THE Shed

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ISSUE 124
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WHAT ARE YA?

There was a comment on one of our Facebook posts recently that I reckon deserves discussion in this column, as an answer online felt not quite right. It is a good point the commenter made though.

The post on *The Shed* Facebook page was on the race car builder from Issue No. 123, Rod Benjes. Rod builds drag cars predominantly, so you could say the article in that issue has a bit of a hot rod twist.

The comment on our post read, "strange to see something like this (and other hot rod items) in a magazine that's NOT NZHR Magazine".

And yes, the commenter is right, we are not a hot rod magazine. I'm presuming this person reads the magazine, and that's a great thing, but it's not entirely clear. If they did, they would notice we also cover woodworking sheddies, but we are not a woodworking magazine. We feature sheddies modelling, collecting, welding, engineering, and even (recently) armour making, and so on, and so on. However, we are not a specialist magazine in any of those subjects.

Our mantra here at *The Shed* is "Showcase clever sheddies making, restoring, creating, collecting, and include some how-tos." If it's interesting, clever, and what someone is doing in their shed, then that's what we share with our readers. Now this may include the aforementioned subjects, such as modelling, collecting, welding, etc., or even something new that we haven't stumbled across yet.

Our main goal is to entertain and inspire our readers. Maybe for you to learn about new tools or processes you were unaware of. But another major goal for us is that a reader may think, *That's a bit of me, I'm going to have a crack at that*, or even, *Geez, I could have done a lot better than that.* Then, they contact us and we write an article on their approach. Everyone wins.

So, this is what we are thinking. Do you agree? Too much of this, or not enough of that? What about doing some articles on radio-controlled cars, as one young reader asked us to do, or more jewellery-making like the mag used to do 10 or so years back?

Google and its AI mates tell us that, "Magazine publishing is the business of creating and distributing a magazine to the public, whether in print or digital format. This involves producing a publication with a regular schedule, featuring a variety of content like articles, stories, and photos, and making it available to readers through sales, subscriptions, or advertising."

The "variety of content" is the main point there for me, but as we always proclaim, we do this for you, not for ourselves, so let us know what you reckon.

This is our last magazine of 2025, so to all our readers and clients, we hope you have the very best summer holiday, and here's to a great 2026. We are all due a good one.

Merry Christmas.

Greg Vincent
editor@theshed.nz

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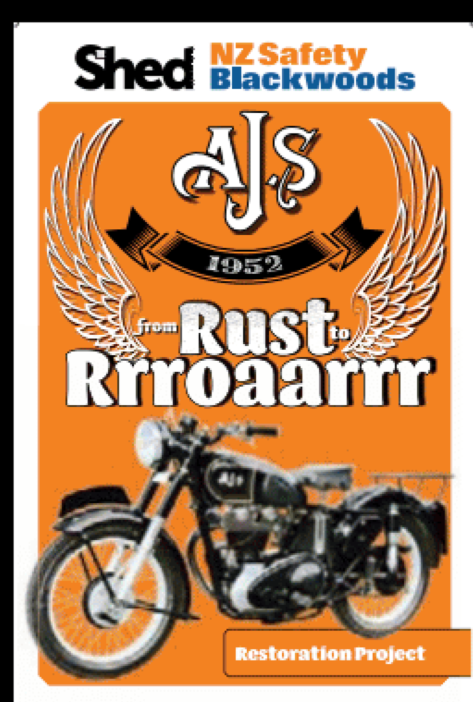

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from Rust to Rrroaarrr
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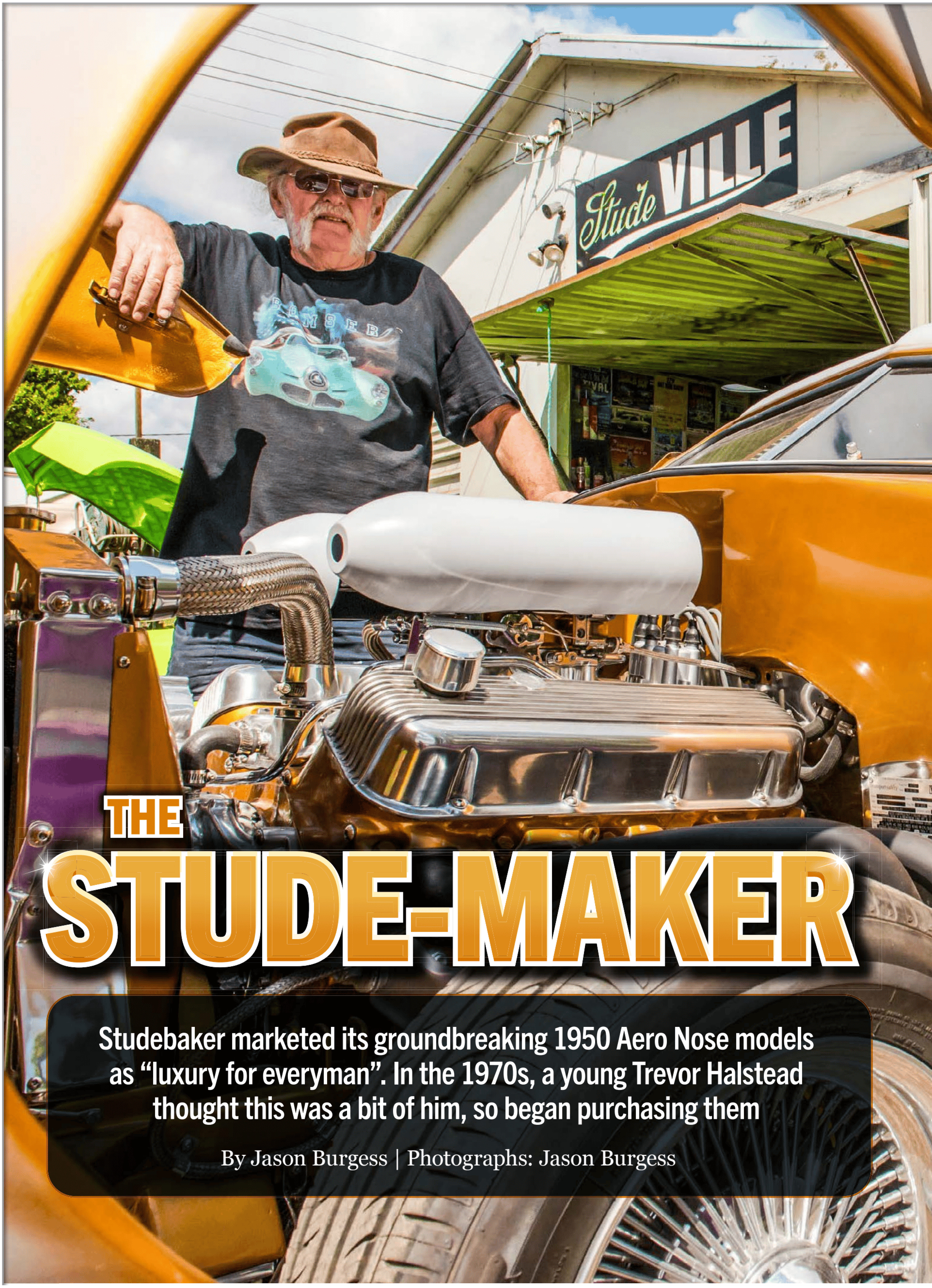
THE Shed
CUSTOM CAR MAKER
STUDEBAKERS REBORN IN A WAIKATO SHED

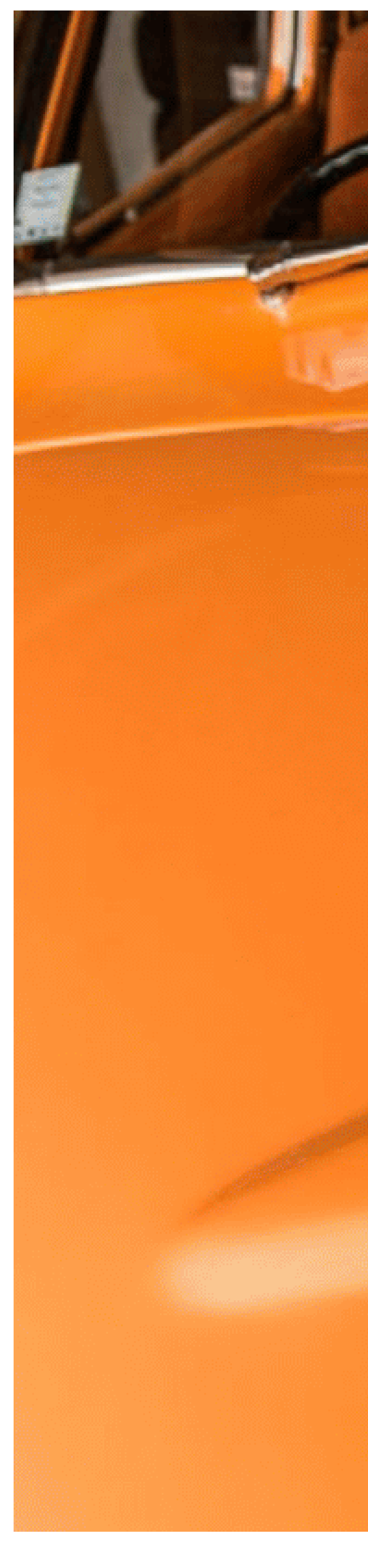


THE STUDE-MAKER

Studebaker marketed its groundbreaking 1950 Aero Nose models as "luxury for everyman". In the 1970s, a young Trevor Halstead thought this was a bit of him, so began purchasing them

By Jason Burgess | Photographs: Jason Burgess

Orange 1953 Studebaker Starlite



In 1950, Studebaker propelled car design into the rocket age with the release of its 'Aero Nose' Champions and Commanders models.

Billed as "the next look in cars" and sold as "luxury for everyman", these side-valve V6s not only marked the beginning of a golden era in US motoring; they also embodied a growing mid-century fascination for science fiction and space race aerodynamics.

To the man on the street, they became known as 'bullet noses', and while they proved to be Studebaker's best-selling model in 1950, those aero lines did not age so well, and by 1952, the company reverted to a more conventional front end.

Fast forward a couple of decades, and to another hemisphere, and a one-man Studebaker 'Next Look' revival was about to begin, in the workshop of Studebaker devotee and custom-builder Trev Halstead. This time, though, those vintage lines would take on wild and offbeat shapes.

The Halstead approach

In Trev's shed, deep in the heart of dairy country, "Studees" as he calls them, are often completely transformed – chopped and channelled, shortened and sectioned into sleek, sometimes outlandish, jellybean-coloured chariots.

Think Ed 'Big Daddy' Roth cartoons

and vintage sci-fi fantasy. Trev is known for building the shapes he likes, particularly the bullet noses, and creating completely fresh lines without sacrificing Studebaker's distinctive look. On occasion, he has even been known to rebuild them as stock too.

Whatever the brief or design, every detail is methodically and meticulously crafted by Trev, whose idiosyncratic reputation is legendary in the custom car and hot rod world.

These cars are unique

Drawings and plans are not common to Trev's customs.

He builds by eye using original photos as the jumping-off point. He is hands-on every step of the way, trying not to be reliant on anyone outside of his shed, and makes it known that he does not want what someone else has got. He says, "There is no car in New Zealand identical to any one of my cars."

While the eccentricity of the bullet-nose centres remains his inspiration, oftentimes a Halstead custom will feature very few complete parts that actually originated from Studebaker's former factory in South Bend, Indiana.

He builds from a jigsaw of components and bodies purloined from all kinds of cars. Working to tight budgets out in the country has honed his skills in improvisation and inventiveness. Over the years, he estimates that he has completed around 20 Studebaker

Studee line up from left to right: '51 teal Starlite, '52 Commander, '53 orange Starlite, and a '56 Skyhawk

Progress boards of previous builds

> "The Studebaker, though, was fifty bucks cheaper"

Top and above: A small portion of Trev's trophies

restorations – along with other custom work: "Chevys and Holdens, and some English stuff which I didn't really like."

Not bad for a bloke who is self-taught; works solo; and, after 50 years of customising cars, still enjoys trawling for parts at a swap meet or wrecker's yard.

Tradie Trev

Out of school, Trev served his time as a chippie in Oamaru, yet considers metal finishing his trade.

He remembers, "The bosses in Oamaru didn't like me because I was a bit of a long-haired motorcycle hoon. Before family, there were choppers. I left home and went to Dunedin in '69, and started working with Dunedin Electroplaters so I could get chrome for my bikes, cheap. Then I became one of those guys who gets black behind a polishing machine. I still use mine most days. I make everything out of stainless because it's getting hard to find a decent chrome plater in this country."

He has owned and customised at least eight bikes – all English: Triumphs and BSAs. "Harleys were a rare beast back then."

In the early 1970s, when his son was born to a former partner, he realised that he needed a family car. That is when he bought his first Studebaker, a '57 Champion, although at the time, he was really in the market for a Ford Customline. The Studebaker, though, was fifty bucks cheaper, a pittance in today's coin, but back then, big money for a young dad with limited means.

By the time he met his present wife, Di, Trev was back on his motorcycles. He recalls, "I was riding a BSA 650 when we were dating, but Di didn't like sitting on the side of the road while I fixed it – I don't know why!"

Bargain hunting

Throughout the '70s, Studebakers remained relatively inexpensive and not so desirable. While other young dudes were looking for Ford Gold Flashes and Mark 1 and 2 Zephyrs, Trev began shopping for Stude' parts.

A couple of months after his first purchase, he bought his second car: a '51 Champion, which would eventually become his coveted custom the 'Bomber' – a car he kept for 49 years.

He remembers, "The Bomber originally cost me $40; it was not in the best of conditions, and there was

Shed wall

no first gear. Then, not long after that, I suddenly had four Studees." Over the years, he reckons he has had over 50 Studebakers in his possession at one time or another. "That is," he laughs, "if you can call derelicts, a car."

The shed

There is a sign above the door of Trev's 80-year-old shed that reads "Studeville". On the walls inside hang a thick tapestry of motoring memorabilia, faded posters, dusty motor show entry passes, magazine and newspaper cut-outs that provide a potted history of Trev's Studee handiwork. Though there is scant paper evidence of the prizes he has won for his car creations and restorations, the real trophies are inside the house: about five deep on multiple display shelves, in his lounge.

Before Studeville, the shed had been built and used as a workshop for forestry truck maintenance. These days, the mortise and tenon joints reverberate to the sound of rock and roll – two-and-a-half thousand of Trev's favourite '50s to '70s tunes – on a continuous alphabetical-order rotation.

He is pretty happy with how the space works, but quietly wishes that "I had bought a hoist, because getting

Aero or 'bullet' nose on the green delivery

Trev circa 1979 with his original Bomber, which he kept for 49 years (photo: Allan Porter)

into a pit now is a bit of a pain." Trev's former premise was a commercial shop in Te Rapa. "I was there for four years and had plenty of work," he says, "but I felt like I was working for everybody else: the council, the landlord. I wanted time to play with my own toys. We moved here 35 years ago. It has worked out good for me in the country."

Moveable feast

Organisation and clean spaces are key to his efficiency; he is constantly reorganising cars, workbenches, and storage areas as needed.

He says he is about to do a major parts cull over the summer. After all, how many driveshafts does one man need? His polishing room doubles as a storage room, with old Post Office pigeon-holes stacked high with ice cream containers full of smaller, lesser-used parts, like rubber boots, fittings, catches, and fastenings from a variety of donor vehicles.

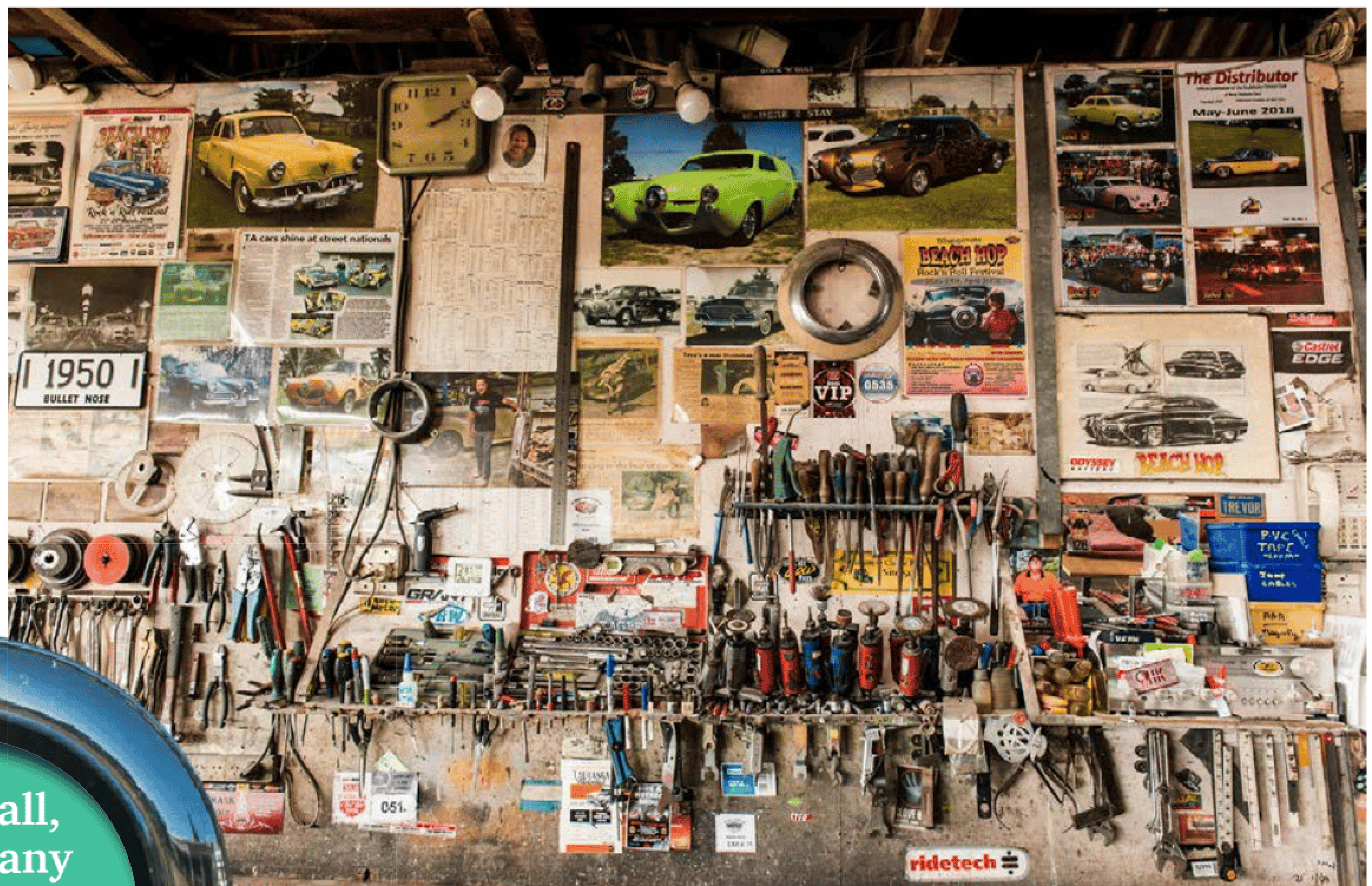
Commonly used parts, "new stuff", stainless nuts and bolts, are stored in his main workshop by the drill press. A back room that was originally set up as a spray booth is now stacked high with vintage kahikatea butter boxes chock-full of stripped parts: leftovers from rebuilds – some brand new, and mostly Studebaker. Vehicles are now sprayed out in the workshop. Another reason to keep everything clear and tidy.

Trevisms

Detailing is a key ingredient in a Halstead build, and if Trev can make it, he will, right down to his shed-made stainless-steel stud buttons that feature on the door and panel upholstery of his last two builds. "Simple construction, really," he says.

The stainless washers are pressed first, screws ground down to fit; then they are pressed and TIG welded into the washers before being linished, then polished to a finish. About a week's work in a set of 100. While we are talking upholstery, he professes that, "I'm a bit crazy about my diamonds and 45-degree-angle squares too." Yet of all the things he does do, stitching the upholstery is the one thing he will not touch; that is all outsourced.

A view of the shed interior towards the polishing room upstairs



Above the tool bench

“After all, how many driveshafts does one man need?”

Mouldings and handles on the doors; speaker surrounds, bracketry in the engine bay, and exterior and interior trims are all handmade – designed up, laser cut and finished with a grinder, then welded together and polished – of course!

A set of door handles takes about a week, including the window regulator set-ups. They are made from a round of stainless steel, carved one at a time. Other handcrafted Trevisms include brake and gas pedals, steering-wheel columns and steering wheels, instrument knobs, and gear shifters. ▶

A few of the yet-to-be-fitted details for the gold KUSTQM

Gold KUSTQM tilt front bonnet

Profile

“I started from the ground up because I can’t put up with not-quite-right”

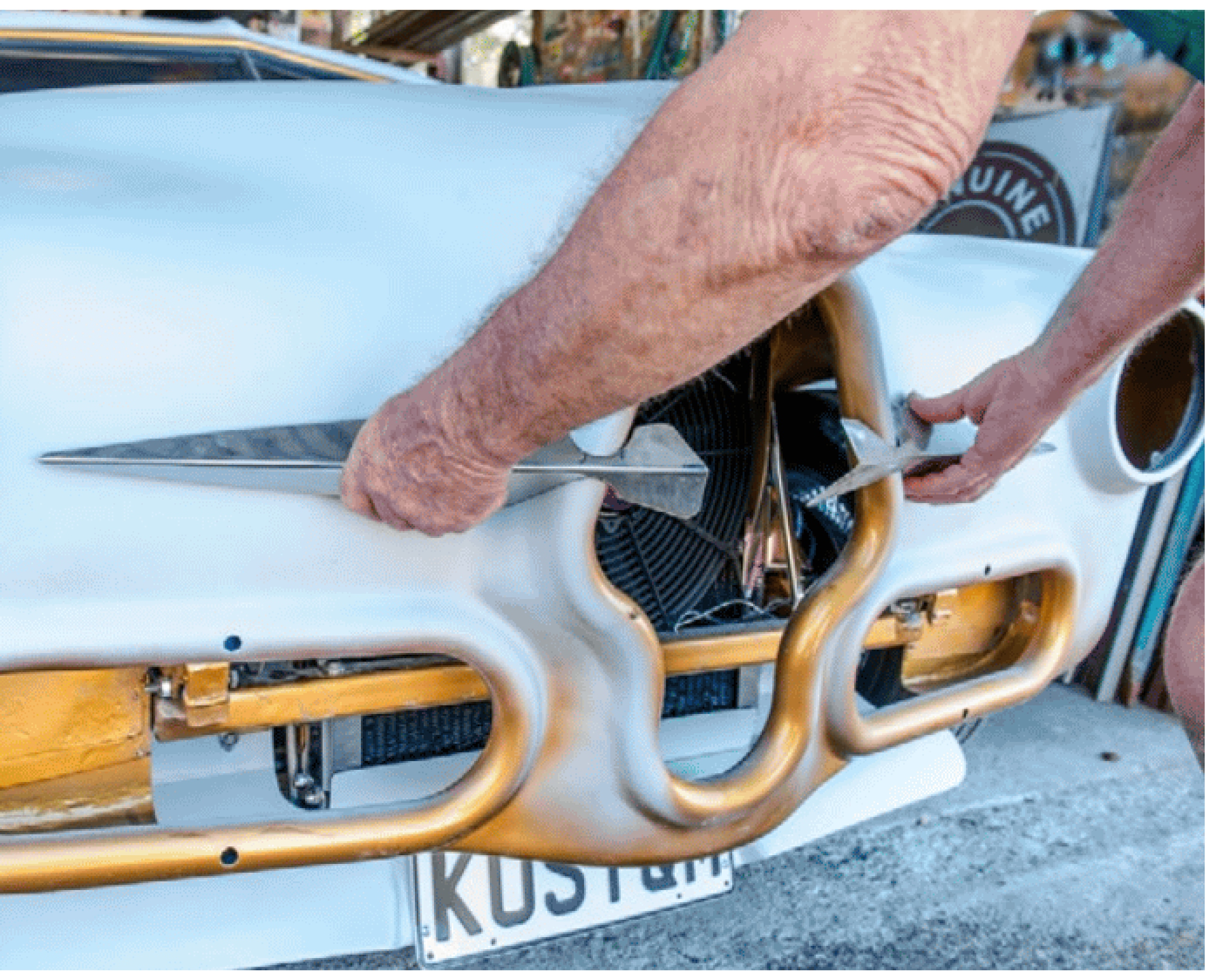
Ready for masking

Trev’s handmade bullet nose badge

The gold KUSTQM

Trev admits, "I'm at that age now, where I don't want to take on a whole lot of stuff."

He is presently looking to downsize his collection of Studebakers from seven to five finished cars. Out here, though, there is no guarantee that 'finished' means done. At the time of our visit, he was deep into a refurbishment of his 1951 'KUSTQM' (with 1947 front sheet metal), a scratch-built he completed 25 years ago. "I'm changing her to gold. It was only meant to be a touch-up. It is just about show standard now. I started from the ground up because I can't put up with not-quite-right. I always want to do the very best with what I have." ▶



Shed-built stainless detailing for the front end

Upholstery for KUSTQM with Trev's trademark diamonds and handmade stainless studs

Trev-shaped body lines and door details

PARTS

"The traditional rule for home-building a hot rod is not buying stuff off the shelf. I bought a lot of bombs in the early days and saved up all the parts. The custom car side of it came out of that. I still use what I can pick up from the wrecking yards, cheap. A lot of stuff gets biffed, 'cos it doesn't work out so well. Some stuff you have to get off the shelf; an efficient system like an MSD ignition, after-market brake boosters, or things like that. There are many Studebaker parts that you can still buy new.

"Body panel stuff is hard to find now, so I do a lot of fabricating on-site. For interior door cards, I use a Palight substrate material; signwriters use it."

Trev prefers the comfort and functionality of modern seats in all his custom rides. He has Starion seats in KUSTQM, the orange '53 Starlite coupe has Mitsubishi, and the green delivery has Toyota K20 bucket seats.

"The teal Starlite has got Honda Inspire seats, from Di's old car. When she was finished with it, I got it, and when I was done driving it, it became parts, so nothing is wasted." The Starlite also has Toyota Yaris power steering in it. He points to his forearms: "Look, nothing here, mate, no muscles on an old fart; it's all gone. They can be hard to steer and hard to back. I wouldn't mind putting electric power-assisted steering columns in all my Studebakers, even the stock ones."

Post Office pigeon-holes with ice cream containers full of small parts

Order is the order of the day, everyday

A board of badges put together by Trev's grandson Jess

Affixing upholstery to Palight substrate

The gold car is unusual in that it began life as a doodle on the back of a record cover. It is also unusual because it has been shortened. “This car took me 16 years to build originally,” says Trev. “When I started it, everyone was still jacking up early ’50s street machines and hot rods. This one had chubby feet on the back. I have put thinner ones on now, which are more practical and cost-effective. She has got a Morris Minor steering rack in it – turns on a dime, two-and-a-half turns, lock to lock. The 408[-cubic-inch] big block Chevy goes like a cut cat.”

Trev concedes that, “This car was so chopped, it felt claustrophobic, so I dropped the window line down two inches. There is a lot of new shape in the door frame. The doors are fabricated from four-door sedan doors. The angle of the windscreen is raked back. There is absolutely nothing on this car that is stock standard, except for the rear courtesy light, but even that has been changed from 6V to 12.”

Piecing it together

“The console is made to clear the Chev Turbo 400 automatic transmission, and it also doubles as a strong backbone for the car and is made from heavy-gauge steel.

“As are the floors. It is supported through the sides where it has been

TREV ON CUSTOMISING

Trev on the metal polishing wheel

Kahikatea butter boxes of parts

Trev says he is no different to most home builders in that he is always trying to build on a budget. He cautions anybody looking to commission a custom: “Often they go over budget. People usually plan to do it over two years, but then find they don’t have the budget to do it in that time. You have to be realistic about how much you can do yourself. Because if you have to pay a tradesman, then it’s going to cost you.

“It’s a great hobby though – cruising the swap meets looking for special parts, finding like-minded car builders and the odd bargain parts at the wrecker’s yards.

“The most important tool is what is in your head. I assemble everything, panel beat and paint everything, and I do most of the engineering, but I don’t stitch. I learn as I go.

“Fifty years and I’ve made a few mistakes along the way, but it comes right with practice. I used to paint all my cars black until I was about 40 years old. Then I realised I must have a mental defect, because it was so bloody hot inside them and it is a big job keeping a black car pristine.”

channelled. There are a lot of major changes and details, including a pancaked and peaked roof made from a Ford XP Falcon bonnet to form the middle section; the tilt-front parts originated from a 1947 Champion with major modifications.

"It has a custom grille set-up with a bullet nose centre in it; it looks like a bullet nose, even though the front panels aren't. The instruments are Jaguar: the speedo and the rev counter are out of an old 3.8; the oil pressure, fuel, water, and volts are out of an XJ6. Much cheaper. I bought the whole dashboard set for $30 at a swap meet. I do a lot of fabrication on the linisher, including brackets and knobs. I don't have a lathe."

Finishing touches

To gild the body, Trev started painting with a 2K base, and finished the preparation with one coat of lacquer primer. There are 4.5 litres of metallic gold lacquer delivered onto the car in 13.5 litres of sprayed material. Every second coat, the body is sanded, or "flattened back", with 1000-grit paper. He says, "There is about a week's worth

The gilding of the '51 KUSTQM

"This car was so chopped, it felt claustrophobic"

“When so many people vote for your car, that is pretty cool”

The prize-winning teal Starlite

The delivery and the tool bench

Trev's custom pedals

Green delivery from behind

of masking that goes into a custom paint job like this."

Once all the custom painting is done and clear lacquers are applied, then it will be carefully sanded with fine-grit up to 3000. "Grit so fine," he reckons, "you could use it as toilet paper." Then comes the cut and polishing.

Shows

Trev started making waves on the custom and hot rod circuit with his black and gold flamed Bomber at the 1979 National Rod Run Show in Auckland, then again at a Dunedin Hot Rod Show in 1980 – "That was a fabulous show, 100 cars in pristine condition. The Bomber won People's Choice."

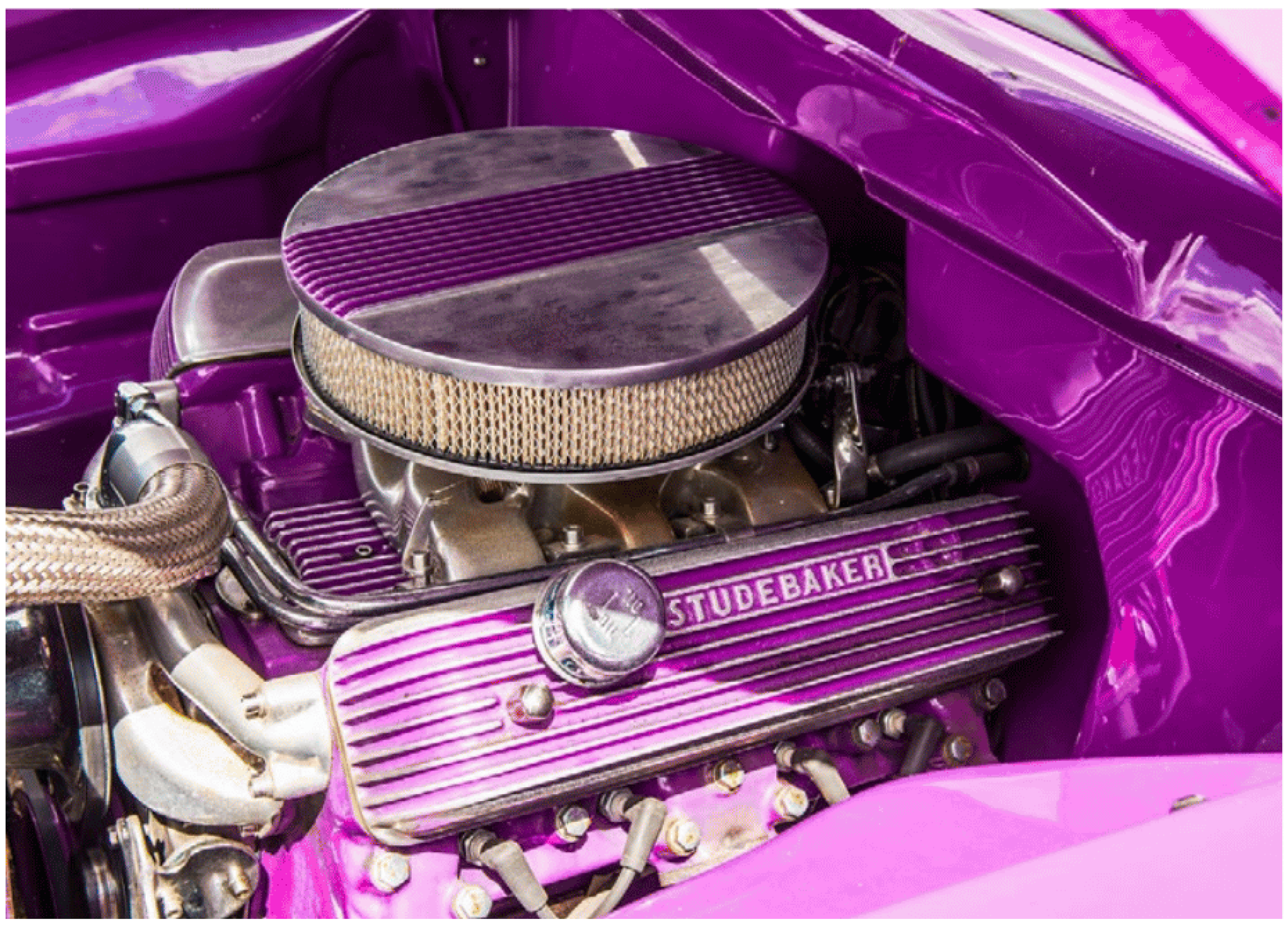
"For a Studebaker to do that back then was out there. No one wanted a Studebaker; it was all Fords and Chevys," he says. ▶

Of all the shows and comps Trev has attended over the years, there is one he has never missed: the Beach Hop in Whangamatā. At Repco Beach Hop 2024, his teal Starlite won Top Five (voted by the public and participants), Top Custom, and Top NZ HRA. Winning Top Five is what really lights Trev up. He has won it six times at Beach Hop with three different Studebakers. “When so many people vote for your car, that is pretty cool.”

He reckons the biggest kick from all his efforts comes from “tightening up the last bolt on a new build and turning the key. Then it’s pure exhilaration driving the new build down the road on its first run. Every Studee is a big buzz when you finish them. But then you start the next one; it’s like a continuous disease that keeps going, on and on.”


Trev in the shed


The purple Bomber



A rebuilt Studebaker V8 under the hood

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A visiting locomotive raising steam in the Steaming Bay at the Halswell miniature railway

Don't miss Canmod, 8 January 2026

By Ritchie Wilson

Canterbury hosts the biannual national model engineering conference

All active Model Engineering and Live Steaming Incorporated Societies in New Zealand are members of MEANZ – the Model Engineering Association of New Zealand, which was formed in 1995 to act as an intermediary between the 32 model engineering clubs and government agencies.

Its aims are to set guidelines and national standards relating to model engineering activities and to represent and further the interests of the member clubs on a national basis.

Biannual conference

Every two years, MEANZ holds a national conference. Early next year, this will be in Christchurch at the Halswell model railway run by The Canterbury Society of Model and Experimental Engineers (CSMEE), established in 1933, and will be called 'Canmod 2026'. The CSMEE has taken over the running of the conference at fairly short notice, so Canmod 2026 won't have all the features of the usual biannual event (there won't be competitions or a marque), but it will still be a major event on the model engineering calendar.

Trains will be running

Canmod 2026 will take place at Halswell from Thursday, 8 January 2026 to Sunday, 11 January, with train running for the public between 1 and 4pm on the Saturday and Sunday.

On Monday, 12 January, smaller locomotives will move to Ashburton, while the larger ones will spend a couple of days at Steam Scene at McLeans Island.

Canmod 2026 involves model boats and traction engines, as well as locomotives powered by steam, petroleum, or battery.

Of particular interest to visiting locomotive drivers will be the new 7¼-inch-gauge track loop, which CSMEE has been working on for the last two years. The new 800m loop can be incorporated into the existing 1000m figure-eight-shaped layout in a variety of ways, giving an interesting range of possible routes.

Ferry bookings may be an issue

Model engineers are expected from all over New Zealand, although there is some concern that reduced capacity on the inter-island ferries over the holidays may be a problem for North Island model engineers wishing to attend. Some model locomotives are very large and are typically transported in sizable custom trailers pulled by powerful SUVs, so there aren't many alternatives available for getting them over Cook Strait.

Coal-fired scale-model traction engines are being built in quite large numbers around the country, so there should be a good representation of these road vehicles at Halswell. The CSMEE maintains a large boating pond, and this will be well populated with powered and sailing models. A display of working stationary engines will also feature.

Affordable fun

The CSMEE's track is on the Christchurch City Council–owned Halswell Domain, so the public is free to visit at any time.

Train rides will be provided by CSMEE and visiting drivers on Saturday and Sunday afternoons for a cost of only $2 per person per ride – the biggest bargain in the city.

Large steam locomotives at Canmod 2023

A lovely example of a logging locomotive. This is a popular engine to model

Many model locomotives are based on New Zealand Railways engines

THE SHED ONLINE

What's happening online at theshed.nz?

Every week, we upload new content onto The Shed *website to add to the hundreds of articles and videos already on the site for readers to discover, learn from, and enjoy. Some uploads of the past few months include:*

Letting off steam

Thousands of hours spent in the workshop have resulted in the creation of some extraordinary working replica scale locomotives.

https://theshed.nz/letting-off-steam/

On the move

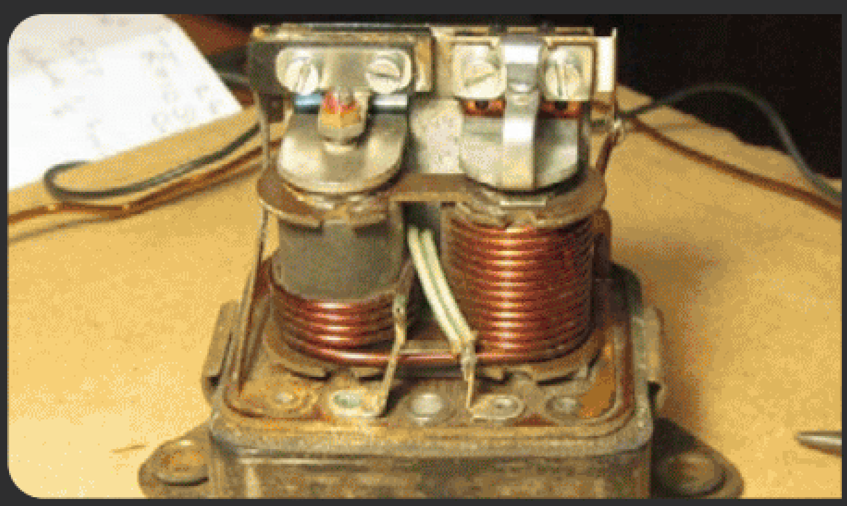
Make a set of load skates to move heavy machinery.

https://theshed.nz/on-the-move/

Forging ahead

Teachers take a busman's holiday, attending a knife-making class.

https://theshed.nz/forging-ahead-novices-take-a-knifemaking-class/



From rust to rrrroarrr – part six

Our AJS resto continues with electricals, suspension, controls, petrol, and oil.

https://theshed.nz/from-rust-to-rrroarrr-video-part-six/

LETTER OF THE MONTH

My kitchen reno

Dear Editor,

Reading about the bookcase construction article in your Oct/Nov issue has prompted me to relate my experience with cabinet construction.

I decided to renovate our kitchen, but buying commercial flat pack units was going to be expensive, and besides, I was not impressed with what was available on the market. Having seen the versatility of IKEA units overseas, I decided to explore making my own version. I had the tools, the ability and the time to do so.

My wife and I wanted the flexibility and versatility of fully adjustable shelves and drawers to accommodate her Tupperware and different-sized pots and pans. I researched this and discovered the Euro32 system. Basically, it works on a system of 5mm holes at 32mm intervals, which would accept 5mm pegs, or standard drawer slides, or door hinges. The holes are 37mm from the front edge. See – **https://en.wikipedia.org/wiki/32_mm_cabinetmaking_system**.

As I was intending to build some 15-odd cabinets for both floor and wall, this would entail four rows of holes in each 600mm high cabinet, 23 in each row, more in the taller cabinets. To ensure accuracy of hole placement, I designed and built myself a steel jig that would allow me to drill all these holes quickly, easily, and accurately. The jig had adjustable stops on the side and both ends for accurate location purposes (see photo).

Auxiliary jigs were needed for tricky spots (see photo). A simple depth stop was also needed on the 5mm drill bit to limit hole depth and avoid punching through the cabinet wall.

Working from a master floor plan, I systematically built the cabinets in the garage in my spare time. Each carcass was biscuit-jointed together, and the end result was sturdy and very satisfactory, as you can see. A simple jig was made for the placement of the feet and kick strips.

Incidentally, all European kitchens are based on a 600mm module, or multiples/divisions thereof, as you will note from their appliances. The rest was just an assembly exercise into the kitchen area, with food takeaways until it was finished.

Regards,

Chris Pattison

Tauranga

No glory for the power

Dear Editor,

Re. The Power and the Glory, Back o' *The Shed* column, Issue No. 122.

I commiserate with you, Jude, on the frustrations in dealing with the current electricity market.

Having worked in the industry for 40 years, I have seen many changes in that time, and I believe the present system is outdated and not serving the country well at all. The business model has been openly described by those in it as working best when there is a shortfall of energy, providing the opportunity for price escalation, and one generating company was taken to court a few years ago for manipulating such an outcome.

We have seen recently that large businesses and industry suffer closures and lay blame on energy costs. The government has finally started to take notice, and it will be interesting to see how far changes will go.

What is of most concern is that the build programs in regard to generation that were instigated by central planning 30–40 years ago have now mostly been absorbed. There is plenty of talk about renewable expansion, which will be necessary; however, I now believe we are in a lag situation, meaning the commencement of such programs should have started some time ago.

Transpower has already signalled their concerns on generation capacity now and in the near future. Add to this the diminishing gas supply, and we could be in for some interesting times. Solar and wind are seen as the saviour, but we will need plenty of them, and note that they are renewable supplies, which means there is still a degree of everyday supply risk.

You may look more fondly now when you see the Huntly thermal power station operating. Most of the thermal plants built in the 1970s–'80s have now been decommissioned. Huntly, through good engineering and adaptation, has been made to last past what would be a normal lifespan for a thermal plant. There is now talk to push that past a planned decommissioning date in 2030 due to the above issues. Without Huntly, there would be energy shortfalls in peak winter demand periods, with the inevitable rolling outages to keep the system in balance.

I strongly suggest you keep your own solar system well maintained for your purposes and the wood box full!

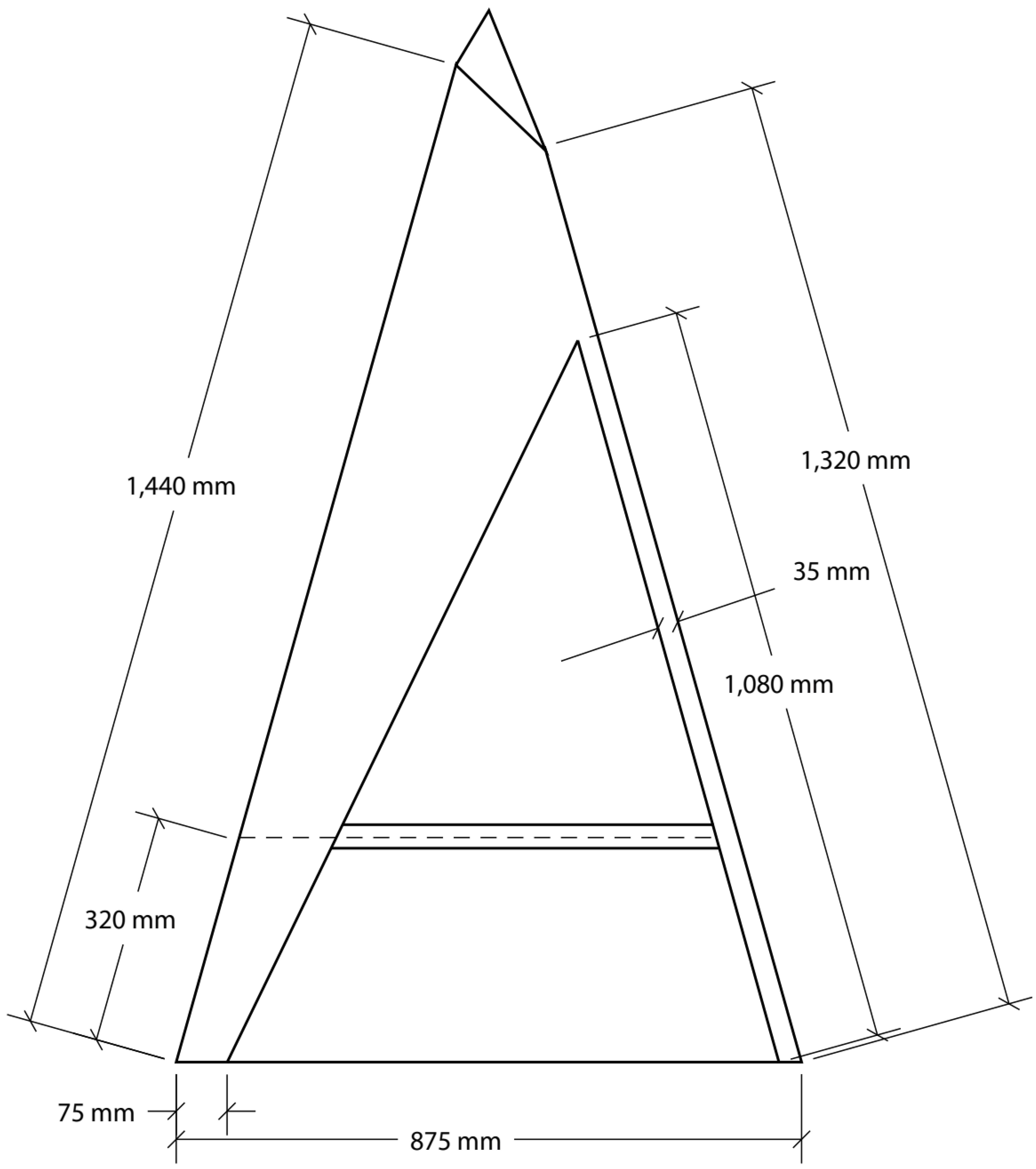
Keep up the good work, great magazine, I still have every edition!

Jon Mason

WARM IT UP

A steel chimenea proves to be the perfect outdoor heater

By Jude Woodside | Photographs Samantha Woodside



Outdoor fireplaces are great on a cool summer's night and even better during the chill of autumn and spring. But not everyone has the space or the time to build a brick fireplace. Chimenea are intended to radiate heat in all directions. They are traditionally made of clay or cast metal, but they can be made of sheet metal.

The issue with steel heaters, of course, is rust. However, 'corten' steel is weathering steel that is intended to rust to a point and stop. It is a corrosion-resistant ('cor') high-tensile ('ten') steel that will develop a patina of rust but not continue to rust through. It is popular as a building cladding and is often used for signs.

How to weld corten

Corten is the ideal material for an outdoor heater, precisely for this reason. These heaters are quite popular both here and overseas, and many of them are made from folded steel. In this instance, I didn't have access to a folder big enough to bend a sheet of corten, so I set about making a replica of one and simply welding the parts together.

Welding corten, or any corrosion-resistant steel, is an issue because the mild steel welding wire is not as resistant as the steel itself, and it could rust through in time. However, 309 stainless wire will weld almost anything, and it's the fallback MIG wire to use when you aren't too sure what kind of steels you are welding. It will do one of two things in this instance – either it will not rust and provide some contrast to the uniform orange rust of the steel, or it will be sufficiently well mixed with the corten that it will rust at the same rate as the parent material. Either way, it's the best wire to use with corten. However, 309 only comes in a 0.9mm diameter wire size, so you will need a larger MIG tip.

CAD design issues

I just moved to a new workshop and I didn't have any equipment for handling material. I ordered a sheet of 3mm corten, which fortunately only weighs 70kg, so two people can handle it easily.

I was keen to make sure that the heater could be made from one sheet.

I tried to model the heater on CAD. I used Onshape – it's free and it works with Mac, but I could not manage to create a three-sided

> “I was keen to make sure that the heater could be made from one sheet”

Laying out the parts

pyramid. My limited CAD skills defeated me, no matter how hard I tried. So I made a mock-up of two sides using ply and worked out how best to lay them out on the sheet.

It wasn’t possible to lay out three of the templates without cutting one slightly short; however, that suited the design, so I went ahead with the layout.

I planned to cut them with a plasma cutter, something I confess I have not done before. I recently acquired a BOC Smoothcut Plasma 40. This machine has a great rating online, and it’s very compact and light. Plasmas require compressed air – they work by ionising air into high-temperature plasma. The plasma creates a needle-like jet that easily cuts through nearly any conductive material. It’s important that the air you use is free from oil and water. Compressed air is notoriously very humid, and this will quickly wear out the plasma tips through which the plasma jet is directed.

Air-drying equipment

I have a good compressed air system in my new workshop, but it has no effective air-drying equipment.

Air dryers for compressed air can run to some very big figures and are vital for manufacturing plants, but for little

Cutting the first section

shops like mine and probably yours, they are out of reach. The next best option is a desiccant dryer. This is a filter placed after a condensing filter that can harvest some of the water. It contains a blue desiccant (silica gel beads) that change colour on reaction to water. I ordered a new desiccant filter and installed it in my shop, so it can be used as and when I need a dry airline for spray painting or plasma cutting.

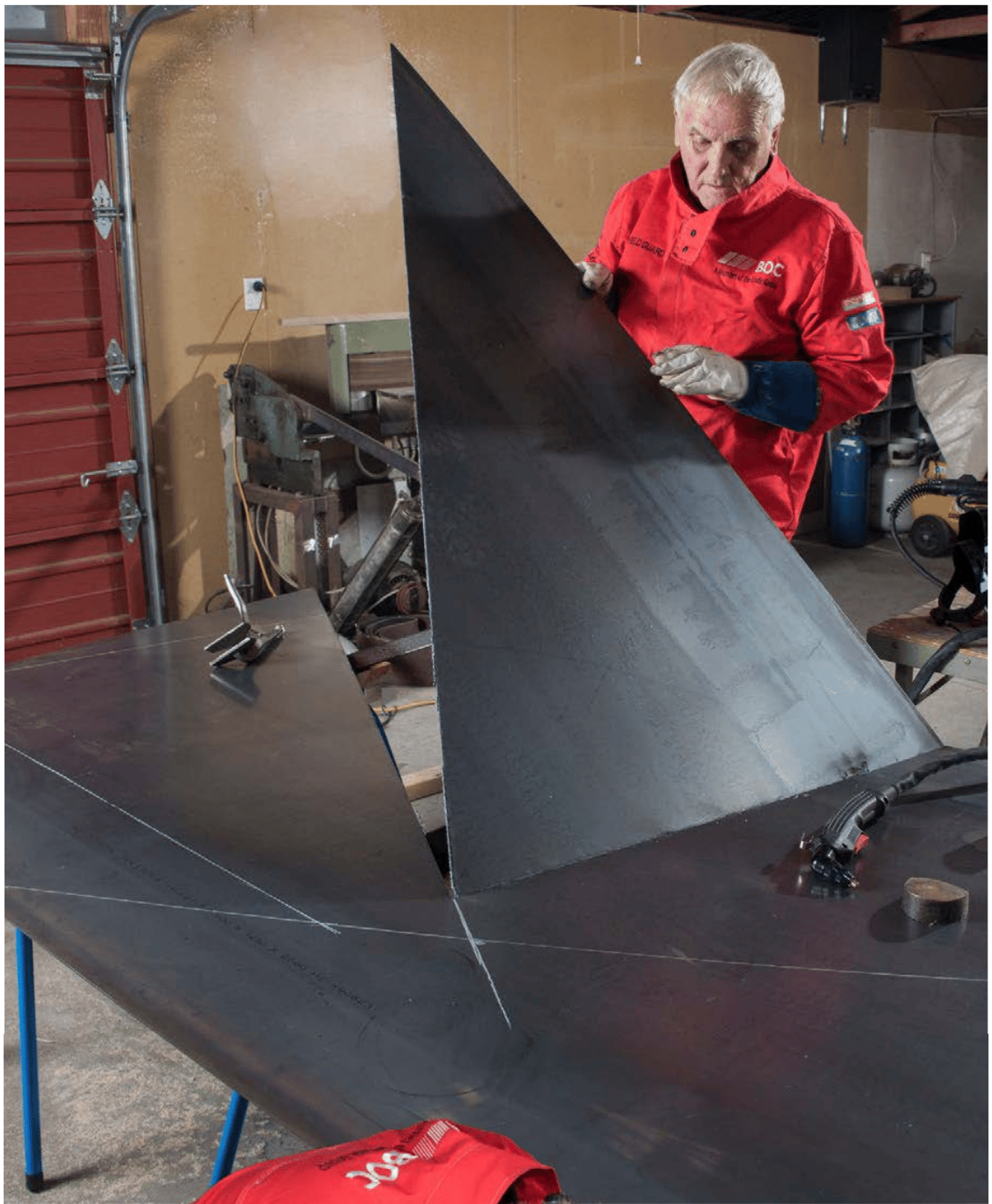
The plasma cutter comes with a regulator, so you can adjust the force of the air. I set mine to around 5bar. All that remains is to set the amperage. This machine can cut up to 10mm mild steel, and that would require 40A. The 3mm sheet can be cut with considerably less, but I opted for an amperage of around 25A. For small-gauge sheet metal, you can simply drag the tip over the piece, although I found that it tended to miss bits, which may be due to the composition of the steel or the fact that dragging the tip in contact with the steel is not a great idea. It is possible to get tips that incorporate a 1mm standoff, and I'm looking out for them now.

I found that I had to go over the cut two or more times to take account of the areas it missed. Overall, the cuts were very clean and very precise until the tip deteriorated, although in the entire cutting, I only changed the tip once.

Cutting the steel sections

With the template firmly attached to the work (I used some lead weights and a clamp) start the cut at an edge with the torch slanted. Bring the torch up to 90 degrees to the work and drag using the template as a guide. Don't go too fast – you can see how the torch is cutting – but don't loiter either. This is a very hot torch, and you don't want to melt any more than you need to.

I cut out the three sides and cleaned up the edges with the angle grinder. The upper surface of the cut pieces was clean, but the undersides had slag and solidified metal slag on the edges. At that point, I realised that I had intended to cut a relief into the base of the sections to create feet for better stability and to prevent too much heat



First section cut out

Cutting the last section

Above and below: cleaning up the edges

transference to the ground, where it might scorch a deck.

I cut one of the templates to create this relief and recut the two sides. The front piece didn't require feet, as most of it is cut away later.

With the piece cut to size, I arranged two at 60 degrees with the help of a block of plywood cut to that angle. I tacked the two pieces together. I could then fit the last piece in place and measure the cutout for the opening. I left a strip to be welded to the right-hand edge. I cut the opening in the last piece with the plasma cutter and cleaned up with the grinder as before.

Fireplace shelf placement

Before tacking this last piece in place, I cut a piece out of the remainder of the sheet to act as a fireplace.

I cut the piece to 60 degrees and to about 650mm. This fits at 320mm from the base. You can adjust this to your own preference, but I felt that this was high enough off the ground not to scorch the base and to allow enough area for the fire itself. ▶

"Overall, the cuts were very clean and very precise until the tip deteriorated"

Tacking the sides

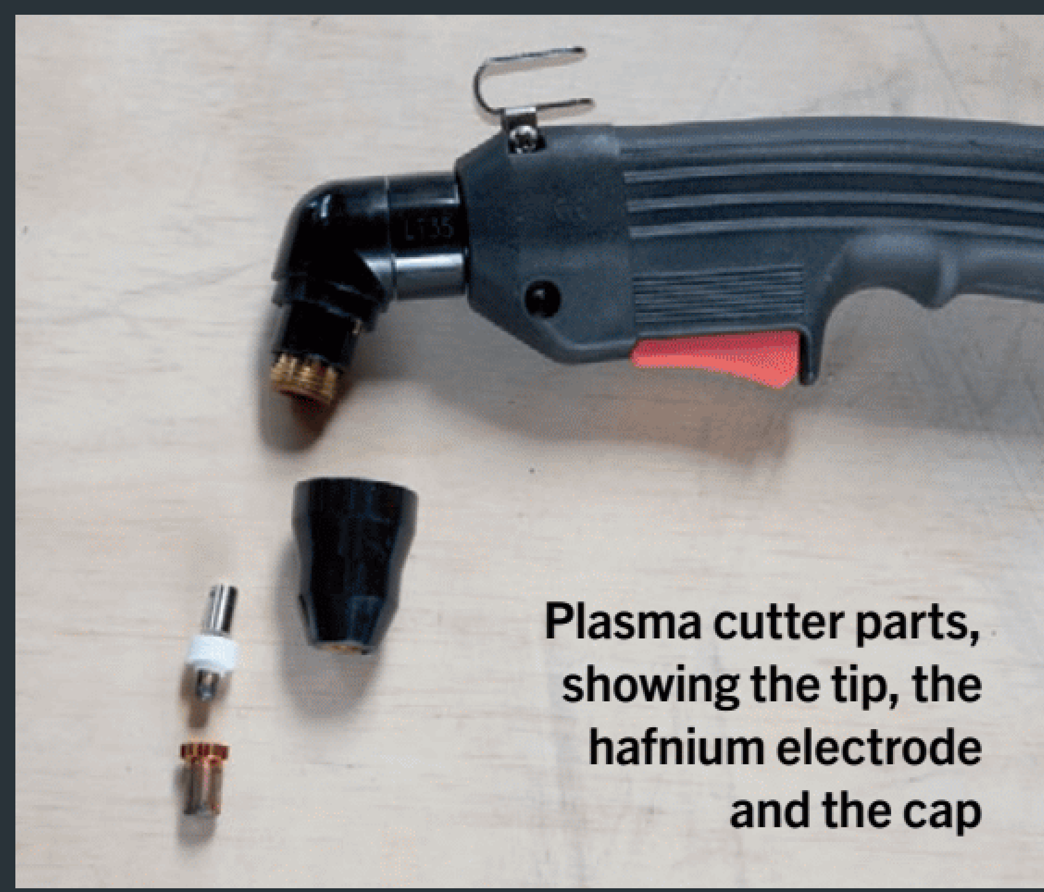
Cutting the relief for the feet

Plasma cutters

A plasma cutter is a relatively simple piece of equipment.

