

# STEAM



# LINES

NORTHERN DISTRICTS MODEL ENGINEERING SOCIETY (PERTH) INC.

May — June 2020

## Last steam in Katanning

IN a time long ago, just before “social distancing”, “self-isolation”, “essential travel” and “lockdown” became the language of everyday life, several members attended the Katanning Miniature Railway’s invitation run day in March.

This turned out to be our last live steam event for the foreseeable future. Despite the looming threat of the coronavirus pandemic, those who undertook the long drive to Katanning were well rewarded with a convivial gathering and some enjoyable time spent on KMR’s extensive layout.

The railway adjoins a large well-maintained public park with lawns, BBQs and play equipment for all ages. Ron Collins and Paul Costall tested out the network of concrete pathways with their Fowler traction engines, while Peter Smith and Ray Cooper ran their Wombats on the KMR 7<sup>1</sup>/<sub>4</sub>” track, along with local members and their locos. There were quite a few interested and appreciative public passengers, both on the railway and on Ron’s low-loader (*see photo top right*). A credit to KMR and a great day out for all.

Let’s all try to make sure that whatever new world emerges after this crisis, there is still a place in it for the delightful art and craft of model engineering.

*Article and photos  
by Jim Clark*



Below: Ray Cooper (left), owner of the first of the new generation Wombats, with Peter Smith, builder of the second new generation Wombat, getting steam up outside the Katanning loco shed.



*Note: If anyone is looking back with the benefit of 20:20 hindsight from this stark new reality and thinking that this might have been a reckless outing, please remember that at the time of the weekend in question social distancing had only just started being introduced, there was as yet no suggestion of restricting travel between WA regions, and community facilities and playgrounds had not yet been closed.  
What a different world it was.*

### Inside this issue:

President’s report	2
The ‘new boy’	3
Technical matters	4
Back of beyond	6
Early valve gear	8
Voyage of discovery	10
“De Cruquius”	11

## President's Report for April 2020

HOW quickly the world has changed! I was just reading through my report for the January-February newsletter: it contained such phrases as "30 members on the day"; "seven locomotives running on the garden railway, and another seven on the other two tracks" and "All in all, we've had a positive start to 2020".

Well... none of that applies to the previous two months, although there was a bright spot with the Katanning weekend in mid March, as detailed on page 1.

The Committee decided to make an early decision about shutting down the club activities due to the COVID-19 virus, mainly because our society's demographics are very much in the high risk category.

Charles Coppack and I closed the club down on March 23 (which is now 4 weeks ago but seems like 20 years ago, depending on how you view the world). We emptied the freezers and put all the bins away, and generally mothballed everything.

Since then, Sue Smith has arranged for the skip to be removed (no point in paying rental for that), and she has halved the cost of our plan for the accounting package, since the number of transactions has reduced significantly. She will also be returning the EFTPOS machine, so any future payments made by members will have to be cash, cheque or bank transfer.

We are trying to minimise the society's outgoings wherever possible, to ensure that the club remains financially viable in the long term.

A few of us are managing to make occasional visits to the club to monitor things, but needless to say all of the projects we had planned are now on hold until we have better days. This is a summary of our recent activities, plus a couple of projects we could start on:

- The gardener (James Garrett) did his monthly clean-up at the end of March.
  - Charles and I have attended to check the grounds once since closing. We ran the sprinklers and pottered around a bit, checking everything was OK.
  - The cleaner gave the toilets a going over... though there has been no recent use of them.
  - Allen Ward spent a few hours at the grounds on April 14, raking up and doing general maintenance.
  - Paul Costall has plans afoot to paint the station, but this is dependant on how much time he gets off from work that pays him money!
  - Steve Reeves has re-awakened the refurbishment of the tunnel façade and this may be something that we can accomplish with just a couple of people working on it in a controlled manner.
- More discussion needs to be had in this regard.



**President's Report  
By Geoff Wilkinson**

One thing I would emphasise, though, is that should anyone attend the grounds on their own, you must follow a few basic principles:

- Ensure that someone else knows that you are entering the grounds;
- Wipe down all surfaces before and after use;
- Don't operate any machinery on your own;
- Double check that all facilities are locked up securely before leaving;
- Ensure that someone knows that you have left the grounds safely;
- If you attend with another club member, ensure you always follow social distancing.

As everyone should be aware, following a recent email from David Naeser, the committee, together with the boiler inspectors, have decided to send our proxy form to AALS for the AGM. David's email is thorough and explains the whole issue better than I can in this report.

With the current limits on social gatherings, it is very frustrating for all of us, but let's look on the bright side of things... our society has an excellent group of people who are contactable for a chat if you need some inspiration or support. And Charles has thrown down a challenge with the Great Swarf Off competition, so we now have a great excuse to get into our workshops and make some swarf!

*Geoff Wilkinson, president*

## Stan's Lament

**Stan Armstrong** writes: "I leapt out of bed. It was Tuesday and morning tea and bickies were due at the clubhouse. If I didn't hurry up it would be afternoon. I remembered all those great bickies, cakes, slices, buttered pancakes etc. etc. that Susan always cooked up for me to take down.

Then the surprise came; I had left my bed so quick that it took about 30 seconds for my thinker to catch up. That virus thing has strangled, for the time being, those oh so enjoyable mornings. Well, then I just had to sit down by myself, wearing my NDMES shirt marked STAN, and eat all the bickies myself."

