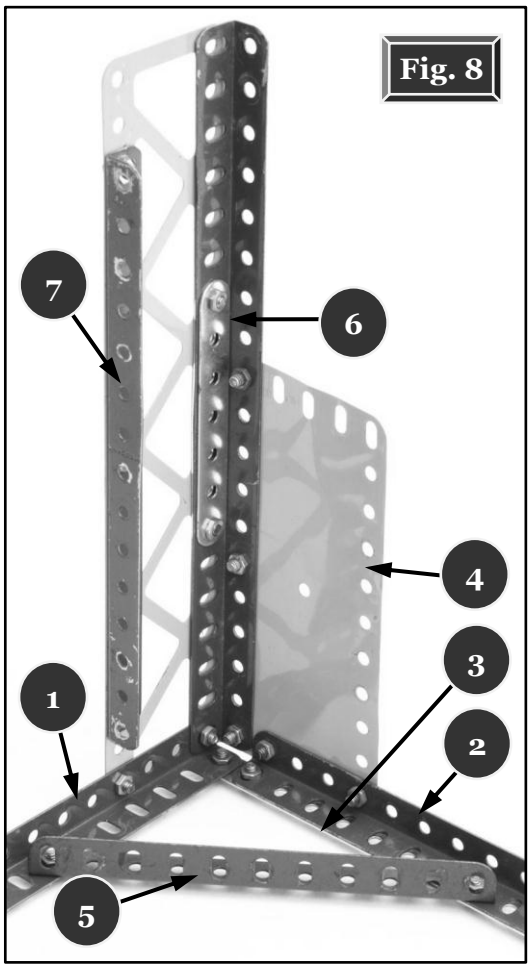


Fig. 8

The exact arrangement in **Fig. 8** is actually at the top left of **Fig. 9** with a mirror image at the top right. Rear corners use a 3" Angle Girder instead of **5** as a 3-4-5 triangle and omit the Strip Plate **4**. The hole counts for the four transverse Girders across the bottom in Figs. 2 & 21 were important therefore preserved and in defying **Fig. 7**, their ends sat *inside* the side Girders although for accurate alignment of slotted holes, they did receive an overlaid 2½" Strip at each end as in **3**, **Fig. 8**. The Girders 29, 30 & 31 across the top were omitted for the time being. In the absence of the baseboard, front-to-rear Girders were fitted with