The cutter consists of a hafnium electrode and a tip with a very small hole that directs the plasma jet. The tip can deteriorate easily without clean, dry air. A desiccant dryer is a good solution for drying air.

The front panel has a switch for setting the airflow duration after cutting ceases and an amperage adjustment.



Plasma cutter parts, showing the tip, the hafnium electrode and the cap

An in-line desiccant filter

The BOC Smoothcut Plasma 40

Stainless 309 MIG wire

Sides clamped in place

Welding the sides from the inside

To make it easier to weld, I laid the piece down on its backbone and supported it with sawhorses. That meant I could fit the fireplace with some persuasion and tack and weld it in place.

While it was prone, I took the opportunity to lay a bead of weld in the 'V'. The difficulty of this was that it couldn't be ground out, so I'm not sure if it was such a good idea; however, it won't be readily visible once the fire is in operation.

I attached a strip, also cut from the scrap, to the front of the fireplace to

Tacking the sides. The lack of a flat plane made clamping awkward

Marking the cutout for the front

The sides and shelf welded

Cutting out the front

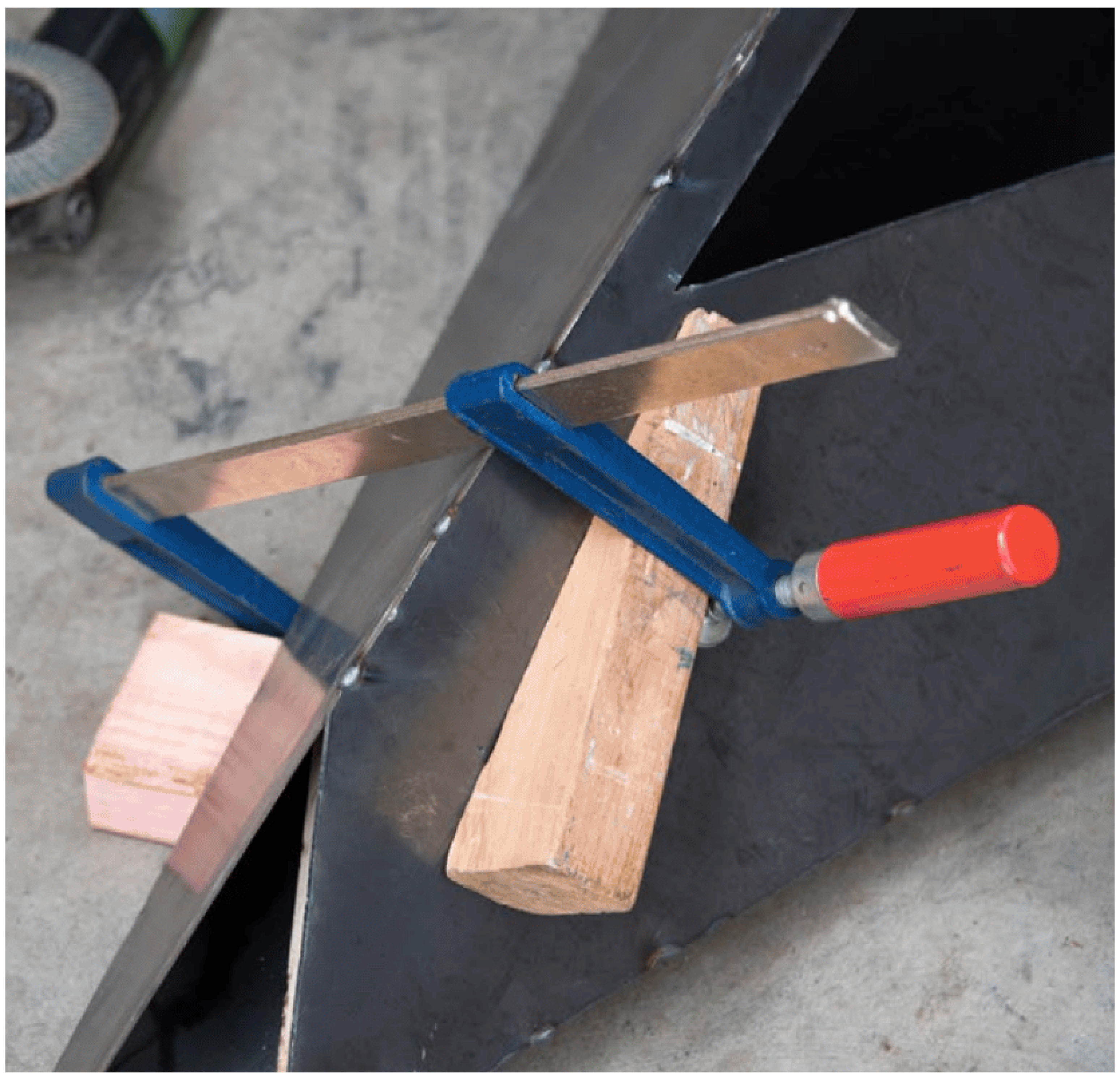
prevent embers from falling out.

With the fireplace in place, I set the piece on its feet again and fitted the front piece. This was not as straightforward as I had thought. Sheet metal has a tendency to warp, and the fireplace had caused it to bulge a little and dip in other places. I managed to get one side (the left) aligned and tacked it in place. However, the other side was not cooperating. I laid the piece down on the ground again and used a shaped piece of wood

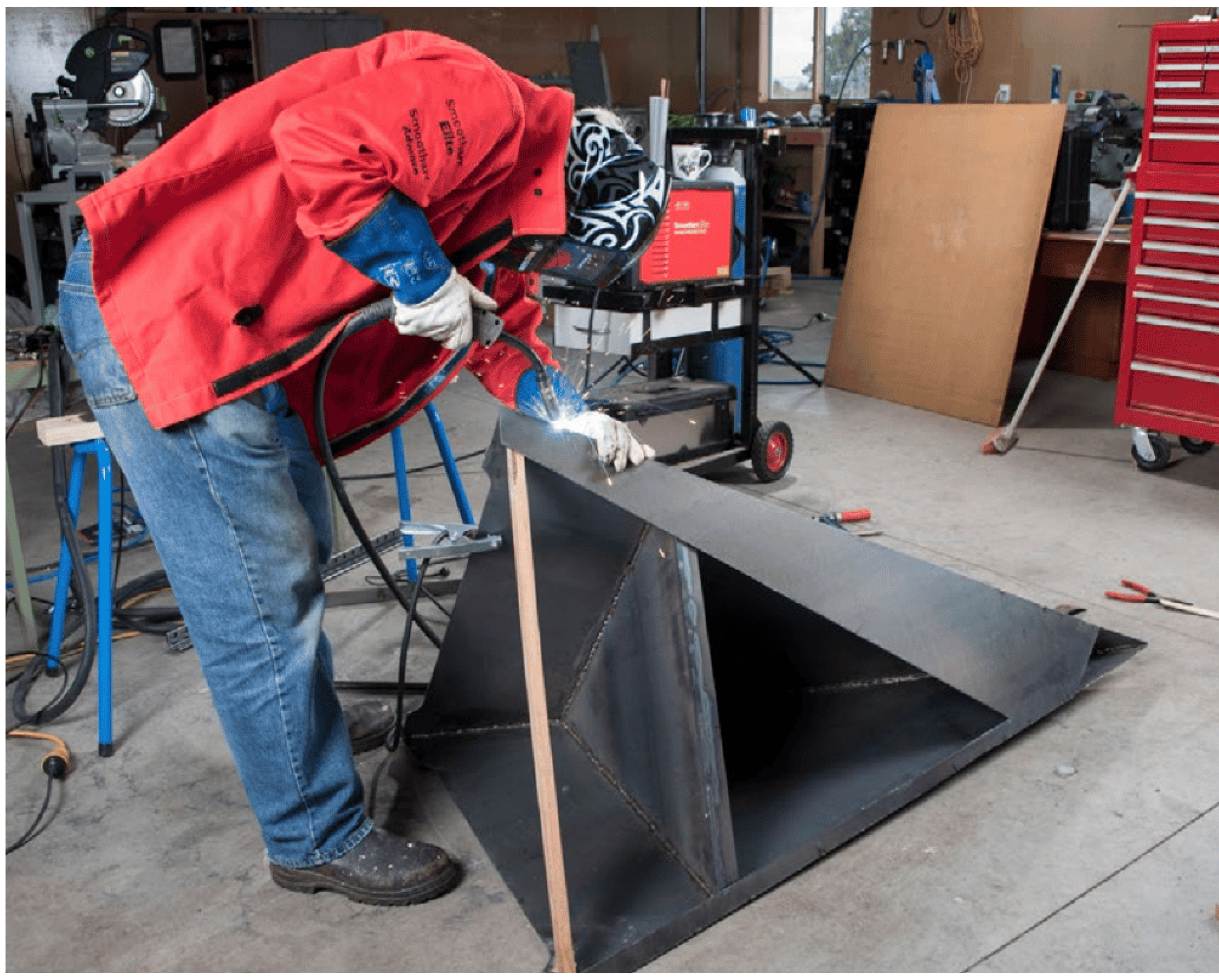
“Sheet metal has a tendency to warp, and the fireplace had caused it to bulge a little”

Tacking the shelf in place

Forcing the sides to fit



Clamp and wedge to pull the sides and front together



Shaped timber to align the sides to the front

to force the side out. It required some tricky manipulation with a clamp and a wedge to force the two pieces together long enough to apply a tack.

I also found that I had to use another shaped piece of wood, cut to 60 degrees, to get the sides in place between the tacks and at the ends.

Great rusty finish

With the sides tacked, it only remained to weld up the seams.

I found the 309 to be harder than mild steel, and I used a few flap discs until I was happy with the seams. The seams and the parts nearby had the oxides ground off them, so I expect those bits to rust first. Unfortunately, I was unable to get this project finished in time to get it to rust. There are ways to get corten to rust faster, including applying acid, salt water, etc., but none is really effective. The only way to do this is to wait, and it can take some months to get a homogeneous coating all over the piece. At first, it is often streaky and patchy, but it will eventually rust to an even colour. Using it will hasten that process, too.

Safely sited

To complete the piece, I knocked up a base from galvanised steel for the heater to sit on and filled that with rocks and gravel to help prevent it scorching the deck.

I also drilled a few 12mm holes in the base to allow air to circulate – not so many that embers could fall through, though. I was prepared to add more, but its first firing proved this was unnecessary. The fire started well and worked as intended, radiating heat both from the sides and the open fire. The added advantage to the chimenea is that its small size means it can be easily moved and repositioned on the deck or in the garden.

It's a worthwhile summer project and can be achieved in a day or two in the average workshop, not to mention being an excellent excuse to buy that plasma cutter you have always wanted.

The completed fire. When exposed to the weather, the rusty finish will appear on the surface of the chiminea within a couple of months

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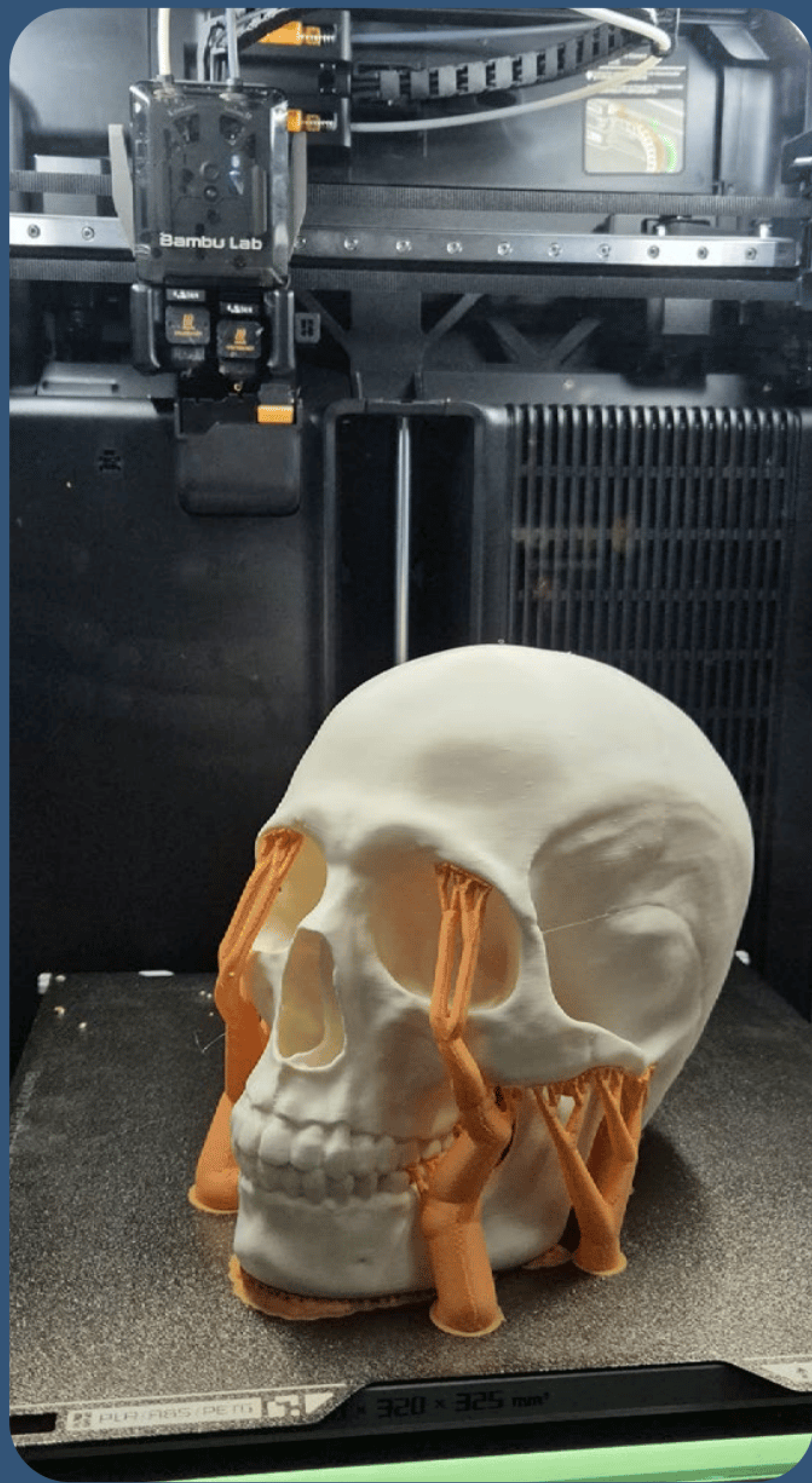

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Ayrburn Classic – breakthrough event

By Quinton Taylor | Photographs: Quinton Taylor and Jonathan Paape (Ayrburn Classic Chief Curator of Cars)

The Ayrburn Classic is a category nominee for the 2025 International Historic Motoring Awards Breakthrough Event of the Year!

This prestigious award is to be presented in London on 14 November.

The Ayrburn Classic shares some illustrious company in the other nominees – The Royal Automobile Club Concours, Concours of Slovakia, Pearl of India Rally, and Icons Mallorca – with the competition to be judged by a team of 38 international judges.

The nomination fully justifies the establishment of this unique event in New Zealand motoring circles, which takes place in the Ayrburn precinct, part of the Queenstown Lakes region.

Keen to return

We recently spoke with Dave Oshrey, the winner of the Japanese Icon section of the inaugural Ayrburn Classic, about his stunning Datsun 240Z.

"I thoroughly enjoyed being part of it," he said. "If you had told me then that there had been other Ayrburn Classics, I really would have believed you. It was so good for a first-time event!"

From the outset, Winton CEO Chris Meehan tasked his team with making the Ayrburn Classic a world-class event. At *New Zealand Classic Car* magazine, we have received comments from many entrants, the public, and industry professionals expressing their enjoyment of being part of, or spectating at, the inaugural event in 2025, its fantastic conception, and the mix of classics.

Come and join us

Chris Meehan is looking forward to the 2026 Ayrburn Classic and urges you to come along and join in the fun, with even more classics and better displays and attractions planned.

"In our quest to have the Ayrburn Classic recognised in the same realm as Goodwood and Pebble Beach, we are ever grateful for the incredible support of all our exhibitors, our sponsors and our guests. I am confident that the talented team we have put in place to run the Ayrburn Classic will put New Zealand firmly on the map at this level of classic car shows, which will be something we can all be very proud of and enjoy for many years to come. I look forward to seeing you there!" Chris said.

On top of the nomination this month comes the announcement of the amazing gesture from the Southward Car Museum, confirming it will transport its Ferrari Monza 750 from Wellington to be displayed at the 2026 Ayrburn Classic.

Joining it will be a fantastic array of classic vehicles you won't want to miss. From everyday classics that at one time were the mainstay of the New Zealand motoring scene, to examples of the very best in supercars.

Don't miss it. Come, bring the family or a classic along over 20–22 February 2026, and enjoy the fun, the atmosphere, those fabulous restaurants and food in that unique Southern Alpine setting, and, of course, see all those amazing vehicles up close.

For further information, contact marketing manager Ella James: ella.james@ayrburn.com.

Resene Paint Expert Jay Sharples shares his advice for painting in hot weather

Keeping you and your paint cool is important, so try to avoid painting in direct sunlight. Overcast conditions are best, but if a cloudless day stretches out ahead of you, a good plan of attack is to start early, ahead of the sun, and work your way around the building, keeping ahead of the sun as you go. Take a break during the hottest part of the day, for the sake of your finish as well as your health, or use that period to prep, for example sanding or priming surfaces.

Tip: Use shade protection where you can. A gazebo or large sun umbrella will help keep you and your Resene products cool, while allowing you to continue painting even in the heat of the day. Keep in mind that if the surface you're working on is dark, it will get hotter in the sun than light coloured areas. With this in mind, it is a good idea to try to do your darker areas when they are in the shade and are cooler. And if you do have to paint in direct sun, try to paint the darker areas first before they heat up. If darker areas are already very warm to touch, give them time to cool down and work on lighter coloured areas first.

Tip: Resene Hot Weather Additive will help combat the effects of scorching temperatures on your finish – add it to your Resene waterborne paint to slow down the drying process and give a longer wet edge. "Resene Hot Weather Additive really helps with the flow of the paint for a great, professional finish," says Jay. Avoid over working or overspreading the paint as this will make it dry faster and is more likely to lead to a streaky or patchy finish. Paintbrushes need to be considered when it comes to painting in hot weather. Wrap your brushes in a reusable plastic bag to keep them fresh during breaks. You can do the same with your roller and roller tray too. If you find your paint is drying too fast, which can be a common problem during hot weather, Jay suggests lightly pre-dampening your surface with water.

It's a gas

Use industrial gas for your shed projects? Chances are that you're paying ongoing cylinder rental fees whether you're using the gas or not.

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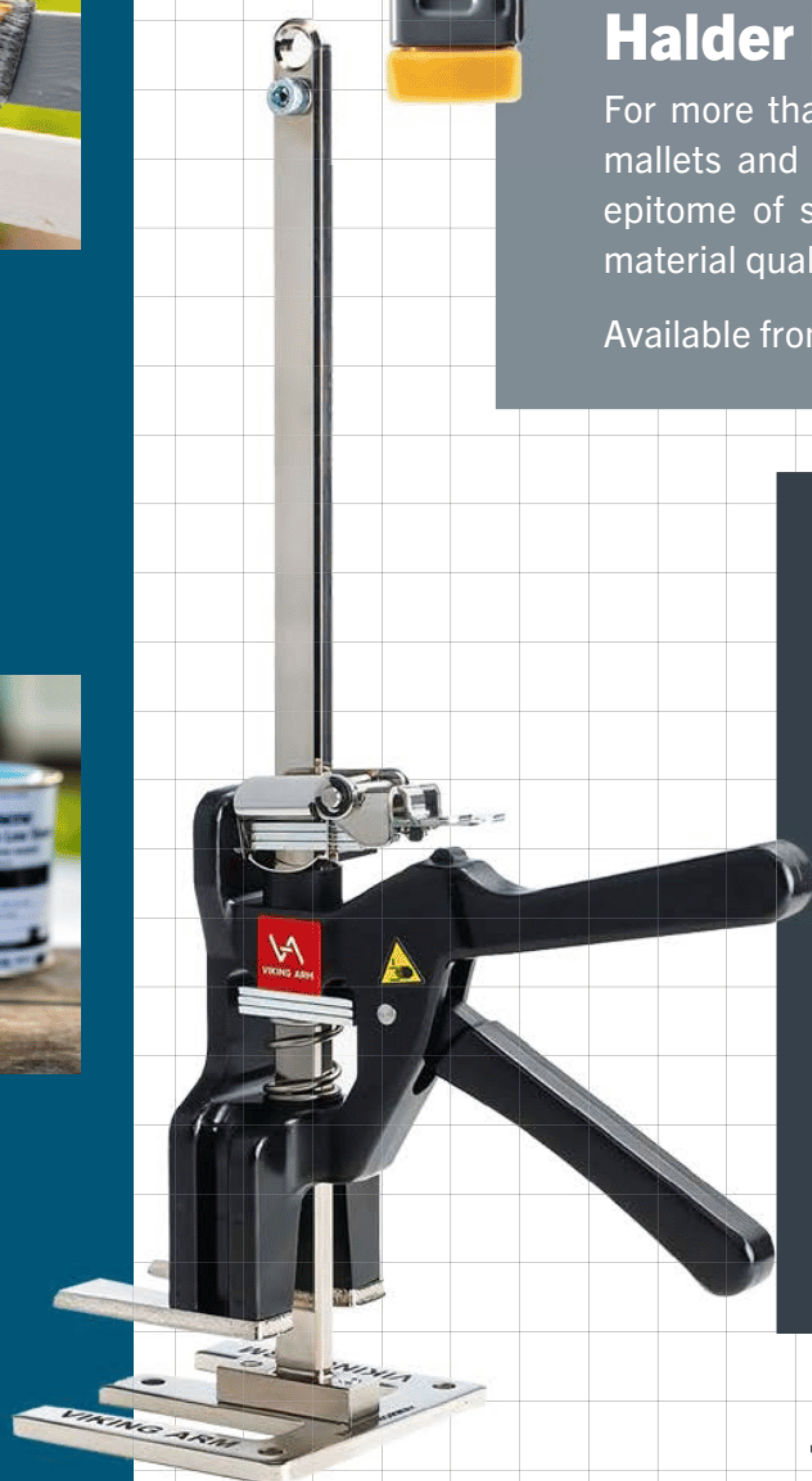

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RESTORING A TRUE ICON

Tiger Moths have a long and significant connection to New Zealand. Our featured Moth – the first one to be built here in 1941 – spent decades sitting in a shed following a crash on Great Barrier. In 2020, a dedicated group of aviation enthusiasts decided it was time to restore this historic Kiwi icon

By Chris Hegan | Photography: Chris Hegan and Ray Cutt

Wayne gives it a whirl

The bright yellow, immaculately finished biplane trundles across the sward, carving a triple trail in the dew-heavy grass. It turns onto the tarmac strip, the engine revs up flawlessly, and the de Havilland Tiger Moth NZ-751 accelerates briefly down the Ardmore aerodrome runway on its way to take to the sky for the first time in several decades. The cliché is unavoidable: this is, indeed, a historic moment.

There is no anxiety. Every nut, bolt, and wire has been inspected and tested for compliance with minute specifications, a repetitive and expensive process that has continued throughout its construction.

In spite of the obligatory plate identifying it as an 'Experimental Aircraft', this is all engineering and science. No one doubts this bird will fly, and indeed it does, lifting off smoothly and heading into the clear blue sky, where pilot and team leader Graeme 'Woodsy' Woods puts it through its paces, its airspeed so low that it would only just outpace the commuters streaming to Auckland on the Southern Motorway below.

Something of a hybrid

The new Moth will join the New Zealand

Woodsy undertaking a final pre-flight check


Fokker DR1

Warbirds Association's impressive collection of vintage aircraft, ranging from carefully preserved original planes such as the World War II Corsairs and Harvards to replicas built from plans, most notably the Fokker DR1 World War I triplane, a faithful copy of the fighter flown by the 'Red Baron', Manfred von Richthofen, and the Albatross DVa, a replica of the plane flown in the Great War by Lt Hans Böhning of Jagdstaffel 36/76 squadrons.

This DH82 Tiger Moth – DHNZ1 – is something of a hybrid – wings, tailplane, and control box are new, while the rest has been restored from original. DHNZ1 was the first of a series delivered to the Royal New Zealand Air Force (RNZAF) from the de Havilland factory in Rongotai in Wellington. It opened in 1939, first importing whole planes and parts, and then making complete aircraft. Tagged 'NZ-751' and used to train pilots, our feature Moth was released from the Air Force around 1946, became 'ZK-ATN', and flew until about 1967.

The Tiger Moth is by no means a rarity; in the '50s, almost 200 were working here in the flourishing top-dressing industry, nearly all flown by former pilots of the RNZAF, and a dozen or more restored examples are back in the air. There is even a club for them, but that doesn't diminish the scale of the achievement of Woodsy and his team. He and a small group of enthusiasts have been at this for almost five years.

The long journey

Graeme takes up the story.

"This one was owned by a guy called Edward 'Hank' Hollick, a bit of a cowboy by most accounts. He had land out on Great Barrier and used it to cart his timber out on it. It crashed one day and finished up in the water off a beach. Someone hauled it out of the water and left it. A few years later, a guy called

ZK-ATN as a topdresser (photo: National Library of New Zealand)

Ian Insley decided to put a Tiger Moth project together. He scavenged around and accumulated a lot of parts, including [via] a trip to the Barrier, where he got a few bits off the wreck. When he found out it had been DHNZ1, he decided that's what he would call his rebuilt Moth. Don't know whether he found the plate or not. He had a good airframe and a lot of parts, but he died in the '80s.

"Then an airline pilot called John McDonald ended up with it and started working with a guy called Stan Smith at North Shore airfield, a very knowledgeable de Havilland bloke, but a bit hard to get on with – I should know: I did an NAC [New Zealand National Airways Corporation] apprenticeship with him.

"Smith and McDonald fell out, but in the meantime, McDonald had had new wings, new tail feathers, and other bits made by Croydon Aircraft Company in Gore. He also had an engine fully overhauled.

"After they fell out, McDonald sold it to someone else who also died, so it sat in Stan Smith's hangar for about 30 years. I used to go up and see Stan, and around 2020, I thought it was time something was done with it. It wasn't original – they had changed a lot of

"It crashed one day and finished up in the water off a beach"

Edward Hollick's gravestone on Great Barrier Island

A perfect take-off after 60 earth-bound years

Early days – bead-blasted and painted airframe

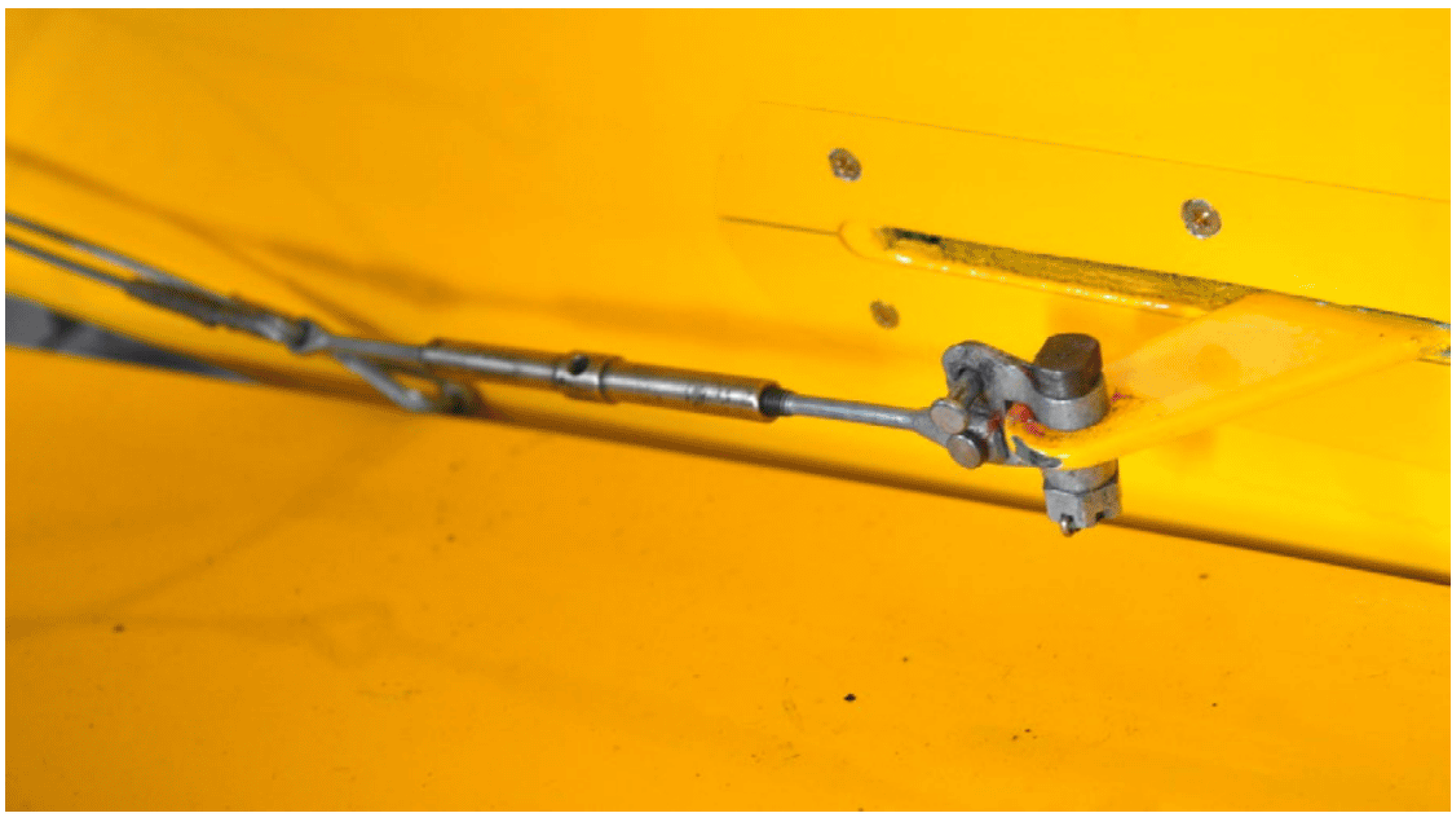
things. So a Warbirds benefactor bought it for us at a good price. We got it for $60K, although Tiger Moths peak out at $130K. If you get one completely rebuilt by Croydon, it'll cost you twice that.

It's all got to come to bits

"Although it was almost a complete aircraft, it didn't have any covering on it, and the steel frame and other metal parts had corroded.

"The tail had been sitting by the door, suffering the salt air and the Auckland climate. The engine wasn't in it. The undercarriage was in place, but a lot was in poor shape. So we took a good look and said, 'It's all got to come to bits.'

"The steel frame had rusted, though only surface corrosion, so we had that bead-blasted and painted on the same day with a two-pot EPG marine primer. Had to do it that fast because rust never sleeps. So we beat the rust and finished it off in the grey that you can see now.


Turnbuckle and thread

"They had a reputation for being easy to fly but hard to fly well"

"That's where it started. We dedicated two days a week to it – Tuesdays and Thursdays. Other times, we would be working on some part, trying to source bits. The Tiger Moth Club is pretty strong; a lot of guys have a lot of bits stowed away. I've got a fair bit stacked back there" – Graeme points to the back of the hangar – "although a lot of it's old stuff; if we can rescue it, we do. People ring me now."

The DH82 Tiger Moths, the biplane version made in their thousands, were originally supplied as trainer aircraft, first to the Royal Air Force (RAF) and later to many air forces around the world. They were ideal because they had a reputation for being easy to fly but hard to fly well. An instructor on the ground could easily pick the good pilots from the mediocre or bad.

"Yeah," agrees Graeme. "They can be tricky. And they weren't all the same. It's not like the old days. [Then,] they didn't mind if one had a bit of a bend on it – just put another ring on it or another undercarriage. Doing anything like that these days would cost you a fortune [to get it certified]."

Lots of little problems

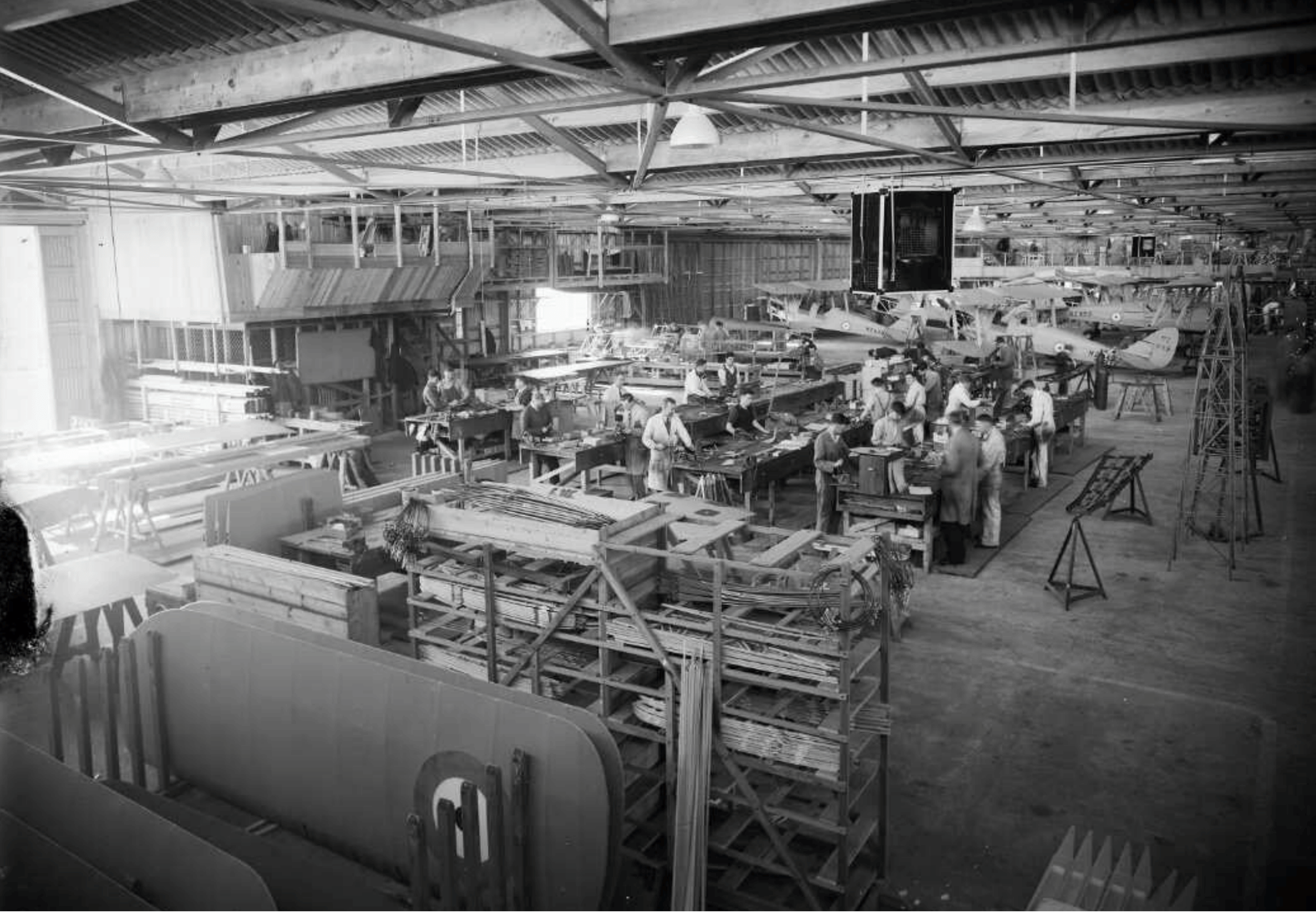
The long job now coming to an end never involved a major problem, but there were little ones aplenty.

"We always have something. Right now, we're dealing with an issue with the barrels of these turnbuckles," Graeme says.

The Moth wing structure is kept rigid, and its 'ailerons' (the hinged control surfaces located at the trailing edge of each wing) are controlled by a system of adjustable stainless-steel wires, kept tight with brass turnbuckles.

"We had it all set up, but on the final checks, we found that there was too much play in the threads," he explains.

"It's a bit of a disappointment for



Rongotai de Havilland factory (photo: National Library of New Zealand)

me," offers Ray Cutt, a machinist who describes himself as a "semi-toolmaker", "because I made eight of them."

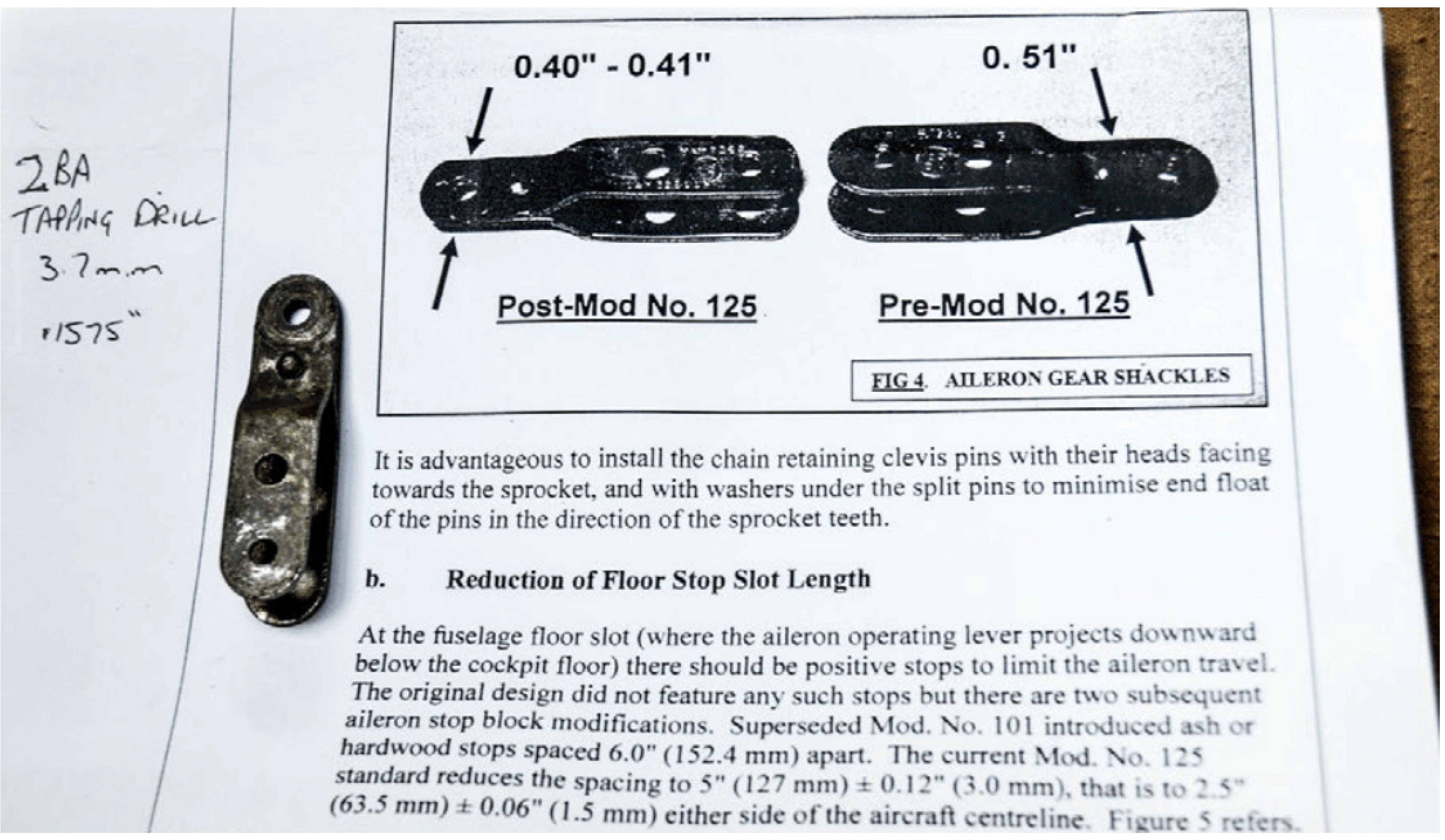
The problem was in the taps used to cut the threads: "It's a left-hand 2BA tap – a rare thread. We didn't think anything of it until the guys came in to check it. Now we're scrabbling to make some more. I've got some new ones coming.

"I give the turnbuckle a wiggle. The thread only just moves in the barrel; in a car, it wouldn't be a bother, but aviation standards are at another level. It would probably be safe, but 'probably' is no good in a plane made of steel, wood, wire, and fabric that might be doing a loop."

"You don't want to lose your rudder," adds Graeme. "You'd see Mother Earth coming at you for the last time. Without a rudder, these planes would probably spin."

Seemingly trivial issue

They are also dealing with another seemingly trivial issue with possible serious consequences. ▶



2BA
TAPPING DRILL
3.7mm
.1575"

0.40" - 0.41"
0. 51"
Post-Mod No. 125
Pre-Mod No. 125
FIG 4. AILERON GEAR SHACKLES

It is advantageous to install the chain retaining clevis pins with their heads facing towards the sprocket, and with washers under the split pins to minimise end float of the pins in the direction of the sprocket teeth.

b. Reduction of Floor Stop Slot Length

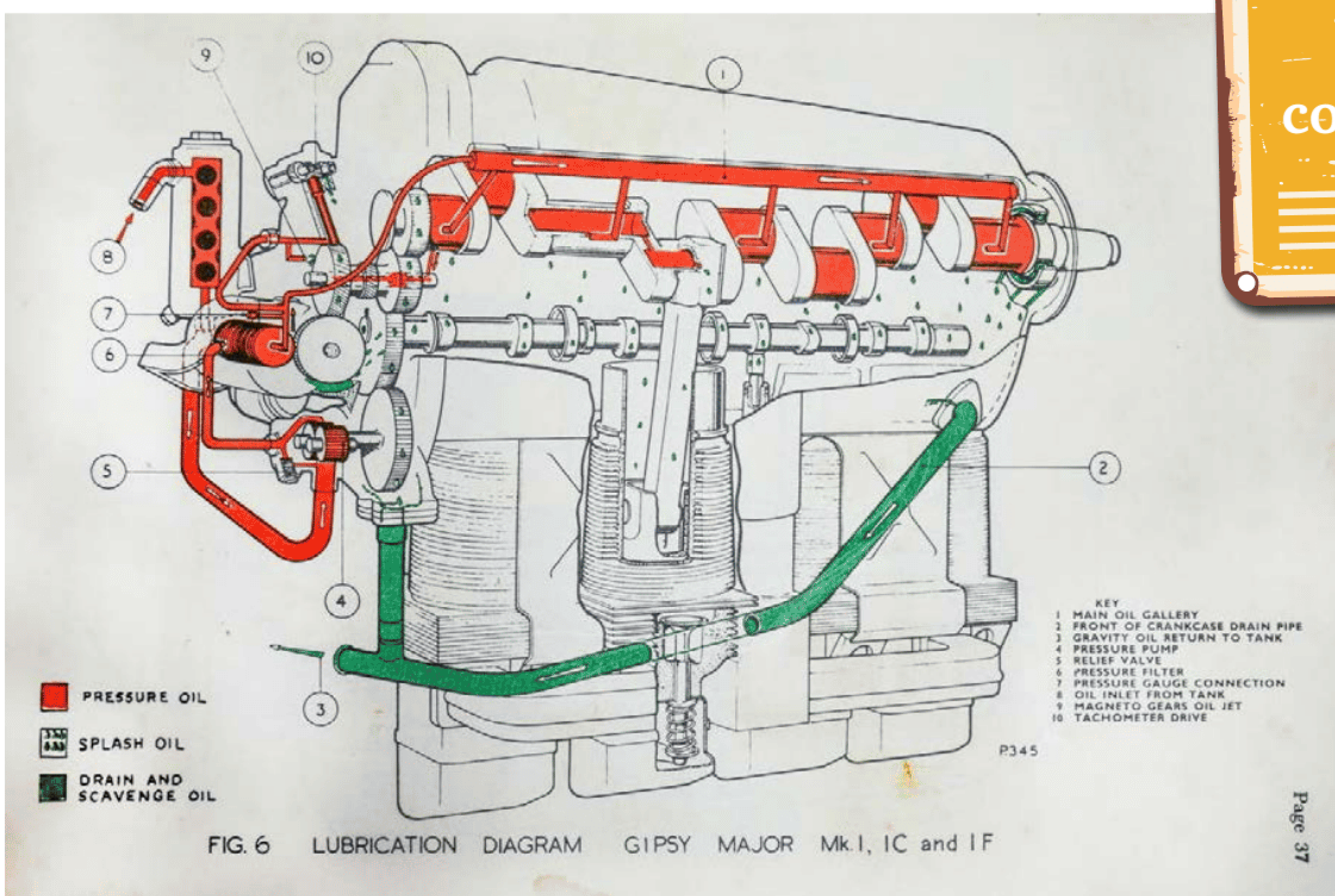
At the fuselage floor slot (where the aileron operating lever projects downward below the cockpit floor) there should be positive stops to limit the aileron travel. The original design did not feature any such stops but there are two subsequent aileron stop block modifications. Superseded Mod. No. 101 introduced ash or hardwood stops spaced 6.0" (152.4 mm) apart. The current Mod. No. 125 standard reduces the spacing to 5" (127 mm) ± 0.12" (3.0 mm), that is to 2.5" (63.5 mm) ± 0.06" (1.5 mm) either side of the aircraft centreline. Figure 5 refers.

Shackle mod – a fine distinction

GPS – the sole external variation (Boeing Stearman in the background)

Original de Havilland DH 71

"The plane sports a new coat of brilliant yellow paint, a colour I have noticed seems to be common on Tiger Moths"



Oiling upside down

Gipsy Major engine – good for hundreds of hours of flying

"See this shackle here," indicates Ray. "This works the ailerons. They've got to be taken down about 40 thou' on each side. It's an 'AD' – an Airworthiness Directive – which came about because the aileron control chain and cable, which runs through the ring and out to the connector here, used to snag on one of the ribs. So you had to put a plate over it, and they found that this then snagged on the plate. These are original metal parts, pre the AD, so they have to be machined down to meet the new spec.

"That AD came out about 20 years ago, but this plane's been sitting around for 60 years, so it never got done. When we've done the work, we'll bead-blast it, paint it, and set them up."

The plane sports a new coat of brilliant yellow paint, a colour I have noticed seems to be common on Tiger Moths.

"That's the trainer colour for the Air Force," says Graeme. With the red, white, and blue on the tail; the RAF roundel on the fuselage; and the call sign 'NZ-751', the Warbirds' Moth will be restored as much as possible to the state of its deployment as the first NZRAF acquisition from the Rongotai works.

New walkway

Headbanger

"The whole idea is to make it exactly as it came out of Rongotai in 1941," Graeme explains. "OK, it's got some modern stuff under cover – you wouldn't realise it, but there are three radios in there – ELT, VHF, ADSB transponder – all hidden away to make it original."

The only externally visible variation will be the small, white bubble of a GPS receiver on top of the fuselage behind the cockpit.

Peculiar engine

Time to take a look at the engine.

A peculiarity of Tiger Moths is that the vertical piston engine is set upside down, with the heads on the bottom and the oil sump on the top, which necessitates an oil pump to replace the normal action of gravity and the piston rings.

When the plane was first designed in 1927, it was as a single-winged high-speed air racer on which the cylinders poked out of the top of the forward fuselage, severely restricting the pilot's view; the subsequent Gipsy Moths had the same configuration.

Someone had the bright idea of fitting the engine upside down. At the same time, the top wing was moved forward to ease access to the front cockpit, and the phenomenally successful Tiger Moth was born. De Havilland set up factories around the world, and they were made in their thousands.

Instrument panel

The engine on the Warbirds' plane probably dates back to the war, but it has been completely overhauled and is now rated at zero hours.

"They're rated for 1500 hours before needing another overhaul," says Graeme, "but you wouldn't get that out of it without work. Around 700 hours, we'll have to take the head off and do the valves and pistons. It's a fairly simple job."

Looking brand new

Looking over the body of the plane, pretty much every part looks brand new.

"Every nut and bolt, somebody's worked on it," says Graeme. "Look at these" – he points to the walkways on the wings – "we had a guy, Les Lewis, he's an old top-dressing pilot. He made those, and we just painted them up.

"A mate of mine called Neville Hay did all the instruments. He had been chief pilot for Air New Zealand, but he started as an apprentice, so I knew him pretty well. We flew together. He did a lot of his time on instrument panels at the old TEAL [Tasman Empire Airways Limited], so he did a complete rebuild of both panels." Minor blemishes aside, the panels look as if they have just rolled out of the factory.

Ray shows me a tattered old piece of upholstery.

"That's the original headbanger," he

explains, "and that's what we had to work from. I made the wooden frame and everything else, and I got my partner's niece, who works at a custom car shop, to do all the leatherwork. So that's what we ended up with." It is as immaculate as you would see on a top-of-the-line custom hot rod.

"Rob McNeill, who has a 20-year-old Moth that's absolutely immaculate"

Fabric-covered wings

As with most aircraft of its era, the Tiger Moth's body, wings, and tail are made of a fabric stretched over a frame, but the days of doped cotton or linen are long gone.

The team used materials supplied by an American company called 'Stewart Systems', which supplied the fabric and the paint.

The fabric is a special polyfibre that, unlike with the doping system, is not 'tautened' (made tight, stiff, or stretched taut) by the application of liquid but is a heat-shrink material called 'Ceconite'.

"We painted the inner side of the fabric before we put it on," Graeme says. "Then we painted the frame with glue and applied the fabric. The glue is also heat-set, so we fixed that by running the iron over it. The external paint is a three-part system, all water-based, and you iron that to bring it up to tension. You have to be very careful, but it all worked. We're very happy."

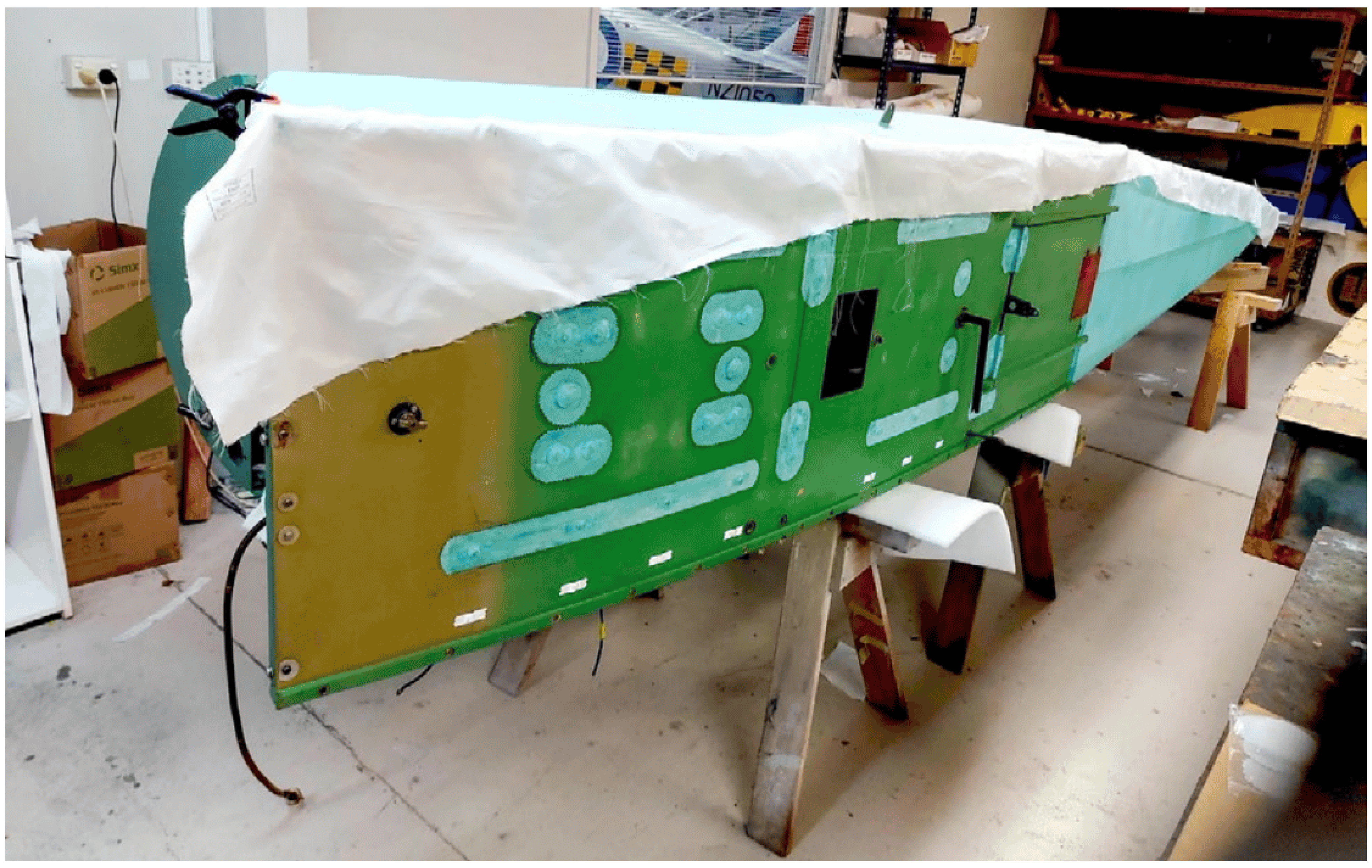
"We" being a core group of four – Graeme; Ray Cutt; Ken Birch, who did most of the painting; and Mike Watson, who did a lot of the engine work.

Skills aplenty

The core group has worked consistently throughout the project, but there has been no shortage of special knowledge or skills from others when these were required.

"There's a guy called Rob McNeill," Graeme says, "who has a 20-year-old Moth that's absolutely immaculate. He's come by and given us a few clues, and as part of the certification, we've had three different guys go through the whole thing, check every nut and bolt. Everything has to be spot on." ▶

The old boys



First fitting of fabric on fuselage

Completed detailed fabric covering of the left side of the fuselage

Want to put together your own Tiger Moth? It's ... possible

The Tiger Moth has to be New Zealand's most iconic aeroplane.

Anyone over the age of 70 will remember having seen at least one in the air spreading superphosphate during their childhood, and for sheer numbers, they outstrip any other aircraft made in New Zealand.

Parts of them are still scattered in nooks and crannies throughout the country. Two complete engines strapped to a pallet in the Warbirds' vintage plane hangar were found after sitting in a shed in Murupara for 60 years.

"It's amazing what turns up," says Graeme.

"See that case there – that's from an engine I pulled from under a house in Opotiki once. The Tiger Moth Club was down there on a fly-in, and this guy rang us up and told us a plane had crashed 50 or 60 years ago, and his father had recovered the engine and stuck it under the house. The thing was still there. Had good bits on it. There are always some parts you can use."

So much for parts, but someone has to know what they are doing. By the time the plane is built, it will be too late to start inspections, with so many tiny pieces all having to be correctly specified and installed.

"You'd have to have at least one certified aircraft engineer on the job," says Graeme – and immaculate record-keeping.

Of course, you could just buy one, either on the busy international market or, as Graeme pointed out, the Croydon Aircraft Company will do you an entire rebuild, but owning it is just the start. Hangaring at Ardmore costs $800 a month, and maintenance is never-ending. For this reason, most vintage aircraft are owned by syndicates. It is no mean undertaking, but there is a gateway. The Tiger Moth Club of New Zealand currently has around 200 members owning more than 30 planes; a recent event included five Tigers and one Gipsy. With connections to its UK counterpart, the club constitutes a deep resource of information, expertise and parts.

Putting a Tiger Moth together is an undertaking well worth the thousands of hours of work involved; watching NZ-751 crawling through the sky was like stepping back in time.

The magic awaits.

A head start

Sixty years in a shed

Got an old one? Make a new one

Custom-made seat-base toolbox

Two grand's worth of chrome

The smile says it all

"Reg Field had a big Lotto win – he won $26m"

The seats have been modified by Frank Parker, the Warbirds president, who made wooden boxes for tools and useful items that fit in the space that used to be occupied by the parachute, which the pilot used to sit on.

The consistent rule seems to be that what can't be done as a donation by volunteers is extremely expensive.

"You see the frame around the windows?" Graeme points out. "They're chromed, the top of the doors are chromed, and the venturis, there on the side. Those few bits cost $2200.

"We could have nickel-plated them, but we had a bit of money thanks to a benefactor. Reg Field had a big Lotto win – he won $26M when he was 80 years old. He became very interested in the World War I stuff. He also paid for the Fokker and Albatross replicas."

Keeping it original

They have taken care to keep everything as original as possible, even down to the nuts and bolts.

"A lot of this we could have replaced with American hardware made to the AN standard," says Graeme. "But everywhere possible, we have used the British standards – 2BA and Whitworth. We were looking for some for the wheel covers and I found some at home.

"See that elbow there? It's got a hole that has to be a certain size. What used to happen is when the engine got a bit tired, a bit of oil would drain down, and it would sometimes block that hole. Then the guys would drill it out. That's all it took for that hole to be too big, and the number-four cylinder would run too rich. Simple things like that you have to figure out.

"Actually, that solution came from Jimmy Lawson, 93 years old and still working pretty much full time for Aero Technology, the aircraft maintenance outfit. He's an expert on these things, a world authority. He rebuilt the magnetos and the carburettor and gave us lots of advice.