*We hear you, Stan!*





## NDMES: a 'new boy's' perspective

*DAVE Barlow has been a regular visitor from the "Old Dart" for several years and so when he decided to up-stumps from the UK and make Australia home late last year, it was no surprise his NDMES membership application was in, even before he and wife Fiona had got on the plane. Such was his enthusiasm for our club!*

*And the boy from Barrow-in-Furness in England's north-west was soon in the thick of things, driving both the club Heidi and Phill's "Irma" at public runs before turning more serious attention to getting his own 2-8-0 "Austerity" completed.*

*Since his arrival, Dave has attended just about every run day and boiler group gathering — before the pandemic put a stop to all our group activities...*

### ***Here is Dave's story, in his own words:***

I emigrated to Australia at the beginning of October, 2019, and submitted my application to join NDMES before leaving the UK. But where did it all start?

My daughter and her family came to Australia on a temporary basis in late 2014, due to her husband's work. They soon realised this was the place to settle down in and started the process of gaining permanent residency, which involved a career change for my son-in-law.

My wife, Fiona, and I visited in April, 2015, and like my daughter quickly realised we also liked Australia immensely. The icing on the cake for me was that, as an ex-submariner, there was an Australian branch of the RN Submariners' Association, of which I am a past national chairman, based in Fremantle, AND ... a miniature railway nearby, satisfying my dual loves.

I had Googled model steam railways Perth and NDMES at Balcatta came up so, armed with my camera, I paid a visit on the next public running day. This was in April, 2015. Having had a few rides and a good look at the track from the public viewing areas, I approached an official-looking member and asked if I could go down to the steaming bay and view the locos close up. That member was Tom Winterbourn, who was president at that time, and he introduced me to Phill Gibbons, which started a friendship with the two of them.

During our chat I mentioned I was disappointed that, while I was on holiday for six weeks, it seemed the club was only open to the public once during that time. After establishing that I was a member of a club in the UK and that we ran every Sunday and bank holiday Monday from mid-March to mid-October and that I drove a 5" gauge steam loco most weeks, I was invited to have a drive of the club loco Phill was driving at the time.

Never having driven a 7¼" gauge loco before, I was a little apprehensive, but found it was actually easier and more forgiving than the smaller gauges. After a couple of laps with Phill and being taught the vagaries of the ground level track with the signalling, points, banks and



Dave Barlow driving the club loco on his very first visit to the club in April 2015. Note the pink shirt! Photos: Dave Barlow

multiple units on the track etc, I was ready to go it alone with a public load. I thought all my Christmases had come at once!

That day I was wearing a pale pink polo shirt (see photo above), which my wife immediately binned when I arrived home, and I was also wearing a huge grin on my face. I never looked back and always let Phill and Tom know when I was coming out for holidays, which was on an annual basis.

On each visit I was always made very welcome and I gradually got to know some of the other members. I was invited to attend the boiler forum at Ron Collins' home and thoroughly enjoyed that aspect of the club.

When my daughter got her permanent residency in March, 2019, and could then sponsor us for the "Aged Parent Visa" (do I really look that old?) we also decided to migrate, but only after some deep discussions with my son and his family, who would be left behind in the UK.

*To be continued next issue...*

**Article by Dave Barlow and Tom Winterbourn**



Last day at Furness Model Railway Club in the UK — Dave being presented with a wooden spoon to stir the s\*\*\*t when he gets to Oz!

## Protecting your new steel boiler

*Continued from the March-April issue...*

YOUR boiler can be stored wet or dry, depending on usage and your preferences.

Probably the easiest way to prepare treated boiler water is to use a separate container which holds a little more than your boiler does when full. Mix up a brew of water, tannin and a little soda ash, if needed to get pH9, as we described in the last issue.

Then with a little electric pump, fill your boiler halfway up the gauge glass if you intend running within a week.

Otherwise, for short-term storage of steel boilers, such as between run days, there are two quick and easy methods I use, one is dry storage the other wet:

[1] Rake the fire out, then blow the boiler down dry with around 30psi on the gauge for a Briggs boiler and 90psi or so for a wet firebox type. Leave the blowdown valve open for a day then shut it.

[2] Rake the fire out, fill the boiler right to the top with treated water (pH9) through the blowdown valve. Open the whistle if one is fitted to the top of the dome until water flows out, then store with the boiler full.

For long term storage (several months or more) there are a couple of other ways I can suggest:

[3] Rake the fire out, blow the boiler dry as [1] above, leave until it cools right down then connect some TIG gas (pure Argon) to the blowdown, with the safety valve removed. When the gas has had time to blow right through, close the blowdown and replace the safety valve. This stores the boiler both dry and oxygen-free.

[4] Richard Stuart from Castledare uses an interesting method: he blows the boiler down hot, leaves until it cools right down, removes the dome then fits a false

dome with a desiccant canister inside it. This absorbs any water and the crystals change colour as they become saturated so you can check and replace the canister.

*(see Richard's photo at left)*

Richard goes on to advise: A slight change has occurred recently, as the "Tandex" treatment formerly obtained from a supplier in O'Connor is no longer available. Castledare has been using another Tandex product, "Tanblend", bought from Dry Cleaning and Laundry Supplies (DCL) at 1/122 Beringarra Avenue, Malaga. The "Tanblend" already includes caustic soda to provide alkalinity and with this product the soda ash is no longer required to achieve a pH of about 9.