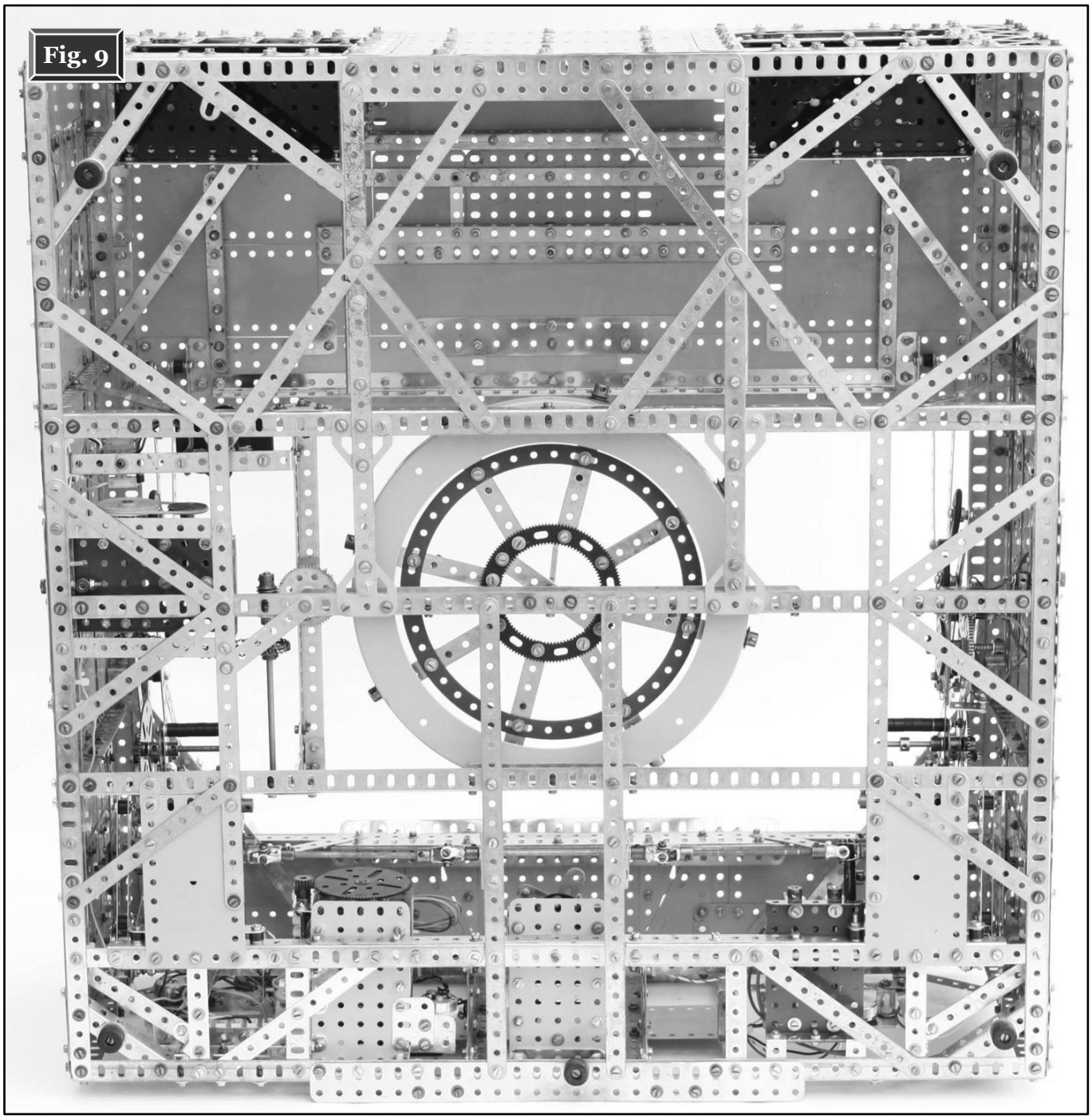


Fig. 9. The table underside showing the extensive triangulation in lieu of a baseboard. Front is to the top, rear at the bottom where the 12½" Flat Girder is part of the arrangements to locate the Magician himself. Towards each lower corner is a 4½" × 2½" Flexible Plate; these are covers under the arm lifter gearboxes. Five rubber feet protect a surface from all those unforgiving Bolt heads.

many nodes made as per **Fig. 7**. Triangulation was by loads of 5½" Strips. The vertical 9½" Angle Girders 16, 17, 21 & 22 were left off for the time being. Ideally, the three transverse 24½" Angle Girders 18, 19 & 20 in Figs. 2 & 21 (which collectively take the turntable weight) really ought to be stiffer - maybe 1" deep channels - each with a further 24½" Girder connected by Flat Girders. The available headroom, however, is a bit tight so deepening couldn't be done.

3.2 Body, Figs. 11 & 12

Overall dimensions are as in GSM32. As the body was to be a standalone unit, central cross members, triangulation and overlaid Plates were added at the bottom plus provision made for easy separation from the table. Chest plating was altered a little to accommodate a central 3½" × 2½" Flanged Plate ready for the arm gearbox (Section 3.19), side plating modified mainly at the top to accommodate the revised shoulder joints and the odd Märklin ring replaced by a Circular Strip. At the front, the whole breastplate was stood off by ½" Reversed Angle Brackets and the vital SMG badge was added to a shoulder. With local