"Avspecs, the people who rebuilt the Mosquito, they've got a heap of old British stuff; they've helped us a lot. They had rear bolts that we needed. You can get them from England, but you get one small bolt and it costs you a hundred bucks. Just for one bolt, because it's got a British thread, it'll be high tensile, and you've got to have it. You might be able to make it yourself, but it's not approved; it has to be stamped 'Marked for aviation use'.

"It's so expensive – see that tyre there? $2K. That pair there – $1500. They only fit on the de Havilland Moth series. And after Covid, everything doubled in price."

The moment of truth

A few weeks later, I got the phone call. "We're going to have a crack at flying it tomorrow. You coming?"

Am I what!

With 10 gallons of gas in the tank, Woodsy had planned to spend half an hour on the first flight, but Wayne Thomas, who has his own Moth, and I spent more than 45 minutes gazing into the endless blue before NZ-751 came in for a perfect touchdown and taxied back to the hangar.

"She's a bit tail-heavy," comments Woodsy, perhaps trying to maintain test-pilot gravity, "we'll need to have a look at the trim."

But the grin on his face says it all. Job done.


The bike a couple of months ago; starting to take shape

RESTORING A 1952 AJS

Part 7

MORE SUSPENSION RESTORATION, RIMS AND SPOKES, PETROL TANK, AND THE TIME HAS ARRIVED TO ATTEMPT TO START THE ENGINE

Peter realises less haste is called for, although keen to complete the restoration. Feeling as though he's playing a game of Snakes and Ladders, with snakes appearing at almost every turn, it's definitely time for reflection

By Peter Barton | Photographs: Peter Barton


The rear end out of storage almost three years ago. Not the proper suspension


A box of rear suspension parts to refurbish and put together


Two front suspension cans and two rear; dents filled with brass and soon to be plated

> "As usual, this seems to be a game of Snakes and Ladders, but with way too many snakes"


A 'Jampot' unit, almost finished. The slightly rusty ring towards the right has to screw up into the plated can against the force of the main spring. The unit has to stretch


The front suspension cans. One plated and the other getting ready

I've continued rebuilding my old motorbike, which I had stored away – mainly in pieces – for about 50 years.

If you have read my previous articles, you will know that the bike is a bitzer. Parts vary from Matchless 350 items to those from an AJS 500, and the years between 1947 and at least 1956. But I call it a '1952 AJS, model 18S'. I've rebuilt the bike so far using mostly rebuilt and repainted/bogged parts, and electroplated some using my nickel-plating methods.

My budget is very limited, and keeping in mind that this bitzer will certainly never be a concours example of the marque (1952 AJS by AMC), I'm having to keep spending on newly bought parts to a minimum. Chromium plating is not an option, so I'm doing my own nickel plating.

Earlier articles give some details of how I plated various bits, including suspension parts, and then how I started reassembling the 'Jampots' and Teledraulics with their springs and damper systems. This article continues their story, along with other things. As usual, this seems to be a game of Snakes and Ladders, but with way too many snakes.

Joining the Jampot club

When the bike was on the road in the last century, it did not have the proper, original Jampots (named for their looks) – rear suspension.

How could I, without guilt, join the Jampot club if my bike did not carry them? But I did have boxes of old spare parts, including those for the correct suspension. Cleaning, nickel plating, filling, and painting done; my last article mentioned that my existing, crucial, oil seals (within the dampers) seem good. Time will tell.

However, some new parts were needed. I bought some new leather washers, which go at each end of the main springs inside the Jampots. Also, rubber bushes, which fit in the pivots and attach the rear suspension system between the frame and swing arm.

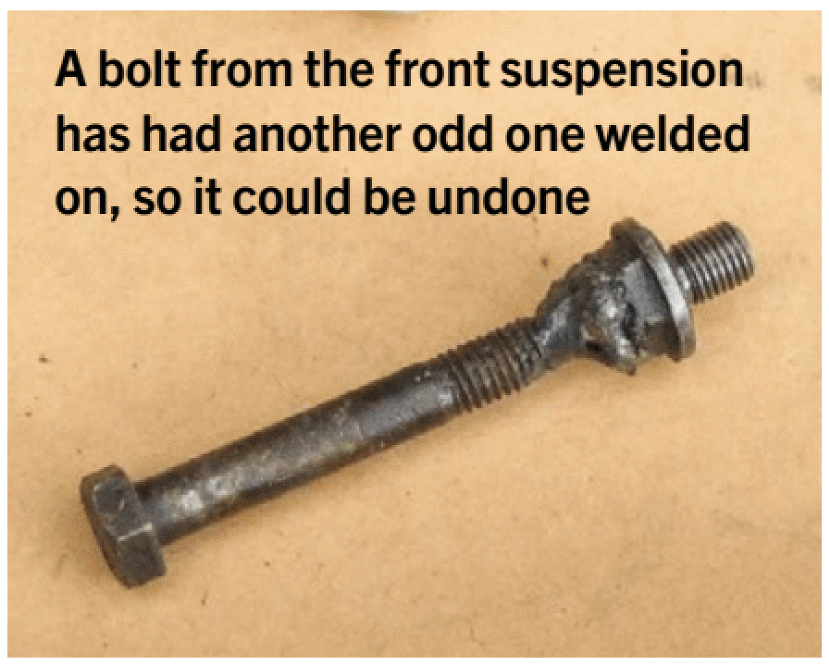
With the leathers in place, I could tighten up the threaded unions (after adding oil to the damper cylinder). Care was needed to ensure that the pivots did not distort during tightening. The home-built clamps, for gripping the soft alloy tubes during tightening, worked well; a much better approach than that used by a previous owner (maybe he/she had a pipe wrench?), which left scars. ▶

The car jack makes the two hinged four-by-twos spread apart, thereby stretching the Jampot so the ring can be screwed on using my pin wrench

Rear suspension cans. Both plated to look OK from a distance

“A much better approach than that used by a previous owner”

Wooden clamps can grip the tubes so they can be screwed into each other



A bolt from the front suspension has had another odd one welded on, so it could be undone

The little welded bolt once fitted into the central recessed hole in the wheel leg. Not much room for a socket to fit, and the socket had to be Whitworth with thin walls

Front Teledraulic suspension parts laid out just waiting for a bit or two of leather

Fitting the lower cam

For each Jampot, I needed to fit the lower, nickel-plated can in place over the bottom of the main spring.

For my ones, the can is held there by a threaded collar (some models use a circlip) which has to be tightened using a pin wrench; I made one. To get the collar started on its thread, either the main spring has to be compressed, or the Jampot system stretched (against a smaller internal spring). I used the second approach, with a car jack and two hinged 100x50 timbers.

An observant reader will have noticed that the threaded collar is not plated nor is it painted. It has had an oily wipe. I am a bit impatient to get the bike on the road and to write about new things for these articles. Now that I have made my special tools, and I am not relying upon the bike for transport, I can return to these smaller items later. “Done once and done right” has sort of gone out the window as far as appearance goes. (Read on about the wheel rims.) I would like to have some kind of inner, Zen calm rather than impatience, but time is pressing.

Jampots onto the bike: done.

The front forks

I also needed to purchase some parts for the front suspension.

Front wheel, full-width hub (alloy) with rusty steel rim and galvanised spokes

Close up of the front hub: new oil seals recommended

Rear wheel without the brake drum and speedometer gears. Much rust

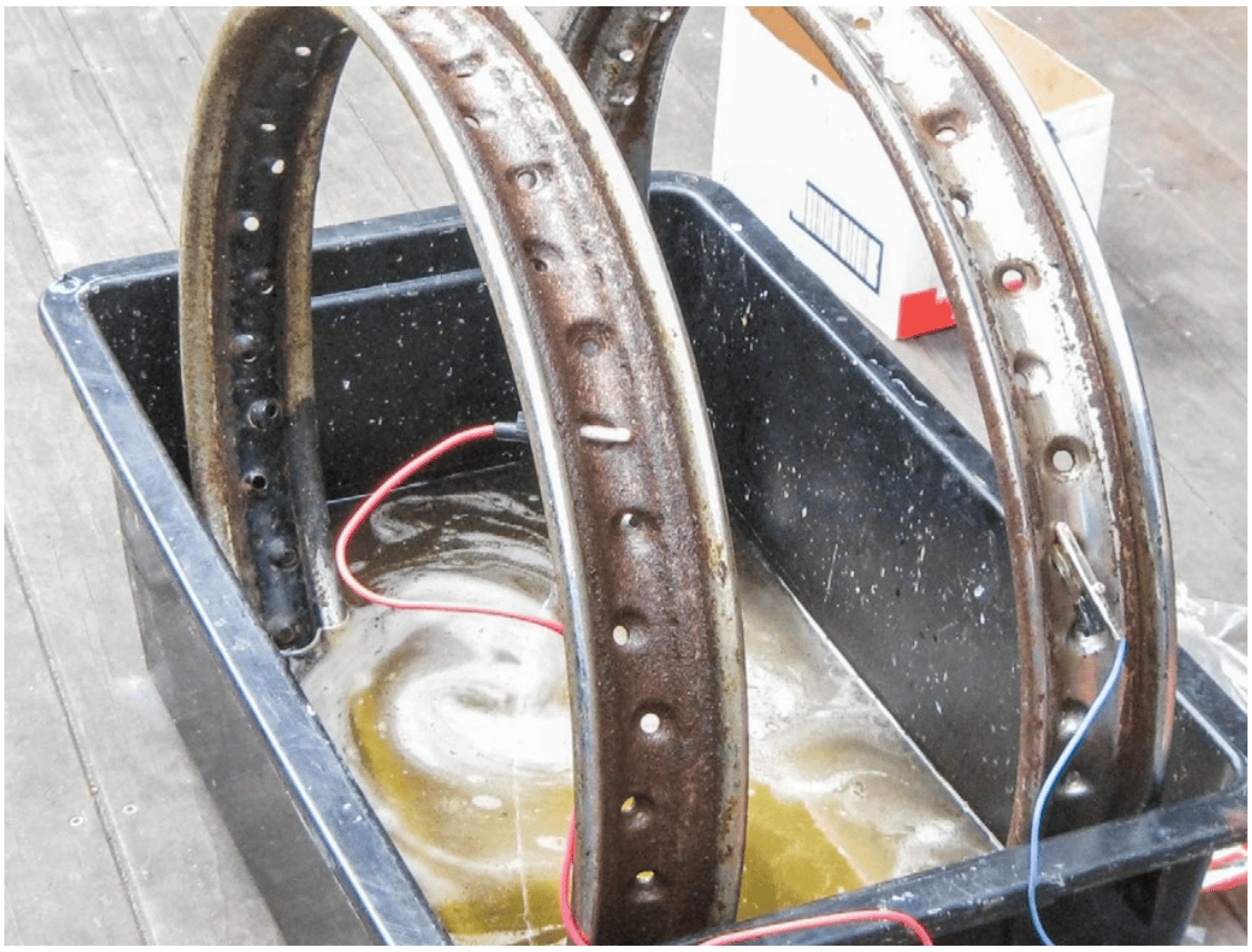
Again, leather washers are required to sit at each end of the two main springs – these are now on order. The front forks also need headlamp holder tubes, which fit, one on each side, between the top and bottom yokes. I bought second-hand ones, which I sanded down and painted. They had narrow, plated-but-rusty rings top and bottom, which I popped off, sanded, and nickel plated.

I wanted to check on the condition of the innards of each fork. Luckily, when I dismantled them, they both still had some oil in them; each stanchion tube was clean, smooth, and shiny in the zone where the oil seal would operate, and each oil seal looked and felt good.

To get each leg of the front Teledraulic system apart, I had to undo a recessed bolt (Whitworth; a narrow-walled socket was required), which is found at the bottom of the leg once the wheel and axle are removed. I had to grind down a socket to fit into the recess. It worked OK on the first bolt, but it split on the second, which wouldn't move. To get the second bolt out, I found I could just reach in with an old, surplus bolt plus a welding electrode and arc weld it onto the head of the stubborn item. Now a decent socket will fit onto this temporary extension. Where there's a will, there's a way.

My previous article goes into other aspects of the front suspension rebuild, such as alloy repair, plating, etc.

As mentioned, I am waiting for the leather washers for the front Teledraulics.



Electrolytic cleaning in washing soda (sodium carbonate, from a swimming pool supplies shop) to remove chromium and some rust

Genuine British leather all the way from England, I hope. Then the Teledraulics can be installed.

The wheels

Now the wheels.

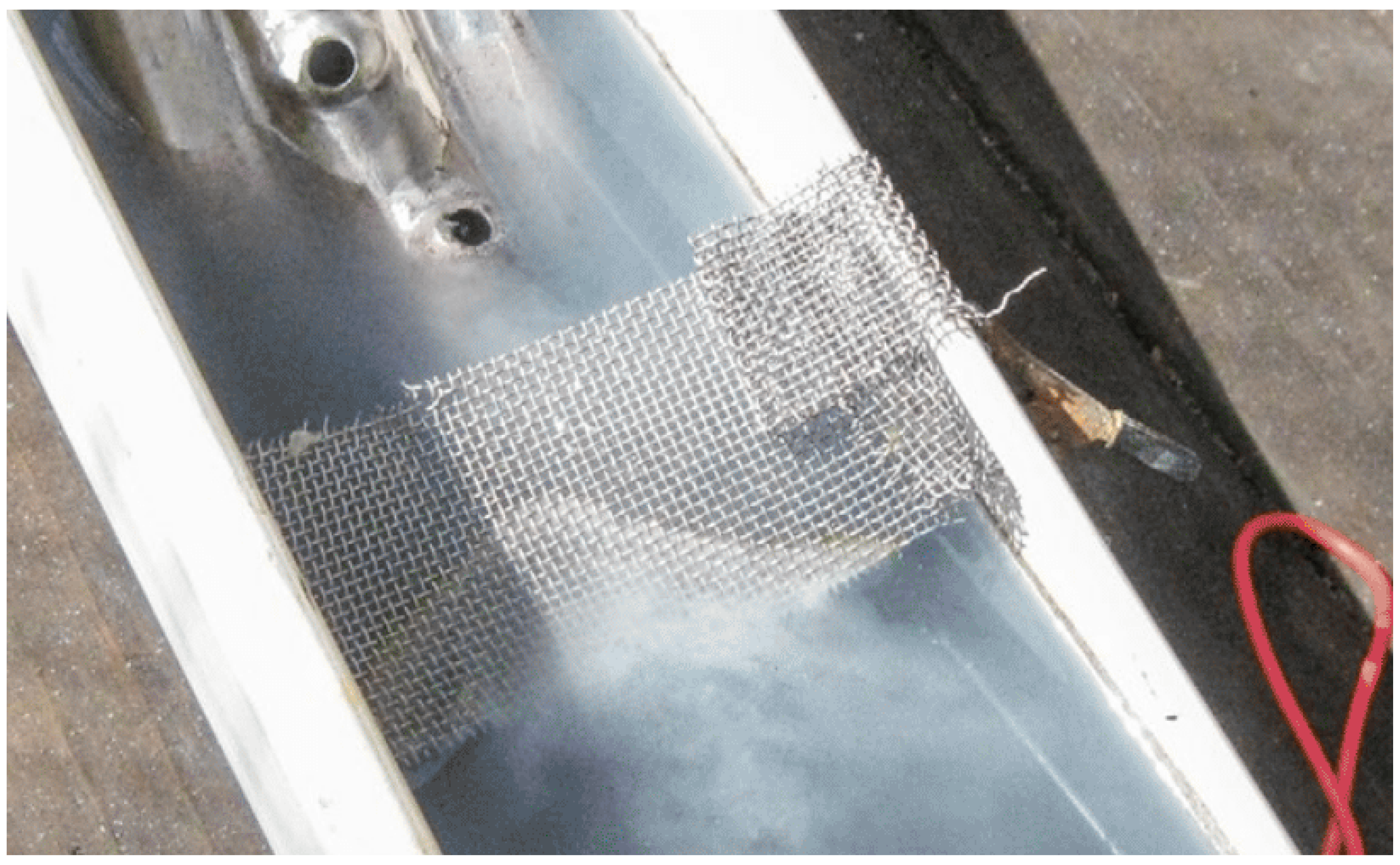
Several snakes in this part of the game. I have six wheels to choose from; all 19 inch and all rusty rimmed to varying degrees. Only one of the front wheels has a full-width alloy hub, being a bit more modern. This will be used for its better braking ability: the bike is a bitzer anyway. It was the one used on the machine 50 years ago, but I do remember that the bike had a bad judder when travelling only very slightly faster than the speed limit. I have faith that with conscientious spoke lacing, tensioning, and balancing of this front wheel, there will be no judder. We'll see.

Likewise, the rear hub, which was then in use, seems the best. However, all the rims are identical dimensions and spoke-holes, as far as I can see, and so I de-spoked the three best wheels. I checked them on a plane table; no warping, no problems?

Time for replating hubs, spokes, and rims. ▶

The larger rust patches were savagely dealt with; see the utensils. I show the guttering I used in different stages.

I wire brushed the inside of the rims and painted them with rust converter/primer



Stainless-steel anode, dilute sulphuric acid, and negative wheel rim (just visible) in cleaning, ready for a plating attempt

Left: Plating – the rim is negative; Watts' bright nickel–plating electrolyte solution. The rim came out looking good, but there were problems.
Right: Copper plating on a rim, looking sick, sunburnt, and peeling

Cleaning

For the first rim, I used an electrolytic method to remove chromium: rim as anode, sodium carbonate solution as electrolyte, and stainless-steel cathode, as mentioned in previous articles.

Eye protection in all these processes is most important; rubber gloves should be worn. The electrolyte becomes loaded with yellow chromium salts, and these are nasty and carcinogenic: eventually, I'll evaporate the electrolyte to dryness and seal the sludge in a plastic bag before disposal.

A steel-wire cup-brush on a small angle grinder to clean up further. So far, so good.

To get rid of more rust, I used a six per cent citric acid solution (citric acid from the baking section of the supermarket) with soaking and scrubbing. Then sanding. Sand blasting would have been better – no scratching. But I don't have the gear. I thought that the later, thick copper-plating part of the process would take care of that.

Nickel plating a rim

I started a nickel-plating process by anode cleaning the rim, by using a six per cent caustic soda (sodium hydroxide) solution and a stainless-steel cathode.

That went as I expected. I had a decent-sized trough that the rims could fit into, and plenty of caustic soda.

A short length of sloped plastic roof guttering, with one end stopped, was just big enough to fit the rim standing up, and have the precious nickel electrolyte covering a small part. The rim was connected to the negative of the power supply, and a shaped nickel tape (anode) to the positive. I didn't heat up the nickel solution (I tested the guttering to see if it could handle boiling water: it softened too much) – a big mistake as it turned out. Every couple of minutes, I rotated the rim by one spoke space, and the new plating looked good.

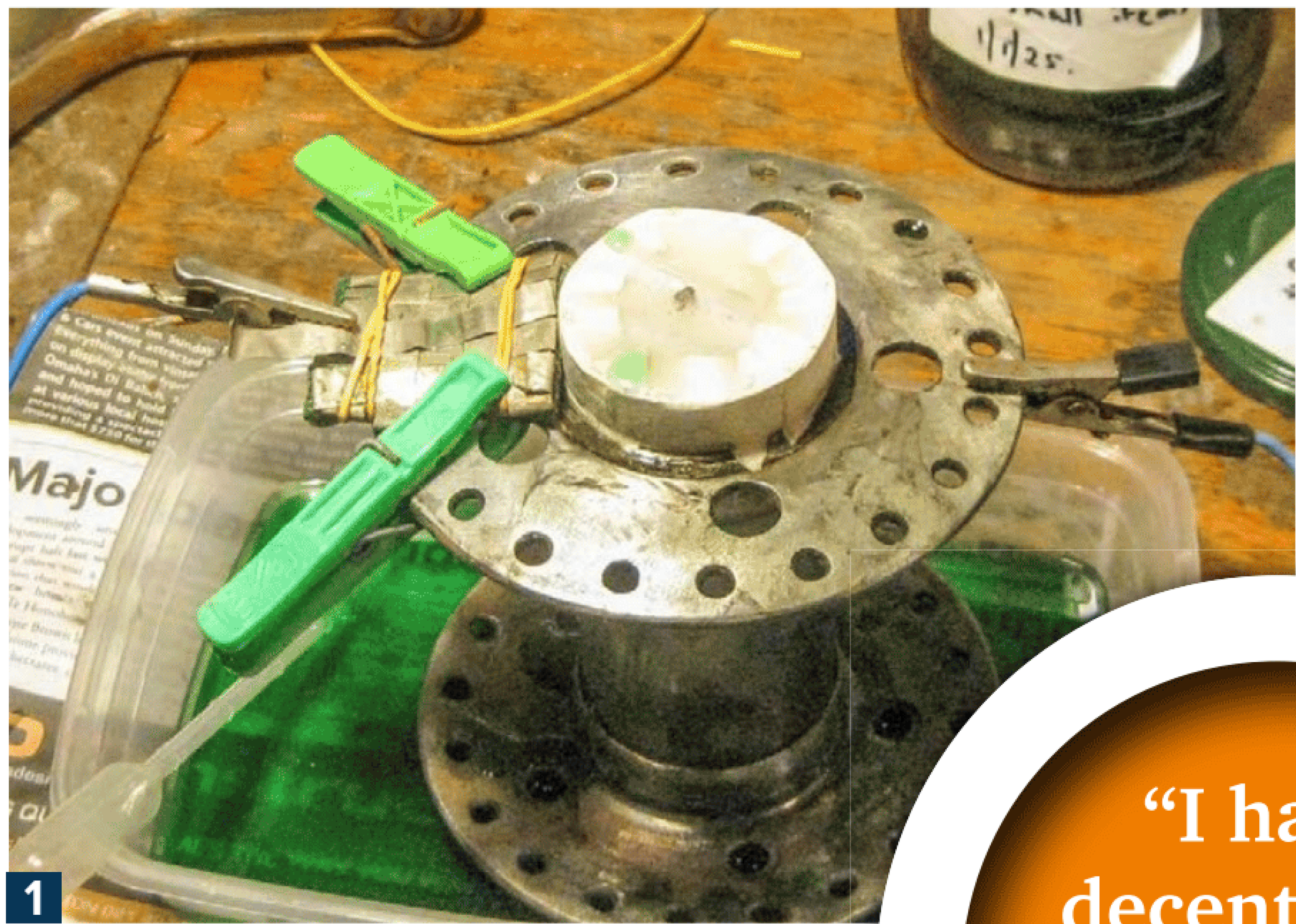
To finish, I rinsed the rim with (first) cold water – collecting the rinsing, of course – and then boiling water.

Copper plating

The next step was the copper plating. Much the same process as the nickel, but copper as the anode and 'acid copper' as the electrolyte. It seemed to work well at the time, but later on it peeled like bad sunburn – another snake.

I had much the same problem with the steel hub for the back wheel: the first nickel seemed OK, but the copper peeled off again. Snake.

I sanded off the copper (and probably some nickel) with fine 1200-grit wet-and-dry paper, and then repeated the nickel plating. Likewise for the rim. This time I used a preparation step, which had six per cent sulphuric acid electrolyte, the piece as cathode, and



1

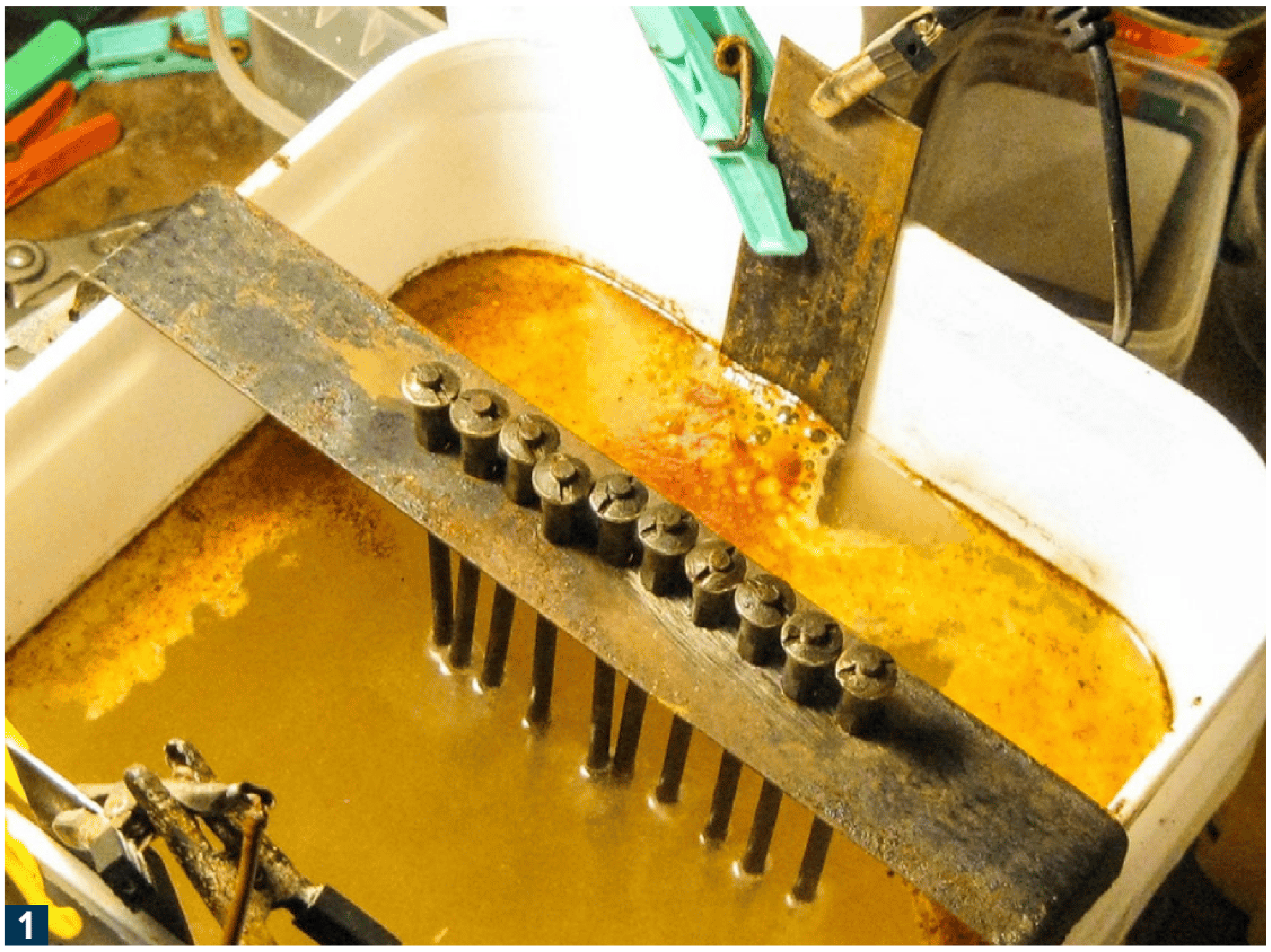
2

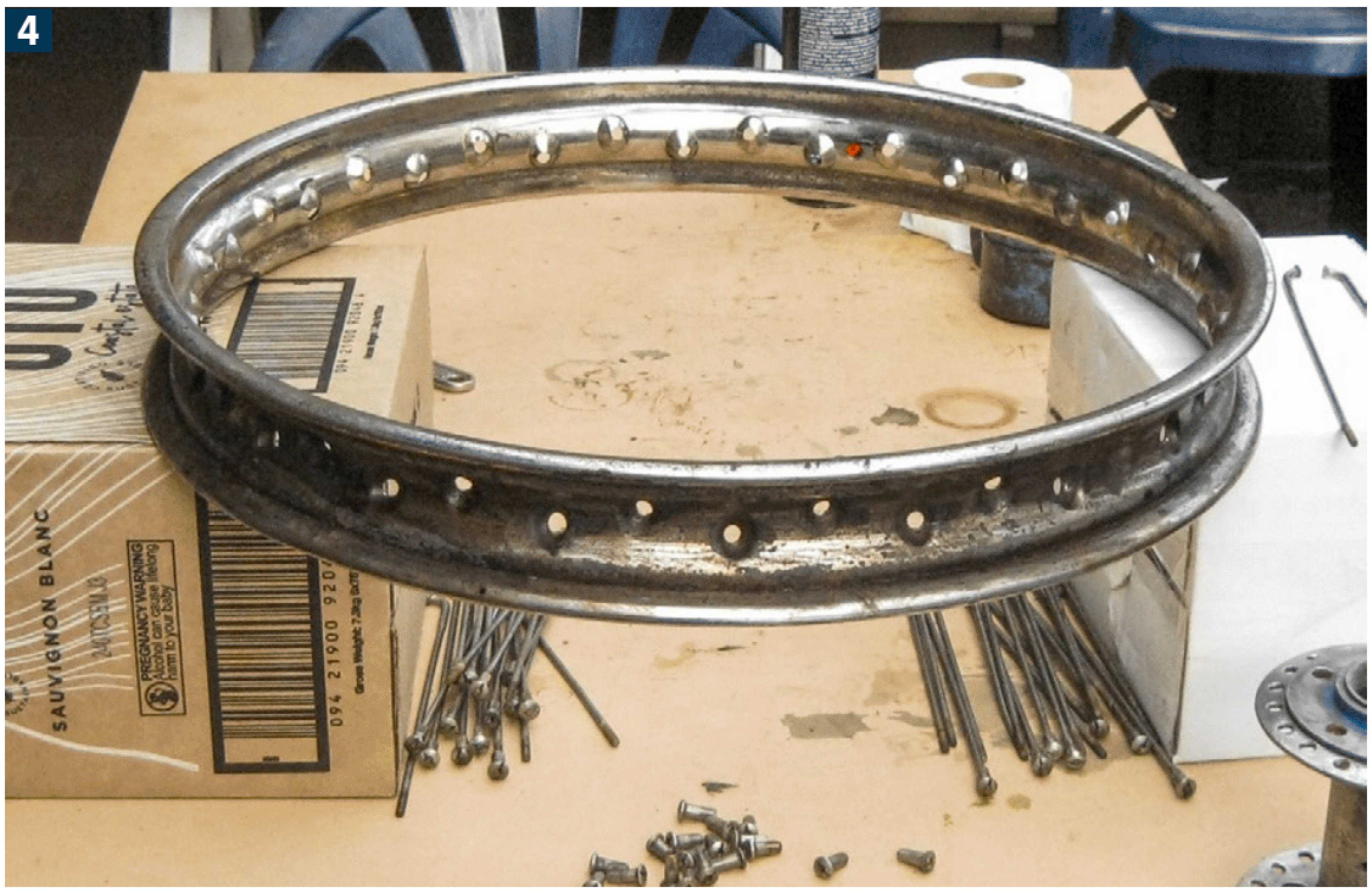
"I had a decent-sized trough that the rims could fit into"

3

4

1. Small-scale plating attempt: a pad woven from nickel tape backs onto a plastic woven kitchen scouring pad and makes an anode (despite the colour of the wire). Inside of the hub blanked off, the eyedropper keeps electrolyte flowing on the pad, the hub as the cathode. Not very successful. **2.** Hub, half with copper, which eventually peeled. **3.** Left alone, my early attempts at nickel plating the hub led to a fine surface rust. Blue nail polish protects the brake-drum mating surface; wax filling protects the inside of the hub from chemical attack. Wax is melted out later. **4.** A successful nickel plate (like this one, done at high temperature) will protect iron or steel from being attacked by acid copper solution on a cotton bud: a poor (or no) nickel cover will show as a pink/brown patch of copper





1. I had 80 spokes to de-rust/de-chrome/degrease: a busbar could do 10 at a time, but some spokes didn't get good contact. The fifth and seventh spokes up from the right did not fizz well and had to be redone. I suppose some time was saved, though. **2.** Spokes on the left are cleaned, ready for plating. On the right, they have been plated: the brass ferrules have gone silvery. **3.** I selected the spokes with obtuse angles (left) to fit inside the hub; more acute angled ones (right) to the outside. **4.** Getting ready for serious lacing (rear wheel). The rim propped up off the bench on a couple of cartons

stainless-steel anode. Things seemed to work better at the time, but after a day or two, I got what I think was fine surface rust. Snake.

Citric acid did clean it up, though. Nickel too porous perhaps?

Nickel plating with my Watts-type recipe is meant to be done at about 60°C, not room temperature. My shortcut had to be abandoned: I needed to get the gear (boiling-temperature-resistant plastic; decent sizes) to carry the rim.

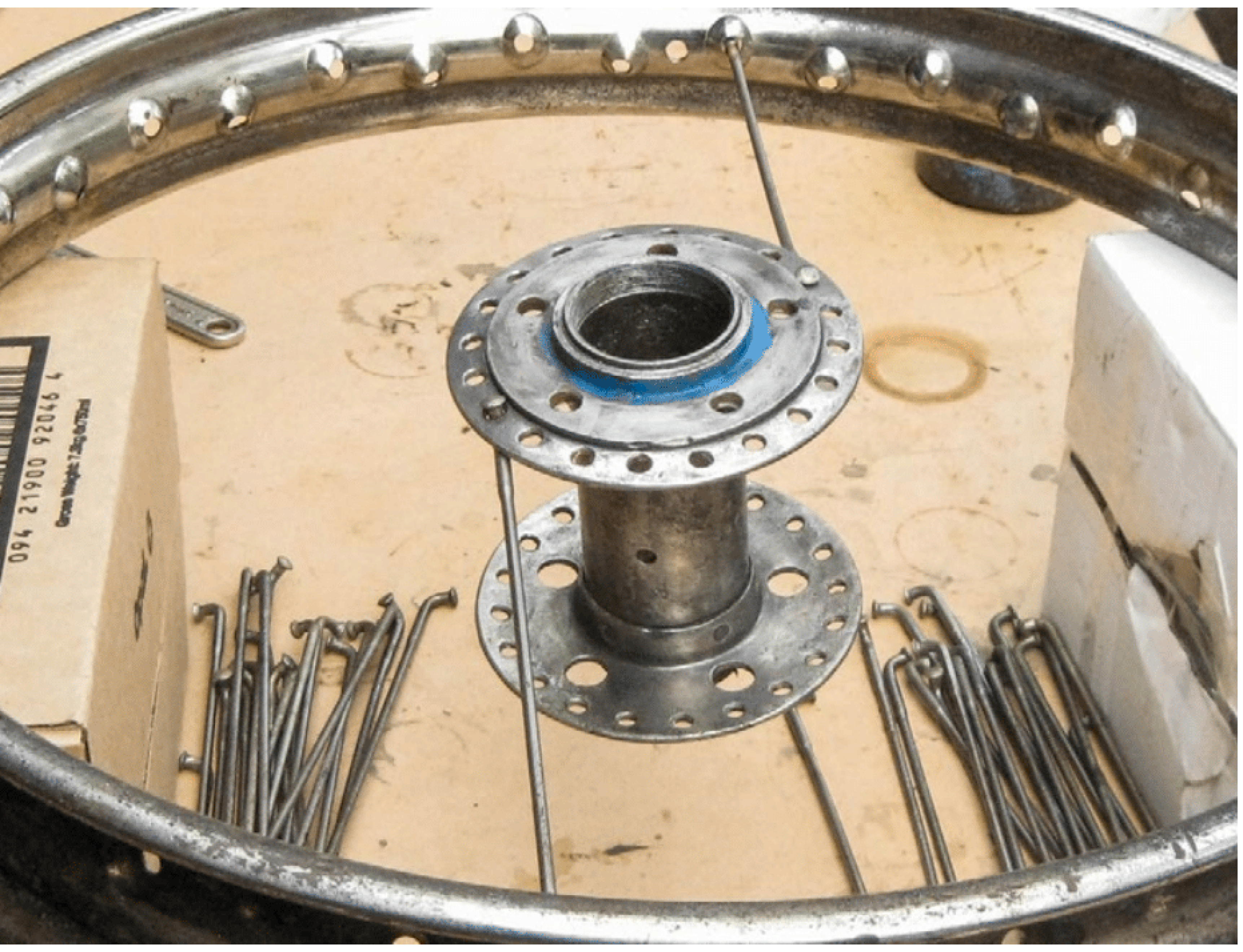
I bought a plastic pasta cooker from The Warehouse, which would enable me to get good penetrative plating (good throwing power). Using 70°C, there was some success with the hub, but the rim still looks bad. My glasses continually fogged up over the hot solutions, which led to some despondency.

I abandoned this rim and decided to use the other two, after cleaning and de-rusting. Time is moving on, and from a distance maybe (reflected in a big shop window), things will look OK (my approach as I outlined it in my first article).

A total of 80 spokes

I started by de-rusting 10 at a time using a busbar, sodium carbonate, and steel anodes. The problem: it was hard to tell which of the spokes had a poor connection to the busbar and, therefore, were not well cleaned.

Some spokes had been painted; I sanded them clean. Other spokes had been galvanised (zinc plated), so they were dipped in dilute sulphuric acid



The first two spokes, inner ones, go in. Opposite each other and kept loose. Spoke holes in the rims give some guidance

All inner spokes on both sides of the wheel plane are in, and the first outer spoke (at the 12 o'clock position) establishes the remaining pattern

The front wheel had five spokes fatter (like the top one here) than all the others. I distributed them evenly around the wheel for balance. Some rim and hub drilling was required

Back wheel laced. The rim doesn't look too rusty from some angles

"I abandoned this rim and decided to use the other two"

until they stopped fizzing. (Steel does not react as quickly as zinc with sulphuric acid.)

I used a high-temperature (70°C) nickel bath for the spokes. I made a better copper busbar with countersunk holes to hang the spokes from, so I could clean and plate six at a time. Still a mistake: some did not have as good contact as others. Snake.

So, one spoke at a time. By now, the nickel tape was running out; scraps searched for. Some hydrogen gas came off the spokes as they were plating, about three minutes for each. Hydrogen embrittlement of the steel? Surely not under this short timeframe.

I cleaned them with a gentle metal polish, and the two hubs, two rims, and 80 spokes are ready for the lacing. The wheel rim goes off the bench onto a couple of cartons for support. I made sure that all spokes with their ferrules had oiled threads; therefore, they were easy to finger-tighten.

Refitting the spokes

I started with the back wheel and its inner spokes; if the outer ones were done first, then the inners would be hard to insert later.

The inner spokes (for the back wheel) have a more obtuse angle compared with the outer ones, where they fit into their holes in the hub. Two spokes opposite each other (but on the same side of the hub) lift the hub off the bench. A little finger tightening, but left loose. The remaining eight inner spokes are spaced evenly around the hub and go to the appropriate (every fourth hole) in the rim. Each hole in the rim had an orientation, which is a clue to which spoke it takes. The spokes remain loose, just finger-tight, at this stage.

I flipped the wheel over and did the 10 inner spokes for the other side. The

The first two spokes go in, front wheel

After both wheels are laced, the next step is to tune each wheel. I reassembled the axles and bearings, etc., then I used a spare swing arm suspension out of storage to support the wheel

spokes resemble tangents extending from the hub. Then the outer spokes go in, filling the remaining holes and giving the familiar crossed appearance.

The front wheel involved much the same procedure, but had had some spokes replaced in the past; I noticed that there had been five slightly thicker, therefore heavier, spokes in a cluster. I wondered if that had been the trigger for past juddering? Anyway, I distributed the five evenly around the wheel (had to enlarge some holes in the hub and rim), and I assume the balance will be better.

Wheel tuning

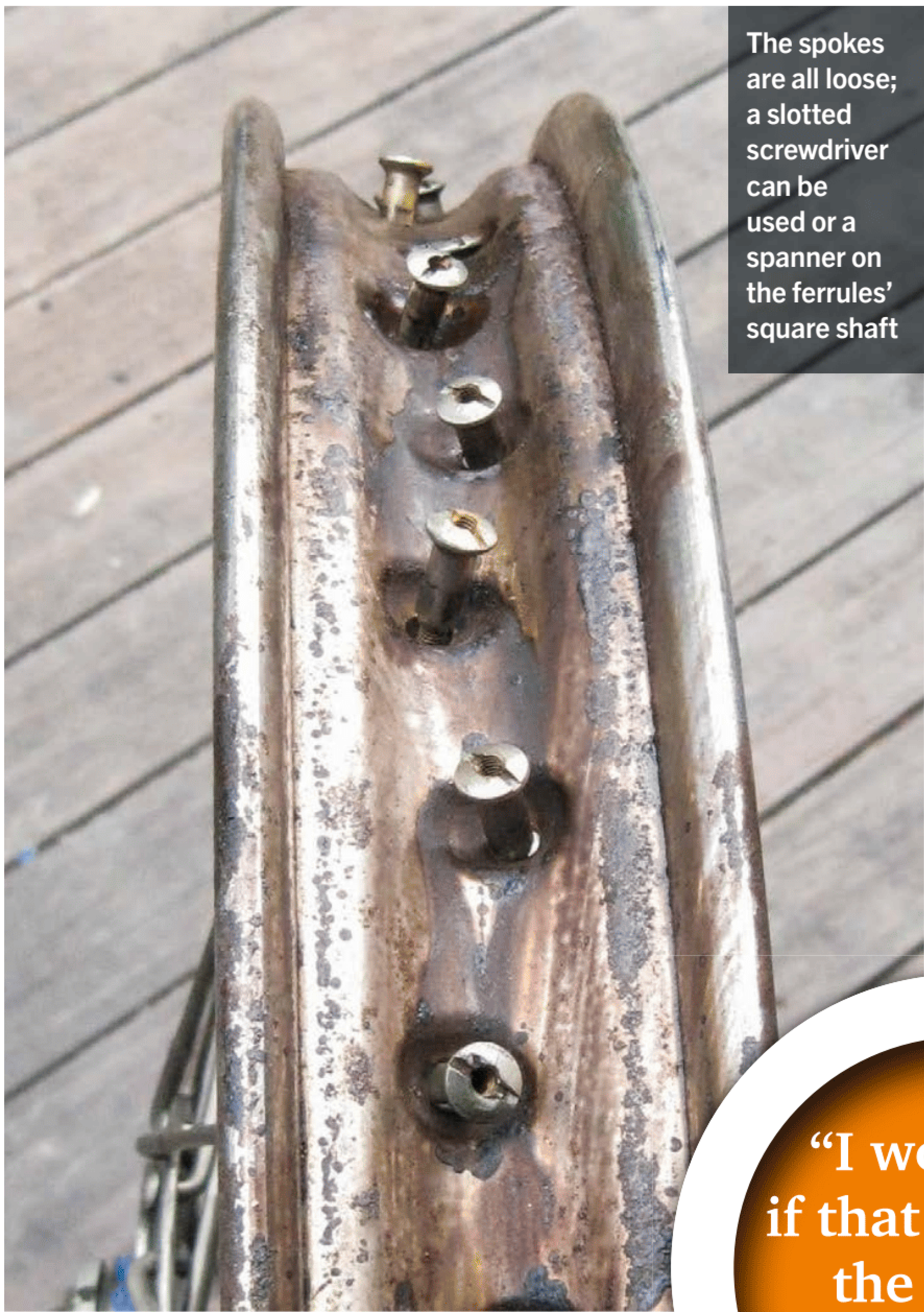
Before 'tuning' the wheels (tensioning the spokes so that the wheels have no wobble or eccentricity), the axles, bearings, and oil seals have to be installed. The front hub (alloy) had to be heated so that the bearings could be pushed home. Happily, no problems here.

To tune the wheels, I finger-tightened all the spokes gradually and evenly (as a first approximation) until I could feel a little tension just come on. I have a dial gauge, but opted to use the simpler rubber-band method for adjustment: I put a rubber band on a spare rear swing arm, and put the wheel into it, the rubber band just grazing the wheel rim.

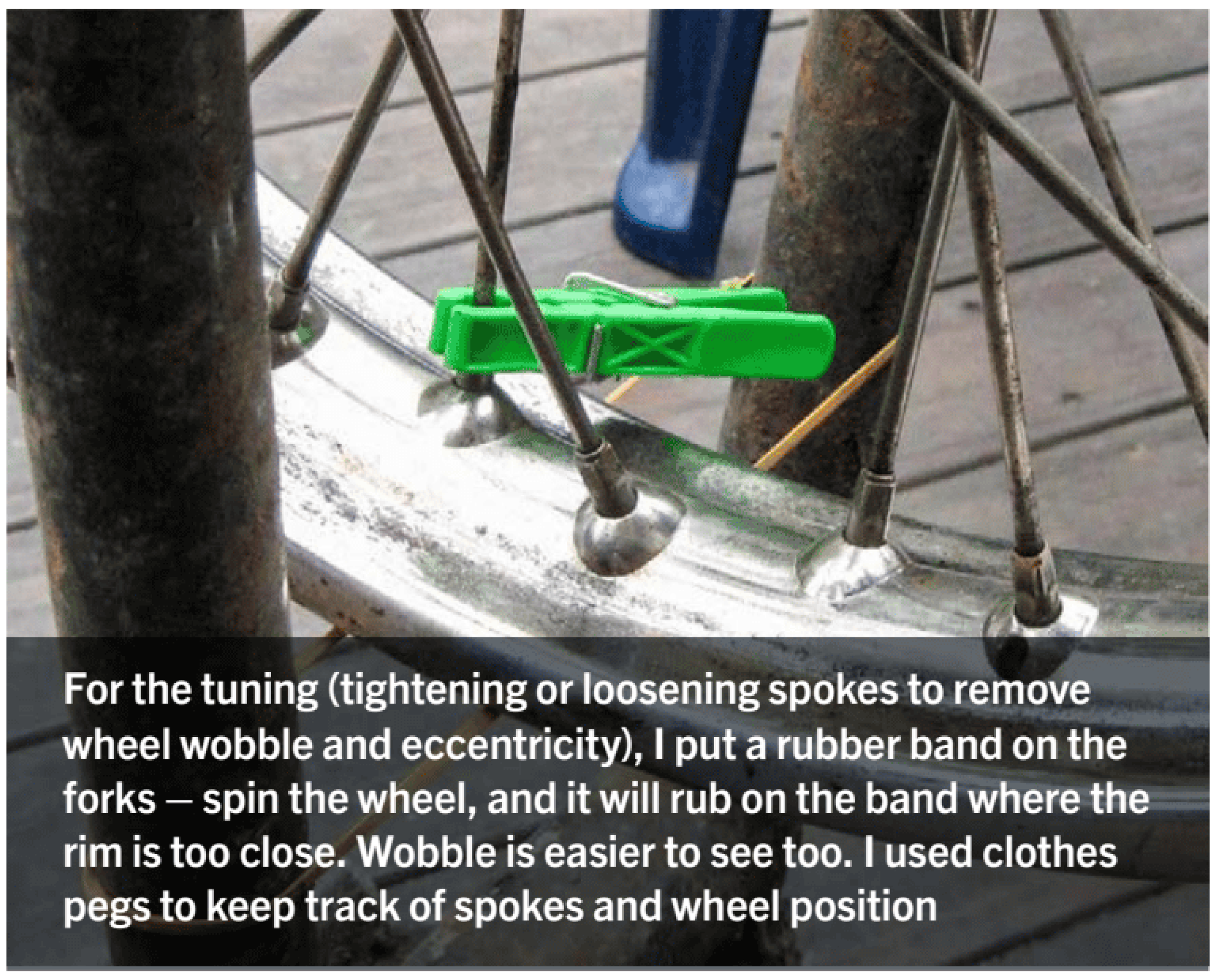
When spinning the wheel, I could see where the rim was touching the band and where it was not. I used clothes pegs on the spokes to keep track of the movement. By tightening spokes evenly and relaxing some on the opposite circumference, I pulled the rim into a circular orbit.

Then I could tackle the wheel side-wobble. Tightening spokes on one part, one side, of the wheel plane and loosening their neighbours on the other side of the plane served to reduce the wobble.

I made a slotted screwdriver to fit into the ferrules, but I also used a spanner on the square shanks of the ferrules. Repeating the processes, I got to the point where movement was smooth,



The spokes are all loose; a slotted screwdriver can be used or a spanner on the ferrules' square shaft



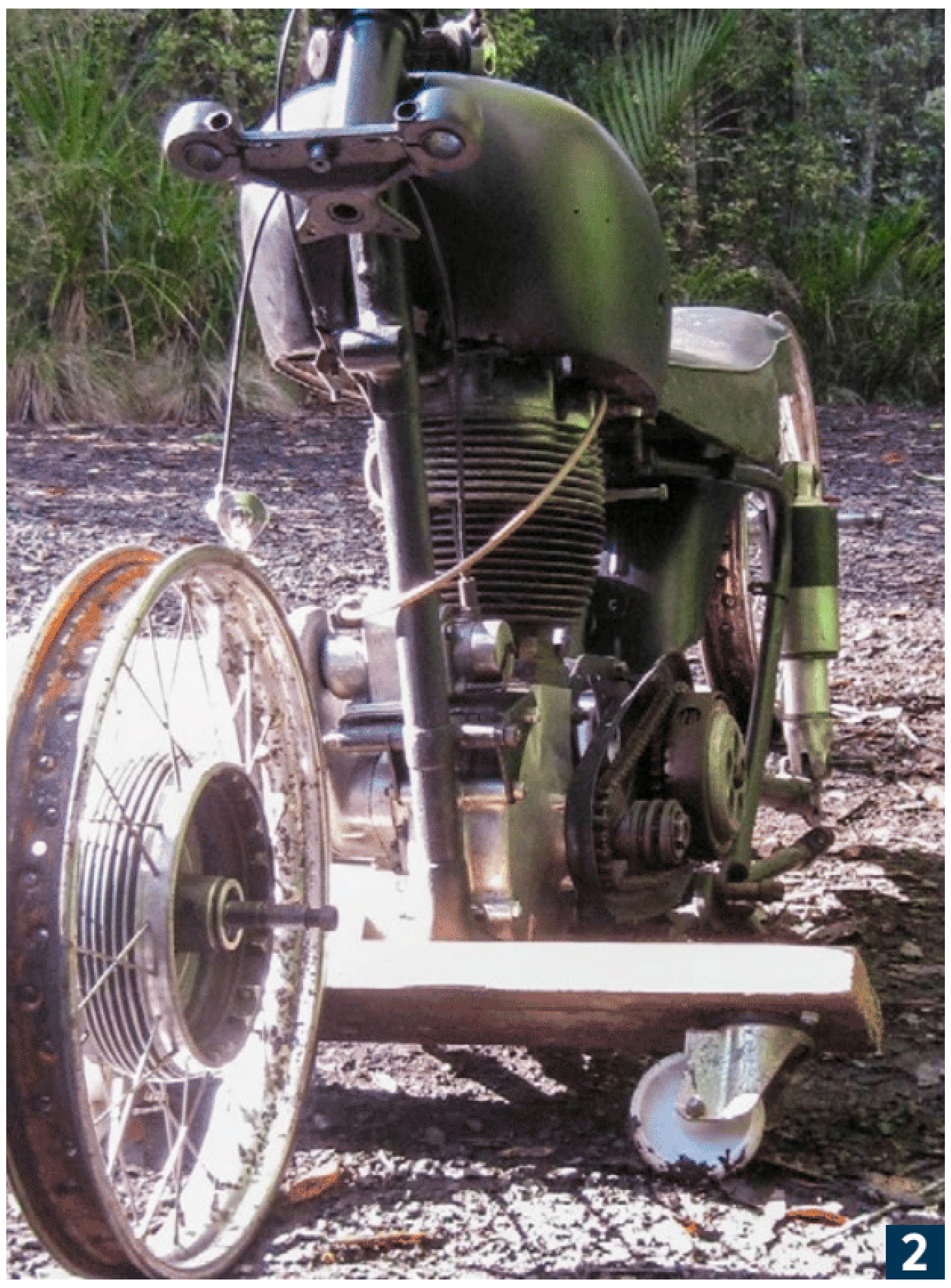
For the tuning (tightening or loosening spokes to remove wheel wobble and eccentricity), I put a rubber band on the forks – spin the wheel, and it will rub on the band where the rim is too close. Wobble is easier to see too. I used clothes pegs to keep track of spokes and wheel position

The rubber band is visible. The front wheel in the background has been done

"I wondered if that had been the trigger for past juddering"

Tightening a spoke ferrule with a slotted screwdriver. I used the same screwdriver for adjusting the bike's clutch springs

I tapped some of the spokes with a soft hammer where they came through the hub if they didn't look properly seated



nothing eccentric, and no side wobble. Dynamic balancing is a different matter, and that will have to be done when the tubes and tyres are put on. Finally, all spokes tightened evenly by a quarter turn. I ground off any spokes pointing in beyond their ferrule.

The home stretch?

It felt like I was approaching the home stretch.

Suspension and wheels are now almost complete (just waiting for those aforementioned leather washers from England).

Of course, tubes and tyres are needed. Electricals still to sort, but I can run temporarily off a battery. Temporary (rusty) handlebars, with some control cables OK (ignition advance and retard; throttle), but others still to replace (front brake; exhaust valve lifter). All the rear chain parts, plus rear brake hub, chain guard, speedo gear drive, cable and chronometric speedometer are present, look correct, and ready to install. More plating and painting at my leisure, later.

Disaster. Another snake in the game.

The time came to fit the exhaust and to try to start the motor. But first, I decided to clean out any rubbish from the fuel tank using kerosene. I could check for any leaks at the same time (a mere formality, you understand). Three leaks, and a bit more than minor seeps. Work stopped for the day while I recovered. No engine start-up.

I do have a spare tank, a fully chromed one, but I would say it is in worse condition. A time for reflection (pun intended)?

There are options. Some are dangerous. I will push forward and write about any solutions in the next article. Stay cheerful, stay tuned.

1–3. Various views of progress. Moving towards a big bolt-up, but the fuel tank needs de-leaking; I'm waiting for front fork leather washers. Wheels will go on after I save for tubes and tyres, then I can get rid of the castors

Coming up in part eight

As well as an arrival of a solution to the leaky-tank conundrum, I hope that the leather washers will be here: the front forks completed and installed. The exhaust header: cleaned and added. Tank badges and knee rubbers to go on, as well as handlebars and controls. Budget permitting, tubes and tyres.

NZ SAFETY BLACKWOODS

Taking care of business, bigger and better

There's something pretty special taking shape down in Drury – and it's set to raise the bar for how Kiwis get the gear they need to get the job done.

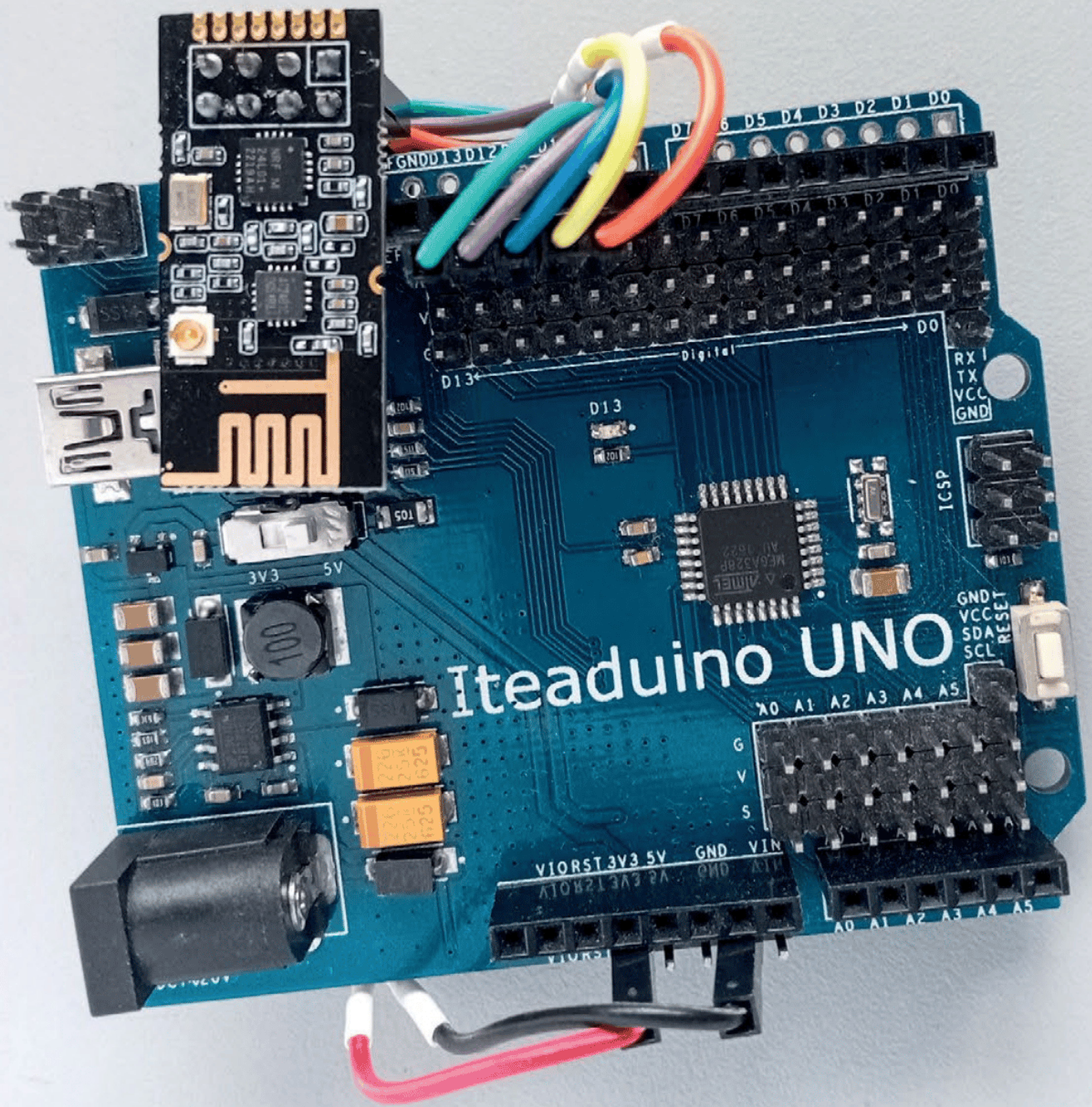
NZ Safety Blackwoods is building a brand-new, purpose-built 18,000m² distribution centre, fitted out with the latest in smart automation and robotics – the kind of tech you'd expect in world-class logistics hubs. But it's not just about the technology. It's about making work safer, faster, and more reliable for everyone who depends on quality gear that's there when they need it.