It is highly advisable to measure the pH though. Too much alkalinity can cause foaming of the boiler water, leading to priming.



**Engineering Matters  
with boiler inspector  
Phill Gibbons**

As to testing the pH, **Steve Reeves** writes:

I crack the blow down valve so some water drips into a small plastic cup. About 20 mm of test strip is torn off and placed in the cup. This is removed after about one minute and the strip colours matched to the colour chart on the circular test strip container to get the pH reading (*see photo*).



Caustic soda, available from the supermarket in the cleaning section, can also be used to boost the pH level, using a small spoon.

**Paul James** (who maintains the club loco) writes:

This week I did as I have been doing for some time with our club loco. I used rain water from the tank to make up the usual medium tea coloured Tandex mix and then set about something I have not done in the past.

I set the pH to around 9 using soda ash purchased at Bunnings and test strips from Sigma Chemicals. I let the solution sit for several minutes, had another stir, rechecked the pH and then filled the boiler through the blowdown via a funnel hanging from a point higher than the top of the whistle. When the solution appeared at the whistle I shut off the whistle and blower valves.

The boiler is now completely full and when next steamed, only a suitable amount of solution needs to be drained before firing it. This method would probably suffice in most instances where the loco is in regular use. Long term storage is surely another issue.

**Ron Collins** writes:

I have been using my Fowler traction engine and the red loco and storing them wet for the last 10 or so years. Likewise, I use rainwater, although we have carbonated our rain water to pH7 (Neutral). The rainwater is mixed with Tandex at approximately 800:1 volume ratio.

The mix is checked and additional Tandex is added if required to achieve approximately a pH8 to pH9 using a Litmus test strip. I pump the mix into the loco until it pours out the whistle (which is on the turret and is the highest point), close all orifices and leave it.

The traction engine is more difficult as it doesn't have a turret. Instead, we fitted a test point in the upper area of the cylinder steam cavity. When the Tandex mix pours out of the test point, the orifices are all closed.

The red loco is 31 years old and when checking the boiler earlier this year, there was a pleasing coat of black magnetite deposits on all inner surfaces of the boiler.

The entire boiler was subject to ultrasound thickness testing and there is approximately 1mm of wastage in 31 years. I think most of that was from external corrosion.

*(Continued on page 5)*





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## Protecting your steel boiler (cont...)

*(Continued from page 4)*

There was some minor pitting and corrosion on the turret cover, however it is 12mm thick and easily replaced if necessary. I think this is at the air/Tandex mix interface if the mixture level drops slightly while stored with a full boiler.

An inspection of the Fowler traction engine at the last boiler test just showed black magnetite deposits on all inner surfaces of the boiler.

In general I am happy to continue with the wet storage of my boilers as they are normally used once a month in the case of the loco and generally about six to eight times a year for the traction engine.

However, I think if storing boilers for longer periods they should be stored dry.

Craig Belcher from Castledare comments: Though I have limited practical experience to offer (I currently store my engine dry if unused for long periods but am open to alternatives), for some anecdotal input have a look at the boiler fitted to 'Cambridge', built in 1968, and stored wet ever since.

It has a 50 litre Briggs steel boiler with copper water walls. The boiler was not blown down often, and was usually pushed into the shed with the injectors on using up what was left of the pressure to top the boiler up.

This boiler was thickness-tested after 25 years and had some material loss, though from memory not in significant amounts.

*We will conclude this subject next issue with some more detailed comments from Steve Reeves and David Naeser.*

**Phill Gibbons**

## Don't forget to prepare your engines for storage!

IT has been about three months since I last ran my loco 'Irma'. I have come home early because of this cursed virus and decided to put the loco back together.

When I pushed the loco I found it had seized. To free it up, I had to take the front cylinder covers off and give the pistons a tap with a hammer. After lots of CRC and a few more taps, away she went! Luckily there was no pitting in the cylinders.

I was positive I had oiled the cylinders after I last ran it, but I hadn't. I had planned to stay away for three months, and if I had been away that long, the cylinders probably would have been buggered.

The drain valves are now plugged off and about a cupful of oil has been poured into each end of the cylinder bore. From now on, if I am going to store locos long-term — for more than a couple of months — I will make sure to plug the drains and fill the cylinders with a couple of cupfuls of oil before I go. Anyone who is planning to put their locos into storage until this virus is all over should think about doing the same. It may save a big re-boring and new piston and ring job.

**Phill Gibbons**

*(If you have stationary engines, it's a good idea to turn them over by hand regularly and let them suck in a squirt of oil, especially if you have been running them on steam).*

## Notes from the Boiler Group

IT seems a very long time since our last Boiler Group meeting on a Wednesday in March, although it's only been a few weeks. I for one miss the camaraderie, the robust banter, the sharing of ideas and the inspiration I always get from this gathering. It's not only boilers that get fixed at the Boiler Group!

I know others are missing it too — also the Tuesday club days, the public runs, club runs and other events we took for granted. There are still a few ways of keeping in touch and keeping motivated, such as phone calls, emails and the Facebook group, plus our newsletter.