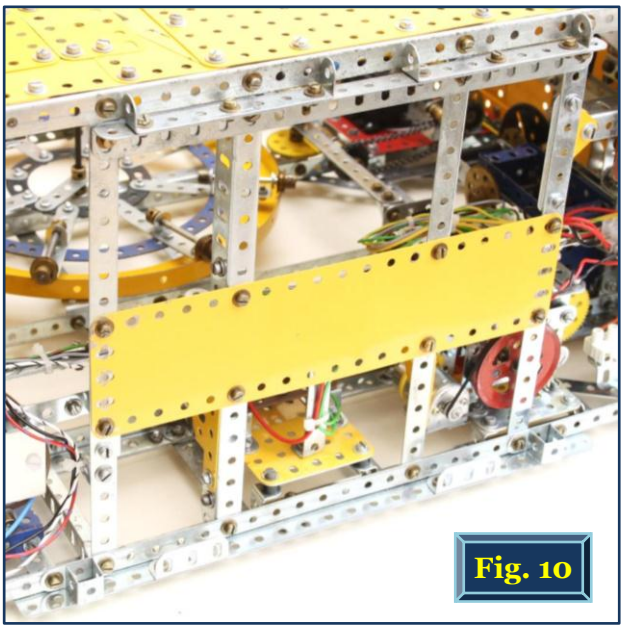


Fig. 10

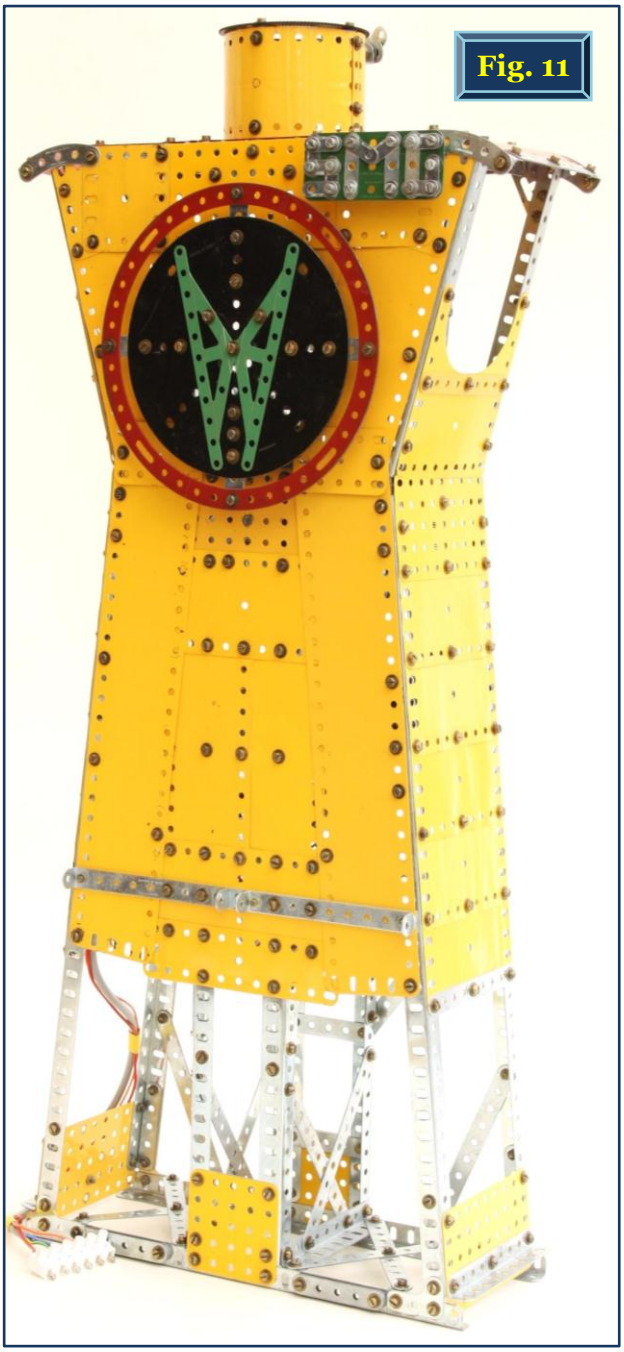


Fig. 11

Fig. 12

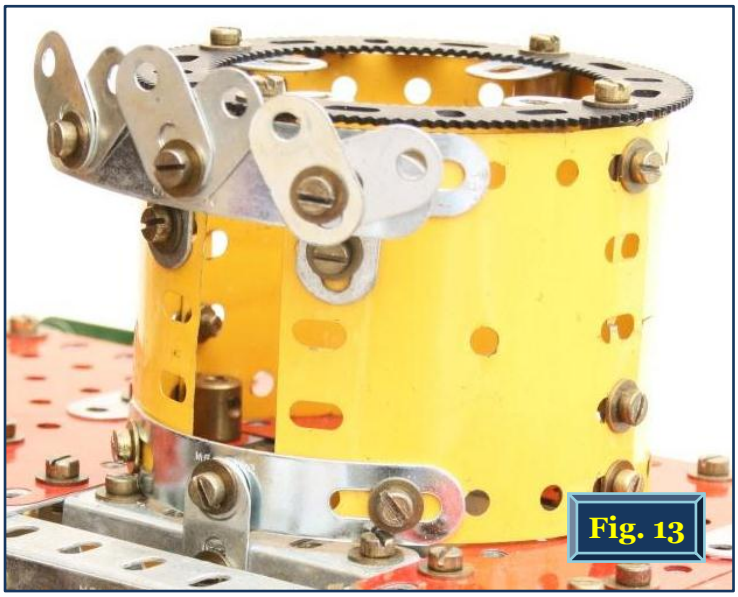


Fig. 13

strengthening, connections between table and body are in two parts; 3½" × ½" Double Angle Strips on a 9½" Angle Girder at the table rear top (**Figs. 10** & **12**) and locators near the bottom edge, **Fig. 10**. Where the geometry allows an exact whole hole count and backed by a 9½" Angle Girder, two 4½" × ½" Double Angle Strips are fixed at about a quarter of body height. These mate with two 3½" × ½" Double Angle Strips on the table, a 5½" Rod through each pair pinning them together and taking the whole body weight. To stop the body tipping forwards, two pairs of 2½" Strips separated by a Washer thickness (seen bottom of **Fig. 11**) slip over 1½" Angle Girders fixed to the 12½" Flat Girder (bottom of **Figs. 9 & 10**). A couple of Double Bent Strips, **Fig. 11**, make robust stops. On the shoulders, the internal structure and plating were both altered a little to better receive the revised and reinforced neck fixings as follows.

3.3 Neck, Fig. 13

Outwardly the same as described apart from being fixed to the shoulders with three Threaded Bosses and a Fishplate from an Angle Girder to a Formed Curved Strip at the rear. Similarly, three more Threaded Bosses secure the Gear Ring. The diametrical 3½" × ½" Double Angle Strip was omitted as part of making the head removable; four Fishplates were accurately positioned as in **Fig. 13**. Two ½" Reversed Angle Brackets at the rear carry another Formed Curved Strip with the jaw-dropping Fishplates. *To be continued.*

Rob Mitchell

Raw 'o Gut

The SMG's annual head-to-head, 8th April 2017

Our regular tranche of bit-chompers can now settle and start work on their dream machines as our yearly comedy contest rules & regs are here. It's a reversal of our very first effort, the 2009 Tug o' War (hence the otherwise unfathomable title of this piece) and it shouldn't be too much of a pushover. Your non-obligatory task is to construct some sort of shoving machine on similar lines to a bulldozer and for each entry:

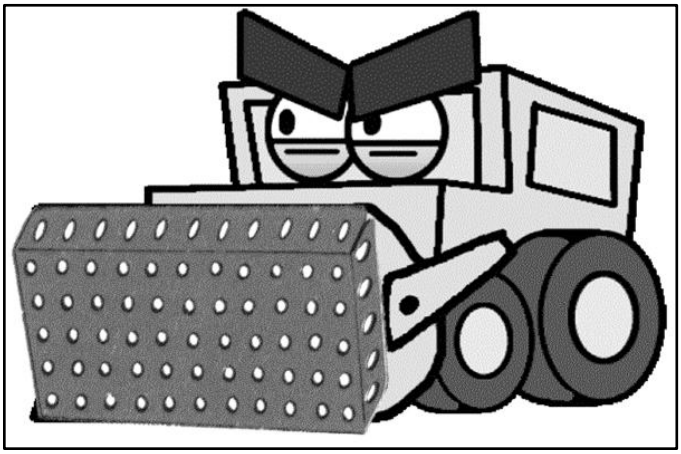
1. Maximum weight of 1.81 kg, 4.0 lb. This will be verified on the day.
2. Overall size should not exceed 13" in any direction.
3. A vertical, continuous, 37-free, 2½"-high front face. A 52 fixed by its flanges would be a good choice and other Flanged Plates or stacked Double Angle Strips will also do nicely.
4. The front face should be set with its lower edge at ½" ±¼" above the table top.
5. Nothing should protrude beyond the front face.
6. Yellow parts, caterpillar tracks, legs or horns are not necessary.
7. Meccano Motor(s) of your choice and electric can be fed by on-board battery or wired to a power supply.

The argy-bargy should progress something like:

1. A line will be marked on a table centreline and a pair of randomly-selected competing machines placed front-to-front directly over it.
2. At "Go!" they will be let loose then hands off.
3. To put electric stamina, expiring clockwork and wheezing steam on an equal footing, there will be a time limit of one minute per epic struggle for supremacy.
4. After a minute, the contraption that has barged its opponent the furthest back from the line will progress to the next round.
5. The halving of entry numbers by eliminating one of each pair will result in a final push-off.
6. The ultimate victor may need an extension to their trophy shelf.

Customary SMG T&Cs apply:

1. Apart from any electricals or a Mamod-Meccano Steam Engine (would anyone dare?), proper Meccano parts only please.
2. A name per entry and the barmier the better.
3. Multiple and proxy entries are accepted with open arms.
4. Entries from West Yorkshire in particular, Lancashire and north Derbyshire may be instantly disqualified should they appear to be 'the bizz', cause worry for the adjudicator and make his own attempt(s) look sub-rubbish.



Rumour has it that a certain member from West Yorks has already ordered materials for a trophy shelf extension so shoulders to the wheel, please, to ensure it goes unused. Before then, feel free to send questions etc or advise of any glaring loopholes to the Editorial address, page 2. *RM*

What's on When

21st January	NMMG with auction, Oxton, Notts, NG25 0SA
4th February	TIMS, Coalbrookdale, Shrops, TF8 7DQ
4th February	RMG, The Chertsey Hall, Chertsey, Surrey, KT16 9DR (trial at new venue)
11th February	NELMC, Hainault, Essex, IG6 2UT
12th February	RMG at Midhurst Modellers Exhibition, West Sussex, GU29 9HD
25th February	HSME, Christ Church Centre, Reading Road, Henley, RG9 1AG 13:00 - 17:00
4th March	NEMS with AGM, Crakehall Village Hall, North Yorks, DL8 1HG (new venue)
11th March	WLMS, Greenford Community Centre, Middlesex, UB6 9JS
25th March	MMG, Baginton, Coventry, West Midlands, CV8 3AB
1st April	SELMEC, Falconwood Community Centre, Kent, DA16 2PG
8th April	**SMG meeting with contest (opposite) and auction, Laughton-en-le-Morthen Village Hall, Rotherham, South Yorks, S25 1YD**
29th April - 1st May	TIMS at Meccanuity with annual contest (two-legged walkers), themes (wind power, most eye-catching model) and awards, Enginuity, Coalbrookdale, Shropshire, TF8 7DQ
6th May	NELMC, Hainault, Essex, IG6 2UT
13th May	NMMG with auction, Oxton, Notts, NG25 0SA
13th - 14 May	NEMS at Beamish Museum, Co Durham, DH9 0RG
25th - 27th May	CAM 44th Annual Exposition at Garges-lès-Gonesse 95140 in the northern outskirts of Paris and about 170 miles (275 km) from Calais; the theme is L'aviation au Bourget (the aviation at Le Bourget); Le Bourget is an international airport in the area
28th - 29th May	NEMS exhibition at 'Meccano Magic', Locomotion, Shildon, Co Durham, DL4 2RE
10th June	NEMS, Crakehall Village Hall, North Yorks, DL8 1HG (new venue)
23rd - 25th June	NMMG at Skegex 2017 (page 48)
21st October	**SMG meeting, a part-based theme, SMG Members' Award, President's Trophy, AGM and auction, Laughton-en-le-Morthen Village Hall, Rotherham, South Yorks, S25 1YD**