Once complete, the new Drury site will bring together three existing distribution centres into one high-performance hub – improving speed, accuracy, and supply certainty for customers across the country. And right out front, a brand-new trade centre will open early next year, making it easy for everyone – from professional tradies to serious DIYers – to get hands-on with quality tools, safety solutions, and workwear from a huge stable of trusted global and local brands.

There's more on the move too, with the North Harbour and Blenheim stores relocating to upgraded sites this year – giving customers even more choice and convenience.

Big things are happening at NZ Safety Blackwoods. From small workshops to large worksites, they're proud to be taking care of business for everyone who loves to build, fix, and create.

Artist's impression of the new building situated at 22 Jack Stevenson Drive, Drury



EXTERNAL COMMUNICATIONS

In the final instalment of this Arduino Basics 102 series, our electronics wizard Mark Beckett shares some tips and advice on how to transmit data over longer distances. There are many options and each has its advantages

By Mark Beckett | Photographs: Mark Beckett

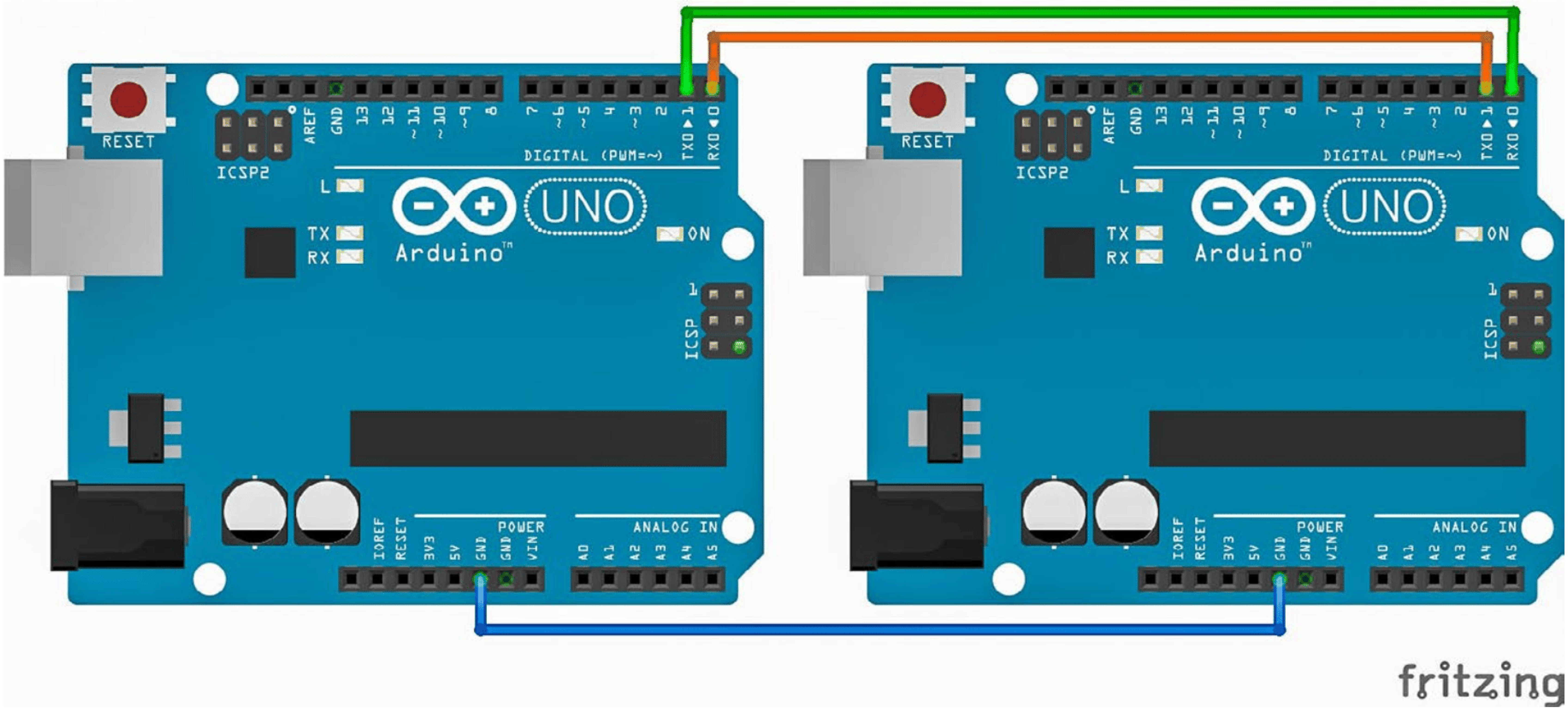
In the last few issues, we've covered data transfer within a limited environment. For this instalment in the series, I intend to offer a few options to send data over longer distances.

Like most things, there is no right or wrong, and depending on the distance, environment, and data, some options are more effective than others.

Cost may be one factor, but given the price of hardware nowadays, reliability and user-friendliness may be more important. George Polya wrote in his 1945 book *How To Solve It* that there are four steps to solving a problem:

1. Understand the problem.
2. Devise a plan.
3. Carry out the plan.
4. Look back (to see if it solves the problem).

Projects are no different, and it starts with understanding what you're trying to achieve.



In my application, I need to provide status data externally in a hostile environment with a 2.0–2.5m distance between the source and the external antenna location. The reception and display to the user varies between purposes (fixed or mobile), but each one can use the same data.

I'm not concerned with knowing if the data were received, as the receiving end can indicate if the message is stale. Early on, I decided the topography of the locations precluded a direct line of sight, so a repeater is planned. This removes the need to fit high-power or high-gain antennas and will allow for omnidirectional transmission.

So now that Step 1 is complete, let's look at some of the options.

Serial data

This is still a valid option to transfer data.

One wire is 'Transmit' and another is 'Receive', and you can have hardware handshaking or simply rely on timing. One big downfall is that the data rate needs to be known. If the Sender (DTE – data terminal equipment) and Receiver (DCE – data communication equipment) are part of a system, then that is easily solved.

Because serial was being used in different equipment, a standard was developed in the 1960s, which became RS232. The standard defines the electrical characteristics and timing of signals, the meaning of signals, and the physical size and pin-out of connectors.

RS232 uses +5 to +15V for Logic 0 and −5 to −15 for Logic 1, and is suitable for approximately 15m without using special cables and techniques to avoid noise. One thing that confuses many people is the crossover. You transmit on one pin and receive on another, which means the cable needs to crossover.

TTL (transistor–transistor logic) serial uses the voltage levels within the device (3V3 or 5V), and the Arduino uses pins D0 (Receive) and D1 (Transmit) – see **https://docs.arduino.cc/language-reference/en/functions/communication/serial/**. TTL serial is really only useful to a couple of metres.

USB socket

The Arduino IDE connects via the USB socket.

This connects to a serial to USB chip; the serial side of this chip connects to Pins D0 and D1 (which is why I suggest avoiding them in your projects). If the board doesn't have a USB socket, then you'll need a USB to serial adaptor to program it.

RS232 and TTL serial have limitations, mainly due to induced noise, which can corrupt the data, but the RS422 and RS485 standards specify a 'differential pair', which uses two wires for send and two wires for receive. The voltage on each wire is driven opposite, which effectively cancels any induced noise and can increase the distance to 1200m.

Just because serial ports on computers have disappeared, it doesn't mean that serial communication is not used or dead. Many systems and commercial applications use serial to communicate – for example, DMX512, Modbus, and some building management. The Wikipedia page is an interesting read: **https://en.wikipedia.org/wiki/RS-485**.

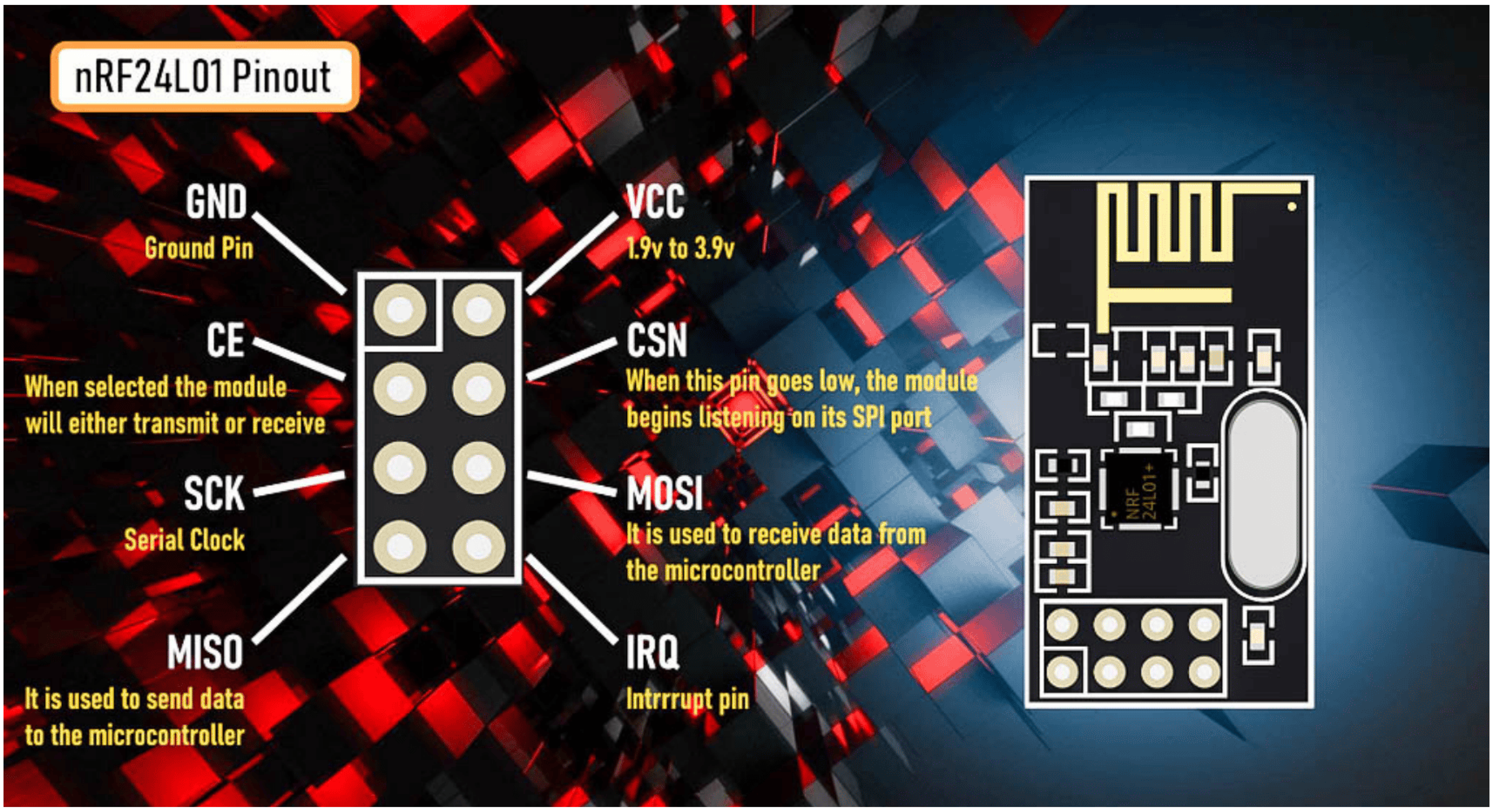
Using TTL serial

In my current Lift Trip Safety System, I use TTL serial to transmit status information from one microcontroller to a second microcontroller.

The second one controls the engine solenoid relay by pulsing the output pin based on the incoming data stream. The idea was that if one microcontroller locked up or failed, then the data wouldn't be sent or received, and it 'fails to safety' – that is, the solenoid drops out, stopping the engine.

The Serial.print information uses the Tx/Rx line and the USB chip to send and receive information to the Serial Monitor window in the Arduino IDE. I've seen other uses where the data are collected by the Arduino (or other microcontroller) and sent serially to a computer for either storage or further processing.

Regardless of which RS standard is



used, these only define the electrical characteristics and not the protocol of the data that are being sent and received.

Serial peripheral interface (SPI)

This is a synchronous serial data protocol used by microcontrollers for communicating with one or more peripheral devices quickly over short distances … Well, that's the official explanation.

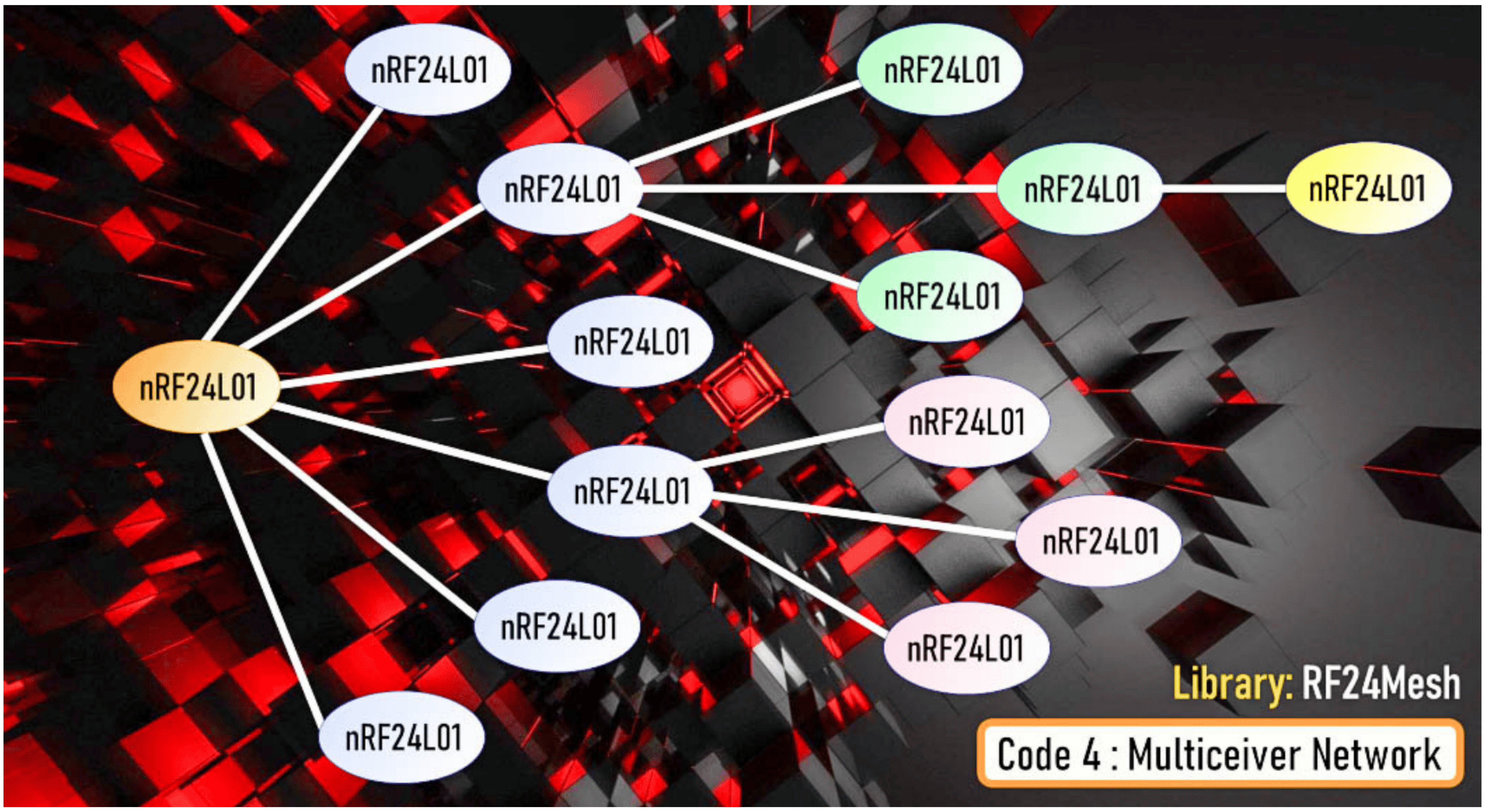
But in reality, it's a very useful method of programming the Arduino and talking to other devices. The downside is that it can use six pins/wires (plus power), and as some suggest, the wiring needs to be no more than 3m (less in a noisy environment).

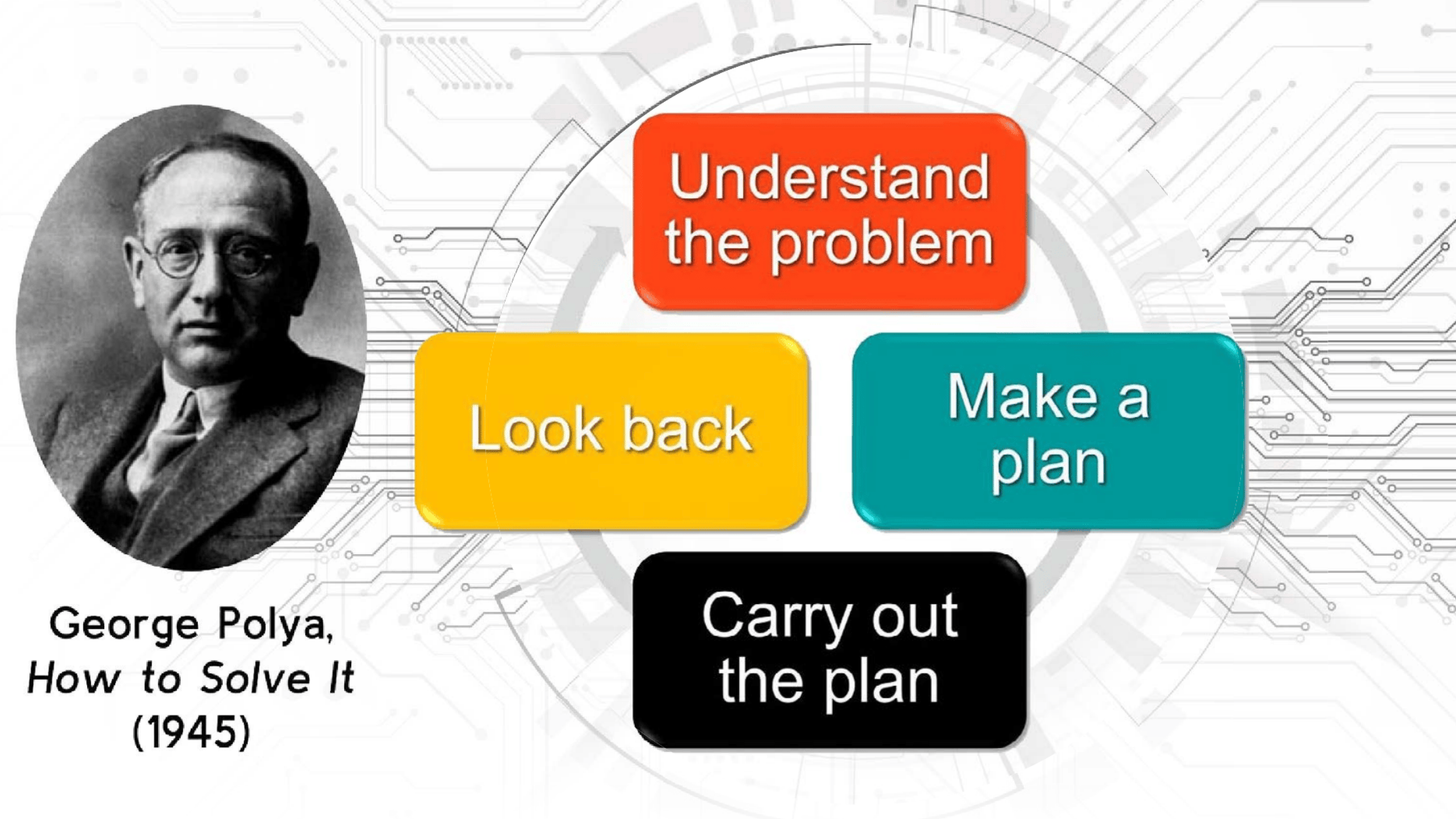
SPI is the connection method, but you still need software to talk with the device or devices that are connected. Luckily, there are plenty of libraries that cover that. I've used SPI to send data via an RFM69 433MHz transceiver and, more recently, to communicate with an nRF24L01 Wi-Fi module, which is detailed following.

nRF2401

The nRF24L01 is a budget-friendly, single-chip wireless device made by Nordic that sends and receives radio signals over short distances.

It works in the 2.4–2.5 GHz frequency range (the same range used by Wi-Fi





and Bluetooth) and doesn't require any special licence to use. This little module can transfer data at different speeds: 250kbps, 1Mbps, or 2Mbps … but enough of the sales blurb.

They are cheap, easy to use, and consume very little power, but the maximum voltage is 3.9V, and at higher RF power, they will exceed the Arduino 3V3 regulator, so an external 3V3 regulator is required. Many of the offerings from Asia show an 'expansion board' which includes a 3V3 regulator and reformats the pins into a slightly more user-friendly arrangement.

When writing this article, I came across this: **https://lastminuteengineers.com/nrf24l01-arduino-wireless-communication/**, which gives clear instructions and explains the code. This should get you started if you want to explore these modules.

Where are the answers?

In my eFlags application project, we needed to control signal lights at a number of stations. The distance was up to 400m. But as I discovered, there were a few things to watch for, and sadly, the internet answers were wild, varying and sometimes just plain wrong.

Some examples don't provide information on what pin to use, or worse, they show a drawing and then use different pins in the sketch.

They can be very susceptible to electrical noise, especially from DC–DC converters, which use a high-frequency inverter. This can interfere with the nRF24L01 or the aerial cable when close.

You need to shift a component on the module to use the IPX external aerial connector.

Use channels above 100 to avoid normal Wi-fi signals.

If you try to use these at the higher power setting, you need to separate them by a few metres, as the receive section has very little filtering and is easily swamped by high RF levels.

ACK

One thing many examples don't cover is the 'acknowledge', or 'ACK', and how it can be used to send data back to the transmitting end without having to swap roles. It is detailed at **https://circuitpython-nrf24l01.readthedocs.io/en/1.1.2/api.html**, but it is confusing.

The RF24 library allows you to set the number of retries. The idea is that the receive-end sends back an ACK, and once received at the transmit-end, it stops retrying.

You can add information to this ACK message, but you need to load the information before the incoming data are received.

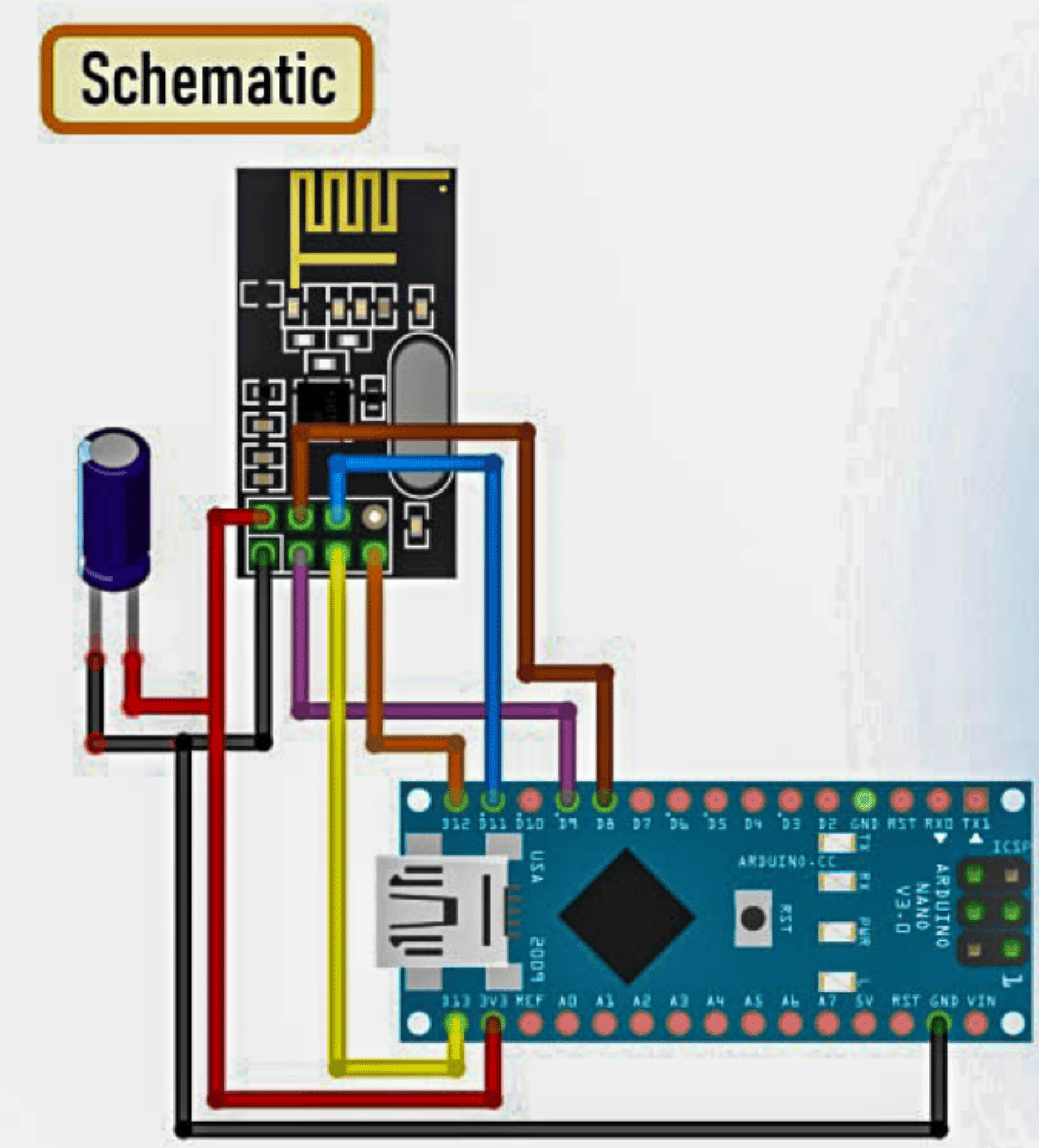
In my eFlags application for controlling lights at each station, I sent the 'Status Setting' (1 = Green, 2 = Orange, 3 = Red) for each unit every 1000ms (one second). After the unit received the status setting, it updated the ackData, and on the next round, it sent back the status, which updated the display. The reality was the status confirmation was always one poll behind, but in human terms, the one-second delay was not noticed, so I didn't need to add anything special to the process.

Using the ACK feature was much easier than arranging for each of the five remote units to send data.

Channels

There is some confusion about channels, pipes, and addresses, which is understandable. 'Channel' relates solely to the frequency used. You could think of this as a road, and providing both the transmitter and receiver are on that road, things should work.

The nRF24 has six 'pipes' that it can receive on, but can only transmit on one at a time. Think of a loading dock where six trucks can pull up to the incoming goods dock at the same time, but there is only one outgoing dock to load them. Nordic calls this 'MultiCeiver', and you can read about it on page 35 of this datasheet: **https://cdn.sparkfun.com/datasheets/Wireless/Nordic/nRF24L01_Product_Specification_v2_0.pdf** (strangely, I couldn't find it



NRF24L01	Arduino Nano
GND	-ve
VCC	+3.3v
CSN	D8
CE	D9
MOSI	D11
MISO	D12
SCK	D13

nrf24L01 SPI connections

on Nordic's website). While this talks about pipes, the confusion is greater than the knowledge gained, so just follow the examples for a one-to-one application.

The 'address' is any five-byte digit or character (i.e., 00001 or Flag1 in my application). Every nRF24 on the channel will receive the message, but those with the right address will process it. The rest will ignore it. Another analogy is hearing a name called out in a crowd; if it's not your name, you ignore it.

You need to specify channel, pipe, and address for communication, and the design of the chip means that data are restricted to 32 bytes in a single transmission. If you need to transfer more, just send multiple packets.

Many of the references suggest a 1km range using the high power and an external antenna; however, I did find this interesting video of a New Zealander (iforce2D) testing the extreme range: **youtube.com/watch?v=4XRp7pkZgPM&t=471s**. Using Yagi antennas, he got 31km at a decent data rate of 500–540 packets per second.

Simple 433Mhz transmitters and receivers

There are many 433MHz transmitters and receivers available to use, and while these provide a simple solution, they are limited in their data and capabilities.

Back in December 2012/January 2013, I detailed a Home Minder which used commercial wireless switched sockets. A handheld remote sent out a signal that turned the units ON or OFF. Rather than hack the remote, I found a library RC-Switch (**https://github.com/sui77/rc-switch**) which had the ability to decode the data. After some trial and error and an Excel spreadsheet, I was able to sort out the codes and send them to many more switched sockets than the remote could.

RC-Switch suits simple codes rather than random data, but this article explains using RadioHead and provides an example for sending a message: **https://lastminuteengineers.com/433mhz-rf-wireless-arduino-tutorial/**. The library is based on earlier versions but supports a wider range of platforms.

One major issue with 433MHz is the overuse of the frequency and failure to follow guidelines on data sending rates. A good example is one place we had meetings at; we were warned to be next to the car for the remote to work due to the excessive 433MHz traffic in the car park area.

The receivers used in simple devices have little or no filtering and are susceptible to RF blocking by strong signals close to the frequency. This means that in some situations, the performance may not be as expected. There are discussions on the forums regarding range, and some say 20m while others use a proper antenna and get 50-plus metres.

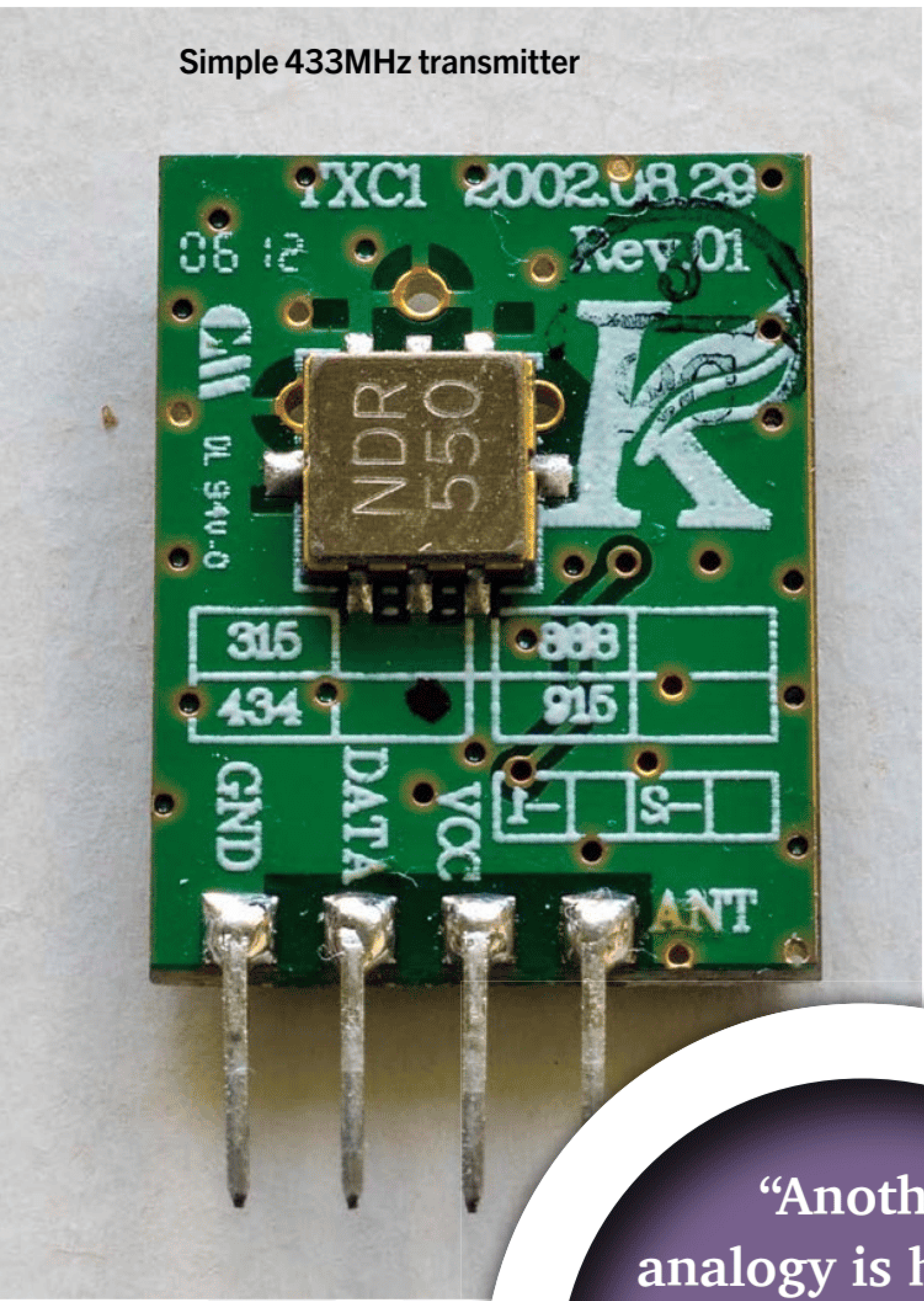
If you're keen on 433MHz, then I suggest using RFM69 or some of the LoRa modules.

LoRa modules

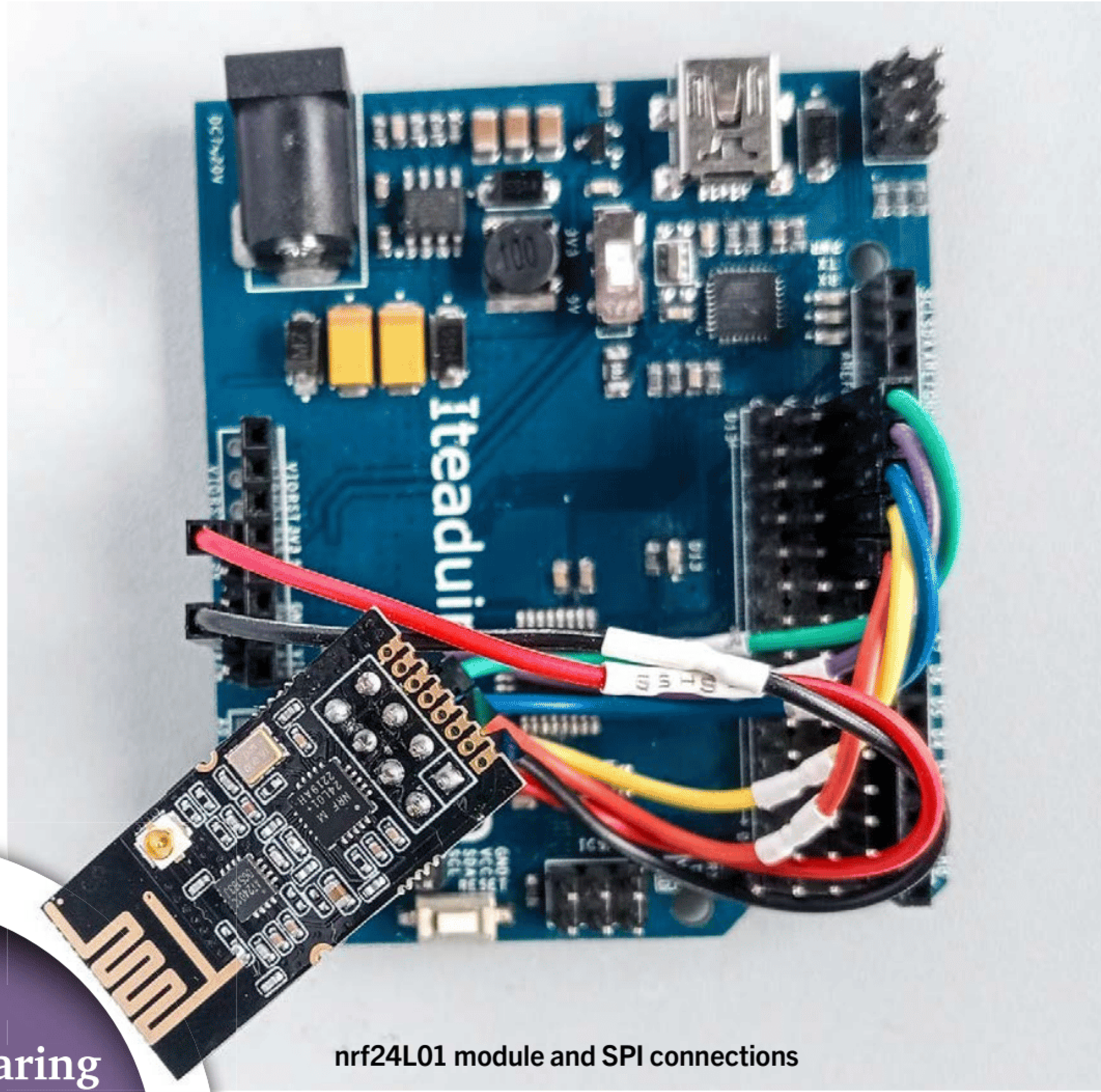
LoRa (from 'long range') was developed by the French company Cycleo, which was acquired by the Californian company Semtech.

The hardware is proprietary, but the protocol is governed and overseen by an open, non-profit LoRa Alliance, of which Semtech is a founding member.

The low power, low data rate makes this suitable for battery-powered internet of things (IoT) applications and the Meshtastic/Meshcore community,

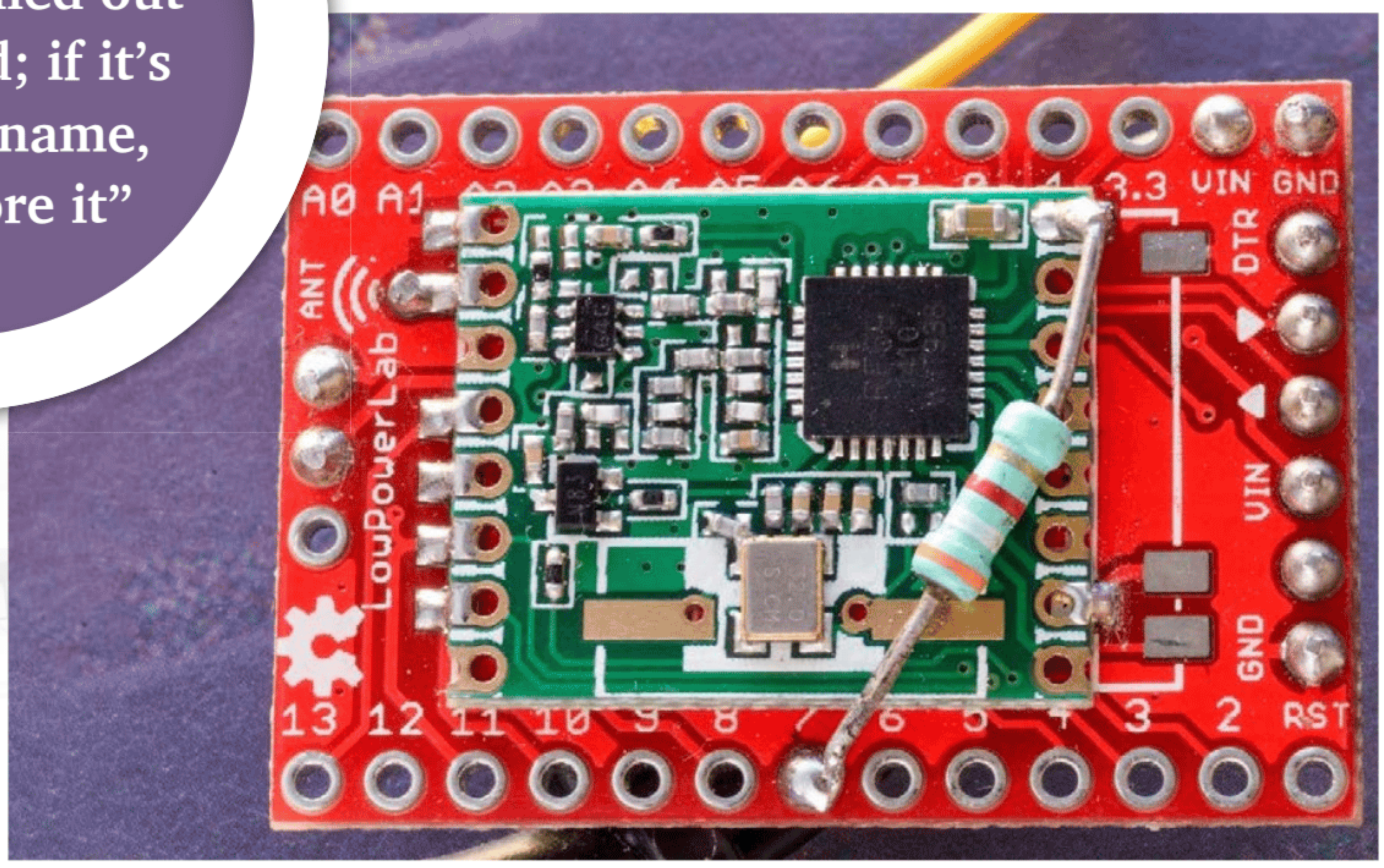


Simple 433MHz transmitter



nrf24L01 module and SPI connections

"Another analogy is hearing a name called out in a crowd; if it's not your name, you ignore it"



RFM69 mounted on Moteino

and some manufacturers have been quick to adopt it.

The radio units utilise the unlicensed 433, 868, and 915MHz frequencies depending on the country and their regulations.

UHF transmission relies on 'line of sight', and LoRa is not some magic bullet that goes around corners, but it will perform with very low received signal strength. To give some idea of LoRa capabilities, the current record for distance is 331km, while the New Zealand record is 166km, both using 868MHz and an omnidirectional antenna at each end.

Communication between the Arduino and the LoRa module uses SPI (similar to RFM69 or nRF24 modules), which means the distance between controller and module should be relatively short.

Cable loss

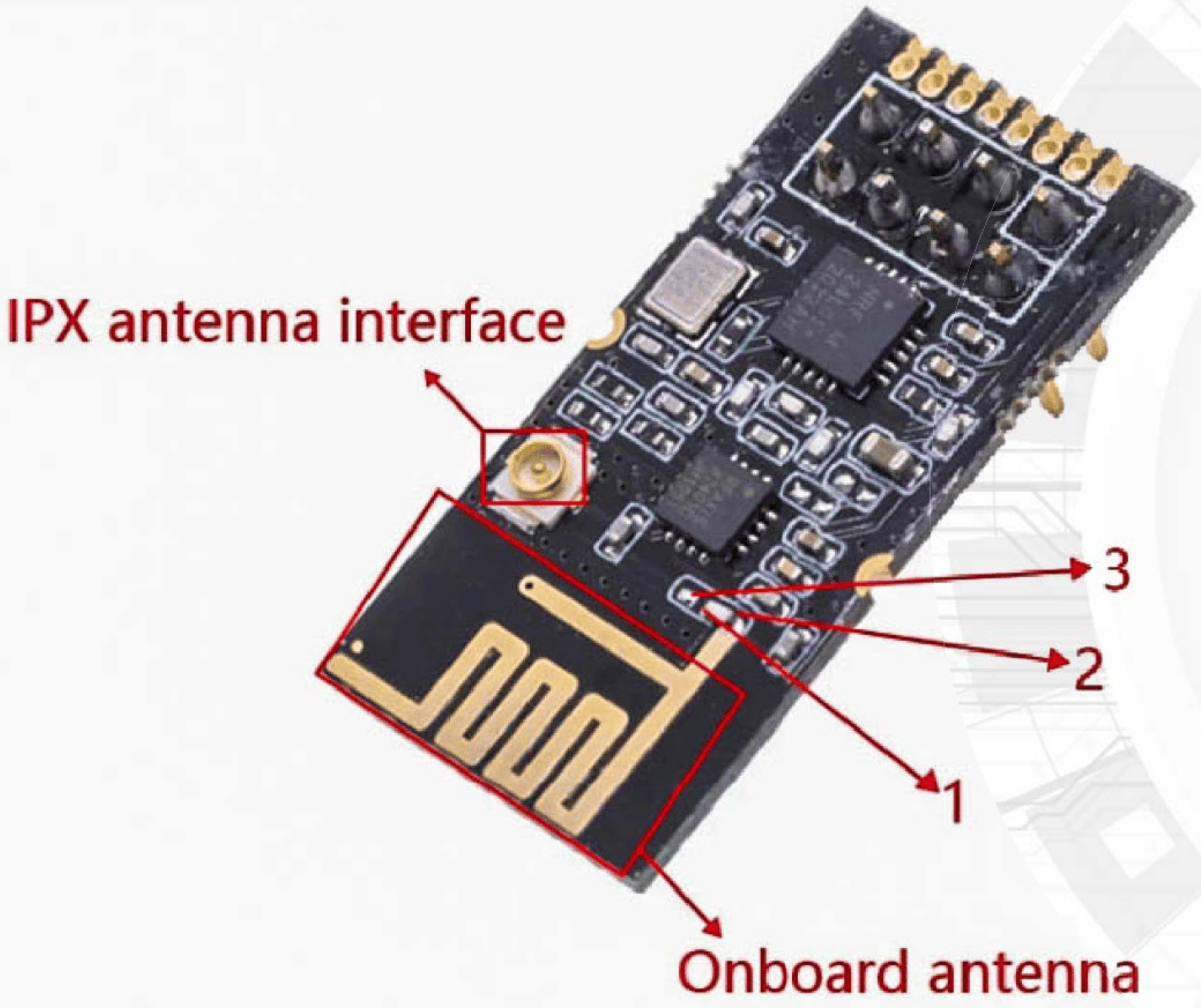
It would be remiss of me to talk about transmitting and receiving data without discussing antenna cable losses.

The higher the frequency, the greater the loss, and while some of the loss can be compensated with antenna gain, this can make them directional. The easy way to imagine this is a light bulb hanging from the ceiling which projects light 360 degrees (or very close to this), but if you add a reflector, the light is brighter in the illuminated direction.

Wi-Fi is 2.4GHz (2400MHz) while LoRa can be 433, 868, or 915MHz, which means slightly lower cable loss. Low-loss cables are available, but they may not suit the connector on the module or present problems within the enclosure due to their size and bending radius.

For my application, I need to have the antenna mounted externally, which dictates a cable length of 2.0–2.5m, and the loss at either 915MHz or 2.4GHz will be significant.

The current thought is to avoid this by using TTL serial to a second Arduino and an NRF24L01 fitted into a waterproof enclosure. It will contain the antenna and solve the issue of mounting and waterproofing the antenna. ▶



The module uses the onboard PCB antenna by default. The chip inductors are soldered to 1, 2 as shown in the figure. If you need to use the ipx carrier to pull out the external antenna, you can place the chip inductors to 1, 3 as shown

"The low power, low data rate makes this suitable for battery-powered internet of things (IoT) applications"

Protocol

The dictionary has many different meanings for 'protocol', but for computing, the simplest I found was: "a set of rules governing the format of messages that are exchanged between computers".

Most published protocols you find when searching are for the transferring of data between computers (or server to computer). Regardless of the method of communicating (cable or wireless), the receiving end needs to know what the information represents; otherwise, it's just ones and noughts.

I2C, One Wire, and many others have their own protocols and are based on the manufacturer's datasheets. Many of these are published, but there are others that have been reverse-engineered and then used by others.

Back in *The Shed* Issue No. 108 (April/May 2023), I posted a link where some clever people had reverse-engineered a Wemo Belkin and were using an inexpensive ESP8266 to emulate it and communicate with Alexa: **toptal.com/arduino/esp8266-arduino-tutorial-alexa-hack**.

I've also seen Mitsubishi heat pumps being hacked to allow for remote control (other than the handheld remote): **https://nicegear.nz/blog/hacking-a-mitsubishi-heat-pump-air-conditioner/**. If you read the comments, there are some links for software and other info.

For the eFlag units, the message format was just two bytes, a number representing the unit and a second representing the status for that unit. For my Lift Trip Safety System, I intend to send the current state, plus the cause. With some juggling and manipulation, I can get this down to seven bytes (0–255), and it will allow reconstitution into something meaningful.

As far as my project planning goes, I have reached Step 3, where I implement it and check if it provides the solution I need. It will solve the biggest issue by providing status information to the office, while the others may require more work on suitable hardware.

Summing up

So, data communication can take many forms, and there is no one-size-fits-all solution. The magic bullet doesn't exist, but the means to help us achieve what we want are far easier than in years gone by.

Useful links

- https://docs.arduino.cc/language-reference/en/functions/communication/serial/
- https://en.wikipedia.org/wiki/RS-485
- https://lastminuteengineers.com/nrf24l01-arduino-wireless-communication/
- https://circuitpython-nrf24l01.readthedocs.io/en/1.1.2/api.html
- https://cdn.sparkfun.com/datasheets/Wireless/Nordic/nRF24L01_Product_Specification_v2_0.pdf
- youtube.com/watch?v=4XRp7pkZgPM&t=471s
- https://github.com/sui77/rc-switch
- https://lastminuteengineers.com/433mhz-rf-wireless-arduino-tutorial/
- toptal.com/arduino/esp8266-arduino-tutorial-alexa-hack
- https://nicegear.nz/blog/hacking-a-mitsubishi-heat-pump-air-conditioner/

Tyler Dipper tries out the empty Fish Tales cabinet before the transformer and fixtures go back in

STEP BY STEP

By Simon Haxton | Photographs: Simon Haxton

BRINGING A PINBALL MACHINE BACK TO LIFE

Unashamedly a huge pinball fanatic, Simon Haxton shares his insights on how to restore an old pinball machine. It's about respect, not perfection, with the minor flaws retained revealing a life well played

There's a special kind of magic in reviving an old pinball machine.

Each one tells a story – sometimes of decades spent flashing and clattering in a busy arcade, sometimes of years forgotten in a dusty garage. No two are ever quite the same, and that's part of the fun.

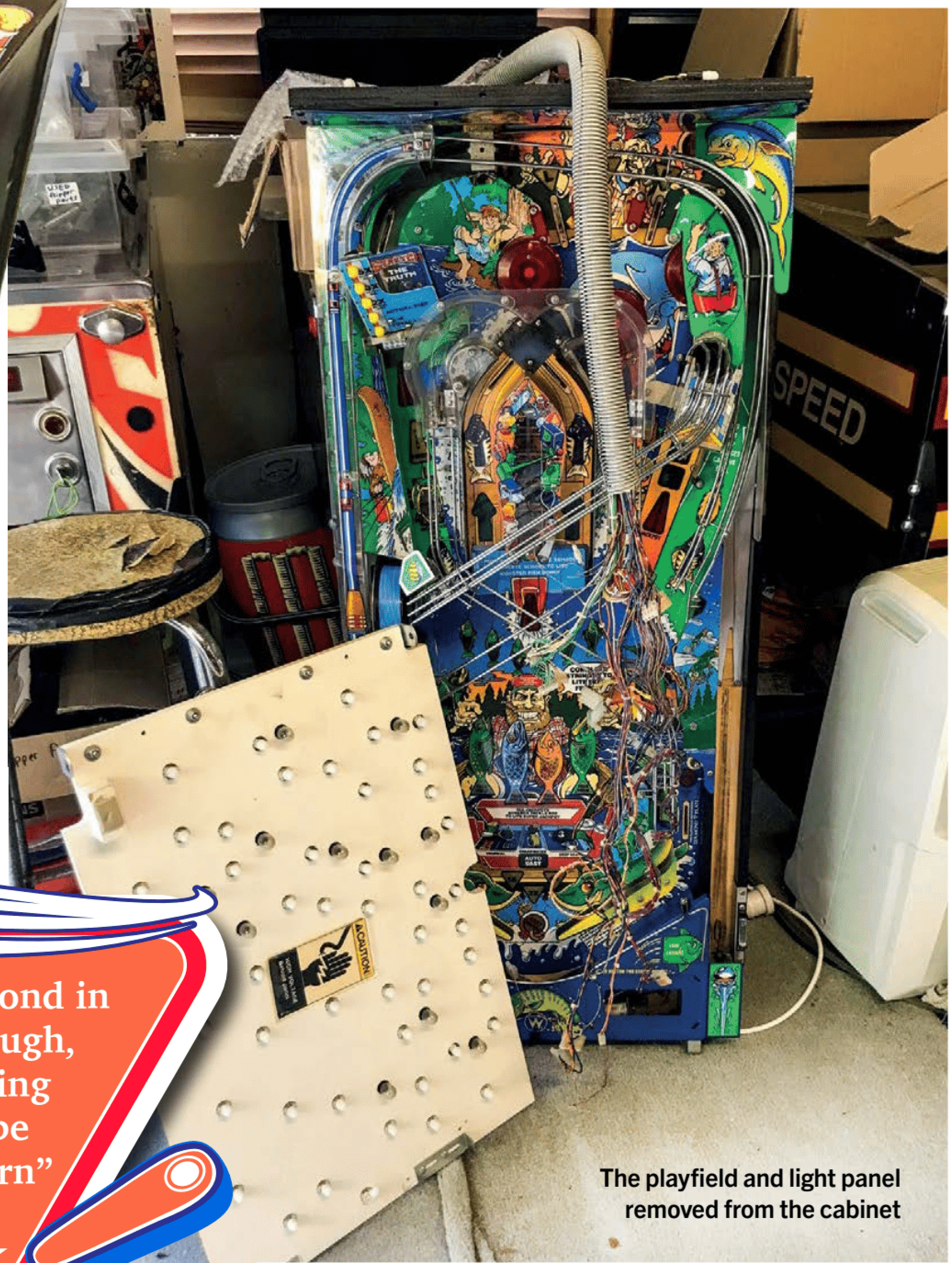
Every restoration begins with the same truth: a game must be judged on its own merits. Machines that have been cared for, cleaned, and maintained can spring back to life with surprising ease. But even a 'dead' game can hide treasures beneath the grime – a diamond in the rough, waiting to be reborn.

Since pinball first lit up the Western world in the 1930s, countless models have come and gone. Many now sit silent, their lights long dark, waiting for someone to bring them back. That's where my process begins.

Initial inspection – safety first

Before I even think about powering on a game, I start with a thorough safety check.

I examine the electrical path, inspect



The playfield and light panel removed from the cabinet

“A diamond in the rough, waiting to be reborn”

the mains circuit, and make sure every fuse is correctly rated. It’s not just about avoiding shocks – it’s about preventing a single bad wire from frying a board that will be costly to replace.

A mentor once told me, “Your best tool is your eyes.” He was right. Careful observation will save you hours of frustration later.

For peace of mind, I run every machine through an appliance tester – my go-to is the Megger PAT150 – to confirm proper earthing and insulation. Only when I’m satisfied that the game is electrically sound do I dare to plug it in.

The first boot – will it wake up?

If the game won’t boot, that’s the next mystery to solve.

When a pinball machine boots, its microprocessor unit (MPU) runs a self-check to make sure the system is ready to play. If that check fails, you’re looking at a fault somewhere deep in its data circuitry.

Solid-state machines often have a hidden villain: leaking batteries. Early MPUs used nickel-cadmium rechargeables to save scores and settings. Later ones switched to AA batteries – but either way, most are long dead. Their leaked alkaline will eat through traces and chips like rust through steel. Sometimes it’s fixable. Sometimes the only cure is a complete MPU replacement – not cheap, but thankfully they are available for most eras.

Fault finding – patience is required

Once the machine powers on, I’ll either start a quick game or run its built-in diagnostics. From there, I list out what’s working – and what’s not.

Broken switches, burnt solenoids, weak coils – these are common and easy to spot. The more challenging issues hide on the circuit boards. Fault-finding here can take five minutes … or five days. The key is patience, logic, and a steady hand.

When I’ve isolated the culprit, I check if I’ve got the replacement parts. If not, it’s time to seek a product from one of the many vendors supplying the enthusiast market. ▶

A nicely prepped cabinet ready for new decals

Two empty Fish Tales cabinets. One very badly faded from the sun's rays.

"Your best tool is your eyes"

The finished machine

Strip, clean, and polish – the cosmetic revival

No matter the condition, every machine benefits from a full playfield teardown.

I remove the plastics, posts, ramps, and rubbers, cleaning each piece as I go. For the surface, I swear by Novus 2 and an old-school classic – Mr Sheen (the original Australian formula, not the New Zealand aerosol).

Older playfields (pre 1990) weren't built with modern clear coats. Many used Mylar overlays for protection, which can bubble or trap dirt over time. Removing them risks pulling artwork with it, so every decision here is case-by-case.

On older wood, where the paint is delicate, gentle cleaning and a final coat of carnauba wax can bring back a beautiful sheen without damage. A little wear tells the story of a life well played – and that's a patina worth preserving.

Deep restorations – when things get serious

Sometimes, a playfield is beyond simple cleaning.

I once restored a 1980s game where

Simon Haxton, doing what he enjoys most, playing a pinball machine

most of the art was gone – bare plywood staring back at me. The solution I favoured was a full overlay: sanding down, applying new printed art, sealing with clear coat, and painstakingly reassembling. Hours of labour, but the result was spectacular.

Others prefer replacing the entire playfield with a reproduction, a used original, or even new-old stock. It's a massive job, but worth it if you want that 'factory-fresh' look.

Modern touches – LEDs and rubbers

Every machine I restore gets new rubbers and LED bulbs.

I don't use crazy colours – my goal is a clean, stock look, just brighter and more efficient. LEDs draw less current, produce less heat, and ease the load on the power supply.

With 150-plus bulbs in a 1990s game, those savings add up fast.

Power and reliability

After decades of service, most power supplies are due for retirement.

I routinely replace capacitors, bridge rectifiers, voltage regulators, and any scorched connectors. If it gets hot, it will fail – that's generally the rule.

For safety, I also fit new power cords and line filters. A shorted filter can trip the mains and cause more damage than you'd expect. These small updates make a huge difference for reliability.

Cabinet care – the outer shell

A cabinet can tell as many stories as the playfield.

Faded art, scratched paint, cracked timber – they all show where the game has been.

I'll admit: I'm not a cabinet guy. If a game needs major woodwork, I bring in a professional. Once prepped, I apply new decals myself for a crisp finish. But often, I leave minor scuffs alone – that's honest wear, not a flaw.

Mid '90s and earlier machines had screen-printed or stencilled artwork. These deserve to be preserved, not repainted. If the art's still decent, let it breathe. Restoration is about respect, not perfection.