Now there are no more run days, outings or events to report, more than ever we will be relying on member's stories, photos and ideas to keep this newsletter interesting for all. Fortunately, I currently have several articles which I'm holding over for the next issue, so thanks very much to those who have contributed recently — you're not being ignored, just "saved for later"!

So if you have a bit of a tale to tell, something to say, a few photos of what you've been up to in your workshop or places you've been to, please let me have them for publication in future issues.

Email: [jimclark@hardwareandsoftware.com.au](mailto:jimclark@hardwareandsoftware.com.au)

**Jim Clark**



Richard Turner helping Keith de Graauw with his boiler at one of the last Boiler Days in March. Photo: Jim Clark

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## Allen's unique 'Ghan' trip to the back of beyond!

*Way back in November, 2018, Allen Ward read about a new train adventure, from Adelaide to Brisbane, using carriages from The Ghan. He just had to be on board! Here is his account of a journey he will never forget, or ever be repeated.*

AFTER reading about Great Southern Rail's special train journey from Adelaide to Brisbane, with daily excursions, I just had to purchase a ticket. There were only seven trips available in December, 2019, and January, 2020.

Here was a unique train trip. Wherever I have been, someone has always been there before me! But....more people have stood on the top of Mt Everest than have travelled between these two cities on one train. So, I bought my ticket using advance purchase discounts.

It was to be a trip of "firsts" for me and my fellow passengers, with bushfires pushing us on to freight-only lines that have not seen a passenger train in generations — if at all! It was to be a unique journey for all the wrong reasons!

Finally, after a long wait, my departure date of January 3, 2020, arrived and I was greeted by a smiling face as I arrived at Adelaide's Parklands Terminal at Keswick.

Checking in was a breeze. I received my car and cabin number. Breakfast was being served in the train terminal and drinks were flowing. I ventured outside to inspect the train. I was expecting to see burnt orange carriages specially painted for the occasion. But, alas, at the front of the train were two old rusty NR locos and the carriages were from the Ghan train, rebadged. Oh well!

The train departed right on the dot at 9am and headed through the suburbs and up the Adelaide hills. At a siding in Belair was a freight train from Melbourne, with two burnt orange locos. They had been sent to Spotswood, Victoria, for servicing and were late getting back to Adelaide.

The scenery passed by as the guests got to know each other over a refreshment or two. Soon we were crossing the Murray River and leaving South Australia. The train arrived in Stawell, Victoria, where we alighted and boarded coaches for an excursion to the Grampians, about half-an-hour away. On arrival at Halls Gap, we had a choice of tours followed by a fantastic dinner.

After food and refreshments, we reboarded the coaches and chased the train, which had moved down the line to Ararat. As I settled back in the lounge car, the train restarted its journey east towards Geelong.

The train made good progress through the night, crossing the Murray River for the second time and passing through Albury at 4.20am. We arrived at Junee just on 6am. But this was where our plans changed dramatically.

The devastating bushfires had caused the closure of the line north through Goulburn and ARTC instructed our



Allen gets ready for the start of his epic journey at Adelaide station.

driver to divert at Cootamundra and take the line to Parkes. Consequently our day tour of Canberra was cancelled. But now started the real adventure!

At Parkes, the crew put the train into a siding a few km the other side of town. The locos were detached and sent back to Parkes to be refuelled and a water tanker came alongside the carriages to top up the tanks. Passengers were not allowed off the train for safety reasons.

With the return of the locos, the train was on the move again, but bushfires had also closed the Western line. So we travelled west as far as East Orange Fork before the train was shunted backwards on to the 'we'. The locos uncoupled, came around the train using the opposite side of the we and coupled up at what was originally the rear of the train.

We were then hauled backwards through Dubbo and on to freight lines that have never before seen a passenger train of such length! During the night we stopped at Binnaway Junction, where the locos were moved back to the correct end of the train.

I woke up at 4am and peered out of my cabin window as the train passed through Werris Creek railway station. Even at this early hour, there was a train spotter on the station with his camera setup on a tripod. Was he tipped off about our arrival or does he normally spend Saturday night on a railway station? In any event, I bet he's never seen "The Ghan" silver carriages full of passengers coming off the Binnaway freight-only line!

From Werris Creek we travelled south for another 200km, passing coal export trains before going through Maitland and veering left to join the Northern line. Apparently not too many trains use this turn as the trees and bushes all rubbed down the side of the train as we passed. From my rough Google calculations, the train had travelled an extra 400km more than the original planned route.

*(Continued on page 7)*

## ‘Ghan’ trip to the back of beyond! (cont...)

*(Continued from page 6)*

The train was now behind schedule but Great Southern Rail was determined to give us some time for an excursion at Coffs Harbour. Along with about 30 other guests, I disembarked at Urunga to walk the boardwalk and then we were bussed back to Coffs Harbour station to link up with passengers off other tours and reboard the train. Just 500km to go!

The train was scheduled to arrive in Brisbane at 5pm, but we didn't get there until way after dark! Actually, standard gauge passenger trains don't go to central Brisbane, but stop at Acacia Ridge, a rail yard about 25km south of Brisbane. We were then bussed to Roma Street station on Queensland Rail's 3ft 6in system.

For the 159 passengers on board, this was a most unique train journey. Chances are, the trip we had via the "back roads" of NSW will never be repeated. Bruce, the GSR train manager, described the trip as "the magical mystery tour". "Satisfaction Guaranteed!"