Contacts as it can be worth checking before travelling (www.hsomerville.com/meccanoevents)

SMG **John Ozyer-Key or Bob Seaton (page 2)** ***and please let us know if you intend to bring anything large and/or travel a substantial distance so we can reserve a space for you***

[redacted]

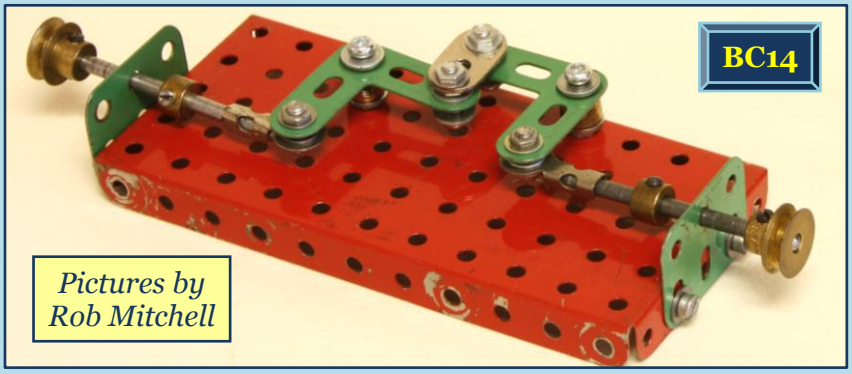
630: the last part

Hats off for Ken Ashton, John Bader, Malcolm & June Booker, Geoff Brown, Mick Burgess, Russ Carr, Graham Jost, Hellmuth Kohler, Ken McDonald, Les Megget, John Ozyer-Key, Stephen Pashley, Ken Ratcliff, Paul Robertshaw, Bob Seaton, Dave Stanford, Bob Thompson, Stefan Tokarski, Kees Trommel, Andrew Wallace, Stuart Weightman, John Wilson, Gregg Worwood and all who have contributed, regardless of scale.

To the wider benefit of the hobby, those in receipt of our *Sheffield Meccano Guild Journal* are welcome to extract or use the contents provided that both the original author and the SMG are acknowledged as the sources. Original materials are obtainable via the Editor. *RM & RC*

A Bevy of Bell Cranks: 2

BC9. A seven-strong *Ring-a-ring o' roses* by **John Wilson**.
BC10. This bicycle shelter was offered by **Alan Lovett** with Fishplates on Right-angle Rod & Strip Connectors accommodating the awkward 'root two' end hole spacing.
BC11. Paul Furness is one to watch with the SMG's daft part-based pallavers and he's again used those Dished Plates to make an inviting attraction for his Bell Crank flutterby.
BC12. A structurally unsound sawing horse by **Rob Mitchell**.
BC13. '...other than an L-shaped lever...' was the trifling 'L' of a rule snubbed by **David Wilkinson** and his shining 128.
BC14. The rule was also shamelessly pushed then pulled by **Rob** with this push-to-pull and temperature compensation thingy as used in mechanical railway signalling.



Pictures by Rob Mitchell