Maintenance for life

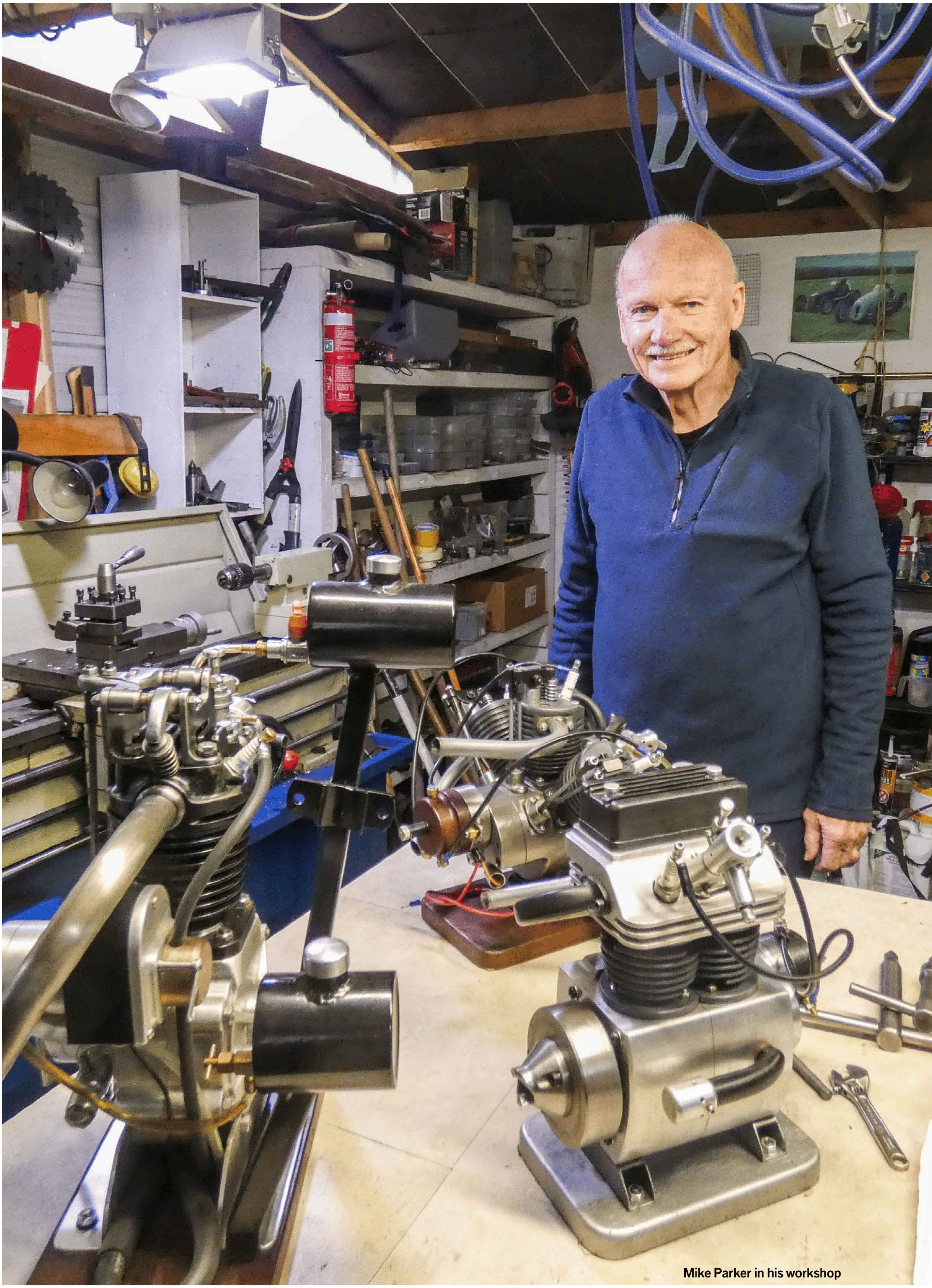
A clean machine is a happy machine. My *Ghostbusters* (2016) has clocked 30,000 plays and still shines like new because I stay on top of cleaning and replace the steel balls regularly. Compare that with a 1991 *Addams Family*, which might have racked up hundreds of thousands of plays in its lifetime – yet still runs strong when maintained.

Pinball machines were built to be played. Regular cleaning, fresh rubbers, and timely part swaps will keep them flipping for generations.

The reward – bringing back the magic

For me, this is more than a process – it's a passion. From my first multiball as a kid, on a Black Knight in Caesars Palace, I was hooked. Every restoration rekindles that feeling. The lights, the sounds, the physics – a blend of art and engineering that no digital game can replicate.

Bringing a pinball machine back to life isn't just about fixing what's broken. It's about honouring a piece of history – one silver ball at a time.



Mike Parker in his workshop

THERE'S "NO MONEY IN ENGINEERING"

Not your average travelling salesman, Mike Parker completed an engineering apprenticeship and started designing manufacturing machines, before moving into business ownership and a decades-long interest in all things engineering – alongside a passion for speedway cars. Nowadays, he uses his skills to create some breathtaking small engines

By Ritchie Wilson | Photographs: Ritchie Wilson

Mike Parker is a pleasant fellow to have a chat with, and it's easy to imagine him being a successful salesman.

He's sold abrasives to engineering workshops, wine to restaurants and bars, and nails and fencing staples to hardware shops and rural supply firms.

He talks fondly of his days on the road representing a very large wine company. He would design wine lists for restaurants, install bulk wine dispensers in booze barns, run wine tastings, and discuss new products with customers.

A lot of this involved drinking the company's vintages, often several times a day, and after a couple of years, this became rather wearying. He then worked for Arrow Nails, a company owned by his brother. Mike used the well-thought-out marketing strategies he had learnt selling wine (new packaging, two-for-one promotions, etc.) to increase Arrow's sales in the retail nail market and to get shelf space in hardware shops.

At one time, the business made a range of nails in steel, stainless steel, and silicon bronze in a variety of styles for many applications. Mike thinks Arrow Nails was among the first businesses to supply stainless steel nails to the New Zealand market. Today, only the fencing staples are made in New Zealand – the other nails Arrow sells are imported.

Not your average salesman

In some ways, though, Mike is a bit different from the average commercial traveller.

For example, he designed and built the innovative machine that makes Arrow Nails' fencing staples. This takes wire (made in Auckland by Wiremakers) and cuts a short length off, bends it over an anvil, slices points on the two ends, and pushes the finished staple off the anvil. All in one rotation of the machine's flywheel.

Because of the clever design, the tools that shape the staple's points suffer little wear and only have to be reground about once a year.

As a young man, Mike completed an

Mike in his workshop with some of his miniature IC engines

Mike's cam-grinding jig. In concert with his surface grinder, the jig allows very accurate grinding of his miniature engine camshafts. The handle simultaneously rotates the cam template and the workpiece

"He says that there is 'no money in engineering'"

A cutter-grinder jog made by Mike. It is used for sharpening lathe tooling

engineering apprenticeship in Christchurch. And he has started and run a couple of general engineering businesses. As a minor sideline, one of the businesses produced "about a hundred" wood lathes. He says that there is "no money in engineering", but his experiences have left lasting effects.

He can use his workshop machines quickly and accurately, and he has very definite ideas on the economics of making things: if something can be bought cheaply enough, there is no point in spending time in the workshop making it yourself. He also thinks that the materials used in producing stuff in the home workshop should be as inexpensive as possible – preferably free.

For instance, the cast-iron cylinder blocks of the model engines he builds are made from a hefty round bar of the metal, which was left by a previous tenant in a workshop he rented. The base of his shop-made surface grinder is a very large lathe faceplate no longer needed by his brother's business.

He has a well-equipped engineering workshop on one side of a double garage beside his suburban home, where he makes miniature internal combustion (IC) engines. The shop's medium-sized metal lathe, small drill press, mill drill,

Mike looking through his drawings of his miniature engines

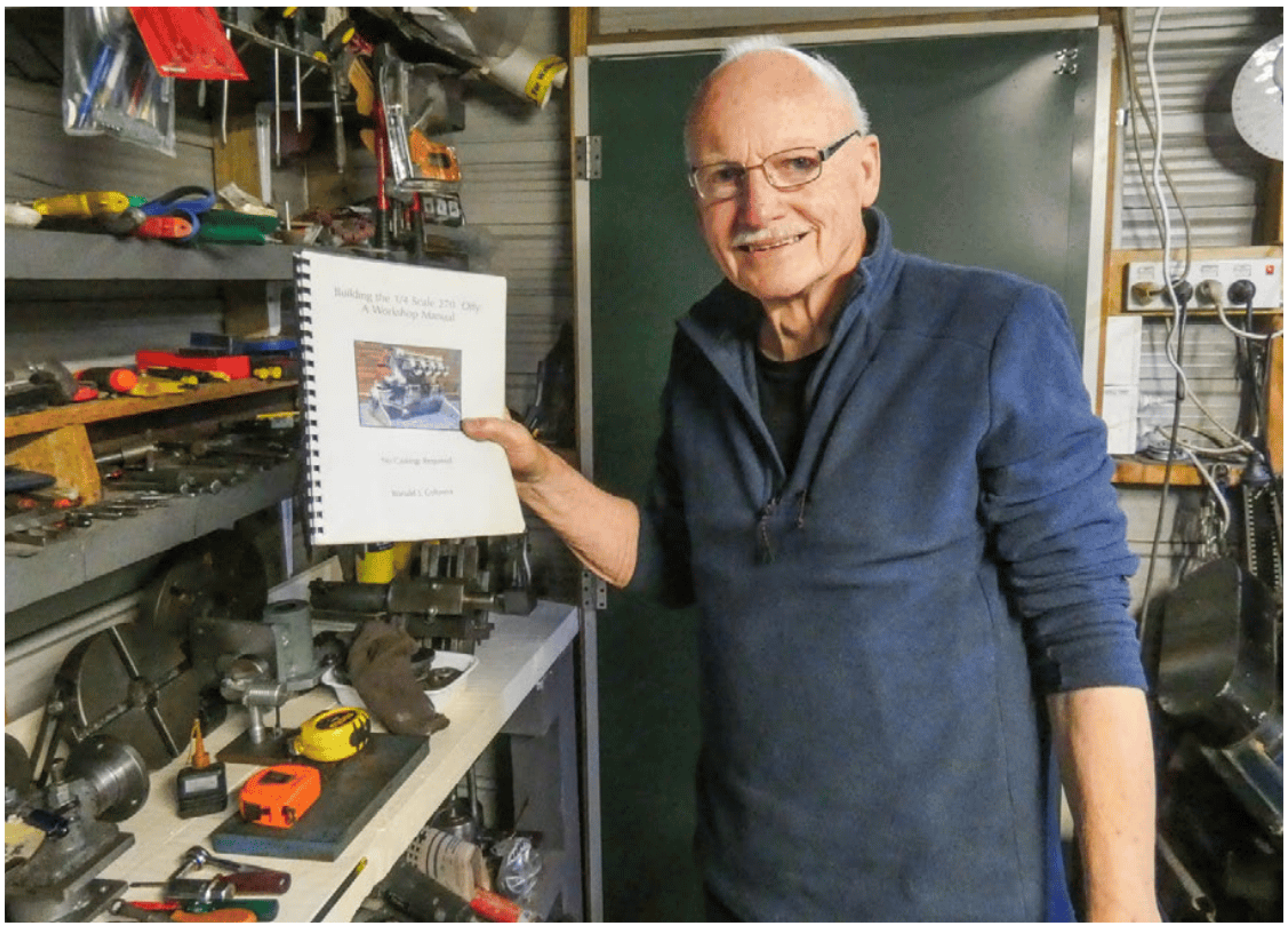
hydraulic press, and bandsaw are all of Chinese manufacture.

An insurance write-off

The lathe was originally owned by Arrow Nails but was thrown on its side in the 2011 Christchurch earthquake, suffering a cracked bed, broken handwheels, and a smashed apron on the cross-slide, causing it to be written off by the insurers.

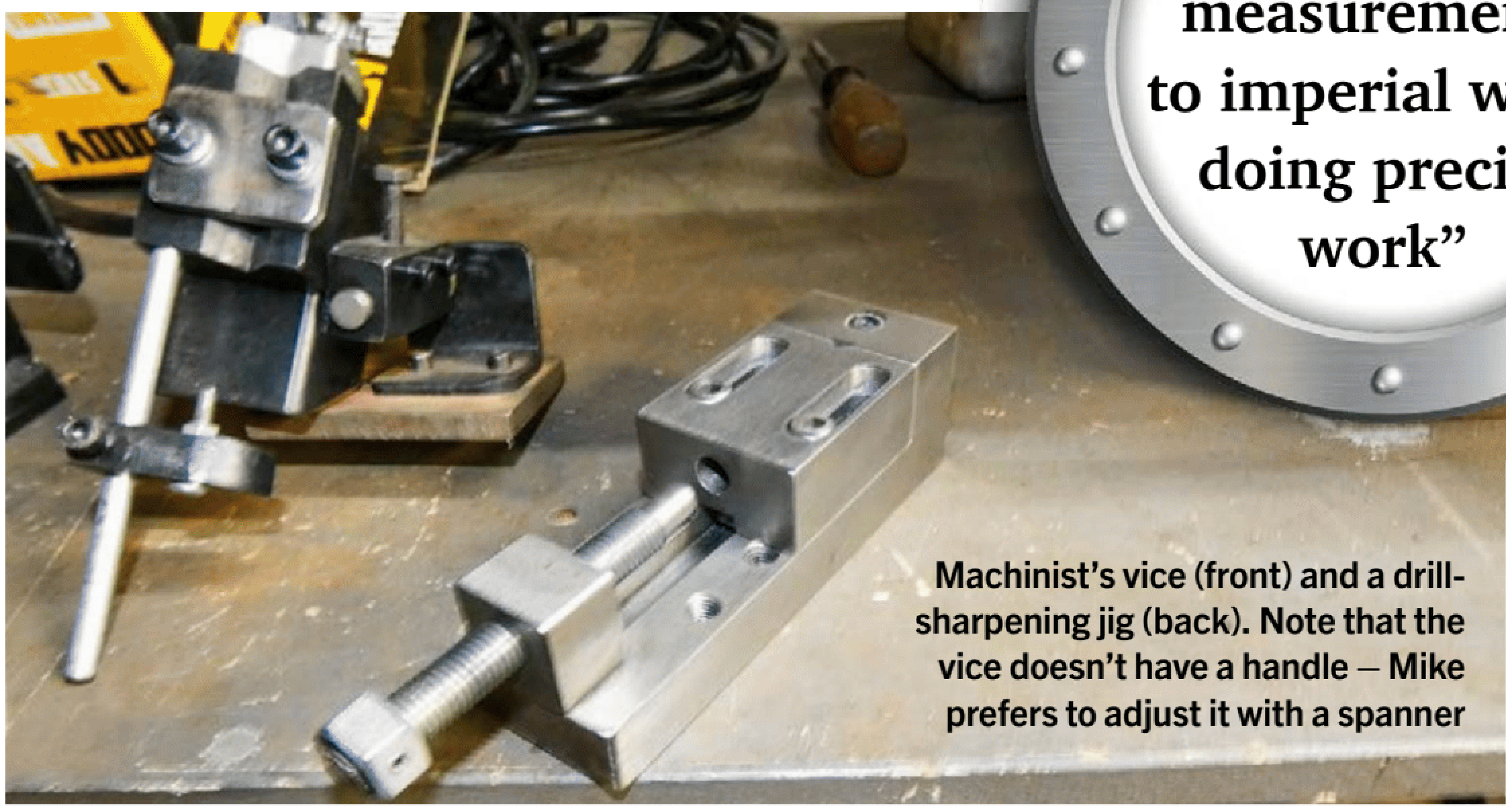
Mike repaired the crack by inserting bolts across the bed and making a clamp to pull one side of the crack into line. He made new handwheels and an apron. He says that he can reliably produce components to an accuracy of "about a quarter of a thou" on the repaired machine. A 'thou' is a thousandth (0.001) of an inch, which equates to 0.025mm. An 'average' human hair has a diameter of perhaps two thou.

Much of Mike's measuring equipment, such as his 60-year-old Moore and Wright micrometer, is imperial. His Mitutoyo Vernier callipers and various rules are metric, and he uses metric dimensions in his drawings, but converts measurements to imperial when doing precise work. He says that he likes imperial measurements because he is "old school" and can use his venerable



Mike holding Ron Colonna's quarter-scale Offenhauser building manual

One of many homemade accessories that Mike uses to improve the accuracy of component machining



Machinist's vice (front) and a drill-sharpening jig (back). Note that the vice doesn't have a handle – Mike prefers to adjust it with a spanner

Surface grinder built by Mike. The main support is made from parts of a wood lathe that he made when he owned an engineering business. The base is an unwanted large lathe faceplate

> "But converts measurements to imperial when doing precise work"

micrometer for them, but he also thinks the old system has some advantages for precision engineering.

The mill drill is extensively modified to give acceptable accuracy and better usability. Its pillar has been replaced with a more rigid one, and a more precise table adjustment has been fitted. It is hardly recognisable as the original machine.

Making machines from scratch

Mike has made several of the workshop's machines from scratch, making extensive use of the scrap bin.

The most complicated is the surface grinder. This accurately forms a flat, well-finished surface on a metal component. At its heart is a bench grinder which cost him less than $100. The grinder drives a narrow 150mm diameter aluminium oxide wheel and is firmly supported above a movable base. The work is held by two inexpensive on/off magnetic holders mounted on the movable base.

As the base is moved, the grinding wheel produces a ground surface on one face of the work. The grinding wheel can be set at different heights above the base because the grinder is attached to a hinged arm (made from a section of an unsold wood lathe), which can pivot up or down.

There is a wheel dresser with a diamond tip incorporated in the design, which is used to true-up the wheel's circumference as it is worn. Mike has made three accessories for the surface grinder: a cylindrical grinder, a radius grinder, and a cam grinder.

Grinding a model engine camshaft

When a model petrol engine camshaft is to be ground, it is set between centres in the cam grinder attachment and positioned under the grinding wheel.

As the cam grinder's handle is turned, the camshaft is rotated and the grinding wheel rises and falls following a sheet-steel template of the cam profile, four times larger than the cam being ground,

Fan engines

The first IC engines were single-cylinder stationary engines mostly powered by coal gas.

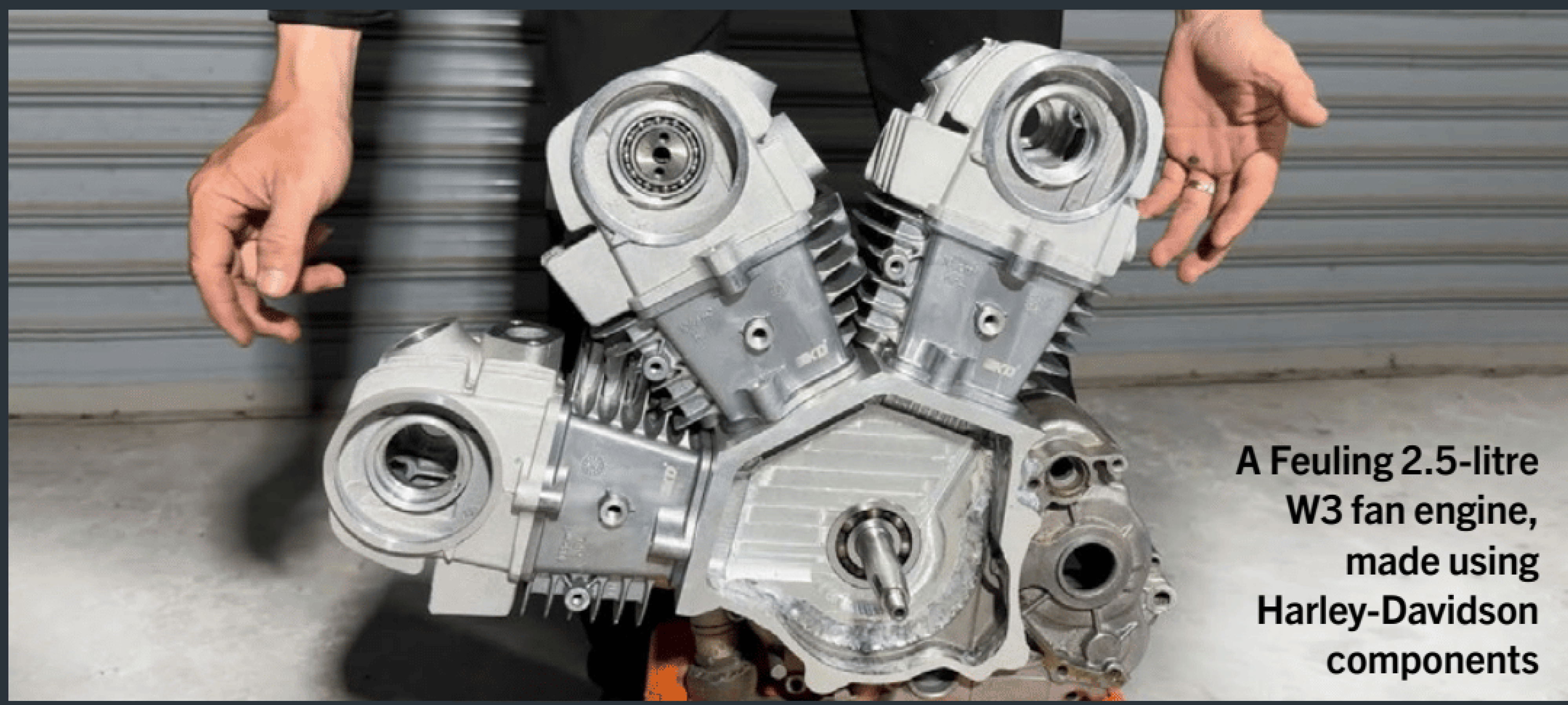
Eliminating vibration is difficult in a single-cylinder engine, so these early engines invariably had a large flywheel to make them run a bit smoother. Having more than one cylinder can reduce vibrations, so a flat-twin or six-cylinder in-line engine can be almost vibration-free.

Both of these have been tried in motorcycles (BMW boxer and Honda CBX), but they have some drawbacks. A popular type of motorcycle engine is the V-twin mounted longitudinally, as in the Harley-Davidson or Britten.

This fits very well in a motorcycle frame and allows an uncomplicated drive to the back wheel through a chain or a belt. For a particular engine capacity, two cylinders produce more power than a single cylinder because they can breathe more efficiently. In general, more cylinders result in better delivery of the fuel/air mixture to the combustion spaces. This is taken to its logical conclusion in Formula 1, where 16-cylinder engines have been campaigned.

Italian Alessandro Anzani began making motorcycles in France with V-twin engines in 1905. He then inserted another cylinder in the middle of the 'V' and produced a W-3 engine, also called a 'fan' engine.

The cylinders were at an angle of 60 degrees to each other. The W-3 engine fits in a motorcycle frame almost as well as a V-twin. In 1909, Louis Blériot caused an absolute sensation when he became the first person to fly across the English Channel. His aircraft was a Bleriot monoplane powered by an Anzani W-3 engine. Anzani also made three-cylinder engines where the cylinders were at 120 degrees to each other, forming an inverted 'Y'; two of these engines were later combined to create one of the first radial engines.



A Feuling 2.5-litre W3 fan engine, made using Harley-Davidson components

In modern times, the Feuling company in the US has produced the W3, a 2.5-litre, three-cylinder engine in a W-configuration, using aftermarket Harley-Davidson components. The three cylinders are at a 45-degree angle to each other – the same as in the Harley V-twin, so the W3 is slightly longer. 'W3' is a registered trademark of the Feuling company.

In the 1970s, Moto Guzzi developed a W-3 prototype, the W103, but didn't put it into production. Like the Anzani, the cylinders were arranged with 60 degrees between them. The engine is reported to have had a displacement of about 850cc.

The advantage of a fan engine is that it occupies much the same space as a V-engine but has 50 per cent more capacity. There are a few examples of larger fan engines, such as the Napier Lion W-12 aircraft engine of the 1930s, which had three blocks of four cylinders on a common crankcase.

Anzani fan engine

which is turning in unison with the cam, the two being connected by a toothed belt.

The pantograph-like effect of using a much larger template is that any slight inaccuracy in cutting out the template is minimised, and the cams can be ground to within a fraction of a thou of specification. The fine grit of the grinding wheel leaves the camshaft with an excellent finish. Seeing it in action makes it obvious that a surface grinder would be a valuable addition to a metalworking workshop.

The tool and cutter grinder also incorporates a small bench grinder made in China. This is used for accurately forming the cutting edge of high-speed steel (HSS) lathe tools. A complicated drill-sharpening attachment has been made for this machine. ▶

Hydraulic press used for assembling built-up crankshafts

“All podium winners at the race had driven Offy-powered cars”

Yet another bench grinder has been fitted with a disc sander and a linisher.

A machinist’s vice is another device that Mike has made from pieces of scrap steel. The finish left by the surface grinder on the metal is very attractive, and it could easily be thought that the vice was an expensive product of a large factory.

Bench grinder with linisher and disc sander attachments

The Offenhauser engine

One of the most famous engines used in racing in the US is the Offenhauser, universally known as the ‘Offy’.

The design of the Offy – water cooled, four cylinders, four valves per cylinder, double-overhead camshaft (DOHC), hemispherical combustion space, fixed head, dry-sump lubrication – dates from the very earliest days of Grand Prix racing.

The Offy is the result of decades of development of the 1913 7.6-litre Peugeot L76 racing car engine, which won that year’s Indianapolis 500 race. The Offy has a fantastically successful history at the Indianapolis Brick Yard, winning a total of 27 times. Between 1950 and 1960, all podium winners at the race had driven Offy-powered cars.

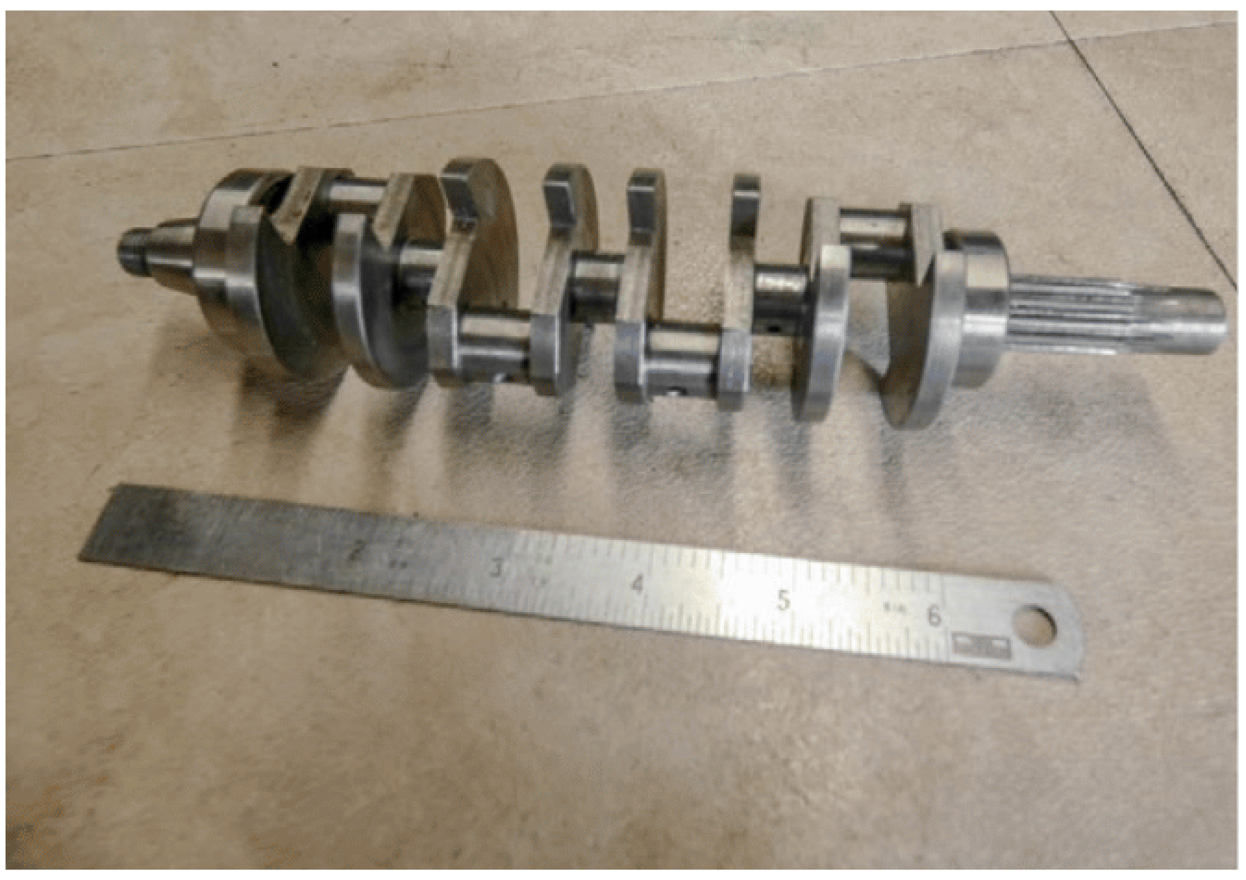
Offy-powered speedway cars in New Zealand, such as Peter Lyttle’s 1947 Kurtis Kraft, which is displayed in Geraldine’s Roger Mahan Heritage Centre museum, use a different Offenhauser engine, which has a smaller capacity and has two valves per cylinder rather than four.

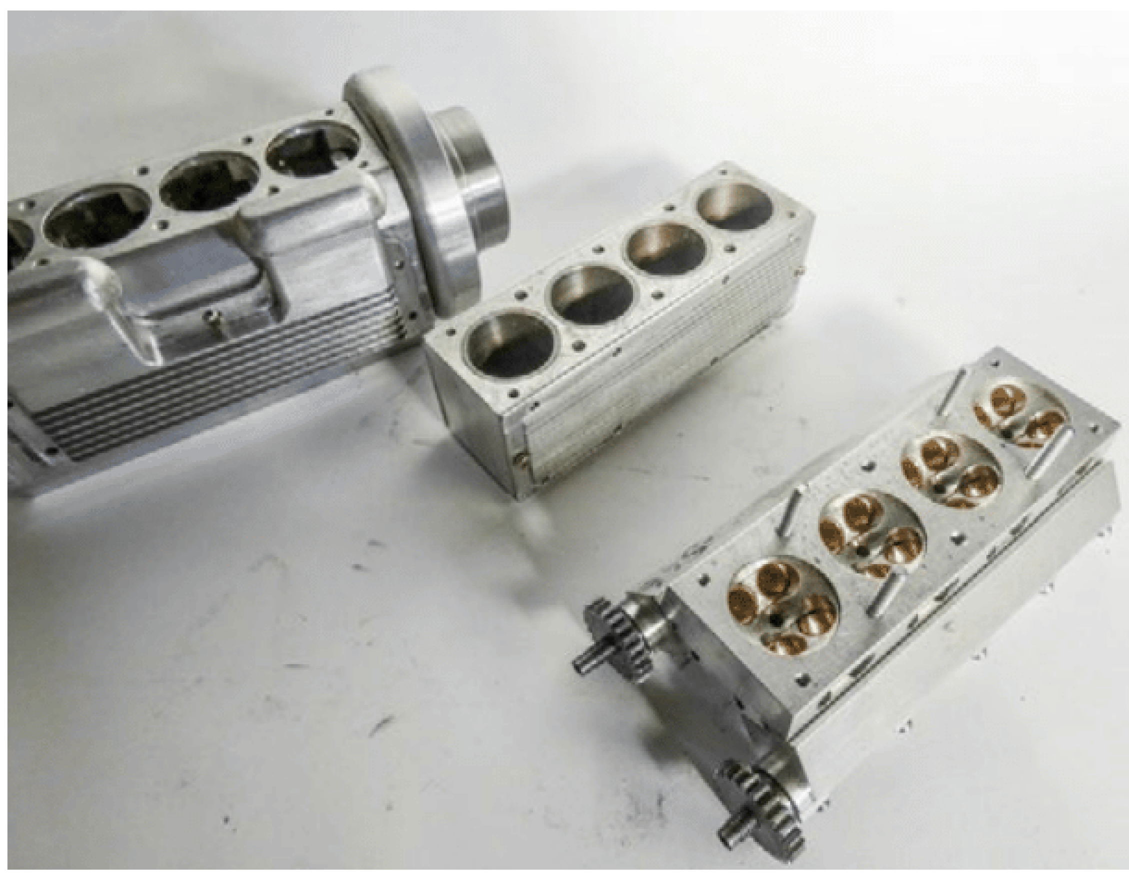
About 20 years ago, Mike Parker bought a book on making a quarter (1:4) scale model Offy engine called *Building the ¼ Scale 270 Offy: A Workshop Manual; No Castings Required* by Ronald J Colonna (1990).

The 128-page self-published manual described how to make a model of the iconic engine from bar stock. Ron Colonna, having worked for a couple of years in a steel mill around molten metal, preferred to avoid castings. Mike’s engine is not finished – other projects have got in the way – but the end is in sight.

Vertical belt sander

Miniature Offenhauser engine





The major components of the Offenhauser engine

MIKE'S MODEL ENGINES

The 1:4 scale Offy 270 Engine

The 1:4 scale Offy engine has a 26.2mm bore and 28.0 mm stroke, giving a capacity of 60cc.

It has a compression ratio of 9.5:1 and has a full-pressure dry-sump lubrication system. The crankcase is barrel shaped, and the five-bearing crankshaft is fed into it from one end. The main bearings are held in circular webs rather than by the usual, relatively flimsy, bearing caps.

On the full-size engines, access to the bolts holding the webs to the crankcase was provided by ports in the side of the crankcase; this wasn't practicable at quarter scale, so the webs on Mike's engine are fastened by bolts from the outside of the crankcase. This design of the main bearing is immensely strong and gave the Offy a bottom end which was almost indestructible.

In Ron Colonna's design, the cylinder head is separate from the block, as is usual in IC engines, rather than being integral, as in the full-size Offy. The model engine's main components are the crankcase, block, and cylinder head. In the full-size Offy engine, the block and head being a single casting means that it has no head gasket problems, so high compression ratios can be safely used and very high (over 40 pounds of boost) forced induction pressures are possible.

To make machining easier, Mike has sometimes not followed Ron Colonna's design. For example, the oil pumps are external rather than internal. Most of the machining on the engine is fairly straightforward but requires a high degree of accuracy.

One of the trickiest jobs was drilling the 1.5mm diameter passageways through the crankshaft pins and webs. This also had to be done to the two camshafts, which, like the crankshaft, have had their journals ground on the homemade cam grinder to the same profile and specification as the full-size ones. He started work on the engine about 20 years ago, but due to other

Don Edmunds

Don Edmunds raced midgets in California in the 1950s and finished 19th in the 1957 Indianapolis 500, winning the Rookie of the Year title.

The race that year was part of the World Championship of Drivers competition. He had a bad smash in practice for the 1958 event and did not start in the race due to his injuries. He had worked in race car fabrication, and after retiring from driving in 1959, he set up a very successful business designing and building midgets, sprint cars, supermodifieds, and a large number of Super Vee racing cars from 1960 to the early 1980s.

Because of his success, his cars were much imitated, and the type of midget he produced became known as the 'Edmunds style'.

In his later years, he restored vintage speedway cars and built intricate model cars. He died in 2020 at the age of 89.

projects, including other engines, progress has been slow.

Since he started the Offy 270 model, Mike has completed and run several IC engines. All are interesting.

Crocker-based Speedway Engine – 2:5 scale

Mike was originally going to build a model of the famous Crocker V-Twin motorcycle engine.

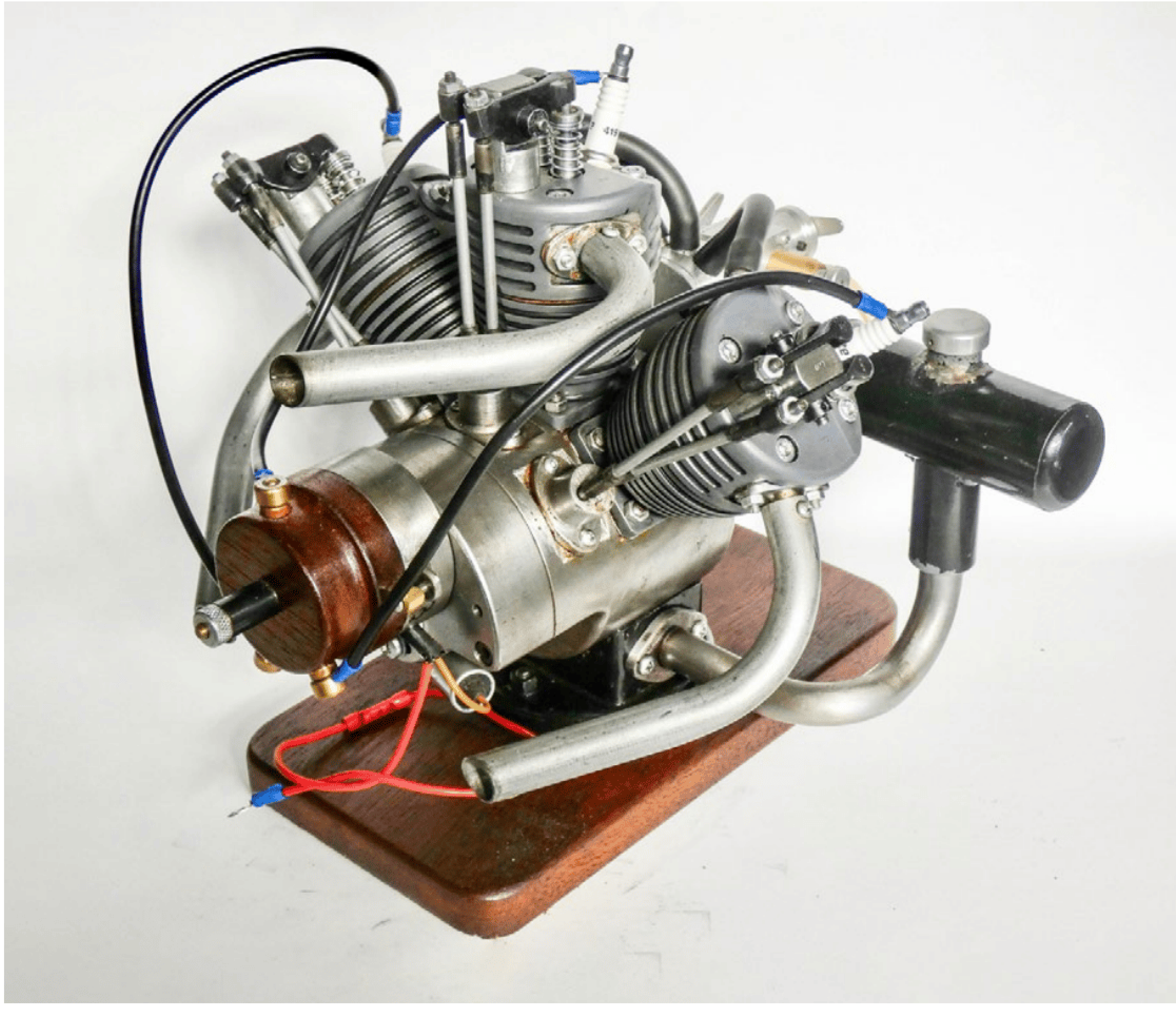
The Crocker motorcycles, which these engines powered, are amongst the most sought after in the world – and unbelievably expensive. They were made in Los Angeles between 1935 and 1940, when Al Crocker then stopped making them to concentrate on the Scootabout motor scooter, which had a small side-valve engine and an automatic transmission.

While researching the V-twin, Mike came across the 500cc speedway engine that Al Crocker developed in 1933. Crocker designed this to compete with the JAP 500 engine at the racetrack; however, he only built about 60 before concentrating on the V-twin. The single-cylinder engine is a typical inclined-valve pushrod engine design of the era, with a hemispherical combustion chamber. At least one of these engines survives.

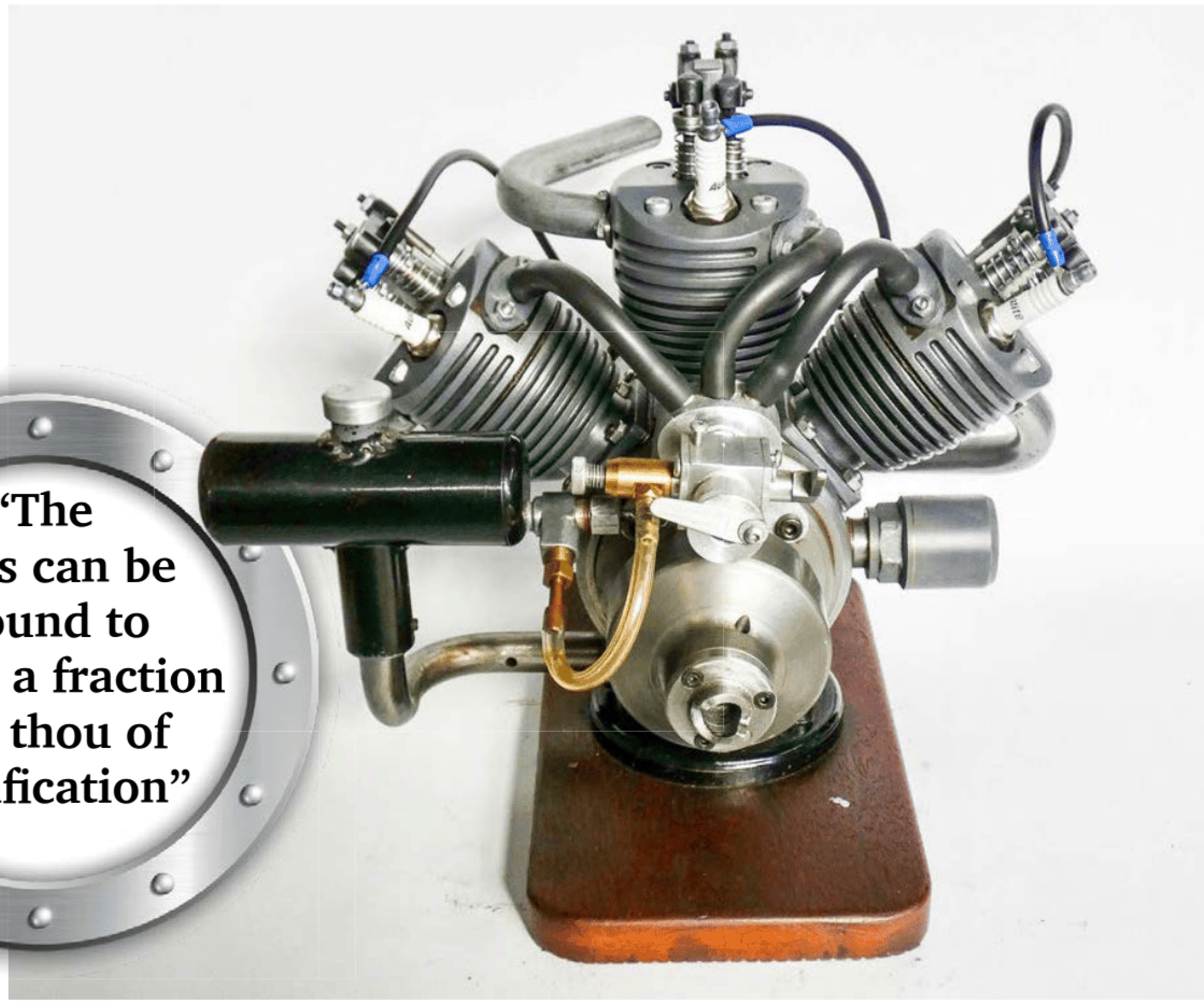
The model has a bore of 38mm and a stroke of 42mm, giving a capacity of 48cc, with a compression ratio of 8:1. The crankshaft is built-up, with ball-bearing mains and an alloy connecting rod running directly on the shaft's journal, as in small Briggs and Stratton engines.

The engine has a total-loss oiling system fed by a gear pump on the end of the camshaft. The camshaft is ground to a typical speedway profile. Mike says that he used exposed valve gear on the cylinder head as this looked better and was easier to make. The ignition uses a points-type ignition set hidden inside a dummy magneto, in typical model engineering fashion. The carburettor was from Ali Express, costing $12; Mike couldn't be bothered making one at that price.

"The cams can be ground to within a fraction of a thou of specification"



The unusual W-3 'fan' engine, designed and built by Mike Parker

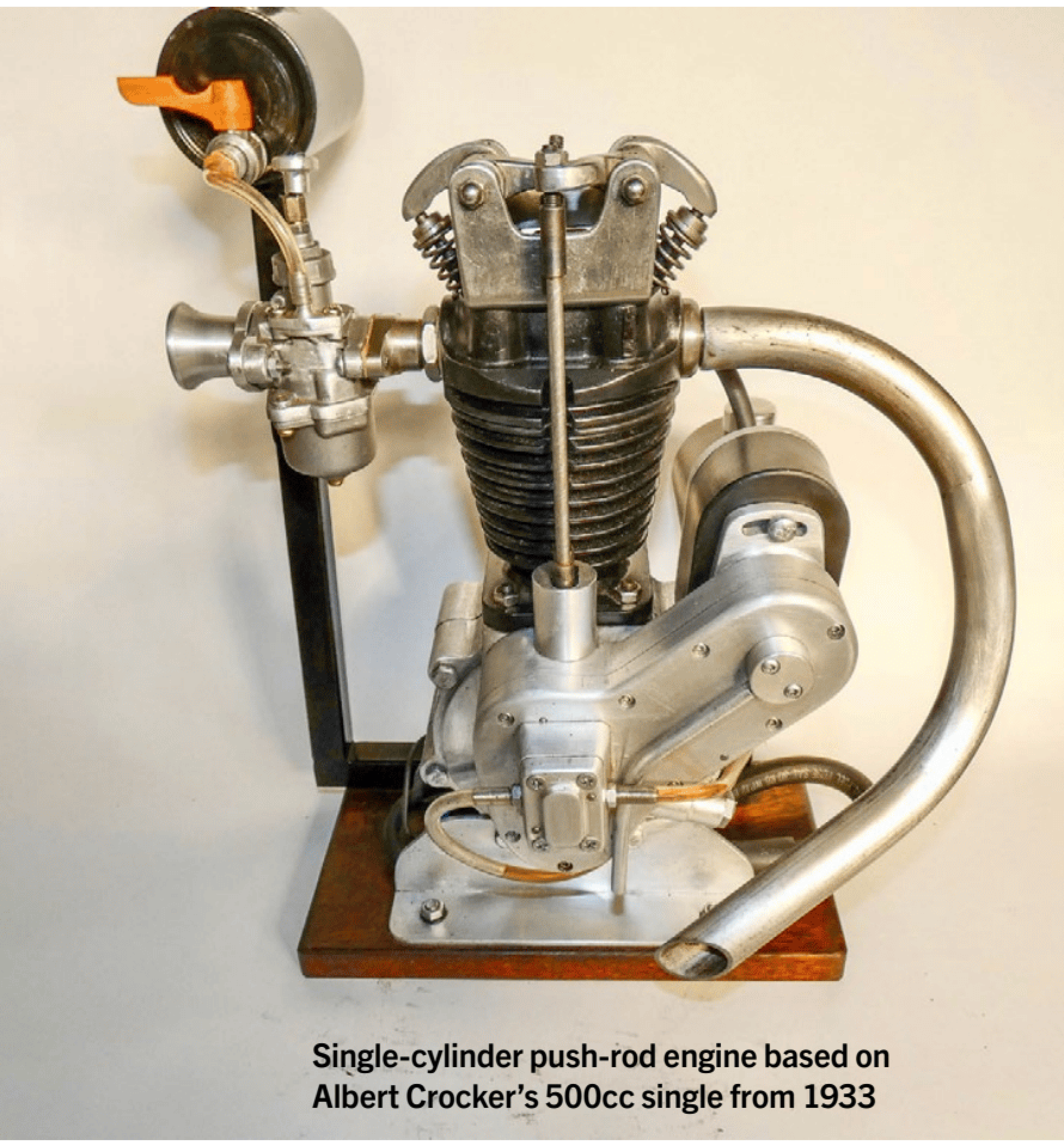


The W-3 Engine

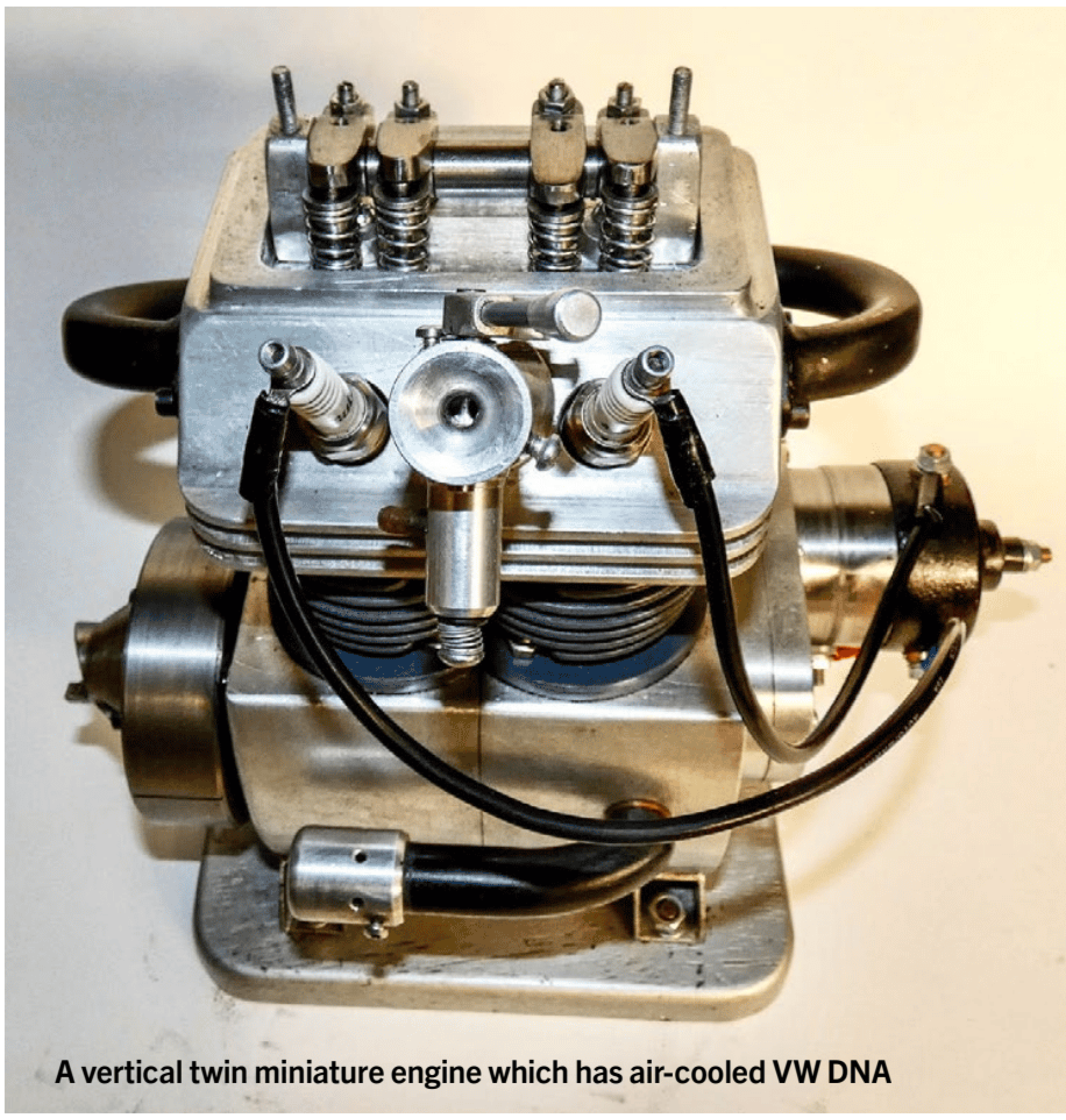
The W-3 engine has three cylinders, arranged like three fingers on one hand pointing upwards.

The cylinders have a 45-degree angle between them. This type of engine is known as a 'W' or 'fan' engine – the cylinders poking upwards like three ribs of a Japanese fan. All the cylinders are above the crankcase, as it was thought that the three spark plugs would be less likely to be contaminated by oil. This was called 'oiling up' in the early days of motoring. Mike is sceptical that any engine with good compression would suffer from this.

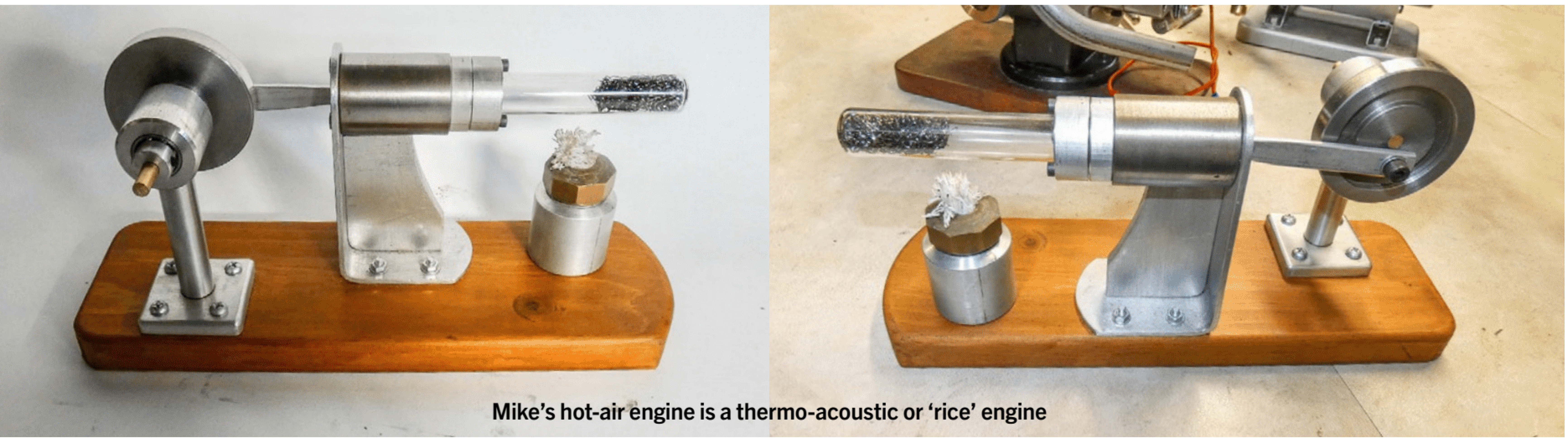
This engine has a bore and stroke of 28mm, giving it a capacity of 52cc. It has an 'overhung' crankshaft with only a single main bearing. The connecting rods are similar to those of a radial engine. This involves a master connecting rod for the centre cylinder running on the crankshaft journal and two 'slave' rods



Single-cylinder push-rod engine based on Albert Crocker's 500cc single from 1933



A vertical twin miniature engine which has air-cooled VW DNA



Mike's hot-air engine is a thermo-acoustic or 'rice' engine

Wooden test pieces, made during the design phase of making the miniature engines

connected to the master rod for the two outer cylinders. The valves are operated by pushrods, the lubrication is by splash and coil ignition is used. Mike designed and built this engine because of its quite novel layout.

The in-line twin

This engine has a bore of 30mm and a stroke of 26mm, giving a capacity of 37cc.

It is based on an air-cooled VW cylinder head and barrels – in effect, a vertical half VW. Mike likes the VW engine a lot. The crankshaft has a 270-degree configuration for the crank pins. This gives an exhaust note the same as a 90-degree V-twin. Mike designed the carburettor, and it has a normal oil supply and a points ignition. The valves are pushrod operated.

The side-valve single

Mike's designs start, of course, in his head.

He then draws the outline of the design on large sheets of graph paper (which he has had for decades) to get measurements and angles. He often then makes a full-size model of various components – crankcases, cylinder heads, etc., in kwila hardwood, to determine if there are problems with the design in three dimensions that are not apparent in the drawings.

He says that he can produce these

wooden prototypes very quickly, spending only an hour or so on them. He is then ready to start making swarf as he machines the engine's bits out of aluminium billets and scrap cast iron and steel. Much of the design is finalised as he goes along.

At present, he is in the thinking stage of a new design, which can be quite lengthy. He was considering a two-stroke with a rotary intake valve, again an unusual design, perhaps somewhat similar to the Vespa Sportique of the 1960s. Having made and got going a few engines, Mike is a connoisseur of IC engines' exhaust notes. One of his criteria for the ignition timing of an engine is what the exhaust will sound like. As many sheddies will know, Vespa is Italian for 'wasp', and the Vespa was given the name because its exhaust sounded like an insect.

He has instead decided to make a single-cylinder side-valve engine and has already drawn up the main components. It will have a bore of 28mm and a stroke of 35mm. Like the W-3 engine, it will have an overhung crankshaft – the easiest type to make.

Mike admires the Scott Flying Squirrel motorcycle, which had a two-cylinder two-stroke engine with this type of crank. The crankshaft is made up of three pieces: a disc, which has the journal offset on one side and the shaft to the main bearing in the centre of the other side.

The advantages of this design are that it is relatively easy to make and that the connecting rod's big-end bearing doesn't need a removable cap because it can be pushed onto the journal. A large washer held by a bolt stops the rod from coming off. The side-valve will have a high-performance camshaft featuring steep sides and an almost flat top. This fairly extreme profile is practicable on a side-valve engine because of the simplicity of the valve drive.

One of Mike's major motivations for using his skills and precision machinery to construct miniature IC engines is the satisfaction he gets when the devices first fire up and run.

Especially if it has an evocative exhaust rumble.

No. 21 was powered by a twin-cylinder Triumph motorcycle engine. It had to be modified so that Mike could fit in it

Mike Parker's speedway cars

Photographs: TJ Palmer – TJ Photos (TJPhotos.co.nz)

In his younger days, Mike Parker was a follower of speedway, regularly attending the races at Christchurch's Templeton Speedway.

Two classes of speedway cars are the midget and the TQ midget. The midget has a maximum wheelbase of 76 inches (1930mm), while the TQ midget has a maximum of 60 inches (1524mm). The midget typically has a much larger engine – up to 200 cubic inches (ci; 3.28 litres) – than the TQ.

With the arrival of the internet, Mike was able to research vintage speedway cars from the 1960s and '70s. Then, in 2004, he came across a classic TQ midget, built in 1976, for sale on an online auction for $3K. He bought it.