I only travelled one way from Adelaide to Brisbane, taking three days and two nights. I returned to Sydney on the XPT via Kempsey. But that's a story for another time!

The "Ghan" train returned to Adelaide with some of the original passengers, and others, taking four days and three nights, apparently without any detours or delays.



Allen's train stands in Ararat station in Victoria.

The new owners of The Ghan, Journey Beyond, were looking for new markets and experiences and so decided to "pause" the Adelaide-Darwin train during the northern wet season (December and January) and test the waters with the Brisbane trip. It must have been a success as the company was already advertising the Adelaide-Brisbane-Adelaide experience next December and January. Unfortunately, like much else, this is now on hold, but hopefully it will one day be available again.

*Article and photos by Allen Ward*

### Calendar of Events for 2020

**All Society events, including meetings, club and public runs are cancelled until further notice.**

#### Know your Society

<b>President</b>	Geoff Wilkinson	0424 080 979	<a href="mailto:president@ndmes.org.au">president@ndmes.org.au</a>
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	Charles Coppack	0409 044 969	
	Peter Smith	0407 472 770	
	Ron Collins	0427 461 279	
<b>Boiler Inspectors</b>	Phill Gibbons	9390 4390	
	Steve Reeves	0408 955 692	
	Noel Outram	9525 1234	
	John Martin	0406 509 400	
<b>Librarian</b>	John Martin	0406 509 400	
<b>Birthday Bookings, Run Days</b>	Paul Costall	0407 010 252	<a href="mailto:costall.paul@gmail.com">costall.paul@gmail.com</a>
<b>Driver Training</b>	Phill Gibbons	9390 4390	
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<b>Website</b>			<a href="http://www.ndmes.org.au">www.ndmes.org.au</a>

<b>Society Grounds and Track Site</b>	Vasto Place (off Balcatta Road), Balcatta
<b>Postal Address</b>	NDMES, PO Box 681, Balcatta 6914, Western Australia



## Valve gear in early locomotives

*Continued from March-April issue...*

AFTER the Rainhill trials and the opening of the Liverpool & Manchester Railway, a number of the improvements introduced in the "Rocket", Stephenson's new locomotive, such as the location of cylinders, multiple boiler tubes and separate firebox, were adopted by other locomotive manufacturers and work on improving the valve gear continued.

In the early 1830s, valve gear design (Carmichael valve gear) had progressed to a single fixed eccentric with double fork that connected with the pivots of a double spanner (a spanner is a connecting-rod in the parallel motion of an engine) on the transverse shaft of the valve. A roller moved by the reversing lever brought the pivots home to the respective valve by a 'gab'.

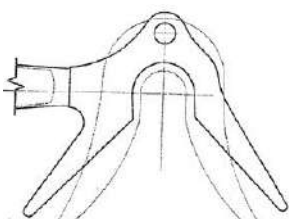
Diagram One (at right) shows the evolution of valve timing motion from 1830 to 1840; from using many levers to using one; from a complicated arrangement to a simple one. It is also a classical illustration showing, in hindsight, how if Edward de Bono's lateral thinking had been used, a lot of time and effort could have been saved.

The Carmichael valve gear is shown in Fig.1. in Diagram One. It was around this time that it was realised that the easiest way to solve the timing problem was to use four fixed eccentrics with four gabs and numerous designs of valve gears eventuated with pairs of gabs for each slide valve. Gabs were assembled sometimes facing each other and in other designs opposite each other as shown in Diagram One Figs. 2-5.

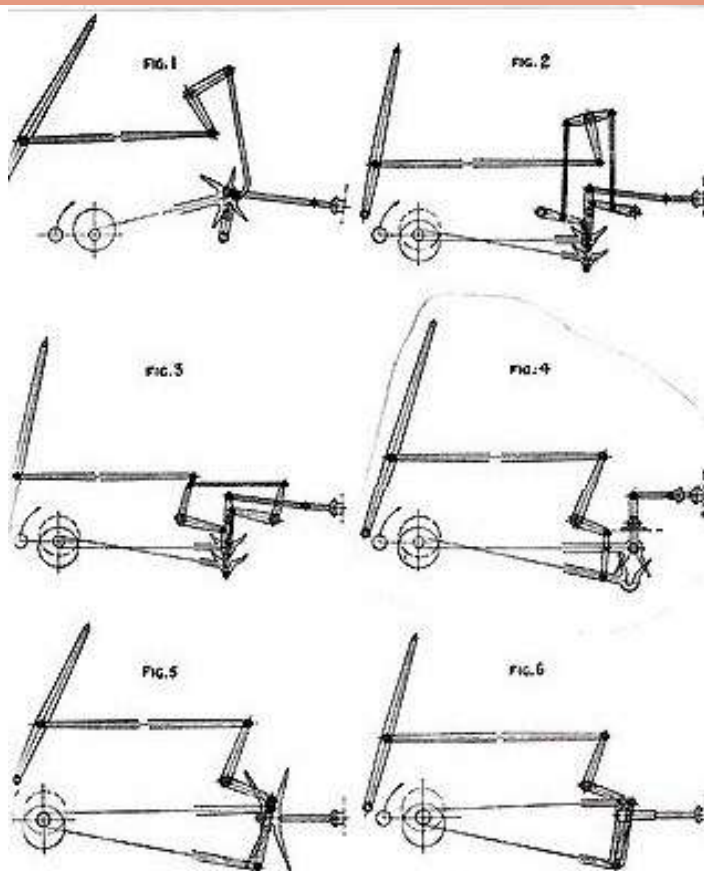
The valve gear in Diagram One Fig. 4 is the valve gear used on the 'Lion' and the drawing below shows LBSC's design for the 'Titfield Thunderbolt' model.