This was car No. 21.

No. 21

Powered by a Triumph Bonneville supercharged 650cc twin engine, the car also had Hilborn fuel injection.

No. 21 at speed. This was Mike's first speedway car

No. 7 lifting a front wheel as it corners

It had been raced by well-known Auckland driver Len Gardiner and later by Glen Whittington from Napier. By the time Mike acquired it, the supercharger was gone, and the methanol fuel had badly corroded the fuel-injection system. The whole engine had to be dismantled and the jelly-like methanol residue cleaned out. He converted it to run normally aspirated on 100-octane petrol with an SU carburettor. Mike's a tall man, and it turned out that he couldn't fit into the TQ without it being extensively modified, which including moving the steering box and roll cage forward.

Mike became a member of the Canterbury Vintage Speedway Enthusiasts' Club (CVSEC) and remains a current member. The club provides the facilities and opportunities to allow car owners to run "spirited demonstrations" in their vehicles.

He liked the car a lot and drove it at local vintage speedway meetings for about three years before selling it. It was displayed in the Highland Park Museum in Cromwell for several years before being sold back to Christchurch.

Over many years, Mike has collected a small library of books on home-building sports cars, such as Ron Champion's *Building Your Own Sports Car: For as Little as £250 – And Race It!* (1996), PJ Stephen's *Ford Specials* (1960), and the 750 Motor Club's *Design For Competition: The Special Builders Guide* (1966), so it isn't surprising that he decided to make his own TQ after selling the Triumph-powered one.

One motivation was that existing vintage TQs were not readily available; another was that it is relatively straightforward to build a reproduction of a vintage speedway car compared with making a road-legal car. After much deliberation, Mike decided to build a reproduction of a 1980s TQ. This was car No. 7.

No. 7

No. 7 was originally going to have a V-twin engine, but Mike finally decided to build a two-cylinder flat-twin half VW engine.

These engines were used by some competitors around the same time as the full-sized midgets started using the four-cylinder VW engine.

To reduce the 1200cc air-cooled engine to 650cc, as required by TQ rules, Mike removed two cylinder barrels and cut the cylinder heads in half.

A full-size crankcase was used with the rear two barrel openings blanked off. The original crankshaft was used, with the rear crankshaft journal's oilway outlets being plugged and running the connecting rods on the front two journals only. The engine was supercharged with an AMR 300 blower and ran on avgas.

The basis of the car was a full-cage chassis, which Mike bought for $80 after seeing it in a friend's backyard. He extensively modified it.

The steering box was completely homemade using parts of a VW crown wheel and pinion. This gave very direct steering to the 10-inch Mini wheels. Both front and rear suspension were coilovers, with Harley-Davidson used on the front and Suzuki on the rear.

The drive to the narrowed and locked Morris Minor differential – commonly used on early TQs in New Zealand – was through a hand-operated VW clutch, which acted as an in-out box.

This car was an easy vehicle to drive, with the horizontally opposed twin being much smoother than the vibrating Triumph 650 vertical-twin.

Mike had a bad accident with this car when it rolled after hitting a large hole in the track. The roll cage went over his arm and caused serious injuries to his left wrist. Three operations were needed to reconstruct the wrist, followed by 12 months of physiotherapy, leaving him with reduced movement in this wrist. The CVSEC made arm restraints mandatory after this accident.

Mike sold this car about 10 years ago, and it is still running at CVSEC track days.

Roll bar midgets

The speedway racers that most appealed to Mike were the classic roll bar–type midgets, which mimicked the body design of mid-1930s open-wheel British racing cars, such as the Austin Seven Twin Cam.

These cars were rarely for sale, and quite expensive when they were, so he decided to build a reproduction of a late-'60s Brisbane-built car, which used a supercharged air-cooled VW engine. This car was reportedly the first midget to use this engine anywhere. It is also believed that visiting American speedway drivers were influenced by this car and, just a few years later, the VW-based engine became dominant in Midget car racing in the US, until it was, in turn, supplanted by in-line four-cylinder engines.

Mike was able to obtain new reproduction fibreglass Edmunds-style body panels suitable for a classic midget,

The VW-powered No. 88 passing another car

and so was able to design the car's chassis around these.

This was car No. 88.

No. 88

No. 88's chassis involved twin-rails with crossmembers, known as a 'ladder' chassis. It had a narrowed Ford Cortina differential and a Ford 10 front axle.

The suspension was unusual: the front axle was supported by quarter-elliptic leaf springs and the rear by Morris Minor torsion bars in a rather novel arrangement. All the work was done by Mike, including narrowing the suspension's differential and cutting new splines on its axles. The car's layout was drawn, full size, on Mike's garage wall, in the best tradition of amateur 'Special' constructors. Traces of the design can still be seen on his wall.

The motor was a petrol-fuelled 1600cc twin-port VW with a Japanese Aisin SC12 supercharger. Twin 1¾-inch SU carburettors were used. The drive was through a MkIV Cortina gear-box, with only the third gear being used. As we will see, the surplus gear-box cogs weren't wasted.

A cut-down Range Rover driveshaft connected the gear-box to the differential – a very short distance. Like most vintage speedway cars, it has only rear-wheel braking, which was operated by a hand lever. Mike reckons he spent about $10K on parts, mostly from online auctions, while building the car.

Speedway driving requires swift driver reactions, and so the steering is geared up by a 'quickener box'. This is a gear-box attached to the Cortina steering box, which amplifies movements of the steering wheel, making the steering quicker. Mike made the one on this car using gears from the Cortina gear-box.

This car performed very well and was admired for its classic looks, but Mike decided to sell it as he developed rheumatoid arthritis, which made driving difficult. The midget was sold to another club member and later went to a new owner based near Palmerston North.

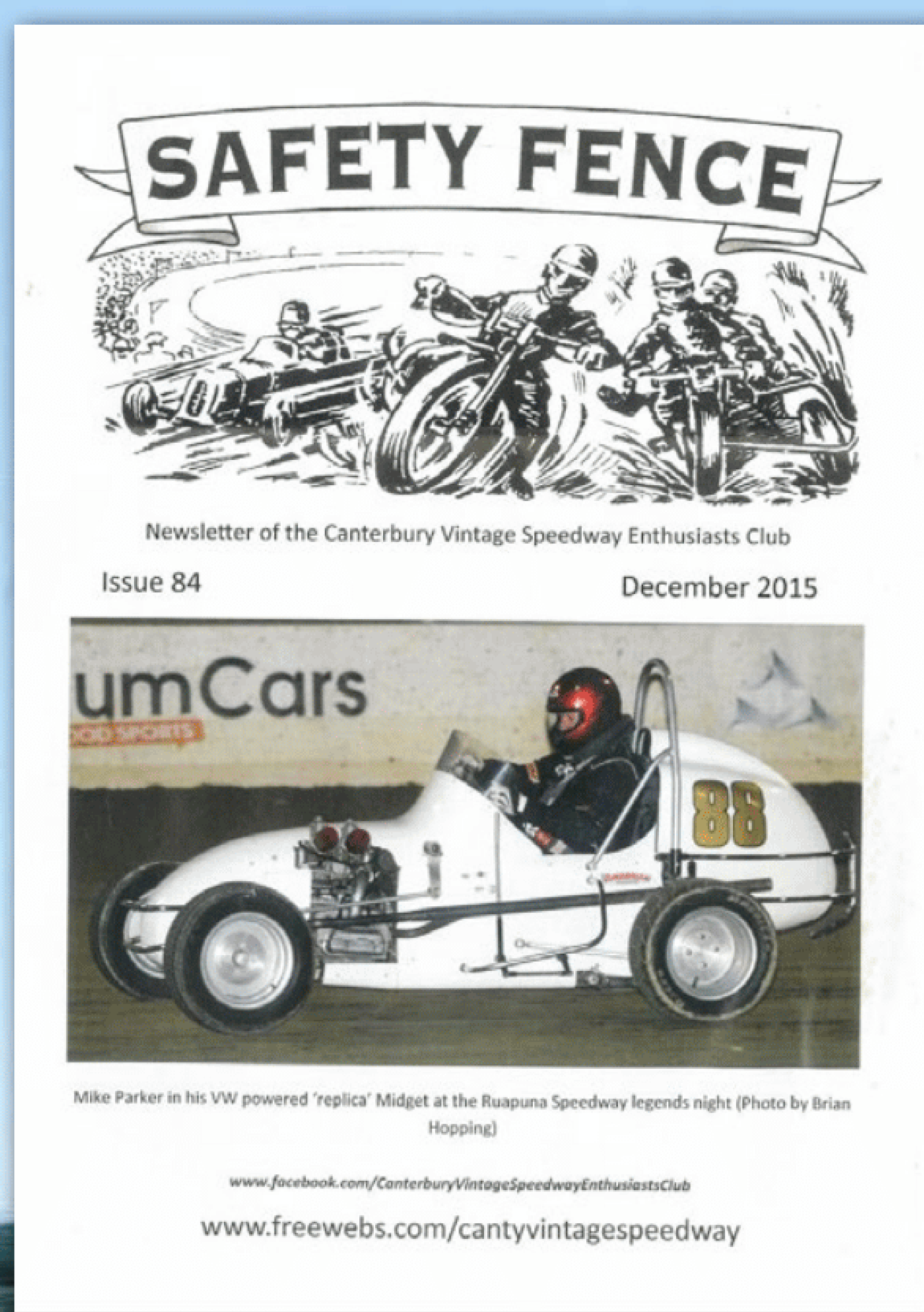
No. X

If Mike were to build another vintage speedway car, it would be a TQ powered by a 650cc parallel-twin, using air-cooled VW engine components, including the crankcase, cylinder head, and crankshaft.

This would essentially be half of an air-cooled VW engine, but unlike the engine in No. 7, which used the front two cylinders of the originally four-cylinder engine, it would use the two cylinders from one side.

It would run on petrol and be supercharged.

Mike's No. 88 midget under construction. The engine is a supercharged air-cooled VW (photo: Mike Parker)



SAFETY FENCE

Newsletter of the Canterbury Vintage Speedway Enthusiasts Club

Issue 84 December 2015

Mike Parker in his VW powered 'replica' Midget at the Ruapuna Speedway legends night (Photo by Brian Hopping)

www.facebook.com/CanterburyVintageSpeedwayEnthusiastsClub

www.freewebs.com/cantyvintagespeedway

No. 88 featured on the front page of the CVSEC's newsletter (photo: Mike Parker)

Giving a "spirited demonstration" on the dirt track

KUMEU HOT ROD SHOW 2026

KEEPING THE WHEELS TURNING TOGETHER

As the engines fire up and the chrome begins to gleam, there's a familiar buzz rolling back into Kumeu this summer. The Kumeu Hot Rod Show 2026, running 16th, 17th & 18th January, is set to return bigger, bolder, and brighter than ever — a celebration of horsepower, craftsmanship, and community spirit that has long stood as a highlight on every car enthusiast's calendar.

For decades, this iconic event has drawn gearheads from across New Zealand and beyond — uniting classic car lovers, builders, and families for a weekend of nostalgia, innovation, and good old-fashioned Kiwi camaraderie. From roaring V8s to meticulously restored cruisers, the Kumeu Showgrounds will once again become a living gallery of automotive art, shining a light on the passion and dedication that fuel this vibrant scene.

But 2026 isn't just another year. It's a year where the show's message carries extra weight. In tough times — when costs are climbing, workshops are under pressure, and small businesses are feeling the squeeze — the Hot Rod community has a unique chance to rally around one another. Events like Kumeu aren't just about showcasing machines; they're about keeping the spirit of the industry alive. Every ticket sold, every handshake shared, and every local supplier supported helps sustain the networks that make our motoring culture possible.

As organisers prepare to open the gates, there's a shared understanding that this show is more than an event — it's a lifeline. It's a reminder that behind every polished hood and roaring engine is a team of passionate people who rely on each other to keep the dream rolling. Whether you're a seasoned builder, a weekend tinkerer, or simply a lover of chrome and curves, your presence makes a difference.

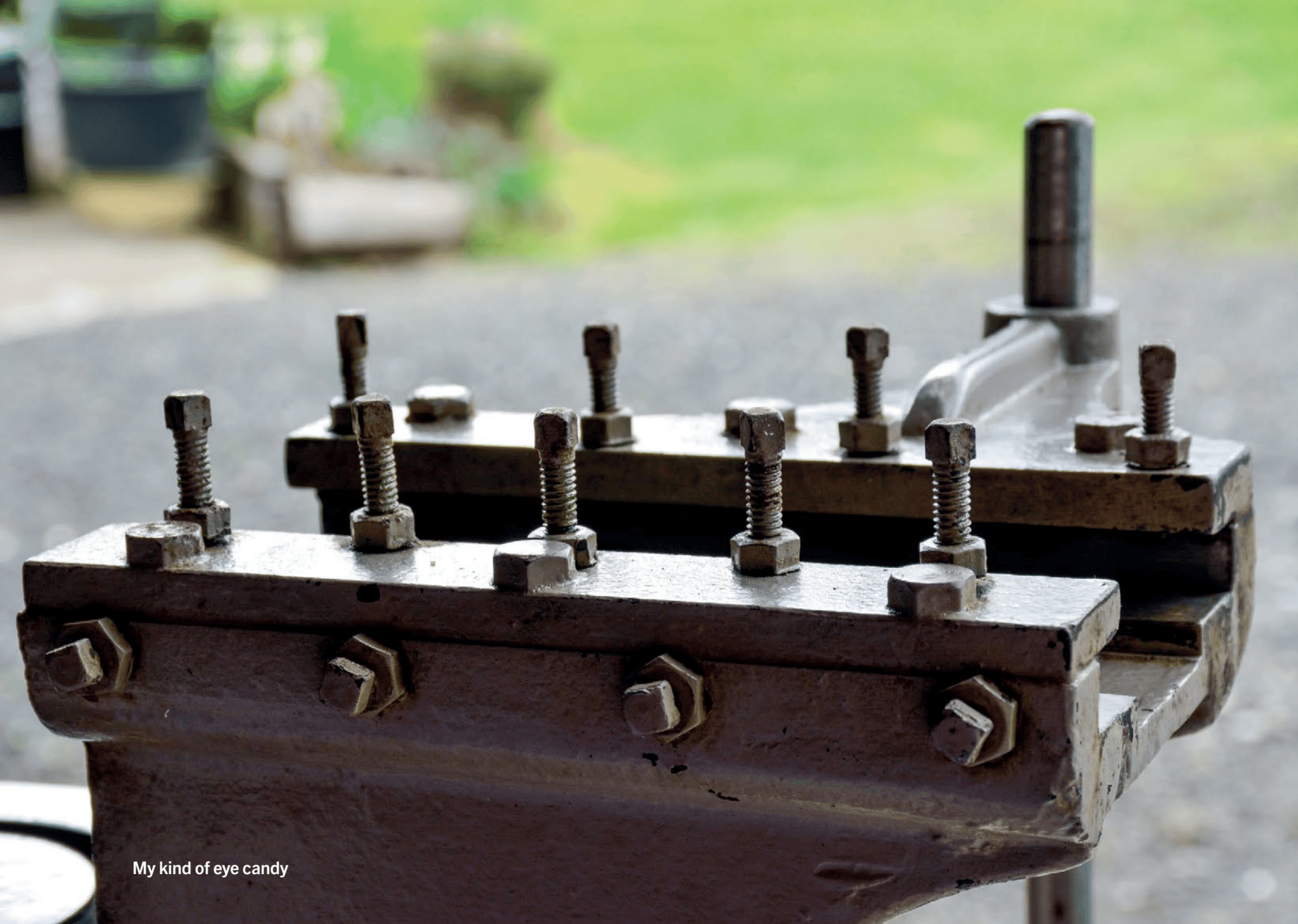
So, dust off the deck chairs, pack your sunscreen, and rev those engines. The Kumeu Hot Rod Show 2026, January 16–18, promises a weekend of nostalgia, excitement, and unity. Let's show that even in challenging times, when we stand together — as mates, makers, and motorheads — this industry will keep on cruising.

Kumeu Hot Rod Show 2026 – January 16th–18th, Kumeu Showgrounds. Stay tuned and support local.

Patently identifying THE CUT OF THEIR GIB

Just like Alice, Murray often finds himself heading down rabbit holes – not to Wonderland as such, but more 'What-is-this-and-who-made-it-land'. Happily, the internet ably helps with discovering patents and tool makers from decades gone by. And then there's Bathurst to fuel his thinking on why we are definitely heading for a future needing simply-maintained tools

By Murray Grimwood | Photographs: Murray Grimwood



My kind of eye candy

In the last issue of *The Shed*, Issue No. 123, I touched on identifying old machinery worth saving; I've been doing more since and learning as I go.

I didn't know what a 'gib' was until a few weeks ago. 'Jib', yes, I've hoisted a few, but gib? No, although I've used many over the years, unwittingly. If you're tracing old machinery history-wise, patents are easily accessible, and this pathway often leads to learning about the people behind the item to which we are giving a new lease of life.

During this period, I watched the rain-soaked Bathurst race too, which put this identifying and saving of useful tools into perspective.

Metal shaper?

I'd never heard of a 'metal shaper', but when I paid a visit to the Otago Model Engineering Society workshop and was shown one that was surplus to requirements, well, I had to put in a tender, didn't I?

I've talked of 'Sheddie eye candy' before; for me, this machine took it to a whole new level. It cost me a membership, too; more on that in a later article. It was clearly missing the screwed-in half of its pulling lever; later, I would find it was missing something else as well …

Drummond Brothers – they could have been the No. 8 Kiwis

My first task was to identify what and who – the manufacturer's badge having been lost (although the screw-holes are still there).

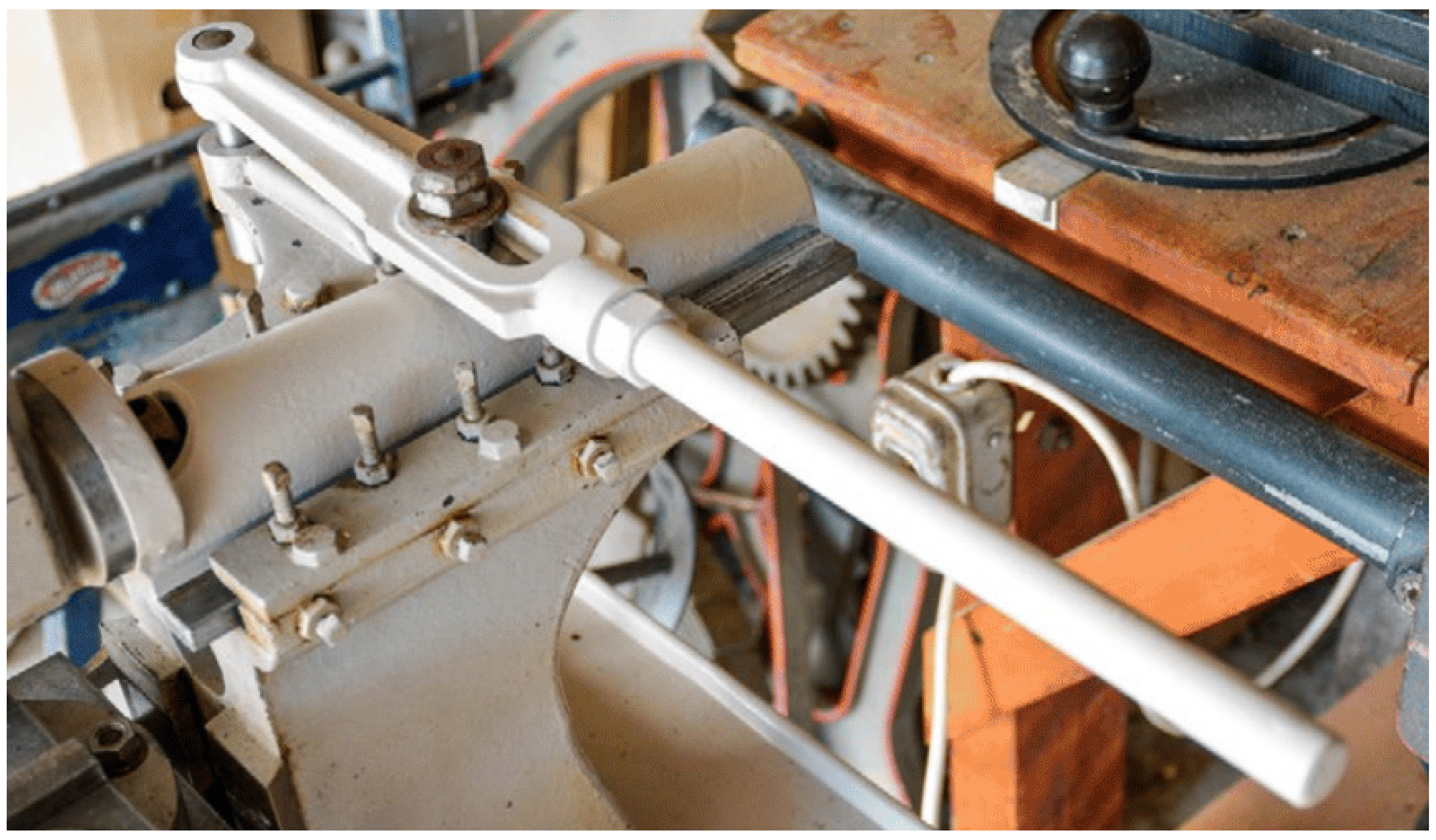
I soon identified it as a Drummond and further homed in on it being the more common Mk2.

Arthur and Frank Drummond formed Drummond Brothers in 1900 to manufacture lathes of their own design. In 1902, they reorganised as Drummond Brothers, Ltd. They were among the first to bring lathes within worker-wage reach, doing so by applying a good deal of lateral thinking. By 1908, they had developed and patent-protected a seven-inch hand-operated metal shaper to add to their range, lately described as "a splendid example of late Victorian engineering" (I couldn't agree more).

Whoever had lost/removed the badge had thoughtfully hand-stamped the serial-number – '786' – into the carriage face. They made around 900, finishing in 1939; this one would have been made late in 1928. Who knows how many still exist? Having gone

Back together – it deserves a better piece of tool steel (in red)

Hand-stamped serial number



I made a new pulling-arm extension

A splendid example of late-Victorian engineering

Still readable after all these years

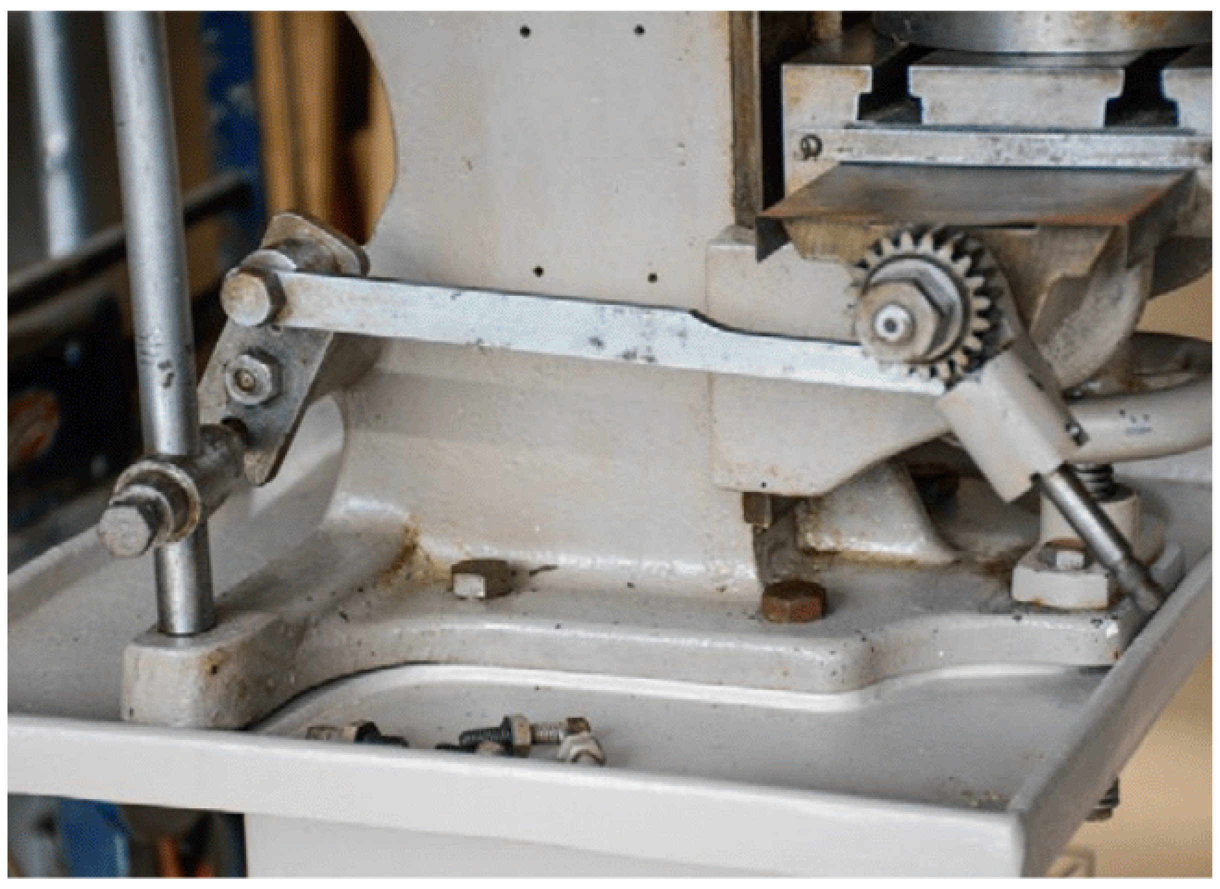
Close-up of table-slide gib (centre)

well down the rabbit hole, I came away feeling slightly smug; it seems these were about as good as it gets in the hand-operated scraper field.

You can tell an engineer by the cut of their gib

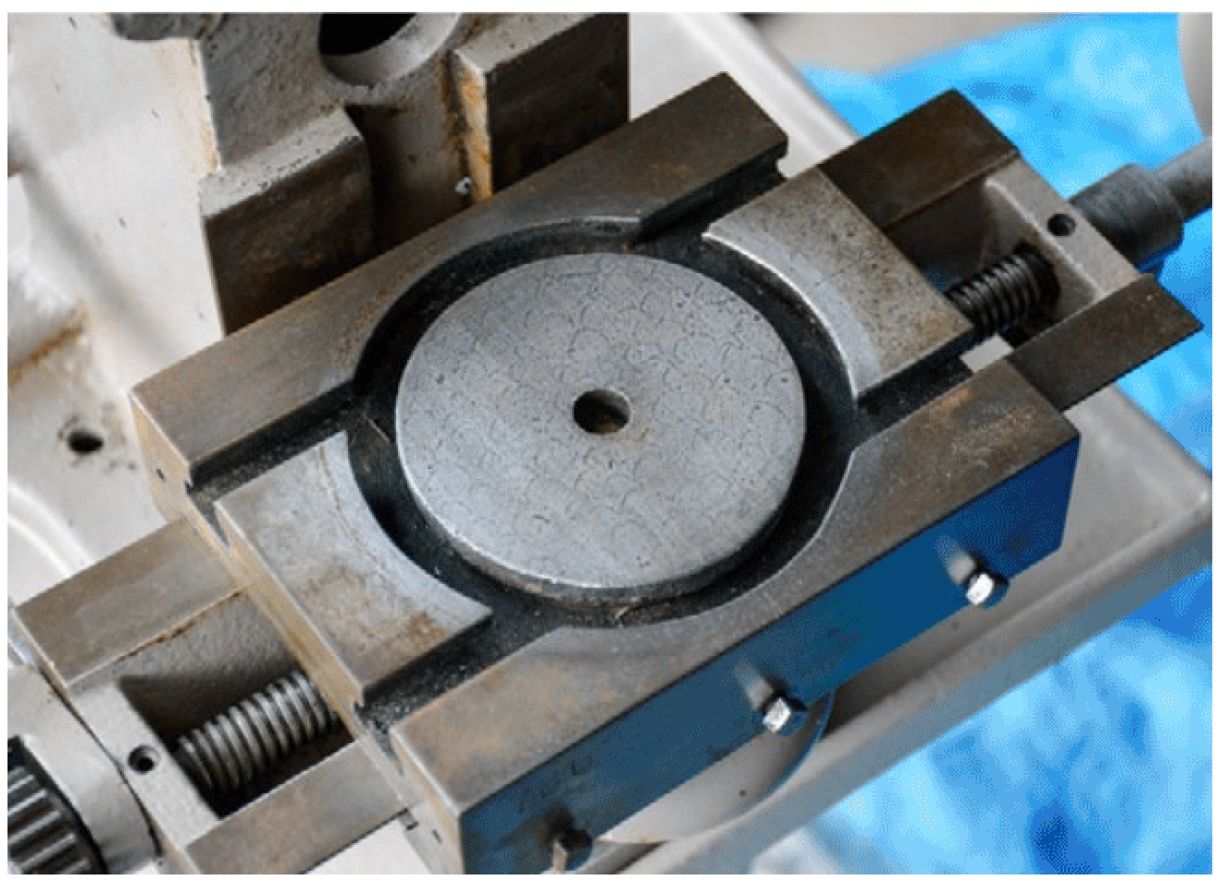
One of the eye-candy features was the wee tappet adjustors all over the place – six rows in all.

Further inspection showed they were adjustments for little strips of metal being used as wear-slack taker-uppers. Both my lathes – a 1950s Acorntools that I've used for more than 50 years and a 1900-ish belt-driven Brown Bros monstrosity – have them, but I've never taken any notice and, by association, never adjusted them – or had to (although Dad may well have adjusted



The gorgeous table-advancement mechanism

Nice detail — tinplate covers keep swarf from the table-slide



As it arrived: empty gib slot lower right

T-head bolts hold the vice in slots (see tinplate photo). Often, the pointy flanges are broken; not so here. Hole through casting (top left) allows shafts to be held for spline work

Old and new – the existing upper gib (bottom) and the replacement for the missing one. Dimples locate it on the adjustors

> "Without it, the scraping tool could not be guided accurately"

the Acorntools in the period that he owned it).

It followed that I'd never asked what they were called. This wee scraper, though, was missing a strip (an upper one for the actuating slide), which happened to be crucial; without it, the scraping tool could not be guided accurately. Indeed, there were round marks where the slide had sat hard against the adjustors – suggesting that someone had tried to use their threaded ends to do the job alone; an impossible ask.

That guide was called a 'gib'

A little net-time revealed that they're called 'gibs'.

Having Googled them, I went down another rabbit hole; what to make one from? How to adjust them? Turns out cast iron might be best – but I settled on brass and bought a strip fat enough to mill down. I learned anecdotally that Henry Ford eliminated gibs completely – in frustration at the worker time wasted adjusting them. He regarded wear-slop as more acceptable than adjustable accuracy! Go figure.

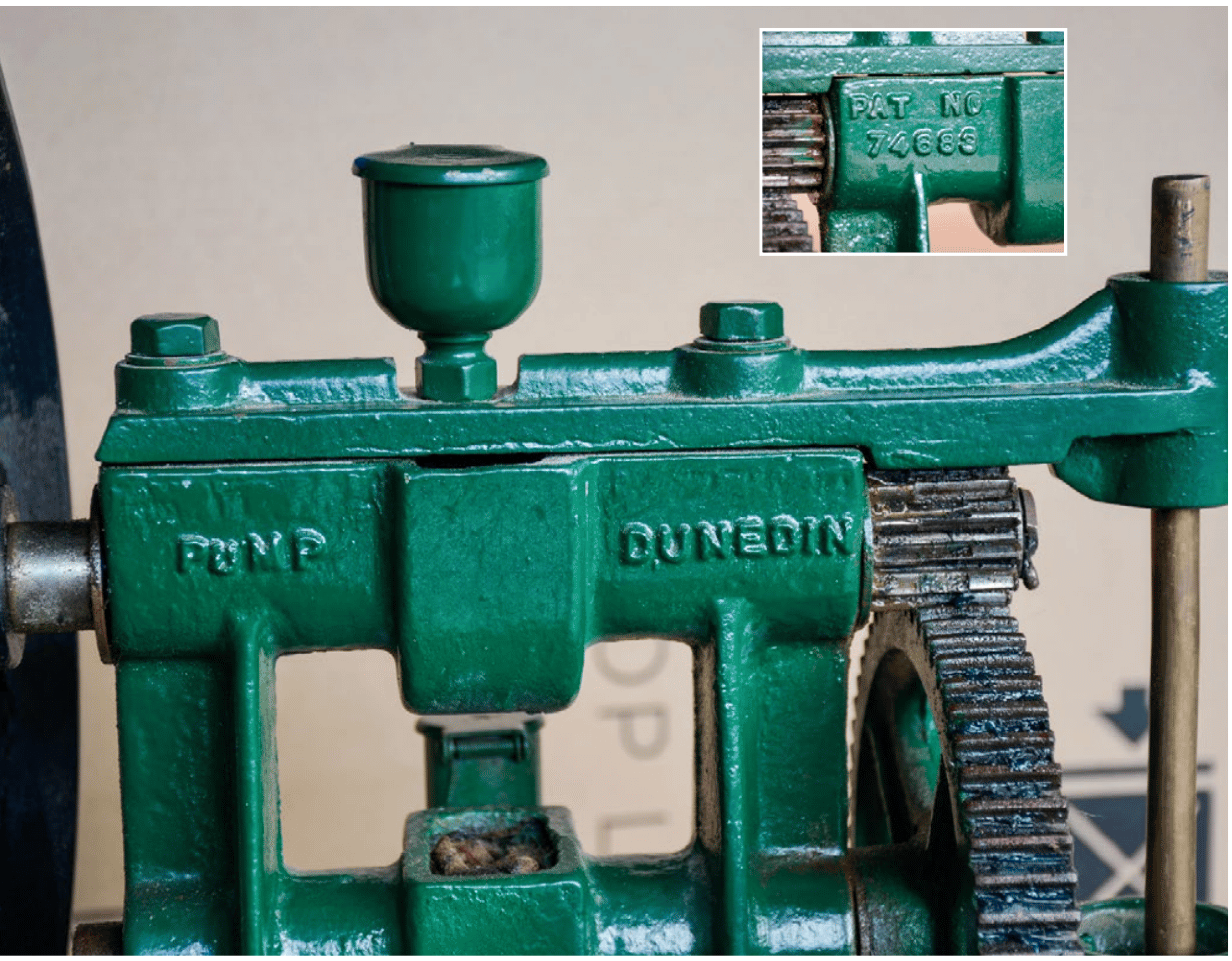
I traversed my make-a-gib options; the shaper's stroke obviously wasn't long enough; passing across the lathe seemed fraught, and I had sort of decided to use a mill bit in the drill-press, when … we had a pizza gathering – as we do around here – and someone's partner turned out to be a mill-owning engineer. He offered to make one, took away an imprint of the adjustor bolt pattern and the opposite gib as reference.

Forty-eight hours later, the new one was in, and I've just added another name to my network. That wee mental exercise showed up the limitation of a seven-inch shaper: lack of travel. Still, it will have its uses, spline and gear-cutting being interesting possibilities. Whatever, I guarantee that it will still be functional in another 100 years, although the present motor probably won't be.

Another back story, this time a pump

It was advertised as a 'windmill head'. It wasn't.

But I thought it intriguing enough to grab anyway. It's actually just a leather-cupped double-acting pump. Clever enough and aesthetically pleasing enough, but just a pump. As to identification, the casting merely said 'PUMP' and 'DUNEDIN' – so it hadn't come very far. But it also had



No name but lovely detail

Double-acting pump (right) can exit left or right. Beautiful though it is, I reckon the ubiquitous Renown pumps are superior design-wise

> “The uniqueness of this design is the stationary central clock”

A fresh printed disc for every night – all that effort to prove someone was doing their rounds …

‘Pat No 74683’, which research showed was submitted in July 1935 and published in January 1937.

The name on the patent was one Francis Augustus Stempa, and a quick search of the name returns an Invercargill court case a few years prior; it seems Mr Stempa perhaps had a problem with the bottle, along with an obvious talent for design. There is no serial number, and I wonder if this was the only one made? It is certainly likely to be the only one still existing.

Essentially, we have an old-school village hand pump, pulley driven via a crank pin and slide, on which someone has already done a nice do-up job (I’ll swear that paint isn’t original). I thought about driving it with a windmill, but it is easier to turn windmill rotation into up-and-down reciprocating motion up at its head, to allow it to align with the wind (the alternative would be bevel gears either end of a central vertical shaft). Seems silly to turn up-and-down into rotational then back into up-and-down, just for the sake of using the machine. Or I could put a handle on the pulley and turn it into a slightly more complicated village pump. We’ll see …

Useless?

I have two other pieces of machinery which I cannot think of a use for – but which are too cute to let go, and besides, one is probably the last remaining example. That one hangs in our hallway, just because. I get visitors to guess what it is – some go close!

Tracing it took some doing, but ended at NZ Patent No. 3138, issued 20 July 1888. Albert Gundersen was a Christchurch watch-/clockmaker, and his machine is described as a “marine electric tell-tale clock”. A wind-up clock has a ‘face’ to which a printed circle of paper was attached daily. There is a row of solenoid-actuated pins which can prick the paper as it passes. The solenoids are actuated in turn by switches at remote stations. All this apparatus was merely a way of checking that nightwatchmen had actually been doing their rounds, and when!

As I found it, there was one circle of paper still attached, which I have photographed and copied; it says ‘male ward’ in the centre. I know that at

Pre-1900 perfection: you can tell he was a watchmaker. Lacquer has kept the brass untarnished for well over a century

least one of these went into Sunnyside Hospital, but suspect that the one I have came from nearby Seacliff Hospital (the only local institution old enough, by some decades). The workmanship is exquisite – as you'd expect from a watchmaker – and the electrical portion must have been state-of-the-art. (This being before dry cells, my first question was what voltage and from where? A hint may be found in the history of Christchurch telephone services: the government demanded at least 30 subscribers for an exchange to be viable; it found them in Christchurch (including the local asylum), where the first exchange opened on 1 October 1881. Did Mr Gundersen tap into that?

The uniqueness of this design is the stationary central clock; usually, nightwatchmen carried bulky recording clocks with them and inserted differently configured keys at different stations.

Mr Gundersen sailed for Norway 'for his health' in 1910, and died a year later. I'm not sure I agree with the surveillance ethos of the machine, but 136 years later, I salute his maker abilities. I have no idea what to do with it, though. If I put a switch in the kitchen for her to prove when she'd been there, chances are, there very quickly wouldn't be a she. So it hangs on the wall as a talking point.

True to type

The other cool-but-useless item is a hand-driven circular chopper, complete with a mitre table. ▶

It was used to shave lead type – what can it be repurposed for?

It had me beat use-wise; did it face off end-grain timber? Then, in one of those serendipitous moments, I asked a person exhibiting vintage machinery whether he had any idea. He walked a dozen paces from his station (he was demonstrating a big old thug-a-thug-a Lister stationary engine) and pointed to an identical one sitting obscurely on a shelf, along with some lead printer's type. Apparently, it trimmed up blocks of type so they would nestle accurately in a laid-up page. So now we know. I can only think of using it to slice cheese – but I guess you'd want to wash it first!

The takeaway

There are limitations to all machinery.

Wear beats everything in the end; some of the newer stuff might last longer from new, older forms were more likely to be repairable; solidity always trumps flimsy. The passing of time has also weeded out weaknesses; if it's still working after a century, chances are it'll be working after another. But some purposes – like lead typesetting – are permanently obsolete.

I look at them all in the 'can-it-be-kept-going' light, seen through an off-gridder's 'will-it-be-future-useful' lens. That pretty much rules out chips and programming (those new to this column can catch my energy/entropy philosophy by typing my name into their search engine, followed by: Interest.co.nz).

It almost certainly rules out battery-driven anything (I'll bet that sentence brings a concentrated howl of protest!). Then I ask if the designed-for purpose will be future-valid, or if the item can be repurposed to be so. The limiting factor is more likely the tool bits rather than the tool holder; the drill bits rather than the drill-press, in other words. The grinding wheels rather than the grinder; the hacksaw blades rather than the frame. So I stockpile …

'Storming down off the mountain' in the family wagon, 1999

And the crowd (in the back seat) roars…

The great race

Watching that rain-soaked, drama-filled Bathurst this 2025 year, had me asking why I am so sure we are headed for a simpler world, one needing simply-maintained tools. Surely all those people in that high-tech arena know what they're doing? Well, no, not necessarily.

They – like many in society – are just experts in very narrow siloes; just because they burn oil doesn't mean they know where it comes from, how it is cracked, or how much is left. And despite all the technological advances, they still trigger the burn with spark plugs and still need to refuel in precisely the same way a Model T does. The fact is that, globally, we consume a million barrels of oil a day. A million. And another two million barrel equivalents of coal and gas. Every day. And we've gone through half of all we've ever used in the last 30 years.

As an old petrol head, I joke that I've driven a Commodore around Bathurst (it was the family station wagon), and I still enjoy the spectacle. But I've come to understand that spark-plugged anything is a temporary indulgence in human-trajectory terms. And I'm sure that tools designed in a non-fossil era will come back into their own (some of them anyway; we won't be going back to lead type, and we may just have to take that nightwatchman's word for it).

I marvel at those old-time patent applicants. They applied quality thinking to perceived problems and came up with solutions which still appear elegant, all these years later. There are worse legacies.

"Surely all those people in that high-tech arena know what they're doing?"

A GOAL WITHOUT A PLAN IS JUST A WISH

How did your 2025 go? Our *Shed* Shrink suggests that 2026 won't improve unless you have a good plan and shows you how to make that plan simple and achievable

By Mark Seek | markseek@rocketmail.com | youtube.com/@theshedshrink

'Tis the season to be jolly! Right?

For most of us, fortunate enough, yes, life hasn't thrown too many lemons at us, so it doesn't require much effort to rustle up enough jollity to get us through the festive season.

But you only have to pick up the newspaper and read how our fellow New Zealand families are doing it tough, and for them, 2025 has been anything but jolly. Hoping that the year ahead will be better than the previous one could be a bit daunting, especially if you don't have some kind of plan to create a brighter situation for yourself.

A phrase comes to mind: "keep your powder dry" – in other words, be prepared for anything. These days, don't be complacent, stay optimistic. Sometimes we can often look around the shed in dismay at some projects that are lying around waiting for an injection of funds to get them finished or even started!

Hmm!

Procrastination can be a constant battle

How do some people manage to complete projects? It means they have a plan up their sleeves. For me, procrastination has been a constant battle to overcome. I came across this phrase: "A goal without a plan is just a wish."

So, I thought I would raise my hand and declare without any excuses that I am terrible at planning, and winging it gets mediocre results. So, if I am going to effect change in many of my situations, I need to look for a simple process to help me. But I don't have to re-invent the wheel. I went back to some old notes and found the 'SMART' goal process, which I know works – as it has for those I spoke to who have tried it.

SMART

SMART goal planning is easy to remember too, as it's an acronym:

S – Specific
M – Measurable
A – Achievable
R – Relevant
T – Time bound

So, follow along with me as I attempt

Merry Christmas!

"IS THE GOAL YOU'VE COMMITTED TO RELEVANT TO YOUR SITUATION?"

to improve my health and plan for a year, feeling optimistic and able to solve problems with a bit more effectiveness.

Specific

Choose a goal that's clearly defined. If you can't be specific, you could end up chasing your tail on so many levels. It could be finances, health, relationships or work opportunities, the list is endless, but be clear and without more than one interpretation.

For me, it's my health I want to improve and my physical well-being (this is quite generic, I know, but I didn't want to bore you with details …).

Measurable

Have a goal that's attainable. This can create a sense that it's working for you and gives encouragement. To measure your goal, you can separate it into three-stage goals: short-term, mid-term and long-term. Dividing them into three stages means you start off small and build on these, and as you see some success, you can increase the goals strategically each time. Remember, how you track this depends on you, but the emphasis should be on tracking success and when you have achieved it.

For me, it's taking regular breaks throughout the day, including regular walks in the morning, applying a healthier diet – for example, eating less sugary foods, trying new recipes specifically, drinking more water, and improving my sleeping by going to bed earlier. I will know when I have achieved this, as I won't be so tired and lethargic and have more energy and enthusiasm for people, work, and hobbies

Achievable

Basically, this means asking if your goal is realistic. There's no point in fooling yourself, is there? If it's achievable, then it will spur you on, hopefully building confidence.

For me, the plan in place can be achieved without too much disruption to my family and my work commitments. I determine who is there to support these simple changes – so, for example, I have asked my wife to buy less sugary foods at the supermarket, and I have invested in some Red Band gumboots to walk the wetlands nearby.

Relevant

Is the goal you've committed to relevant to your situation?

It should be; otherwise, why are you doing this thing in the first place? Maybe you lost your job – that's a major setback, and trust me, I know personally how that feels. So, make sure it aligns with your broader objectives so that it makes sense.

For me, the objective to feel healthier is obviously about living longer, incurring fewer medical bills, but ultimately, what motivates me is being a healthy grandfather to my grandchildren and enjoying this aspect of my life now, and being a happier bloke with my mates.

Time bound

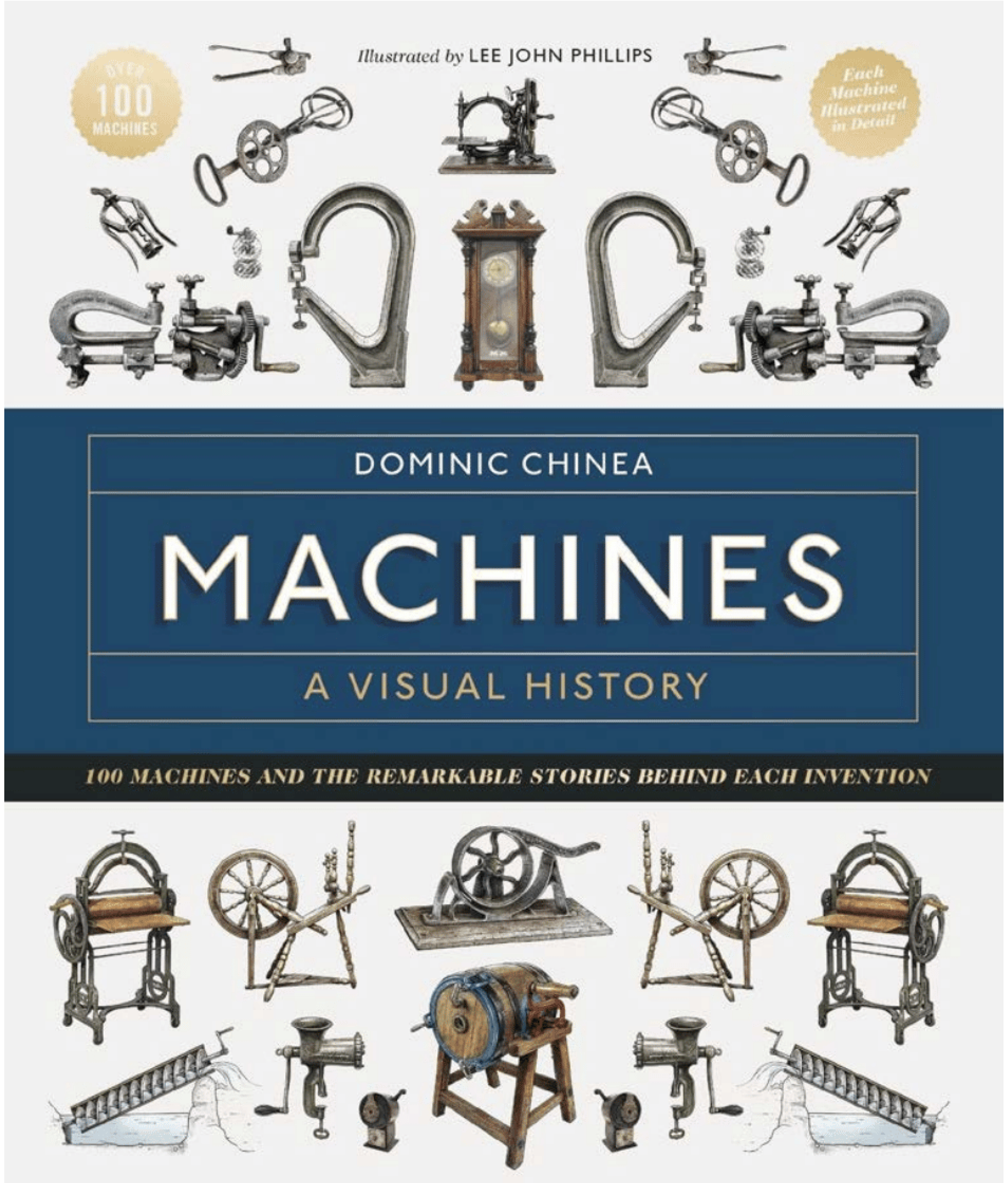
Any goal planning worth its weight will have a deadline or a timeline for it to be measured against, and knowing this can keep you accountable to yourself. Remember to make it a timeframe that reflects and is relevant to your current situation.

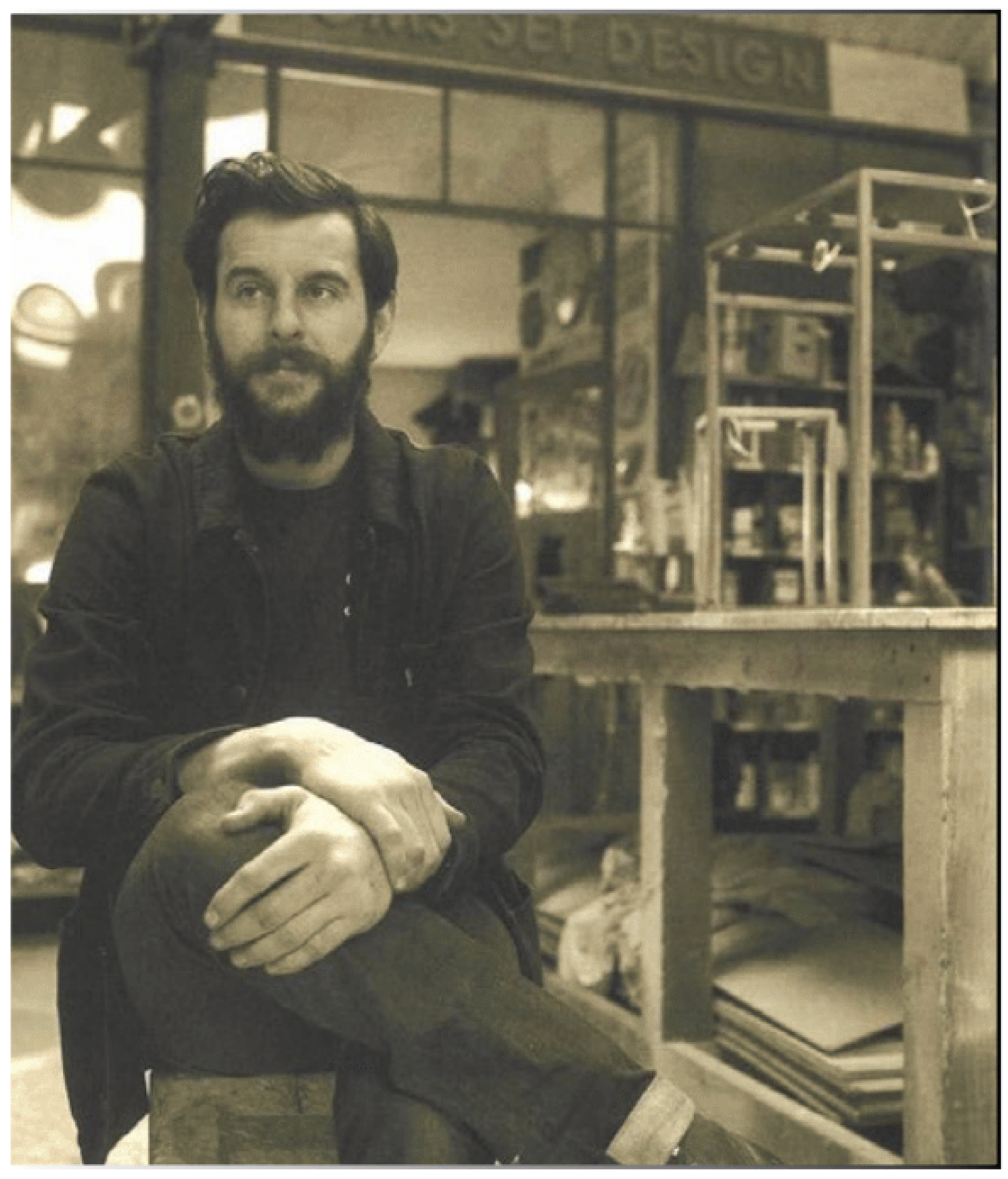
For me, I have given myself six months to feel healthier. This reflects how I am making small changes over a longer period. My goal is that, by my birthday, 20 May, I will feel healthier, have more energy, my sleep will have improved, and I will have a healthier diet. I will be eating more fruit, rice, fish, and fresh vegetables. I will have reduced the amount of processed foods I eat and be drinking more water.

Happy 2026

I hope this article is helpful.
It is intended to encourage those of us who may have had a challenging year. My intention with my *The Shed* Shrink articles is hopefully to entertain, encourage, inspire, and bring a sense of community. To all those who have been involved in *The Shed* Shrink articles in 2025 – thanks; it's been a pleasure.

See you all in 2026!





By Dominic Chinea
ISBN: 9780241645543
Published by Dorling Kindersley Limited in November 2024
Hardback, 240 pages
RRP $65
Reviewed by Ritchie Wilson

MACHINES
A VISUAL HISTORY

This large-format book, with exquisite drawings by Lee John Phillips, is a companion volume to *Tools: A Visual History*, which was reviewed in *The Shed* Issue No. 121 (June/July 2025).

Both books were written by Dominic Chinea, who is one of the craftspeople on the BBC television programme *The Repair Shop*. He is the one with the black beard who does metalwork (shaping, welding, riveting, etc.), painting, and signwriting.

He also fronts *Make It at Market*, another BBC show, which helps practical people into a career making and selling homemade stuff – lead-lights, stone carving, baking, etc. He also has a YouTube channel showcasing his latest restorations. He has run his own set-design company and has undertaken courses in signwriting and automotive body building, so he has a wide range of skills and experience. Both his books reflect his great interest and expertise in antique gear of all kinds, and he has an affection for human-powered machines.

A hundred different devices

Machines: A Visual History profiles 100 different devices for converting one type of energy into another.

The first section is on simple machines: wedges, pulleys, and levers, for example – the sort of things you would get in an introductory physics text. The subsequent sections have more complicated devices such as a steam locomotive, a mechanical calculator, a dishwasher, and a bookbinding machine, which are very complex.

Some of the machines, such as the egg-beater hand drill or the nutcracker, wouldn't be out of place in Dom's tool book. His very first drill, a hand drill bought, inevitably, at a car boot sale, was an egg-beater drill, possibly made by the Millers Falls Company (est. 1868) of Greenfield, Massachusetts, one of the most important makers of hand drills before Black and Decker took over the market for drills in the 1960s.

Dom points out that for delicate work in soft materials, a hand-powered drill is often superior to a powered one. What type of drills do neurosurgeons use to drill into their patients' skulls? The drill illustrated is a breast drill with a curved plate to push with the chest while one hand is cranking and the other is holding the drill steady. They were generally known as 'gut buster' drills in New Zealand.

More sophisticated ones had two gear ratios, giving two speeds for the same rate of rotation of the crank. I've always liked them and have had a few over the years. One was a Yankee model made by North Brothers of Philadelphia, Pennsylvania, which had neat internal gearing which was shifted by a small nub, precisely like the one on Yankee screwdrivers. Mine never worked properly and is long gone, but I see they are advertised for very high prices in the US.

So good, he bought one

About 10 out of the 100 machines are owned by Dom. A similar number have passed through his hands in *The Repair Shop*, and there are some that fall into both groups.

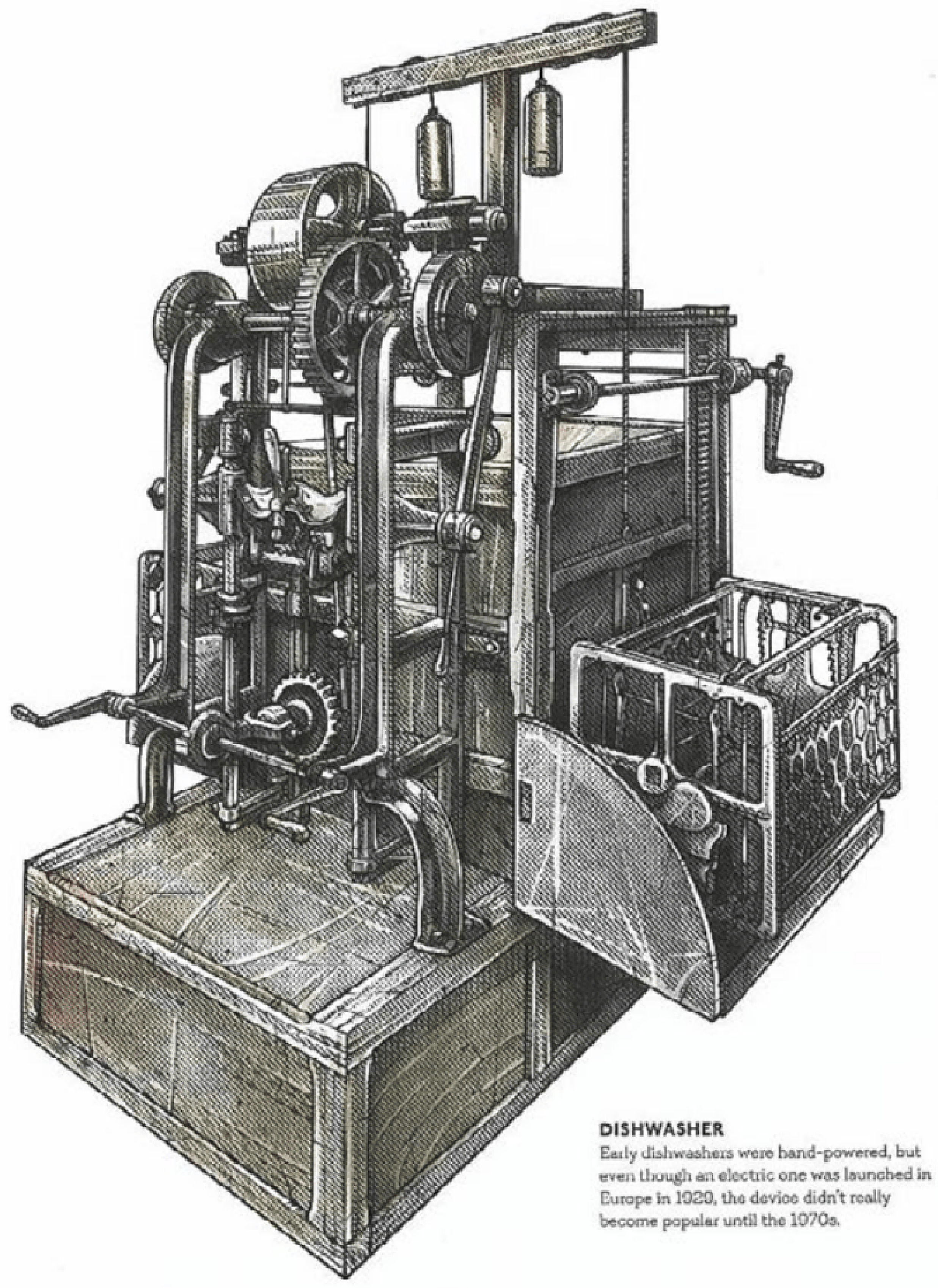
The very distinctive G-shaped Wilcox and Gibbs sewing machine appealed to Dom so much when he was repairing it on the TV show that he bought one for himself, as did *Repair Shop* presenter Jay Blades. All three sewing machines had to be extensively repaired. The Wilcox and Gibbs machines were mainly made in America, but some – including Dom's example – had some components cast in England at the Coalbrookdale foundry.