It seems a simple step to connect the eccentrics to the valve rods by a slotted link, yet it took about ten years for the link to be invented. Robert Stephenson did not claim to have invented it, but his firm was the first to use it and it became known as the Stephenson Link Motion — the first modern valve gear.

**Article by Bill Walker**



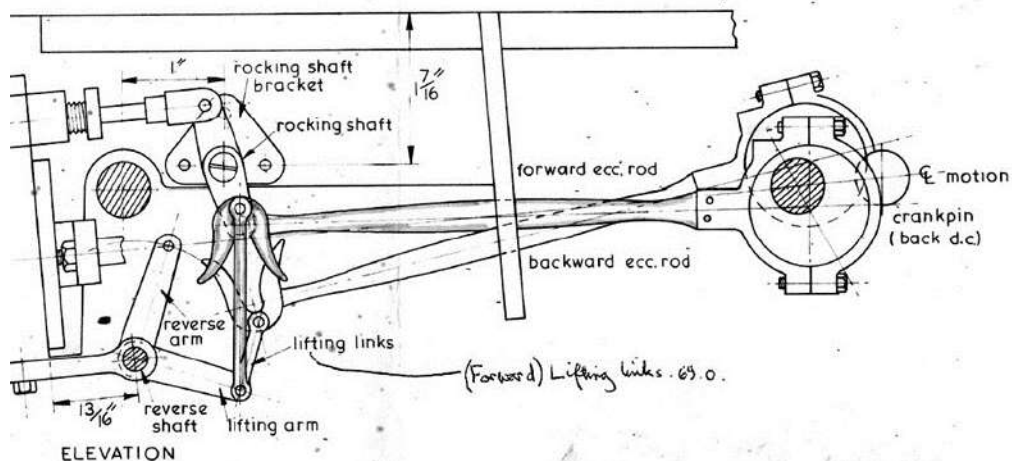
Above: Side elevation detail of a typical 'gab', designed to pick up the pivot driven by one or other eccentric and convey the motion to the valve.



**Diagram One—showing the evolution of link motion valve gear**

- Fig.1 — Carmichael's gear as first applied by Robert Stephenson & Co. in 1835, with two fixed eccentrics
- Fig.2 — Introduction of four fixed eccentrics, with forked gabs and single reversing lever, as applied by Stephenson
- Fig.3 — As for Fig.2, but with reversing shafts below boiler level, also by Stephenson
- Fig.4 — With forks opposed and single reversing shaft, as applied by Buddicom (also as used on 'Lion')
- Fig.5 — With gabs contained on valve spindle, as applied by Stephenson, 1841
- Fig.6 — With slotted link, by Williams and developed by Howe, 1842.

From: J.G. H. Warren "A Century of Locomotive Building by Robert Stephenson & Co 1823/1923" D&C/Heritage 1970 copy of 1923 edition p370





## The Stuart Turner 27 (well, three 9's anyway...)

*Continued from the March-April issue... This part details some interesting features of the build.*

THE Stuart governor design of 1981 is not a nice thing to make. The governor 'balls' come as a double casting complete with their actuating arms attached.



How to make a nice ball and also make the arms out of these castings frightened me enough to avoid doing it, so my first engine has these parts fabricated, using bought in bronze balls (see below).

Stuarts must have learnt of customer dissatisfaction over time as they have completely redesigned the governors for all their engines.

I had the castings for the 1981 version but luckily Richard Turner had the drawing for the latest design which uses no castings at all.

It looks more complicated and has more parts, but is easier to make and to me, is a more attractive governor anyway (photo below).



The balls are stainless and come too hard to drill, even with cobalt drills, but if left overnight in our wood fire it leaves them blackened but soft enough to deal with — and still stainless.

The handrails were made using stainless balls treated the same way, drilled first in the 3 jaw, then cross drilled in a jig and silver soldered in position.



The 'tiles' are just made by bead-blasting alternate squares in the aluminium base. All the paintwork is baked enamel — 150°C for 40 minutes in my wife's oven. The nameplates are brass, etched using Ammonium Persulphate (10mins at 70°C in the slow cooker) with the 'artwork' printed on PCB Transfer Film on a laser printer then ironed on to the brass with the domestic iron.



Clearly, success in model engineering requires unfettered access to all the household appliances at some time or other!

The globe valves were completely fabricated from brass bar and their handles made with stainless rims.

Two governors would be hard to set up even in full size to ensure each engine carries an equal share of load, and hunting between engines must have been a problem.

Apart from individual indicator diagrams, how would you know which engine is working hardest? On air and without a load, each of my governors seems to have a self-excited oscillation, continuously opening and closing which causes speeding up and slowing down which causes ...well you know...

Too little friction, no damping and no load is probably the cause, so why didn't I use one governor and one governor valve on the common steam supply to both? Well, there are full size examples of twin stationary engines with two governors which must have been successful, and you know — I just like looking at them — so there is twice as much enjoyment. The single governor on a twin tends to have some ugly linkages or pipework.