Coalbrookdale is world famous because it is regarded as one of the birthplaces of the Industrial Revolution of the eighteenth century. Years ago, Dom bought a barber's chair for a set he was building and kept it as a decoration in his workshop. A broken one of the same make was brought into *The Repair Shop* by a barber whose family had owned it for decades. It was a 'Belmont', "like a Cadillac of a barber's chair" and dates from the 1960s.

Broadcasting seeds

Dom relates how soldering skills taught to him by other *Repair Shop* craftspeople were used to repair the metal parts of a mechanical seed spreader.

This machine was used to spread seed on a ploughed field in a more even



Dishwashers were invented in the late 1800s by Josephine Cochrane because hand washing — even by herself — continually damaged her fine china. This early example seems to be driven by a flat belt from overhead shafting, which isn't shown

HOME AND RECREATION

205

MACHINE 089 NUMBER

that you'll often find in the UK, they often bring ...asses at school, where ...hing like a wooden plant ...nd for a long time, and at all. The first known dates back to 1816 in a ...nd it seems likely that ...ime in the 18th century.

you'd be seeing geared drills with a gear ratio of over 4:1, so each turn of the drive wheel would make the chuck spin four times as quickly.

Millers Falls, established in Greenfield, Massachusetts, in 1868, was a big name in manufacturing and it produced some of the most respected geared drills around. In its 1915 catalogue, Millers Falls produced 28 different hand drills and 40 breast drills. These could even be mounted in specialised metal frames to form a drill press.

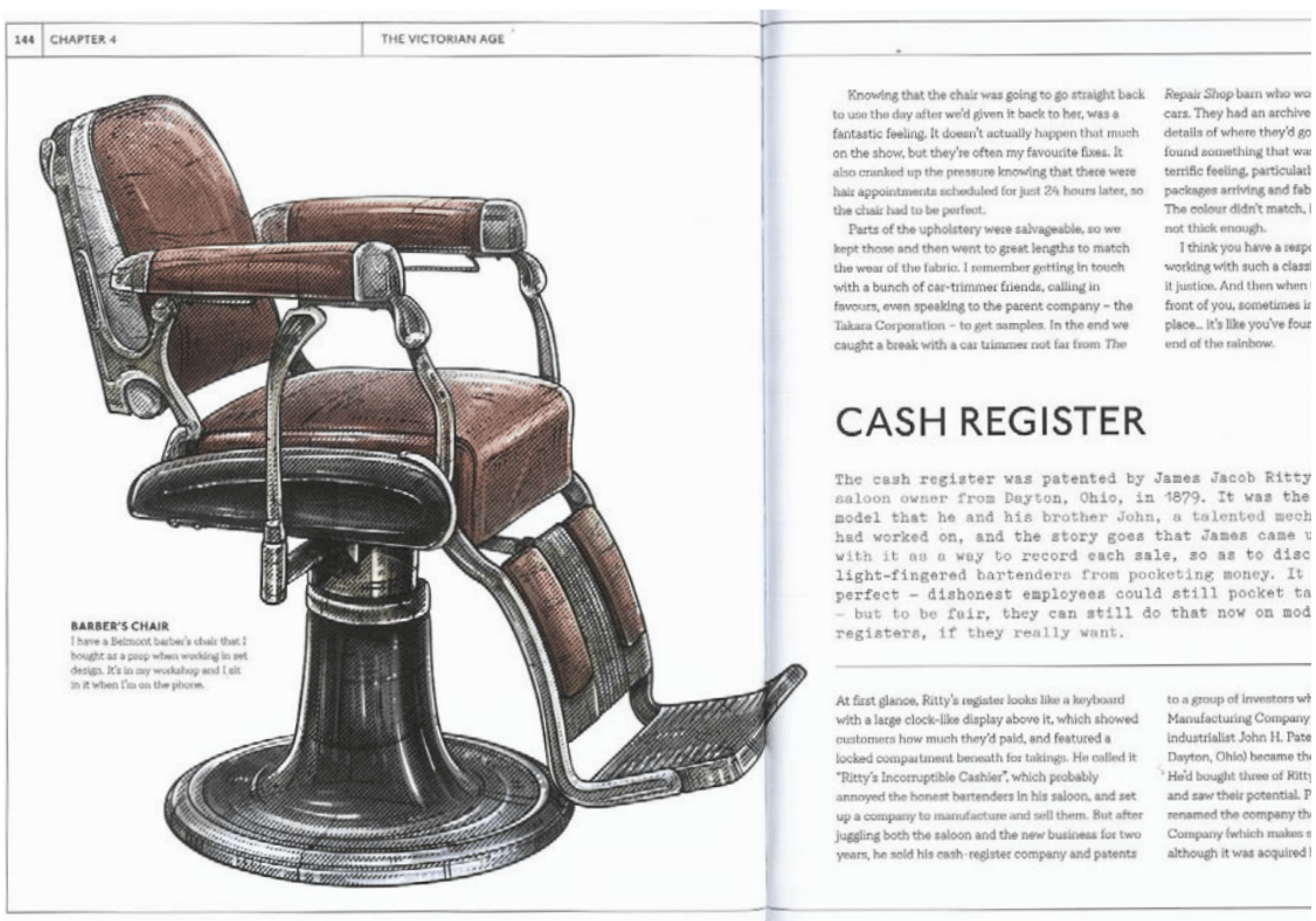
Its No. 13 breast drill, which was first produced in 1881, provided a gear ratio of 4.5:1 thanks to its 15cm/6in-diameter drive gear, and double pinions that afforded it more stability. This made it ideal for drilling into metal, although it came at a hefty cost at the time, which seems to have been something the company was quite proud of in its catalogue! It was a really successful drill and produced all the way until the mid 1930s. Miller Falls' most famous hand drill, though, was probably the No. 2, introduced in the 1870s. Although it was modified over the years, the basic design was still much the same, 110 years later.

The first drill I ever bought was a hand drill, which I picked up at a boot sale. They are great little machines for getting children into woodworking, and the drill bits can be stored in a secret compartment in the handle.

And with a keyed drill chuck, kids won't be able to loosen the bits. I don't really need to use a hand drill that much these days, but Lucia Scalisi, our painting conservator at *The Repair Shop*, does all the time and she swears by them. She uses them to drill pilot holes in the back of stretchers or frames so she can screw on the little brackets and hooks that hold the stretcher in the frame. For drilling small holes in soft wood, which is something that needs to be done slowly and carefully, a hand drill is ideal. You just crank the handle and push down gently. I've helped her out on a few jobs, and it's the scariest thing using an electric drill to bore into the back of a frame knowing there's a valuable painting on the other side which Lucia has spent weeks conserving and restoring. One slip, and you'll go all the way through.

THE FIRST DRILL I EVER BOUGHT WAS A HAND DRILL, WHICH I PICKED UP AT A BOOT SALE.

HAND DRILL
The geared drill was also known as the eggbeater drill because of its appearance. Most hand drills have a gear ratio of 4.1, so for every turn of the handle, the drill bit will turn four times.



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BARBER'S CHAIR
I have a Belmont barber's chair that I bought as a prop when working in set design. It's in my workshop and I sit in it when I'm on the phone.

Knowing that the chair was going to go straight back to use the day after we'd given it back to her, was a fantastic feeling. It doesn't actually happen that much on the show, but they're often my favourite fixes. It also cranked up the pressure knowing that there were hair appointments scheduled for just 24 hours later, so the chair had to be perfect.

Parts of the upholstery were salvageable, so we kept those and then went to great lengths to match the wear of the fabric. I remember getting in touch with a bunch of car-trimmer friends, calling in favours, even speaking to the parent company – the Takara Corporation – to get samples. In the end we caught a break with a car trimmer not far from *The Repair Shop* barn who wo... cars. They had an archive... details of where they'd go... found something that wa... terrific feeling, particularl... packages arriving and fab... The colour didn't match, ... not thick enough.

I think you have a resp... working with such a classi... it justice. And then when ... front of you, sometimes i... place... it's like you've foun... end of the rainbow.

CASH REGISTER

The cash register was patented by James Jacob Ritty... saloon owner from Dayton, Ohio, in 1879. It was the... model that he and his brother John, a talented mech... had worked on, and the story goes that James came u... with it as a way to record each sale, so as to disc... light-fingered bartenders from pocketing money. It... perfect – dishonest employees could still pocket ta... – but to be fair, they can still do that now on mod... registers, if they really want.

At first glance, Ritty's register looks like a keyboard with a large clock-like display above it, which showed customers how much they'd paid, and featured a locked compartment beneath for takings. He called it "Ritty's Incorruptible Cashier", which probably annoyed the honest bartenders in his saloon, and set up a company to manufacture and sell them. But after juggling both the saloon and the new business for two years, he sold his cash-register company and patents to a group of investors wh... Manufacturing Company... industrialist John H. Pate... Dayton, Ohio) became th... He'd bought three of Ritty... and saw their potential. P... renamed the company th... Company (which makes s... although it was acquired ...

A Belmont barber's chair — "a Cadillac of a barber's chair"

pattern than could be achieved by throwing the seed right-and-left by hand – a technique known as 'broadcasting'. He mentions that the most famous seed spreader manufacturer was the Cyclone Seeder Company (est. 1868) of Urbana, Indiana.

A day or two after reading this, I was at a local Sunday market where one of the traders was selling a dusty canvas and wood contraption with a crank and gears fastened to its base. Stencilled on the canvas bag in red was: 'Cyclone Seed Sower, The Cyclone Seeder Co. Inc., Urbana, Indiana, USA, Since 1868'.

The canvas was torn and had been inexpertly repaired, and so, for $10, it was mine.

There are stories online about using seed sowers in the early days of European settlement in the US. One of their main drawbacks was that the sown seed had to be covered with soil by harrowing. In the 1800s in North America, there were unbelievably large flocks of the now-extinct passenger pigeon, which could descend on a newly sown field and eat all the seed before the harrowing could be done. Because the horse-drawn seed drill inserted the seed into the soil, the grain wasn't so easily eaten, so drilling became the preferred method of sowing grass and wheat seeds.

All the fun of the fair

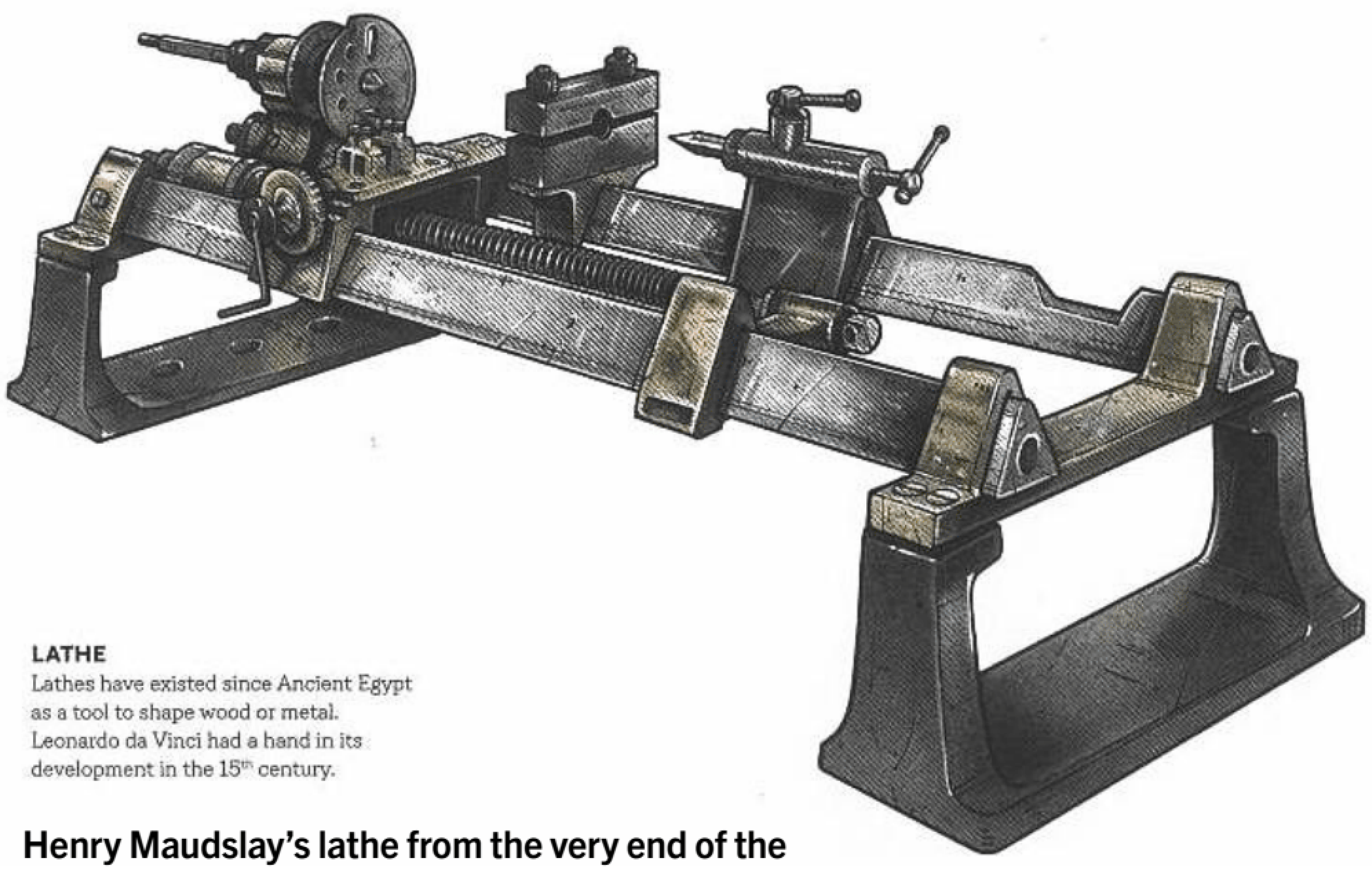
One large section of *Machines: A Visual History* is Fairground and Novelties, which contains 15 machines of the type seen at A&P shows and industry fairs in this country.

Things like Ferris wheels, roller coasters, and carousels (called 'merry-go-rounds' in New Zealand). Candy floss machines are familiar here but are known as 'fairy floss' machines in Australia and 'cotton candy' machines in America.

Dom makes much of the fact that an American dentist invented them. Fairy floss was a hit at the 1904 Saint Louis World's Fair, selling almost 70,000 servings. Many of the machines listed in the book were exhibited in the series of exhibitions, which were such a feature of Victorian and Edwardian times.

The 80m diameter Ferris wheel, designed and built by George Washington Gale Ferris, was the star of the Chicago Exposition of 1893 and also of the Saint Louis World's Fair 11 years later. It was intended to emulate Paris's 1889 Exposition Universelle's 330m

A Cyclone seed sower recently bought at a Christchurch Sunday market for $10. The seed sower featured in Dom's book is the Aero broadcast seed sower from Kilmarnock in Scotland



LATHE

MACHINE 037 NUMBER

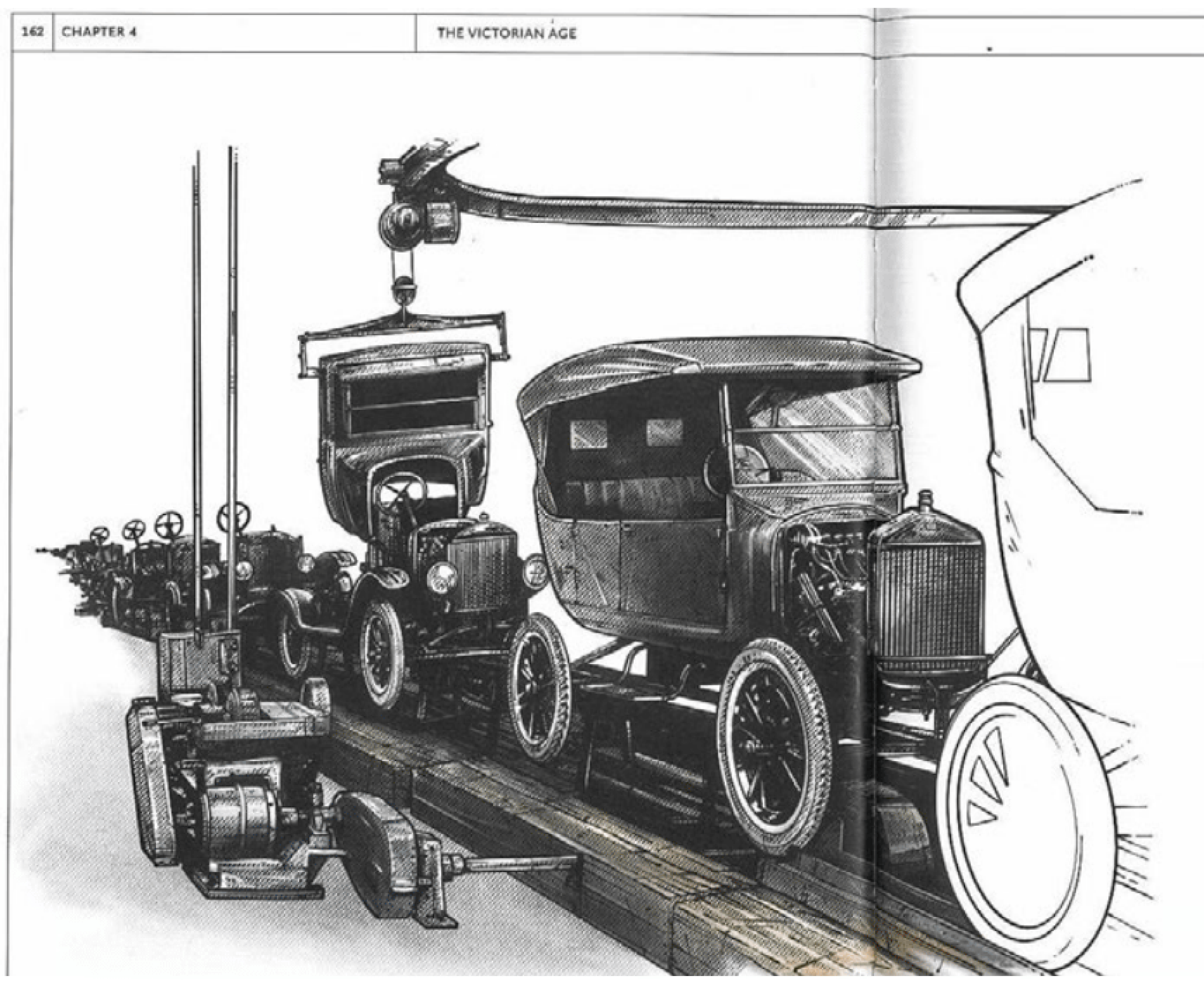
The lathe is a machine tool (a mechanical device to cut and shape metal, wood and other materials) that rotates a workpiece so you can shape it with a fixed cutting or grinding tool. It's a surprisingly ancient invention: there's evidence for a woodworking lathe operated by two people going back to Ancient Egypt.

It wasn't very sophisticated, though, with one person turning the wooden workpiece using a rope and the other shaping it, but it was better (and safer) than manually turning it with your hand. The first lathes would have been ground-level devices, with two parallel wooden supports from which iron spikes projected to hold the workpiece in place. A strap wrapped around the workpiece gave the turning power, and this would have been controlled by an assistant because it needed two hands to operate.

The next design was the bow lathe. String attached to the ends of a bow (think bow and arrow) wrapped around the workpiece, which meant a sole user could turn a workpiece with one hand by moving the bow

LATHE
Lathes have existed since Ancient Egypt as a tool to shape wood or metal. Leonardo da Vinci had a hand in its development in the 15th century.

Henry Maudslay's lathe from the very end of the 18th century. Note the lead screw which enabled the cutting of screw threads in metal



162 CHAPTER 4 THE VICTORIAN AGE

FORD'S MECHANIC CONVEYO

Henry Ford wasn't just – he was a trained mac and inventor who built car in his spare time, working as an engineer Illuminating Company

In 1896, while still working at the co Edison, and they went on to become year that Ford built his ethanol-pow horsepower Quadricycle, which ran workshop behind his home.

He left the Edison Company in 1 Automobile Company, but it was sh January 1901. Later that year, Ford car, founding the Henry Ford Comp October 1901.

In 1913, Henry Ford introduced th factory in Highland Park, Michigan. way cars were made, with every asp place in designated sections across t conveyor-belts inspired by the meat Within six months of the introducti the time it took to construct a Ford car for middle-class Americans) had hours to just under 6 hours, which i

Although the wages were famous Company – $5 for an eight-hour shi profit-sharing plan) – the workers w controls. Firstly, the creation of the tall Eiffel Tower. The 1940 Centennial Exhibition at Rongotai in Wellington featured a 47m tall art-deco Exhibition Tower and a model New Zealand Railways layout built and maintained by pioneering model-maker Frank Roberts of Auckland; nearly three million visitors attended.

What the Butler Saw

The 'test your strength machine' and the mutoscope were both worked on by Dom on *The Repair Shop*.

I can remember examples of both from the Canterbury A&P Show's side show alley. The mutoscope is better known as a 'what the butler saw' machine. By turning a crank handle on the side of the machine, the viewer was presented with a series of photographs in rapid succession, like a movie, giving the impression of smooth motion. The subject matter was often thought of as racy in the 1920s, when they were made.

What the butler actually saw through a keyhole of a door in his employer's London townhouse was the subject of a widely publicised 1887 divorce case. The mutoscope at the A&P show was in dilapidated condition and, after putting in (I think) a penny, what I saw was one photo in a keyhole frame, but nothing more, because the crank wouldn't turn. I was accused of breaking the machine and didn't get my penny back. Today, these iconic relics of England's seaside piers sell for thousands of pounds.

Dom had to make a new stand for the one he was working on and examined an original in a seaside museum in Brighton, England, to get an idea of what they looked like before starting work.

Unknown machines

Some of the machines in the book were completely novel to me.

The paternoster lift was one such. It is a lift which has a number of open-fronted compartments. These are attached to a large chain, which carries them upward. At the top it moves them sideways as the chain travels around a giant cog, and carries them down, until they are again moved sideways at the bottom cog.

Passengers step into a compartment as it rises past them and step out as it passes the floor they want. It is a very efficient method of moving people from one floor to another,


184 CHAPTER 5 FAIRGROUND AND NOVELTIES

MUTOSCOPE

MACHINE 081 NUMBER

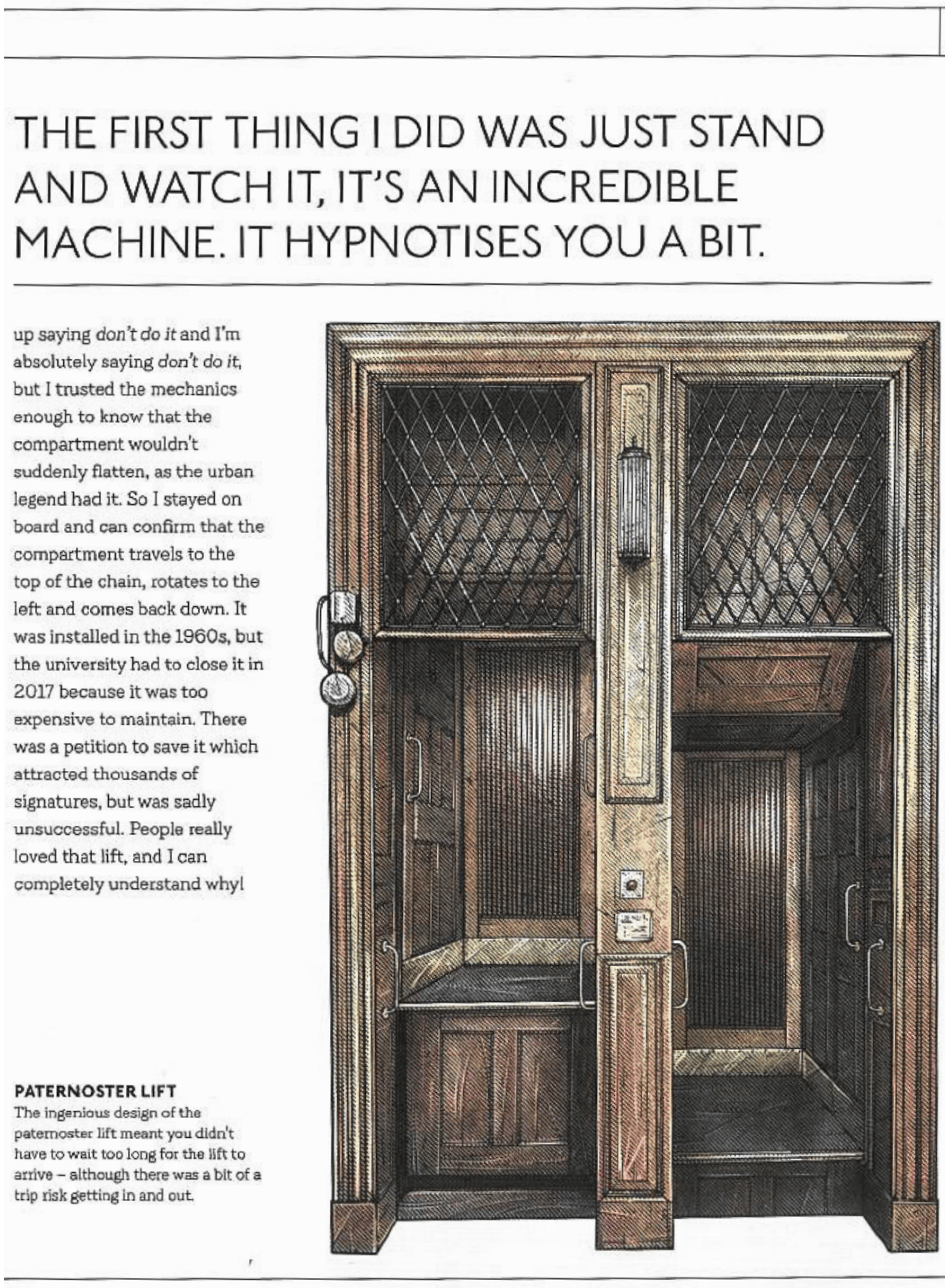
Another classic feature of an amusement park and pier was the Mutoscope. The Mutoscope was an early motion-picture device containing hundreds of sequential photographs, arranged much like a really big Rolodex, and when the user operated the crank, they turned so quickly that they seemed to move.

The American inventor Herman Casler filed a patent for the device in 1896, but the invention was a collaboration between Casler and the British inventor William K. L. Dickson, who had emigrated to Virginia and was hired at Thomas Edison's laboratory in 1883. Dickson had been largely responsible for developing Edison's Kinetoscope – another early motion-picture device that had been unveiled to the public in 1894. Unlike the Mutoscope, there was a continuous loop of film which ran inside the Kinetoscope on rollers powered by an electric motor, but the effect was very similar, creating the illusion of moving pictures.

The Mutoscope was simpler and sturdier than the Kinetoscope, and was manufactured from 1895 by the American Mutoscope Company, the firm Dickson formed with partners Casler, Henry Norton Marvin and Elias Koopman. The device was licensed to William Rabkin in 1920, who had founded the International Mutoscope Corporation. From the beginning, Mutoscope reels were notoriously "racy" for the time. They became known as "What the Butler Saw" machines in the UK, after the title of one of the famous reels produced for the device. It was inspired by a high-profile divorce case from 1886, involving Lord Colin Campbell and his wife Gertrude Elizabeth

MUTOSCOPE
These early motion-picture devices, operated by a crank handle, were known in the UK for their slightly racy films.

A 'what the butler saw' machine. At the front of the device are the viewing portal, the slot for the penny, and the operating handle


THE FIRST THING I DID WAS JUST STAND AND WATCH IT, IT'S AN INCREDIBLE MACHINE. IT HYPNOTISES YOU A BIT.

up saying *don't do it* and I'm absolutely saying *don't do it*, but I trusted the mechanics enough to know that the compartment wouldn't suddenly flatten, as the urban legend had it. So I stayed on board and can confirm that the compartment travels to the top of the chain, rotates to the left and comes back down. It was installed in the 1960s, but the university had to close it in 2017 because it was too expensive to maintain. There was a petition to save it which attracted thousands of signatures, but was sadly unsuccessful. People really loved that lift, and I can completely understand why!

PATERNOSTER LIFT
The ingenious design of the paternoster lift meant you didn't have to wait too long for the lift to arrive – although there was a bit of a trip risk getting in and out.

The paternoster lift – not for the faint hearted

and they are, supposedly, popular, despite occasional gruesome fatalities. Dom rode the one at the University of Leicester around the top cog and survived.

I didn't know that diamonds are polished, so the scaife was new to me, as was the brilliant-cut machine, which cuts decorative grooves in sheets of glass.

I would imagine that many of the Lee John Phillips illustrations in this book – the Ford Model T assembly line, the screw propeller, or the fortune-telling machine, for instance – are copied from photographs, rather than from the actual physical objects, as in Dom's previous book. Still, they are all exceptionally skillfully done, nevertheless. Dom writes very well and delivers lots of information in an appealing way. Together with the very skilled design team, they have put together an excellent book.

Dangerous ditches

Early on in the book is the Archimedes screw, an ancient machine for lifting water.

It consists of a tube with a long screw fitted snugly inside it. The screw has a crank attached to its top. If the bottom of the tube is immersed in water, turning the crank will lift the water until it flows out the tube's top. It is apparently very common along the banks of the Nile, lifting water from the great river into irrigation channels. I had a long holiday in Egypt, just after the Camp David peace deal with Israel was signed, but I don't remember seeing this form of irrigation.

What I do remember was seeing a fellahin lifting water out of the river using a bucket attached by rope to one end of a long pole, which pivoted on an upright pole in the middle, like a see-saw. This was called a 'shaduf' or 'shadoof' in Arabic, or a 'lift' or a 'well pole' in English. The young men operating the shaduf made it look easy, but they often suffered from serious diseases caused by parasitic worms lurking in the still water of the irrigation ditches.

They frequently died young.

Favourite axle stands

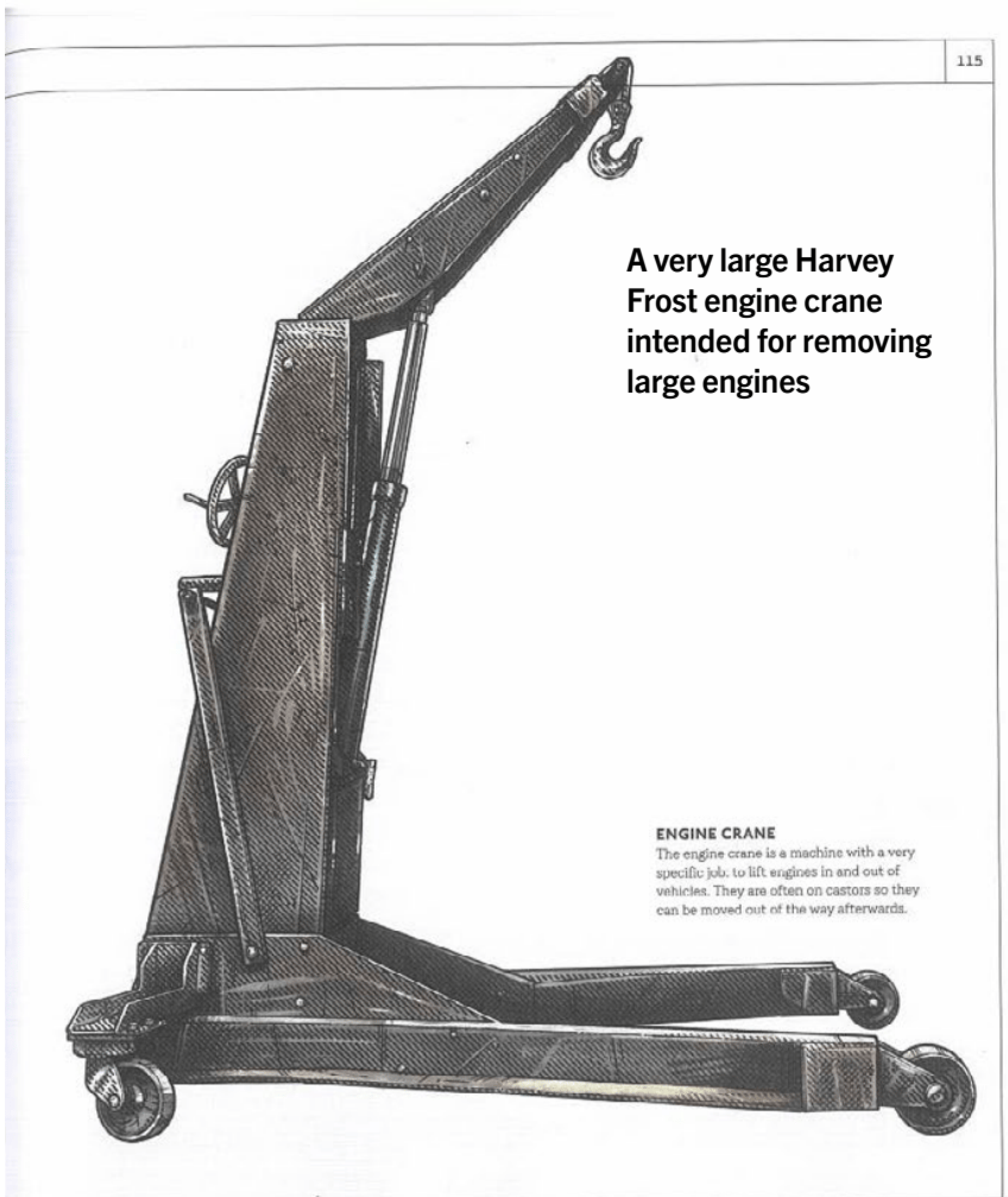
The Harvey Frost engine crane was particularly interesting to me because, for decades, I have had a couple of cast-iron axle stands with 'Harvey Frost England' cast on them. I have often used them and like them a lot.

They resemble the stands made in Auckland by RR Bramley and Co. Ltd, both having height adjustment by way of an acme screw. Even the New Zealand–made ones are difficult to come by.

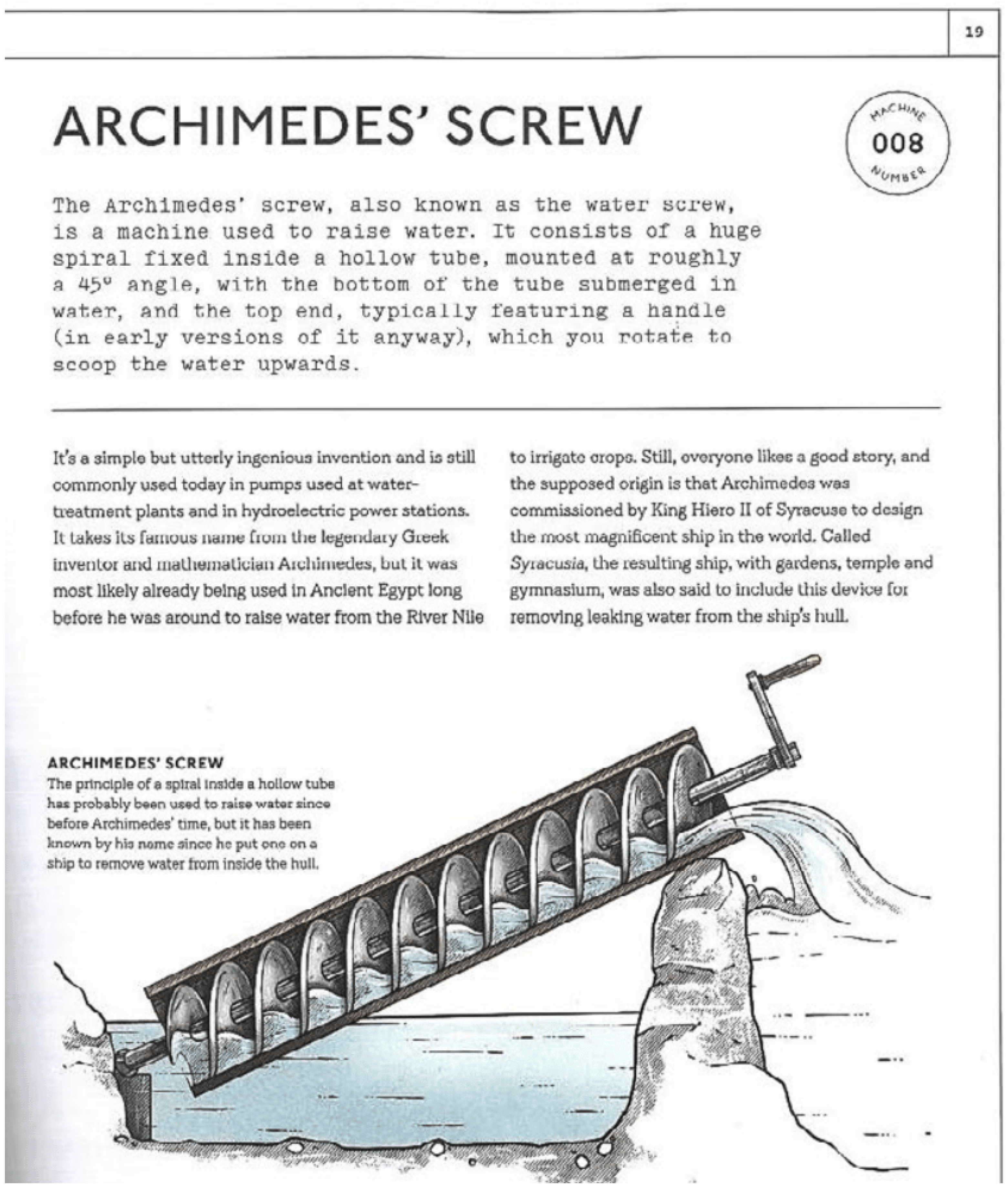
The Harvey Frost company is famous in Britain for making breakdown cranes which fit on the back of trucks and are used to tow broken-down vehicles. Many garages would have a truck fitted with one. They are sometimes installed on old Land Rovers and appear to be an accepted part of the vintage Land Rover world.

The Harvey Frost company is still in business, making breakdown gear. Dom has a very large engine crane, which he thinks was intended for removing the engines of trucks or light aircraft. He keeps it outside the entrance of his workshop. I was tremendously impressed that he uses it almost every day, moving engines into the back of his van or unloading the Ranalah wheeling machines he has started to manufacture.

He lifts something weighty nearly every single day! Now that's a real sheddie!



A very large Harvey Frost engine crane intended for removing large engines



A cross section of an Archimedes' screw – still used for raising water on the banks of the Nile

COMING ASHORE

After a lifetime of working in the joinery industry, Richard heard the call of the sea. But eventually, a shed called him ashore. In setting up his new forever workshop, he is using a machine that has quickly become his number-one woodworking tool

By Jason Burgess | Photographs: Jason Burgess

Richard with his Hammer C3-31 Combi machine.

When yachties Richard Turnbull and his partner Barb decided it was time to drop anchor and throw down some roots, they did not want to be too far from the water.

A solid community and access to services were fundamental to their quest; so too was a place with some space for veggie gardens and a brand-new pole shed for Richard. After an extensive search of Northland, they found themselves a semi-rural oasis on the outskirts of Kerikeri. The property required a little tickle-up, but otherwise ticked all the boxes. For Richard, a former joiner and builder, a chance to kit out his purpose-built workspace and new digs was an ideal way to get his feet back on terra firma: doing what he does best – working with fine timbers.

Charting a course

Time on the boat was part of Richard's exit strategy from a life well spent working in the trades.

He cut his teeth building large-scale rimu furniture in Canterbury for many years before relocating to Sydney, where his joinery skills transferred to house building for Federation Homes. His versatility was put to the test when an opportunity came to him, out of the blue, to rebuild and operate a boutique vineyard in the Hunter Valley for a TV producer client.

Regarding the vineyard, Richard admits, "I was keen on the end product, but I knew nothing about making wines. My client said, 'Look, we can go out and find somebody to run it for us and potentially get taken to the cleaners, or

A moveable feast: every work station is on castors for increased flexibility in the shed

Cutting board

To achieve the necessary contrasts in his 3D end-grain cutting board, Richard opted for American timbers: black walnut, maple, and rosewood, which put the C3-31 through its paces. He says, "The project required a lot of very precise cutting. The table saw was perfect for this; it is very accurate. You cut and then take a shaving off with the planer to get a really even finish. You could do it by hand, but you would need to be skilled with a plane to get it right. With this machine, it was fairly straightforward." The result is as durable as it is striking, although Barb laughs, "I can't even lift it!"

we can ask you to run it and learn about it as we learn about it, because you are someone we can trust.' We took a leap, a bloody big one, and turned it into a thriving enterprise."

Three years on, with children in tow, he decided the vineyard wasn't really the business for a young family. He returned to Christchurch and the building industry, which turned into a business that restored homes in post-earthquake Christchurch.

Just months before lockdowns, with unexplained prescience, Richard sold ▶

"With these machines, you have to know what to get right first and then work back and align everything else up to that – [it's] quite involved, as you have got infinite adjustment choices"

his share of the business and then put to sea. The ensuing months turned to years tacking off the southern and eastern seaboards. He remembers, "We lived off the coast of Oban, Stewart Island, for months. Talk about lucked out!"

"The Cathedral"

Having owned and worked in joinery shops on both sides of the ditch, Richard has a solid handle on how to maximise his workspaces.

Flexibility and portability were fundamental in this shed's design. With the exception of a long, window-lit workbench, everything is on castors, so areas can be reorganised to suit each project and never be restricted by space. Which is where his new Hammer C3-31 Combi – a compact, five-function ▶

"Improvised yacht tech" – Richard's lever system that drops down extenders on the bench. "Push the lever into a locked-down position and the bench goes up on castors," he says

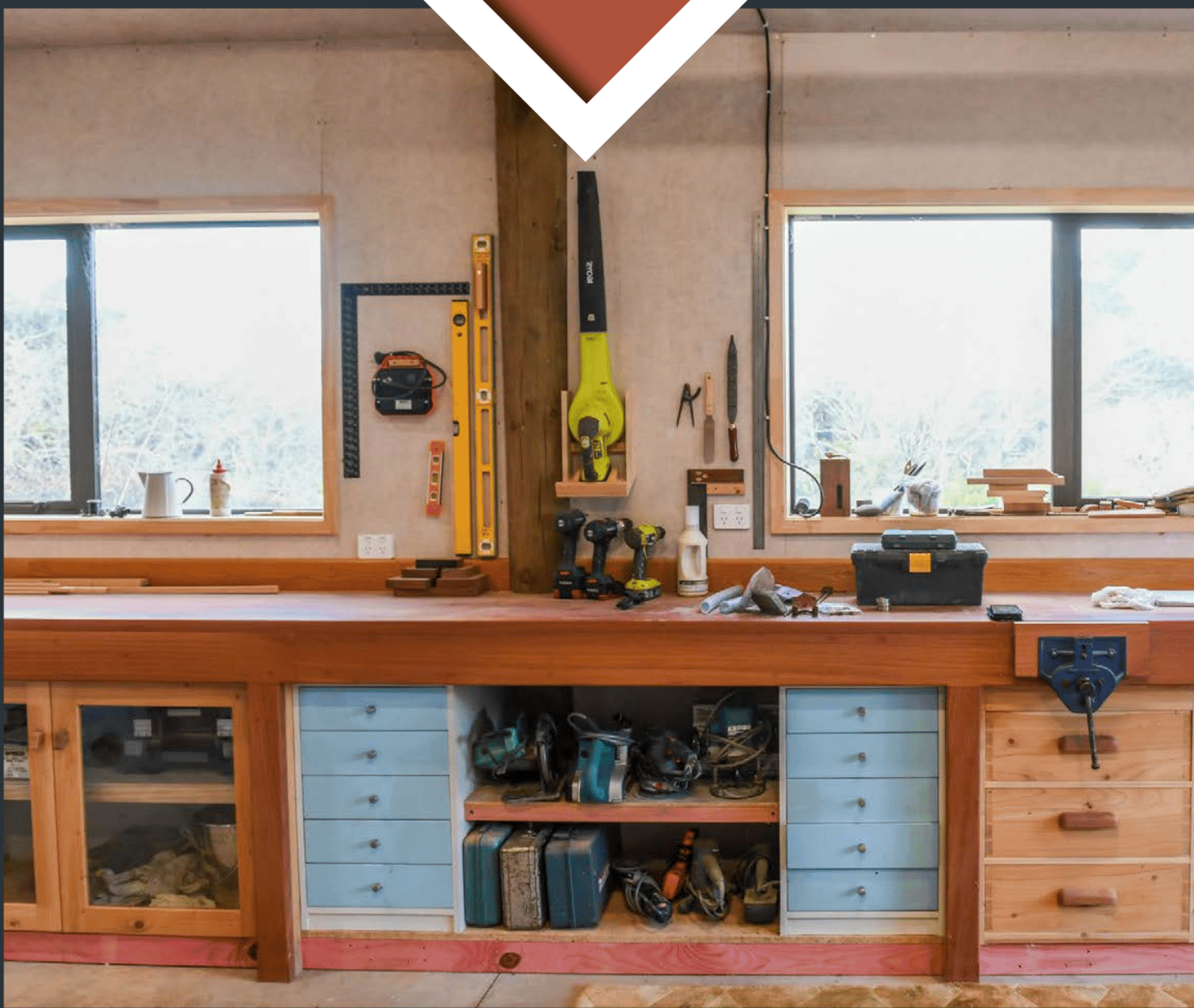
Generous drawer space for machine part storage

"Barb calls Richard's shed 'The Cathedral'"

In the shed

The workbench surface is made from saligna sourced from the local mill.

"I wanted something very hard-wearing, straight and dry too. They milled it and threw it in the kiln to dry it off. I went back to them and said how nice and stable it was; it made the best workshop bench I have ever made. The miller looked at me and said, 'A workshop bench? I thought you were doing a kitchen!' I've been careful with it. It has a wax finish, so it can be a little slippery. I can drill place pegs into it, but I haven't had a job yet that requires that, so I've held off putting pegs in, as I can clamp stuff off."



The workbench

At the shed door

The en suite

When he refurbished the couple's en suite, Richard wanted a moody atmosphere and a timber grain that was reminiscent of ripples on the water. Planks of fiddleback-saligna were used for the match lining and drawer fronts; this was sourced from the back of a shed at the local mill.

"It was a demanding timber to work with," he says. "The grain goes all over the place, and it's very hard!"

Then came the vanity top: a beam of old ironbark that Richard had been carrying around for years. The wood was formerly a column in a building he had worked on in Christchurch. "If I thought the saligna was hard, the ironbark was a challenge for tungsten carbide! There's no shop-bought drawer runners; it's all dovetailed drawers and traditional carcass."

Out of doors

Speaking of hefty, Richard's generous outdoor table was built from 12x12 lengths of plantation kwila, which he brought back from Sydney.

"It is high in silica, so hard on the gear," he admits. "I took it down to the local miller. He said, 'I haven't seen timber like this for a long time. This stuff has come out of some big logs.'

For extra strength on such a large piece, and with the help of the C1-31, Richard has used mortice and tenon joins inside a mitre on each leg, which provides a large surface area for glueing and is all enclosed within the joint.

"And get accurate, repeatable cross-cutting"

woodworking machine – comes into its own: “It uses about a third of the space that separate machines would take up,” he says, “and, with a flick of a lever, the whole machine can be moved around to where I need it.”

Great organisation applies to the plentiful shelving and cabinets too. Of the shed, Richard says, “I’d love to build a small boat in here. Actually, I could move everything around and build a big boat quite easily.”

Barb calls Richard’s shed “The Cathedral”. The high ceiling is certainly nave-esque, and the beautiful kauri entry door is befitting a stately timber church. But like many of the fixtures in Richard’s hallowed place, the door was made to “play around” with the C3-31’s capabilities, and in this case, its spindle moulder. By admission, the machine has become his go-to tool for planing, thicknessing, format cutting, morticing, as well as moulding.

Fine-tuning

When the C3-31 arrived, Richard said it was still bolted to its original shipping pallet, so there was some assembly required and calibration needed.

Achieving accuracy and correct alignment between each functioning area of a combination machine requires time.

Richard says, “W & R Jacks [which he bought the machine from] did offer to send a tech up for a fee, but you are ▶

Cupboard doors

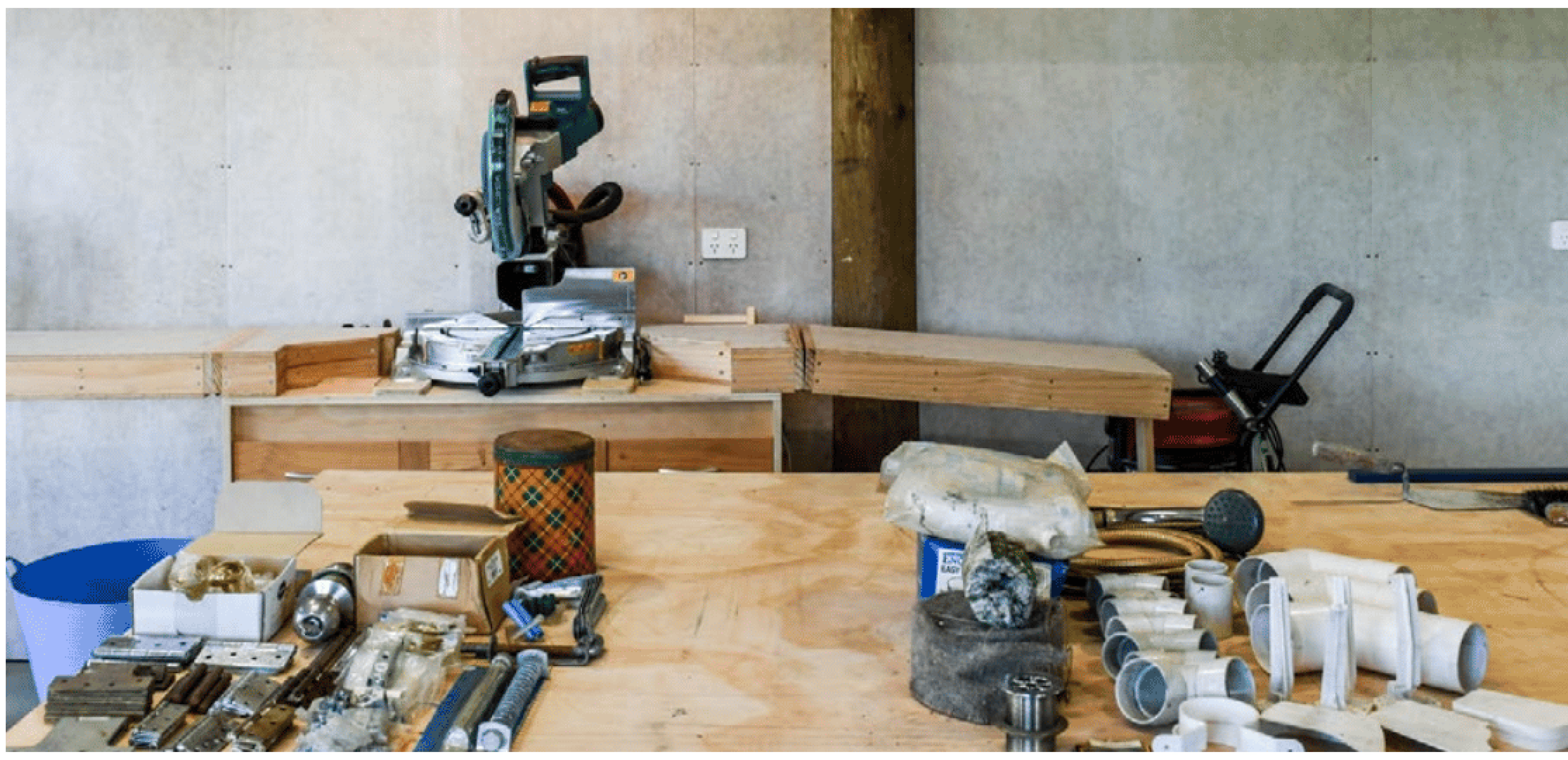
Another timber that Richard loves to work with is macrocarpa, which he used on some cupboard doors. He employed “the machine” to do all the jointing work. “I played around with a set of cutters I bought for doing cupboard doors. It is very easy to make a door with these two cutters: one handling the profiles and one for doing the stops. I can now whip up cupboard doors very quickly and easily. I was given some pieces of toughened glass, unusual for a workshop, but as my memory craps out, it will be quite useful to be able to see stuff!”

Projects

With decades of woodworking experience behind him, Richard has an eye for fine grains and has had an opportunity to work with quality timbers that are seldom seen these days.

In his Christchurch joinery shop, he specialised in making large rimu furniture, tables, and chairs, all completed with a shipbuilder's adze – "scarily sharp" – for a fine finish.

In Sydney, he often used plantation hardwoods, and where possible, wherever he was, he saved as much surplus timber as he was able to store and is now giving it new life around the shed and his home.



Richard is emptying a storage container: "Sorting hardware for a plumber mate and other bits for a builder mate"

much better off learning the adjustments yourself, learning the machine and getting familiar with all of it. I got right into the machine.

"There is quite a lot of setting up with these tables. It's a big learning curve, which is the same with any machine I have worked with. You have to tickle them up to get them operating the way you want them. I love the sliding table saw because I'm used to working on dimension saws; it gives me the ability to handle large items by myself and get accurate, repeatable cross-cutting. It is a nice, solid machine. I don't have to worry about it getting out of whack."

A cut above

Richard accepts that he is "more a machinist than a hand-tools man – [I'm] still handy on the hand tools, but I love my machines. Just about every piece of timber I bring in here goes through this machine in one form or another. Rough-sawn stock is all straightened and thicknessed out on this [the C3-31]. It has got a nice rip fence with a very fine adjustment on it. It is much easier and much safer to be doing those sorts of jobs on a proper bed where you can run all your fences and keep everything nice. The other thing I love is the spiral cutter head. Individual tungsten carbide blades are beautifully machined so that all these cutting faces work in one plane. Tungsten carbide is very sharp and deals with the timber differently than flat cutters; they leave you with a very smooth finish.

"I'm on this machine with just about everything I do, and I have only used about half of its potential at this stage."

"Still handy on the hand tools, but I love my machines"

NIUE'S MASTER EBONY CARVER

On holiday in the tropical paradise of Niue, Helen Frances has the opportunity to meet the highly regarded local woodcarver Jack Feleti. Jack has been carving for most of his life, and shares with Helen his inspirations and techniques for creating pieces from the lush Niuean forest, predominantly using the exceptionally hard wood black Ebony

By Helen Frances | Photographs: Helen Frances

A sign, 'Ebony Carver,' points the way through verdant Niuean rainforest to the shed where master carver Jack Feleti crafts exquisite ebony pendants, bracelets, ornamental hair combs, 21st birthday keys, decorative weapons, and other treasures.

Jack has been carving ebony since he was a boy living in Hapuku village with his grandfather Feleti (Frederick) Jackson. "He always had a knife and carved, so I just started off, just naturally. I used to have a workshop hidden in the bush. Nobody knew what I did," Jack says.

Aged 25, he started selling some of the carvings. Later on, Jack's wife Vivien joined him in his business, selling his carvings commercially.

The villages own the forest

The natural environment of Huvalu Forest, partially owned by Liku and Hakupu villages, is where Jack sources his raw materials.

Before we visit his shed and shop, Jack takes us a few kilometres out of his village to explore the source. Light filters through a thick canopy of trees; rough, rocky coral limestone, covered with ferns and mosses, crunches underfoot.

Jack is passionate about the health of the forest that he knows so well. He points out particular trees, giving their Niuean names and telling how they are used. The *moota*, a type of mahogany tree, is used for making the hull of canoes, *vaka*, and the deck covers are made from the lighter wood of the *le* tree. The *vaka* are so light that they can be easily carried and launched from the rocky shoreline. There are no sandy beaches on Niue.

The trees have many uses

Several native hardwoods have buttress roots that run along the hard surface to gather water and nutrients.

Kieto, an ebony tree, has distinctive silver, almost whitish grey bark on the trunk. The *kolivao* tree is used in construction and was once commercially milled. A tea can be made with the leaves, and cuts can be treated by applying leaves mashed up with saliva. Jack says the name translates as "dancing bush".