The two cylinders are each 1.5" bore and stroke which on a locomotive, would make it quite powerful, and I have no boiler large enough to power this even on no load, so I suppose that's the next project. Demonstrating the engine on air means the displacement lubricators won't work, so that's why I added a mechanical lubricator driven off the valve shaft. The lubricator has a single pump so its discharge was taken to somewhere it might hopefully supply both cylinders equally, which it doesn't always do.

The lubricator tends to over-lubricate the engine and empties the tank quite quickly, but if it's not filled on every run it will probably be fine. Reducing the lubricator output is difficult since the valve stroke is fixed, and reducing the swing of the arm just stops the ratchet working — too few teeth on the ratchet wheel.

*Article and photos by Laurie Morgan*

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## Doug's 'voyage of discovery' helps isolated students

*THIS is the third part of an article looking at the extraordinary range of model engineering projects undertaken by our Canadian member Doug Pitney.*

THE first two parts of the Doug Pitney trilogy have dealt with his model engineering pursuits, but there's another, humanitarian side to our Canadian member.

Just to recap, Dr Doug Pitney, PhD, basically calls Canada home, although he travels "Down Under" every Australian summer to escape the worst of the harsh Canadian winters. His log cabin at Kelowna, 400km east of Vancouver on the shores of Okanagan Lake in British Columbia, is inaccessible during the winter months.

"Snow and ice make driving impossible while bears and cougars make walking to the cabin too scary!" he said.

Doug has many friends in Perth, mainly through his association with the University of UWA, where he was a mathematics lecturer. And it is some of these friends who feature in this third instalment on his extraordinary achievements.

An avid backpacker to all corners of the globe, Doug has seen the desperate need for educational materials in many third world countries.

So, what could one man do to help? Plenty!! And his desire to help once found him in a small boat with an outboard motor on a five-hour voyage to Fiji's remote Yasawa group.

For 10 years, Doug collected teaching aids "with a lot of help from my friends" and shipped them in containers to Africa and the Pacific region.

"It all started in 1993 while supervising a student teacher at Warwick Senior High School," he recalled.

"The curriculum changes made hundreds of maths books redundant, so I rescued them from the dumpster.

"My flat and my daughter's garage were inundated with text books, Mac computers, microscopes, art training kits, beautiful canvas wall maps and even desks and chairs."

Knowing of the acute shortages in third world schools, over a 10-year period, he collected more than 80,000 books, which were shipped in 20ft containers to Lusaka (Zambia), De Aar (South Africa), Arusha (Tanzania), Lautoka (Fiji) and Lae (Papua New Guinea).

UWA became a big donor of money, books and redundant equipment and many other organisations and people, including our own Clive Chapman, helped gratis. The project's success was due in large part to Zan Blair, secretary in the UWA Graduate School of Education.

"An amazing source of inspiration," Doug said.

"I was collecting so much valuable stuff I could have filled two or three containers a year!

"One day a covered trailer full of text books from Eastern Hills Primary School was left outside my Nedlands flat with the donor's name taped to the licence plate.



Photo of Doug taken at the November, 2018, public run where Doug is in animated discussion with Phill Gibbons and Clive Chapman.

"Fort Knox storage in Fremantle played a key role, providing two or three storage units at no charge."

"On one occasion they provided storage space for a complete primary school outfit, including tables and chairs."

Contacts to collect the containers and distribute the materials was always a problem.

"I met a man from De Aar City Library (South Africa) on a TransPerth bus. Over coffee we discovered we had a mutual friend at Port Elizabeth Technikon. Professor Judy Schumann subsequently helped trans-ship a container containing 50 microscopes, library reference books, text books and computers to his city," Doug said.

Doug's hands-on commitment in delivering teaching aids resulted in him making the journey on the South Pacific Ocean which is hard to comprehend. For five hours he travelled in a small open boat to Viwa, the remotest western island in Fiji's Yasawa group, 45 nautical miles from Lautoka. "Had we missed the island (no GPS here but a very experienced crew), the next stop would have been the Solomon Islands!

"I was guest-of-honour at the graduation ceremony at Viwa District School. The school enrolment was 62 students, pre-school to Year 12, with a dormitory, library and classrooms surrounding the rugby pitch — the focus of the girls and boys at the school.

"The village chief loaned me a formal sulu and Fijian shirt for the occasion. No 5-star hotel here, just a dirt floor and mosquito net!"

After four months in Australia for our 2019-2020 summer followed by flight delays due to bushfire in the eastern states and the coronavirus, Doug will soon be back in his lakeside cabin continuing his love affair with model engineering, in all its facets.

*Article and photo by Tom Winterbourn*



## When it comes to steam engines — Oils ain't oils!

TALKING about steam engines often conjures up all sorts of images, mostly of the railway kind. But as the Castrol GTX TV oil ads used to say in the late '80s: "Oils ain't oils" — and the same applies to steam engines!

In our society, we deal with small cylinders that we can hold in our hands and we are in awe at the size of cylinders on some of the world's big steam locos. But nothing compares with the Netherlands' "De Cruquius", housed in a museum a short distance from Amsterdam's Schiphol Airport.

Let's put things into perspective. The 345-tonne 4-8-8-4 Big Boy, built for the Union Pacific Railroad in the USA, had four outside cylinders 24"×32" (610mm×813mm). Massive by railroad standards. The four cylinders on a British Duchess Pacific were 16½"×28" (419mm×711mm) and the three on an A2/2 were 20"×26" (508mm×660mm).

In Australia, Victoria's 'Heavy Harry' had three at 21½"×28" (550mm×711) and a NSW C38 class Pacific had two 21½"×26" (550 mm×660 mm).

But, in the constant battle against the sea, the Dutch produced a monster steam cylinder, with a diameter of 3.66 metres (144")! "De Cruquius" was and still is the largest steam beam engine ever built, capable of draining 320,000 litres of water per minute from the surrounding Haarlemmermeer, or Haarlem Lake — that's an Olympic swimming pool every eight minutes. It was the largest freshwater lake in the Netherlands and was finally drained in 1852.

My trip to the Museum de Cruquius during a visit to the Netherlands in early January was arranged by Adrian Strik, who would be known to some NDMES members. We had never met, but had been corresponding for about a year. We were put in touch with one another by WA steam loco doyen Keith Watson. Adrian lived in Perth for a while and was often seen at Castledare Miniature Railway.

In the limited time I had at Schiphol, Adrian picked me up from the hotel, gave me an extensive and personalised tour of the museum, at which he is a volunteer, and then dropped me back at the hotel. And no, Jen did not come with us!

The museum's engine room, unchanged for 170 years, attracts thousands of visitors every year. The engine still goes through the motions, but alas it is now powered by electric motors and the massive fire boxes and boilers are long gone, although there is still



An external view of the Museum de Cruquius, showing some of the eight radiating arms, or balance beams of the pumping engine. The rods drop down to the pump barrels which raised the water 4.5m.

a façade showing what the fireboxes looked like from the front.

The museum reflects the history of the Netherlands' constant battle against sea water, with over 40 per cent of the country below sea level. The reclamation of Haarlemmermeer by means of steam power marked the breakthrough of the Industrial Revolution in the Netherlands. "De Cruquius" was commissioned in 1849 and pumped Lake Haarlem dry in just over three years, together with two identical steam-pumping stations. The other pumping stations were modernised after 50 years, but De Cruquius remained untouched.

It was decommissioned in 1932 and the Dutch Royal Institute of Engineers adopted the pumping station as a museum and saved it from demolition.

The museum, which opened in 1936, was one of the first technical museums in the world. It also houses models of windmills, steam engines and various pumps, polder models (land in a low-lying areas reclaimed from water by building dikes and drainage canals), old maps and prints and the former boiler rooms provide an excellent overview of the struggle against the water.

Naturally, the Dutch are very conscious of the dangers of climate change, as their very existence is under constant threat. The display includes a water model, which shows what the Netherlands would look like without dikes and what damage a storm flood can cause. The big model is frequently drained of water and then refilled again.

*Article and photos by Tom Winterbourn  
(more photos on page 12)*

## Oils ain't oils! (cont...)



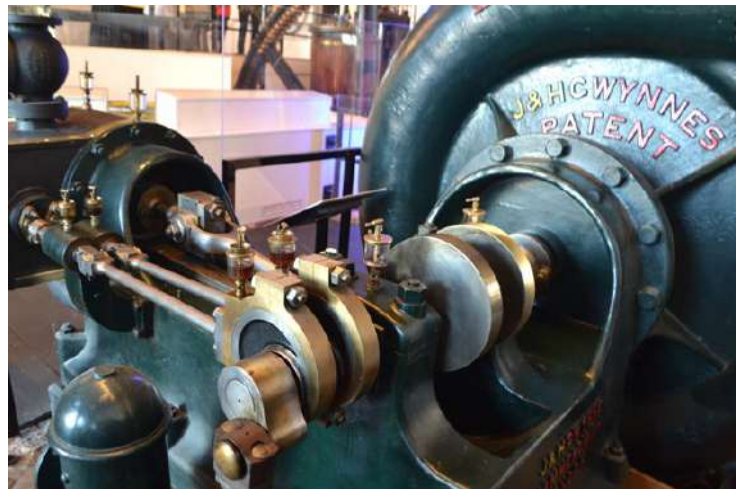
Above: Details of the "great weight" of the main Cruquius engine. This originally weighed 82 tons and was pushed up by the huge cylinder below. Radiating from the periphery of this "great weight" are the eight balance beams which operated the bucket pumps on the outside of the building.



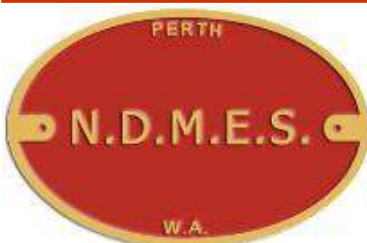
The tops of two of the pump barrels, which raise the water some 4.5m from the bottom of the former lake to the level of the 'laundry' floor. Two of the 8 pumps still raise water to this level when the big machine is demonstrated.



Left: Details of the vertical cylinder plus slide valves and the balance beam, dating from 1826. This rotating beam engine originally drove a scoop wheel with a diameter of 7.5m.



Above: Two brass eccentrics for the valve movement of the oldest steam-powered centrifugal pump in the Netherlands. The pump dates from around 1890. The twin eccentrics operate slide valves using the Meyer principle, which permitted a simple form of adjustable expansion of the steam.



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