Kafika, which Jack also carves, only takes a nail when the wood is green. Many of the trees, including the *kieto*, “It’s the hard core, the heart of the tree”


In Jack Feleti’s shed, he brandishes an ebony club. He works with aged ebony, which is extremely hard


Jack has a large collection of *kieto*, ebony hardwood, which he gathers in Huvalu Forest


Uga, or coconut crabs, live on land and are hunted for food by pigs, dogs and people


An ancient fossilised clam shell in the forest attests to a time when the coral atoll was submerged beneath the sea

produce berries that fruit bats, coconut crabs, pigeons, and other birds eat. *Kanumea* is another sacred tree that has massive buttress roots, and the *ovava*, “strangler fig,” (banyan) with giant aerial roots is also much in evidence.

Jack trills the calls of the male and female pigeon and gets a reply. “It’s a habit I have whenever I come into the forest,” he says.

He points out a fossilised clam shell dusted with moss – proof of a time when the raised coral atoll was submerged beneath the Pacific Ocean. We also come across a large yellow and black spider sitting in a web that spans two trees. The web feels very strong to touch, and Jack tells how fishermen would make fishing lines by rolling web filaments together.

Wild pigs hide in the caves

The rocky terrain indicates the presence of caves, and Jack says there is a labyrinth of interconnected caves beneath the surface where coconut crabs – *uga* – and wild pigs hide out. We come across the remains of a *uga*, on which wild pigs, dogs, and other *uga* feed. Some local people hunt *uga* at night.

“Not many local people come into the forest; they get lost,” says Jack, who knows his way around without paths. He cuts a notch in a tree trunk as a marker for his son, Jack Jr.

Jack and his sons hunt in the forest, and that is when he finds his most precious carving material. Jack collects ebony from the forest floor – branches, roots, or logs that have fallen naturally. Following Cyclone Heta in 2004, they found a *kieto* tree that had blown over. Jack got it lifted out, and the black log is lying in the garden beside his shed.

“The ebony is hard to find. Sometimes it has been lying there for 50 or 60 years, covered with moss,” he says. “The outside is softwood, which rots away quickly in about two years, like rusted steel. If I go looking for it, I don’t find it, but when I go hunting pigeons, I do. It’s the hard core, the heart of the tree.”

Cyclone damage

Cyclones can lay waste to the forest, and Jack recalls the damage done by Cyclone Heta: “The whole island was like it’s been burned down, like a bomb dropped

The Rock

Niue is also known as 'the Rock of Polynesia' – one of the world's largest coral atolls. Niue formed when an underwater volcanic peak grew as a coral reef that was lifted above the ocean's surface by tectonic activity and changes in sea level.

Its true name, Jack says, is 'Nukututaha', meaning 'island standing alone', which distinguishes it among other Pacific nations made up of many islands.

"That's the name it should be all the time – Niue Nukututaha. 'Niue' is a name that recognises the arrival of the coconut," Jack says.

An ancestral story tells of two brothers who were charged to bring "the fruit of life" back from Samoa.

"The chief asked, 'What did you bring back?' And they said '*Ko e nui e*' – 'Behold the coconut!'"

Several trees grow massive buttress roots to gather water and nutrients from the rocky surface which is hard to penetrate.

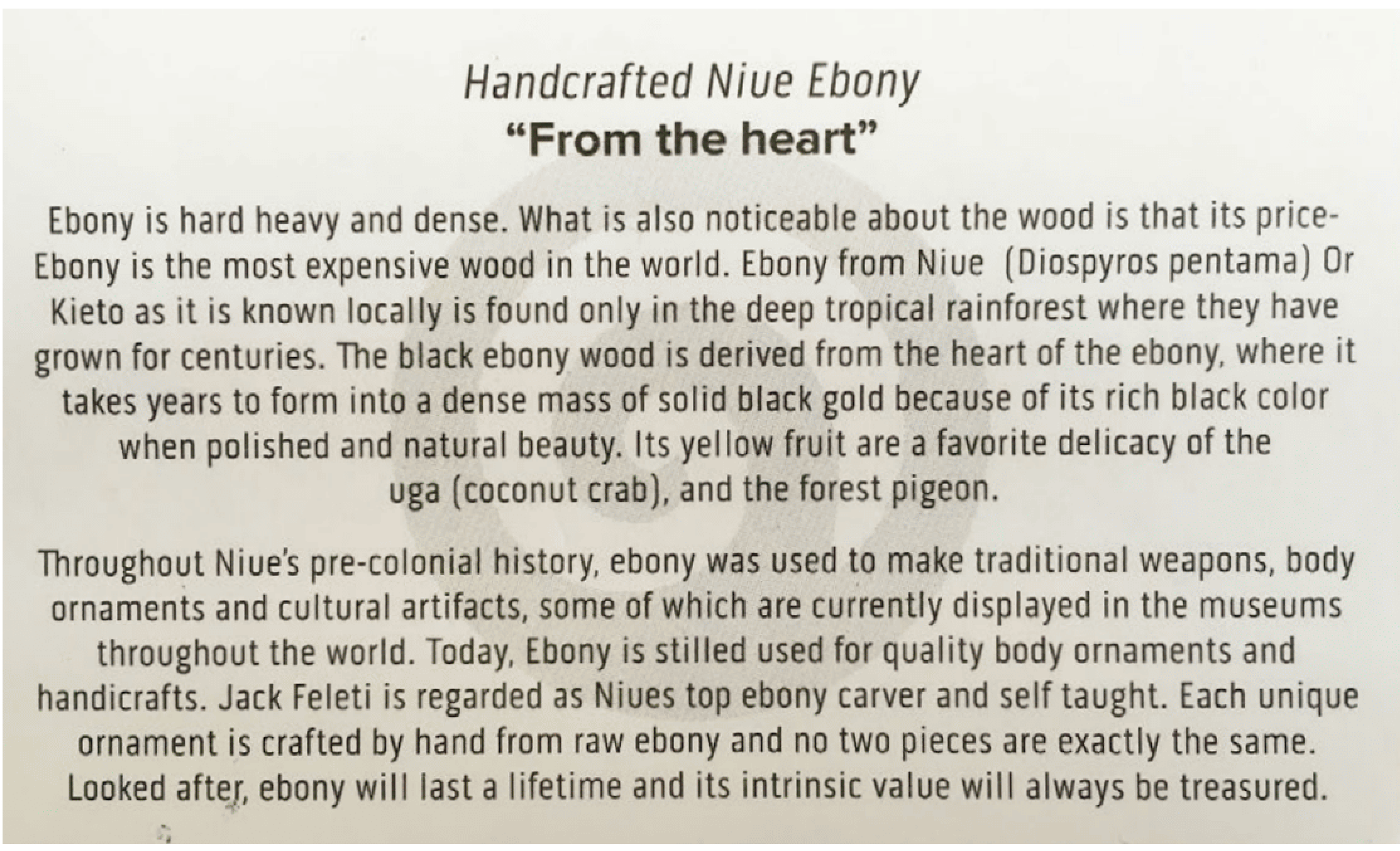
The coconut tree, which appears to grow abundantly on the island, is used for food, rope making, building, and as the middle piece of Niuean women's woven hats. Jack carves the coconut shell as the starting point from which the women weave.

Another name, 'Savage Island', Jack says, was given to the island when Captain James Cook tried to land. The local people were not welcoming.

"There was no beach, and he couldn't come ashore. He saw people with 'blood' on their faces – they rubbed their faces with red banana and scared him off" – the red pulp of the *hulahula* banana, a local fruit.

here, and the whole forest was exposed to the sun. I never went into the forest for six years. Then, when everything started to grow back and was rotting away, with all the broken branches and [other debris from the cyclone], you couldn't walk in it. It was dangerous. You might walk into a cave because all the caves are covered up with branches."

The cyclone also destroyed Jack's original shed, which he had to rebuild, and this is where we head after our forest visit, passing two stone houses, old and new, made from limestone coral rock.

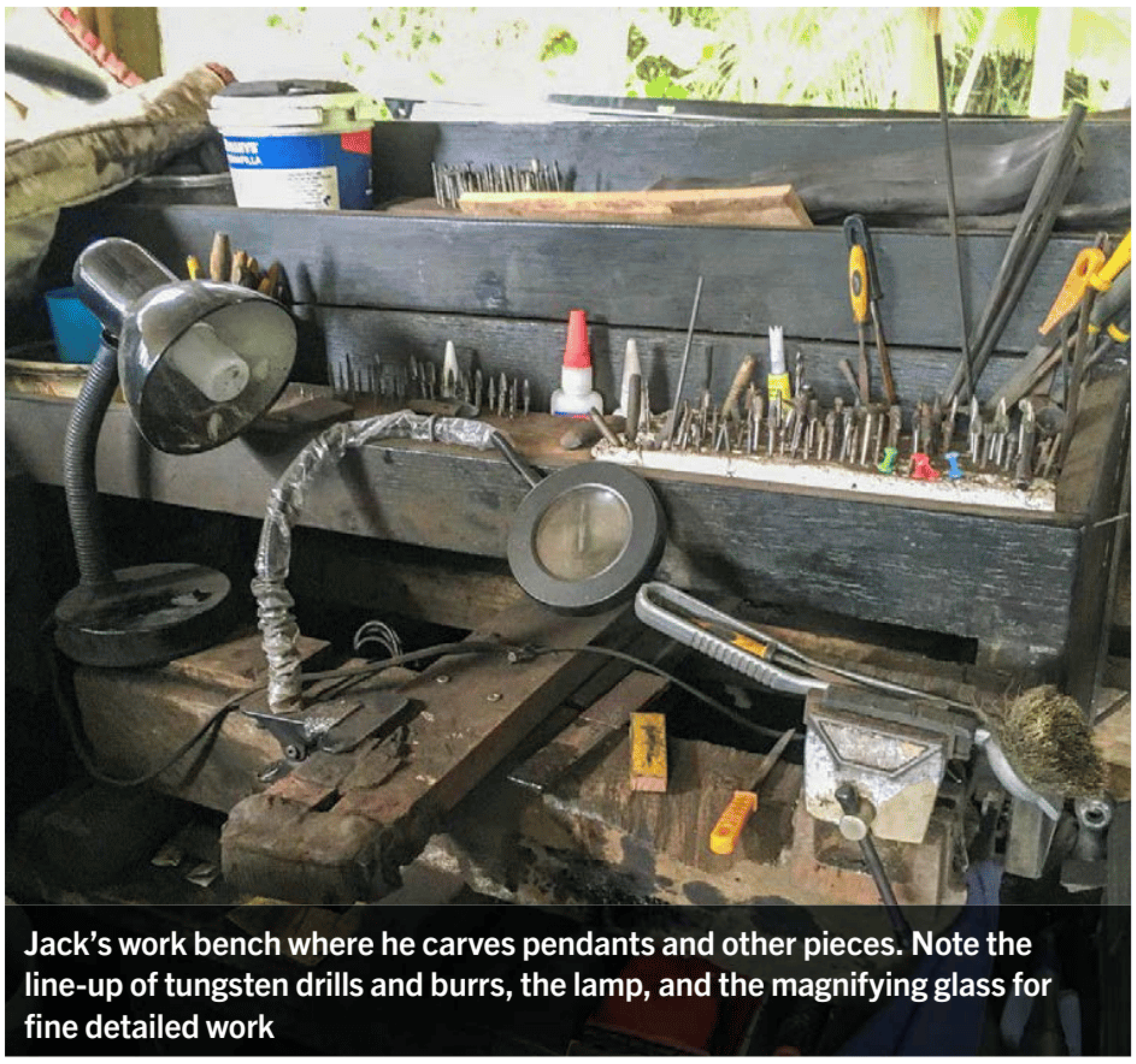


Handcrafted Niue Ebony

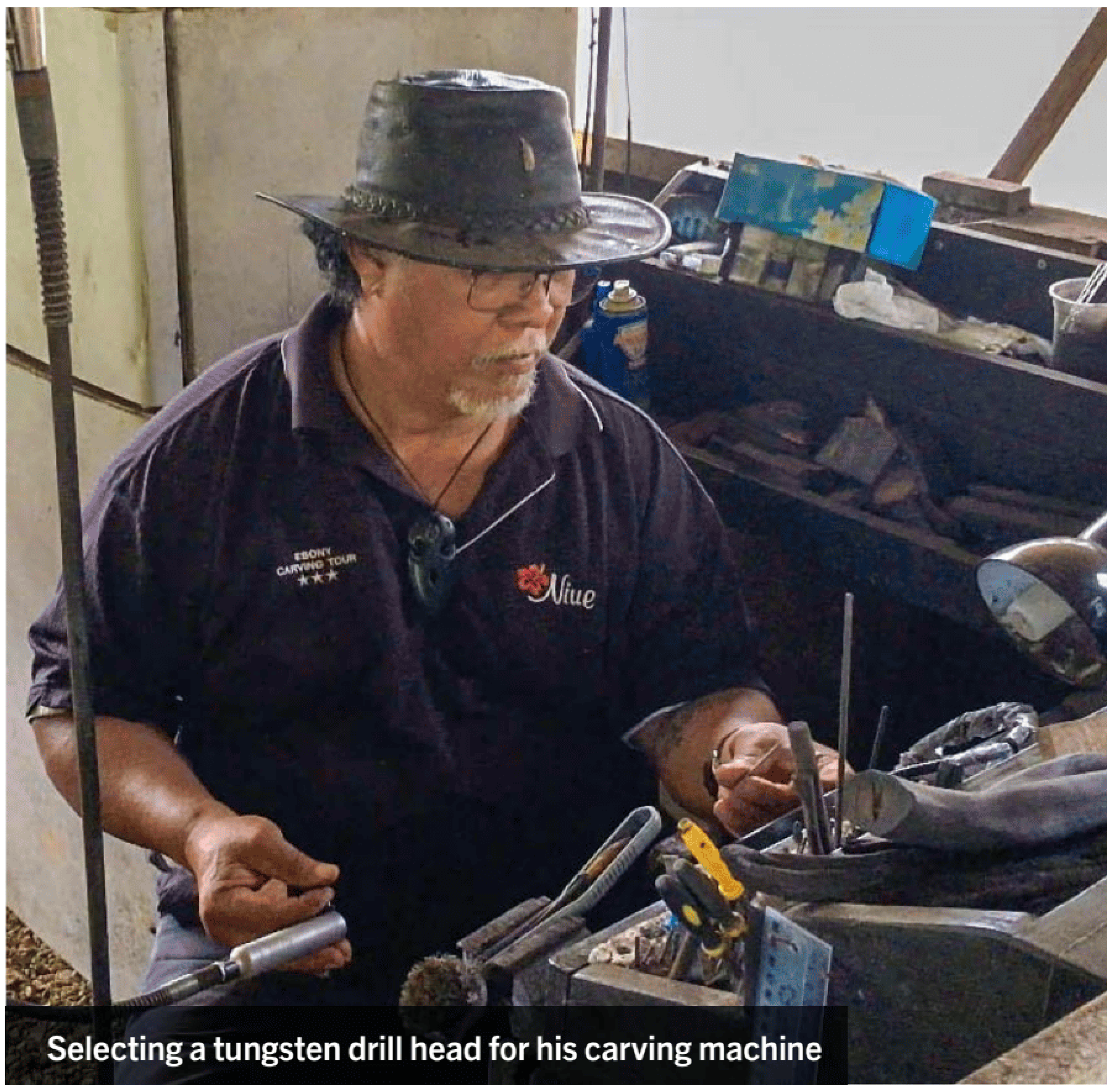
"From the heart"

Ebony is hard heavy and dense. What is also noticeable about the wood is that its price-Ebony is the most expensive wood in the world. Ebony from Niue (Diospyros pentama) Or Kieto as it is known locally is found only in the deep tropical rainforest where they have grown for centuries. The black ebony wood is derived from the heart of the ebony, where it takes years to form into a dense mass of solid black gold because of its rich black color when polished and natural beauty. Its yellow fruit are a favorite delicacy of the uga (coconut crab), and the forest pigeon.

Throughout Niue's pre-colonial history, ebony was used to make traditional weapons, body ornaments and cultural artifacts, some of which are currently displayed in the museums throughout the world. Today, Ebony is stilled used for quality body ornaments and handicrafts. Jack Feleti is regarded as Niues top ebony carver and self taught. Each unique ornament is crafted by hand from raw ebony and no two pieces are exactly the same. Looked after, ebony will last a lifetime and its intrinsic value will always be treasured.



Jack's work bench where he carves pendants and other pieces. Note the line-up of tungsten drills and burrs, the lamp, and the magnifying glass for fine detailed work



Selecting a tungsten drill head for his carving machine

Jack uses a Bosch bench drill to power the initial sanding of beads inside a sanding dish

Jack's shed

Back in Jack's large shed, which is open to the elements and shaded from the tropical sun, Jack shows his considerable resource of *kieto* wood he has gathered over the years. There are piles of both chunky and long, gnarly, twisting pieces heaped up in several places.

He brandishes a lethal-looking war club; another length he uses as a walking stick. The wood is different shades of colour, from rich brown, almost black, through to deep amber. This rare, aged wood is hard-hearted and challenging to work with.

"You have to be patient. It's like you're working with steel," he explains.

Outside his shed, a work stump sits where he's doing some sanding. The stump is also from the *kieto* tree, and he shaves the surface to reveal the dark wood whorled with lighter shades.

Machines, tools, and carving

Inside Jack's carving workspace, he has a lamp, a magnifying glass for intricate work, files, sandpaper, and an array of tungsten and diamond drills and burs in many shapes and sizes.

Jack used to use Dremels, but the ebony kept breaking them. He has an Archer power-carving machine that looks a bit like a dentist's drill with long flexible shafts connected to the handpiece and a foot pedal control.

He says that the Archer machine is old and no longer produced. He has also used a Foredom machine, which he says is a popular American-made brand.

The radio is also important company

A drop saw cuts the ebony — so far so good; it is still working!

Jack also makes wooden rings


Refrigerators protect tools and metallic materials from the tropical humidity


Jack makes beads which he drills from ebony and other wood such as *kafika*

A wee drop of humour!

"Jack used to use Dremels, but the ebony kept breaking them"

during the four to five hours he spends carving a decorative piece. And for a bit of humour, on a shelf, he has a 'Jack Feleti'–labelled bottle of Jack Daniel's.

The humid climate on Niue is not tool-friendly. Jack keeps many of his tools and metallic materials in old refrigerators that he has inherited from the Matavai Resort, where his wife Vivien works in human resources.

"Niue is a rusty place. Everything rusts," he says. "So I keep them fresh. All my tools and all my other stuff are in here."

The "other stuff" includes his hunting guns.

Ebony kills plenty of tools

Jack has a number of machines around the shed that have been wrecked – "kaput; burned out" – by the ebony, but with the cost and time spent on repair, he prefers to buy new ones as required.

"I'm trying to find other ways to continue carving without buying more machines," he says.

A large red drop saw manages to cut through the ebony; it makes a din and gets smoking hot, he says. There are several burned-out drills and bandsaws (brands not disclosed), but a Bosch bench drill is still doing a good job.

Jack makes beaded bracelets and rings out of ebony and other, lighter woods. He drills out the round shapes from blocks of wood. There is skill in doing this, as he drills one half of a ball, then the other.

"You've got to keep still to have a straight cut on both sides to make the ball come out really round," he explains.

He then uses the Bosch drill to sand them, the beads whirling round and round inside a sanding dish with sandpaper in the top. He changes the grades of sandpaper as required.

"You have to hold on to the drill so you don't go down too much. You have to limit how far you go and listen to the sound of the balls because you can damage them. When I get to really smooth, I change to a softer sandpaper. After the sandpaper, I put the buffing pad on it," he says.

He finishes each bead off by hand to smooth the surface to his satisfaction and to eliminate the ridge that forms around the middle.

When he has enough beads, Jack sands them while he and Vivien watch TV at night. ▶

Bell ringing

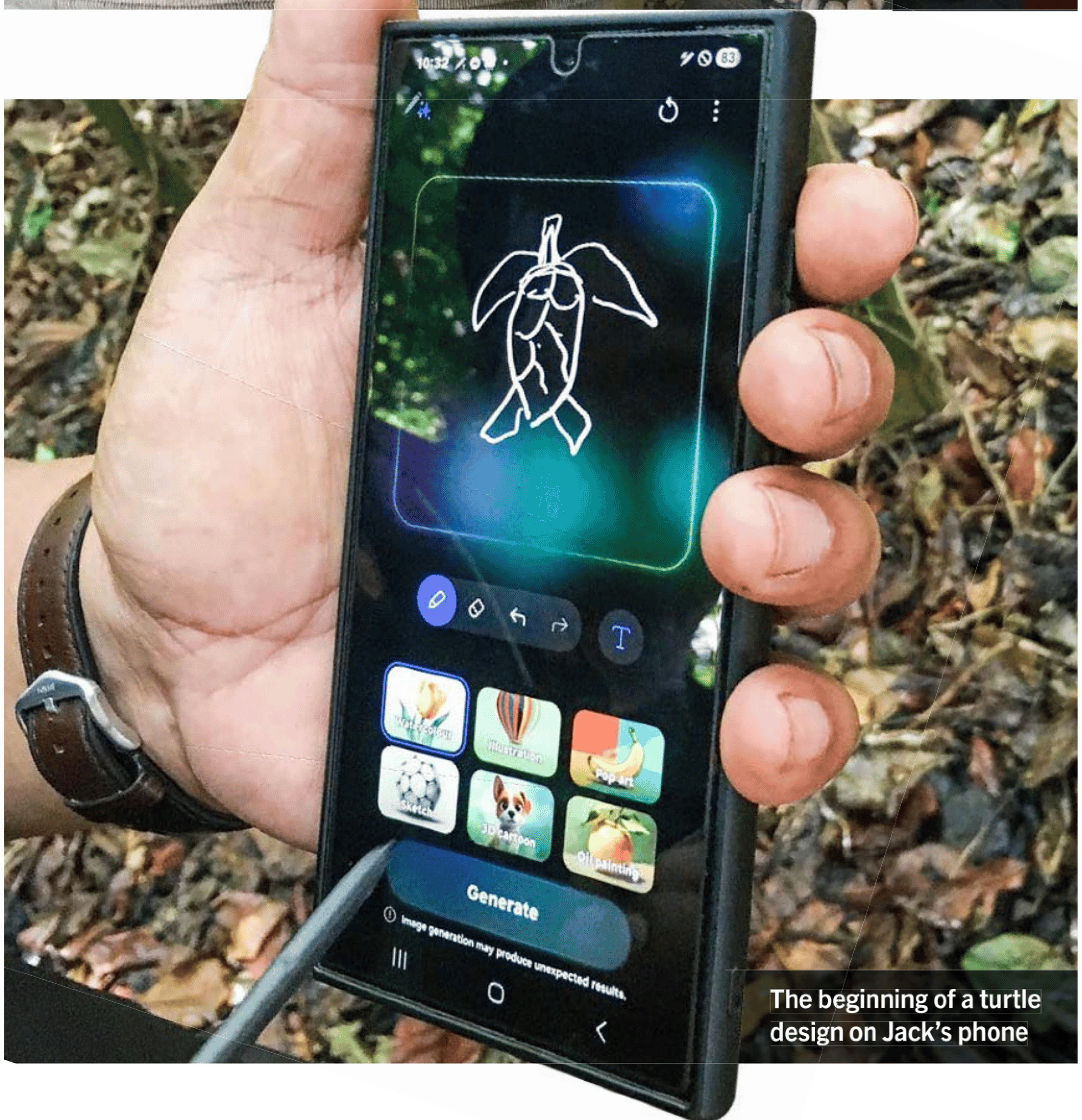
Friday is Jack's day for relaxation from the week's work; however, time off also seems to involve work of one kind or another, such as carving.

"Friday, I'm getting ready for the weekend. Sunday is the hardest day of all," he says.

Niueans have a strong Christian faith. Visitors to the island may attend services and are requested to observe certain practices, such as not swimming until the afternoon in designated areas.

"Jack does initial design work for carvings on his phone and refines it using AI"

Bead making for bracelets using a sanding dish then finishing off by hand



The beginning of a turtle design on Jack's phone

"When I get to the really finest, like a thousand grit, that's when I go inside. So I sit in front of my TV and watch the news while I'm sanding away, because it's not that dirty, not dusty."

He uses water while sanding, and finishes off with the polishing machine, which he keeps in the house to avoid toing and froing between the house and the shed.

AI helps out with design

Jack does initial design work for carvings on his phone (see image of the turtle shape) and refines it using AI.

Designs for his pendants include war clubs, sports bats, whale tails (the huge mammals come to waters around Niue mostly between June and October); Tokamotu – a sacred being from the days before missionaries brought Christianity to Niue; fish hooks (*matau*); bird and wave; dolphin pendants; and many other exquisite designs that reflect Niuean culture and the people's relationship with the natural environment.

"The fish hook is a symbol of the people of the Pacific. If you come across somebody wearing a hook, you know where he comes from. I have my own designs. Sometimes I make the hook look like a hook; sometimes I make it like a logo. It's a hook, but it's got a lot of meaning in it."

Jack also works on commissions, and

Ebony

Ebony trees are a group of tropical hardwood species in the *Diospyros* genus, prized for their dense, dark-coloured heartwood. There are over 700 species across Africa, Asia, and the Pacific, valued for making furniture, carvings, musical instruments, and traditional crafts. They are slow-growing and can reach heights of 15 to 30m.

Among the best-known are *Diospyros ebenum* (Ceylon ebony) from India and Sri Lanka, *Diospyros crassiflora* (Gabon ebony) from Central and West Africa, and *Diospyros celebica* (Makassar ebony) from Indonesia. In the Pacific Islands, several native species thrive, including *Diospyros samoensis* and *Diospyros pentamera*, as Jack knows it.

D. pentamera, also called 'black marblewood' or 'grey ebony', is native to Australia and parts of the southwest Pacific. It grows in subtropical and tropical rainforests and plays a role in forest ecology by providing habitat and fruit for birds and other animals.

The wood from this ebony tree is the one Jack uses for his carvings, gathering the wood sustainably from the forest floor. The species is not as well-known as its African cousins; however, it produces equally valuable dark, fine-textured timber.

D. samoensis is also important, growing in coastal and upland forests

and is traditionally used in carving and tool-making. Like other Pacific ebony species, it contributes to both biodiversity and cultural heritage.

In Pacific islands, many *Diospyros* species face threats from deforestation, overharvesting, habitat degradation and cyclones. International agreements like CITES regulate the trade of endangered ebony, and sustainable management practices are increasingly encouraged. In island nations such as Niue, protecting species like *D. samoensis* and *D. pentamera* is important both for supporting biodiversity – maintaining environmental health – and traditional uses of the wood.

Exquisite pendants displayed in Jack's shop. The designs have cultural significance for Niueans and their relationship with the ocean


A spear to mark a young man's 21st birthday


Sanding the spear stand. Note Jack's work stump made from a *kieto* tree


Stages in carving a piece of ebony – drawing with a white pen; carving with tungsten drills and burrs; filing and time-consuming sanding

this includes people's own designs, at a higher cost.

"If a Māori comes over here with his own design and asks, can I make a design out of that so he can present it to his girlfriend or mother? I can do that. Sometimes they come with a greenstone [carving], and they want me to make it out of ebony. I also make some pieces for the government. They buy them to present to VIPs."

Design process

After drawing and refining a design on his phone, Jack selects a piece of ebony to suit, or a shape of the wood might suggest a design.

He then draws the design on the ebony with a white paint pen and carves it using his specialist carving machine. He changes the drills and burrs to achieve different detailed effects.

Filing and time-consuming sanding follow, then oiling each piece to enhance the ebony's naturally smooth, glowing finish.

"There's a lot of sanding with ebony. After I shape it, I use a file, and after the file, the sandpaper. There are about four types of sandpaper – rough to fine. After sanding, I take it to the polishing machine and polish it to see if there are any more sandpaper marks," he explains.

International scene

Jack sells his work around the world

My Niue experience in brief

I spent a week in Niue at my own expense, staying at the Scenic Matavai Resort.

There are many other types of accommodation available on Niue; however, the resort was very comfortable, the staff very pleasant and professional, and the food and cocktails delicious.

An orientation trip offered by Niue Orientation Tours (NOT) around parts of the island proved an excellent introduction, peppered with the banter of former New Zealand school principal Keith Vial and the local knowledge of NOT guides.

Snorkelling – at Limu Pools, Matapa Chasm, and Avatele Beach (one of the few with rough coral instead of sand) and in deeper water with a tour guide from Niue Blue – was literally out of this world, floating above vibrantly coloured coral and tropical fish in their natural habitat. And then there was whale watching – we were lucky to see a few humpbacks and tail flukes surfacing close to the little boat. Riding on the powerful Pacific Ocean was in itself an awe-inspiring experience.

Booking a rental car with Denzel Car Rentals in March seemed to be a lucky break, as several car rental companies were booked out in July, a popular month for tourists.

and has been an exhibitor at two world carving expos.

The expo in Japan in 2006 was two weeks long, and in China in 2010, the expo lasted six months. What with the setting up and packing afterwards, Jack spent nearly eight months away from Niue. He made many pendants for the Chinese, who, he says, love the feel of ebony – as does Jack. In Shanghai, it kept him in touch with home.

"When you wear it, you touch it. The Chinese would feel it when they were talking because it's very smooth. It gives you hope. You close your eyes, and you can see the forest. You can see the caves."

Ebony carving shop

Jack displays and sells his carvings from a temporary shop in a container crate. The display includes treasures in a glass cabinet that are not for sale, such as a massive chunk of polished *kieto* from the tree that was blown over during Cyclone Heta, and a valuable sperm whale tooth that he mounted on a *kieto* stand.

Among his range of pendants, there are different styles of *matau*. One has a whale-tail design that enhances its symbolism, as whales are often seen as guardians and protectors of Polynesian culture. Another incorporates a shark

fin with a whale tail hook, and another is shaped like a map of Niue island. The Niue map is also etched on a pair of fine decorative hair combs to be worn in a topknot. The pendants shaped like clubs and spears symbolise masculinity, strength, and courage.

In the cabinet, there is a 21st birthday key that Jack carved out of ebony for his daughter Ebony. He uses other wood, such as *kafika*, for similar purposes.

A family affair

Jack was making a war spear and stand for a local man's 21st birthday, and his son Charlie, a tattooist, had done the decoration.

He made a coconut husk rope to wind around the handle, and when finished, he was going to oil it with coconut or furniture oil.

The decoration, he explained, represented important elements – three stars for the village, curving wave shapes for the Pacific Ocean, leaves and flowers for the land, and a weaving design that represents Niue as one nation of many (14) villages.

Jack will continue carving, showing tourists around his shed and selling his work. The time has come, however, to hand over guided visits of his beloved forest to his son Jack Jr, who will take over Ebony Rain Forest Tours next year. These tours share local stories and legends, along with insights into the unique flora, fauna, medicinal uses of plants, and geology of the Niuean rainforest landscape.

facebook.com/ebonysforesttour/photos

A rare sperm whale tooth mounted on an ebony stand is displayed in a cabinet in Jack's shop

Bookcase

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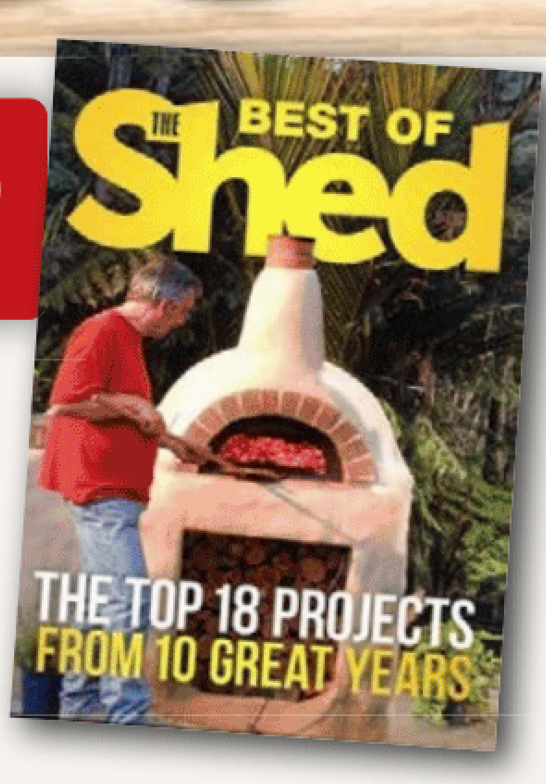

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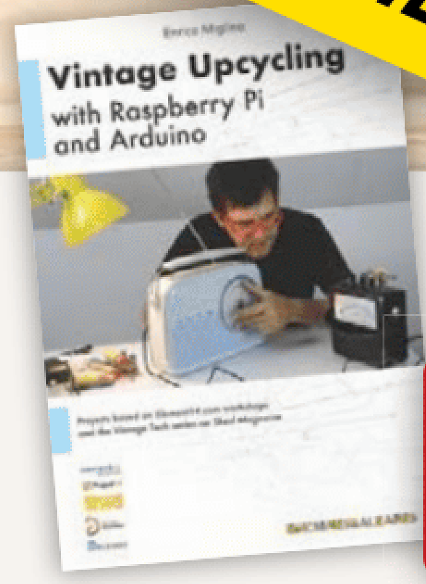

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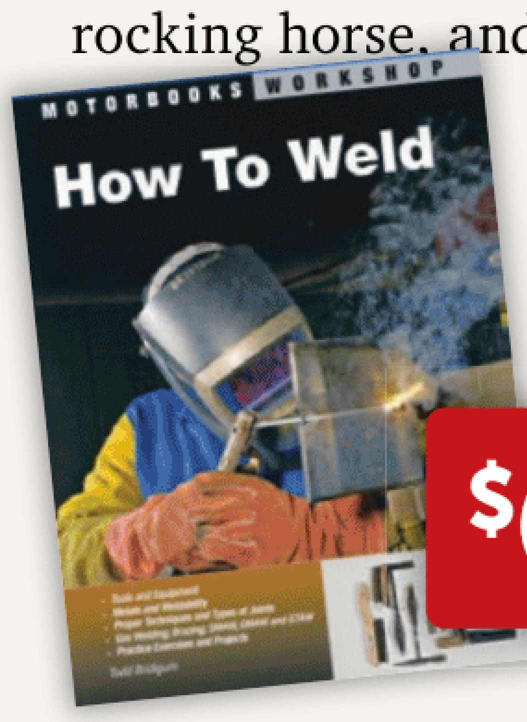

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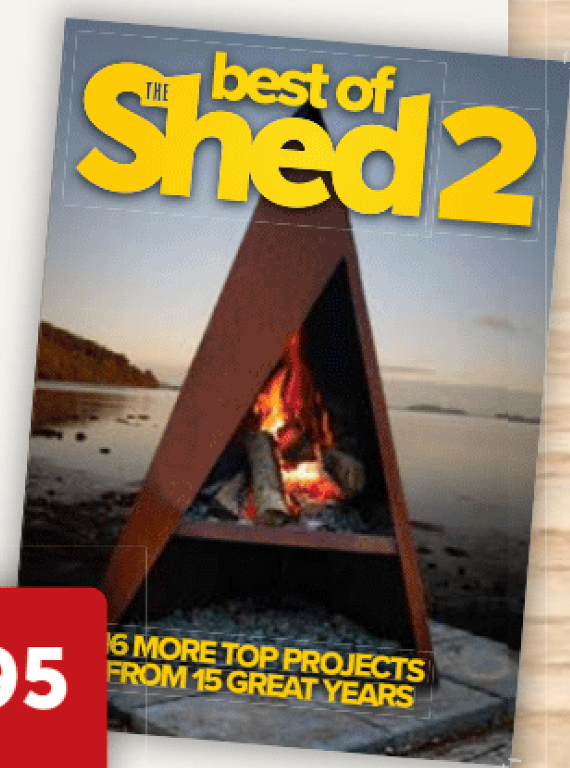

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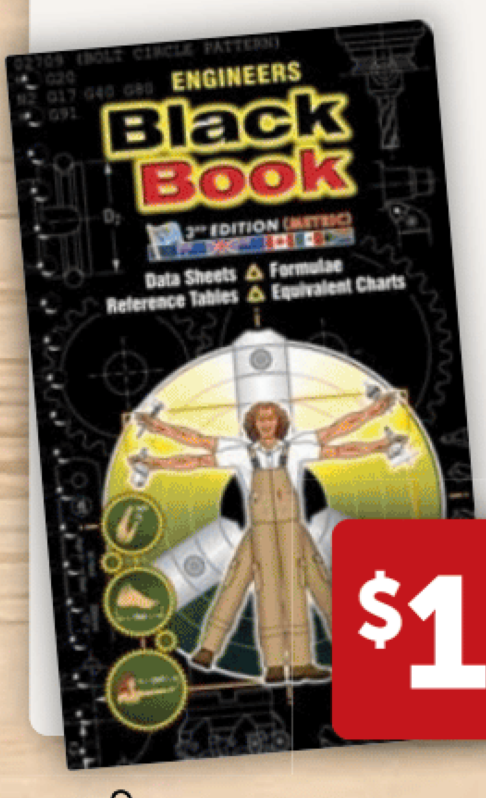

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The Shed QUIZ NO. 5

1

At what temperature does water boil at the top of Mt Everest?

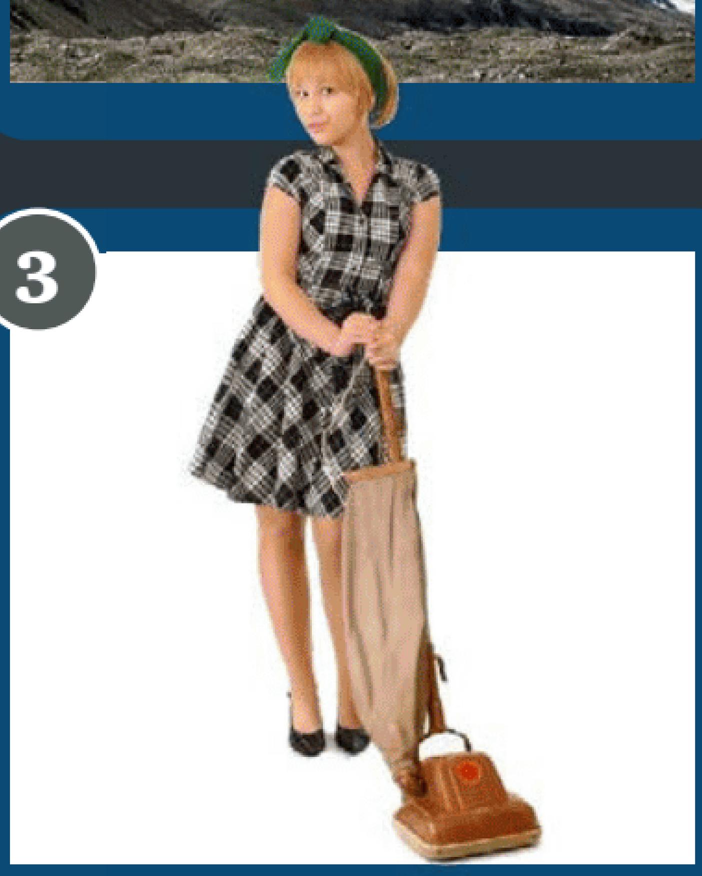
a) 50°C
b) 70°C
c) 100°C
d) 105°C

2

What material do you typically use a spokeshave tool on?

a) Steel
b) Aluminium
c) Wood
d) Plastic

3



Who invented the domestic vacuum cleaner?

a) Hoover
b) Spangler
c) Edison
d) Dyson

4

Can you drive a plug-in EV from Auckland to Wellington without stopping to charge?

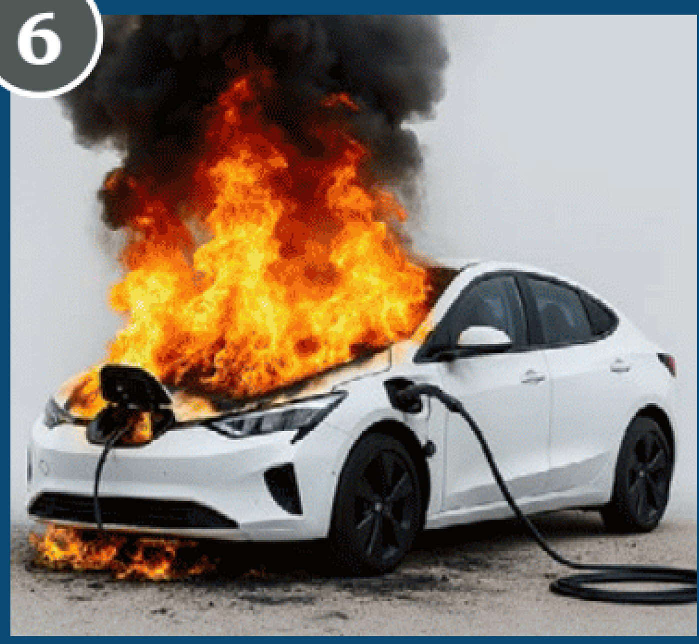
a) Unlikely
b) Easily
c) No way
d) Only if going downhill (North to South)

5

What is the colour of sunset on the planet Mars?

a) Orange
b) Red
c) Puce
d) Blue

6



How do you extinguish an EV battery fire?

a) Call 111
b) Dry powder fire extinguisher
c) Cover with a fire blanket
d) Turn it upside down

7

How many times quicker does steel rust on the Chatham Islands than on mainland New Zealand?

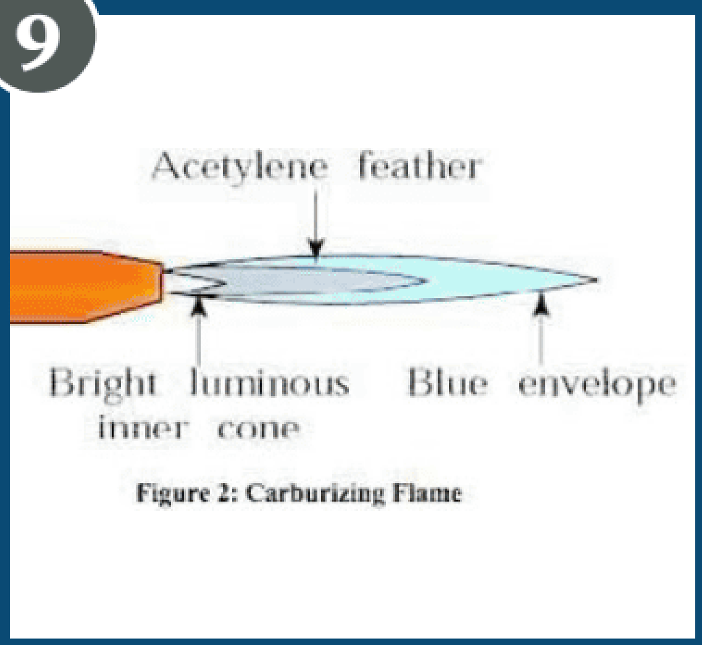
a) 5
b) 10
c) 50
d) No quicker

8

Which is the hardest New Zealand timber of those listed following?

a) Maire
b) Tōtara
c) Mataī
d) Kauri

9



What temperature is the tip of the inner cone of an oxy acetylene flame?

a) 2100°C to 2480°C
b) 1100°C to 1480°C
c) 3100°C to 3480°C
d) 4100°C to 4480°C

10

What is the melting point of lead?

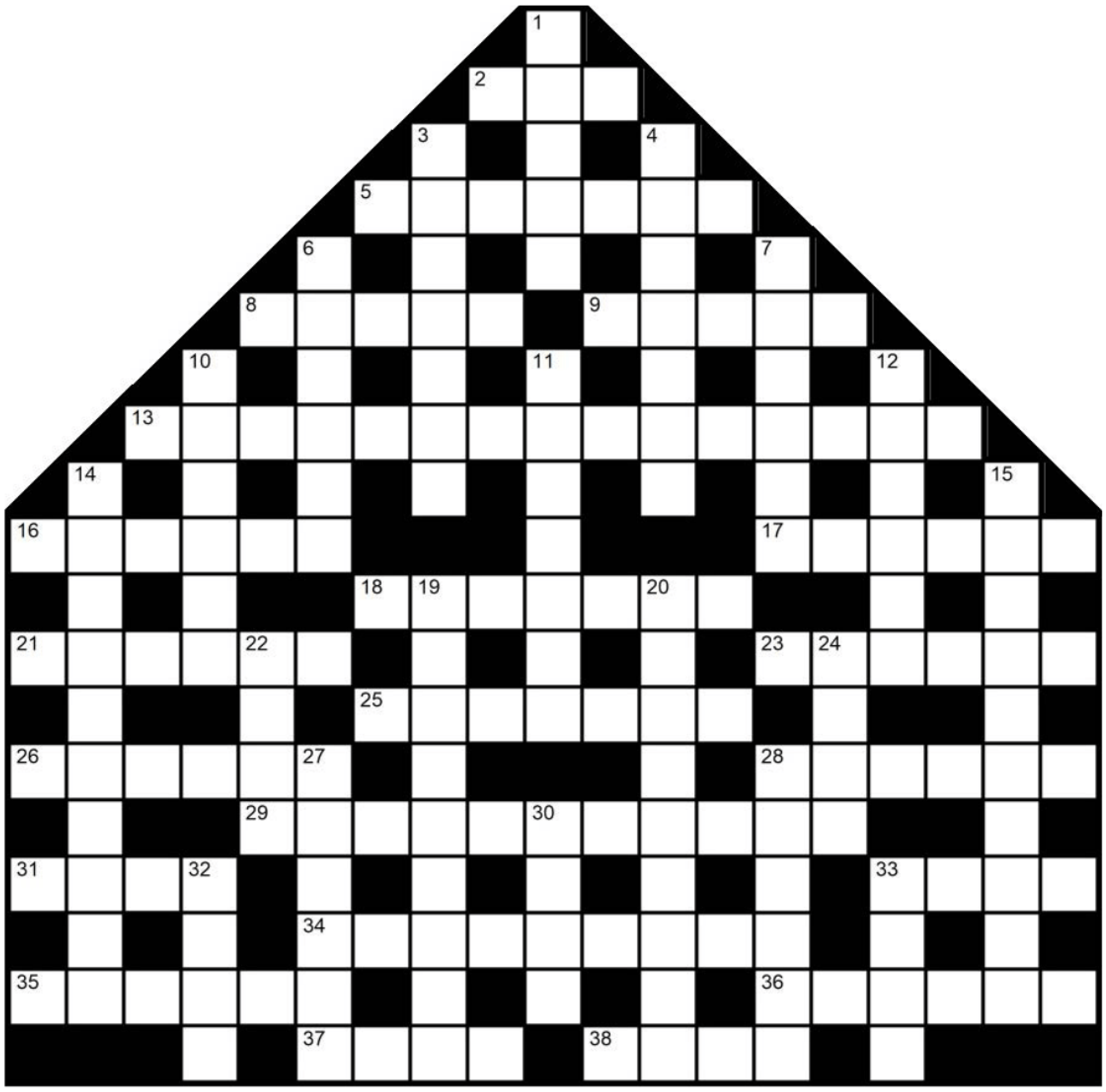
a) 227.5°C
b) 327.5°C
c) 427.5°C
d) 527.5°C

Answers: 1. (b) 70°C; 2. (c) Wood; 3. (b) James Murray Spangler in 1907. In 1908, William Henry Hoover began manufacturing them as Spangler did not have the money to do so himself; 4. (a) Unlikely. Most EVs' range is 300 to 500km, but this decreases with the age of the batteries. The driving distance between Auckland and Wellington is 640km. If you went for (c) No way, you're probably not very wrong, but some EVs have a range of 800km; 5. (d) Blue; 6. (a) Call 111. All other methods are not going to work and will probably cause serious burns. Move well away and call the fire brigade; 7. (c) 50; 8. (a) Maire. While it is the hardest, it is difficult to work with, so it is an uncommon choice for projects. Tōtara rates second in this group, mataī third, and kauri fourth; 9. (c) 3100°C to 3480°C; 10. (b) 327.5°C

By Māyā

THE SHED CROSSWORD NO. 2

(21 was seen in a 14 13 in 1909; 18 8s fought against German 34s in 1917)



Across

2. See 5

5/2. Humiliation on losing a defective type of 25 (7-3)

8. See 18

9. See 28

13. What's charged for transport? (8,7)

16. Stern princess leaves the local area (6)

17/38. Cave, Matthewson and DeSantis put together a type of 25 (6-4)

18/8. LP comes with a free kite (7,5)

21. Fleming's Doctor joins team backing chap with a bright idea (6)

23. Extra mounted a potential romantic partner (6)

25. Club where Terry is disheartened to get a container of juice (7)

26. A 37's overturned by us, you can count on it (6)

28/9. Some returning fleets net rockfish with metal 7ed to become 4 (6,5)

29. A golfer many treated as Arthur's enchanting sister (6,2,3)

31/33. Sketch bar where you'll find runners (3,5)

34. Was "Coleridge's Unusual Neckwear" a hit for Fleetwood Mac? (9)

35. A footrace without booze? That's just a rehearsal (3,3)

36. Indignation lacks resistance, leading to a loss of power (6)

37. Vehicle for hire, thanks to football team (4)

38. See 17

Down

1. Bodies of water - and hair, they say (5)

3. Gun is certain to hold one's attention (7)

4. After the start, "more reliable" becomes "more out of practice" (7)

6. Tap to push something through, in a manner of speaking (6)

7. Sketch soldiers when back in hideout (6)

10. They might be silver-haired, or golden (6)

11. How one could attach a decking panel to a frame? I can't be bothered! (5,2)

12. Tranquil place to take drug (6)

14. UK debaters could become a 13 manufacturer in 1902 (10)

15. Don detailed what Gollum coveted and why 28 9 becomes 4 (10)

19. Grab one crook and steer to flight recorder? (6,3)

20. Deter poor construction - this is what sinks ships! (9)

22. Egg on beginner against hesitation (4)

24. Employee has a cunning plan (4)

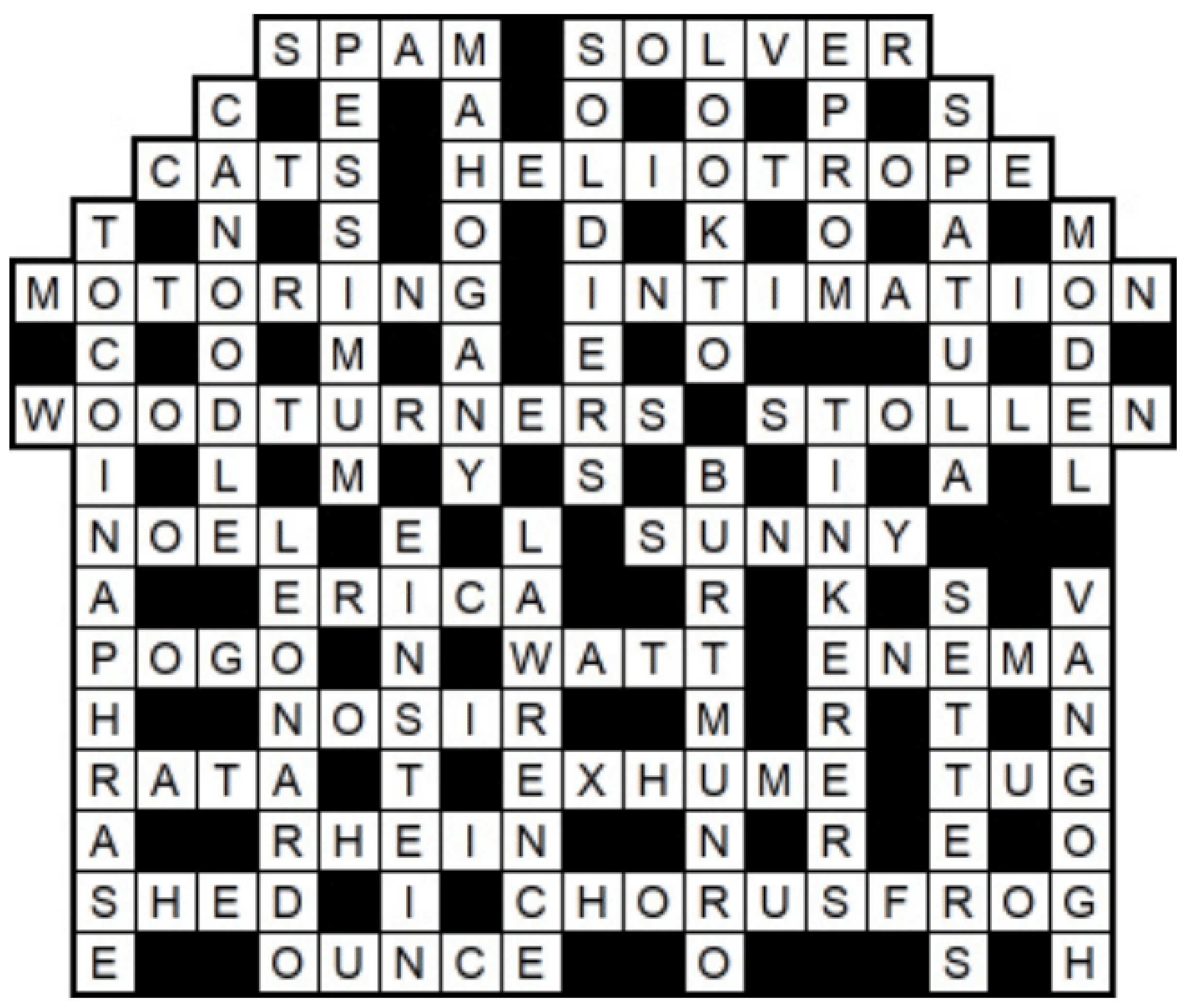
27. Issue with insect's speech sound (6)

28. Vehicle's activated for Rachel or Kit, for example (6)

30. Enthusiasts crazy for hard-shelled seeds (4)

32/33. Is lady of the night's fee ... a salt? (8)

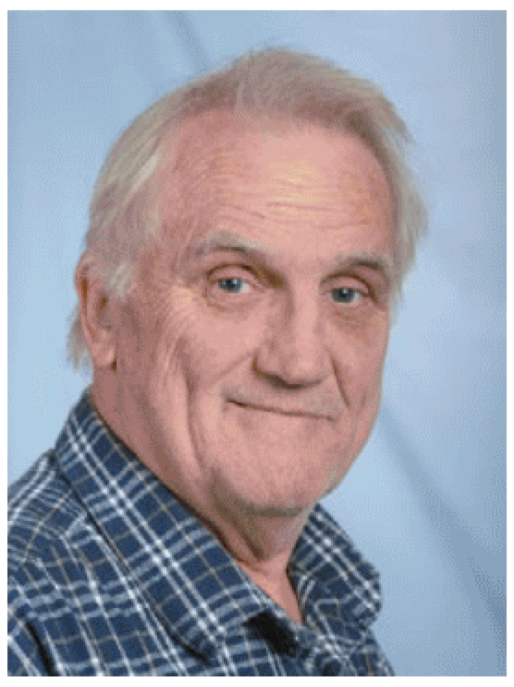
Answers: *The Shed* Crossword No. 1



The restored bench

The pattern maker's vice, in place

THE PATTERN MAKER'S VICE



Jude decides to restore a favourite old jarrah workbench and fit his trusty, and now probably quite rare, vice

By Jude Woodside

As part of setting up my shed, I had planned to shorten the legs on my old workbench.

I built this workbench 35 years ago in Australia of laminated beams and jarrah stretchers. I don't remember where I got the jarrah, but I clearly had a lot of it. The bench was so good, I had it shipped home when I returned from Australia. It has proved a worthy piece of equipment, very sturdy, but I made a mistake when I built it, so it was always a bit too high. I wanted the bench to match the rest of my equipment, 875mm high.

A straightforward job: simply unbolt the top, and cut the legs. But I thought the top looked a bit dodgy. It was stained, full of holes, and looking worse for wear. What if I planed it? We have the technology. So I removed the top and carefully cut it into three pieces that would go through the planer and thicknesser.

I reassembled the top and added a piece of rosewood to one side to extend it a bit, and two pieces of rimu on the ends, mainly because the previous ends looked unsightly.

Installing my trusty vice

Some years ago, I bought a pattern maker's vice from the US.

It cost around NZ$600, and the shipping was nearly as much again. This one is a copy of the Emmet vice; there are a number of styles, but they all work the same way.

With the top still free, I decided it was time to install it. I had thought of recording the process, but I was in a hurry, and I figured not too many people would have one anyway.

The pattern maker's vice is unique in that it can be used in a variety of positions. The jaws rotate through 360 degrees, and the vice itself can be tilted to 90 degrees. They can clamp non-parallel items, and the four included dogs mean it can easily hold circular objects.

Pattern makers needed to be precise

They were made for pattern makers, who, in my youth, were the peak of the woodworking profession. They made the models for casting large pieces of equipment, and it was a profession that required the ultimate dedication to precision.

These craftsmen were the engineers of woodworking. Their models not only had to be accurate; they had to take account of the shrinkage of different metals and allow for draught – the slight angle that allows mouldings to be released from the cope and drag. They made gears, engine blocks, pulleys, wheels, crankshafts – anything that could be cast. This very vice would have been made first by a pattern maker. I've attached it to the bench diagonally opposite the wood vice since the bench is movable. It gives me more options for holding work.

Well, that's it for another year of interesting times – 2026 can only get better. Merry Xmas.

'Dynamite Dave' Alexander is a self-taught doer with an eye for detail, unquestionable discipline, and a passion for motorsports. Dave has always lived his life at full tilt – but this time he's heading for 300mph in a 7m long rocket called a 'Lakester'.

January 2026

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
			1 New Year's Day	2 Day after New Year's Day	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19 Wellington Anniversary Day	20	21	22	23	24	25
26 Auckland Anniversary Day Northland Anniversary Day Shed ON SALE TODAY	27	28	29	30	31	

THE Shed
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February 2026

The Leeston shed of Paul French is home to a workshop, various cars, hot rods, and an extensive collection of advertising signs. The advertising signs relate to a broad range of products, from biscuits to bicycles and from ice cream to colas and oil companies. It also doubles as a home. It may be sheddie heaven.

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
						1
2 Nelson Anniversary Day	3	4	5	6 Waitangi Day	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23 ClassicCar ON SALE TODAY	24	25	26	27	28	

March 2026

Chris Elliott is a Jack of all trades with the heart of an Italian. When it comes to two wheels, Chris has been riding and working on Vespas since he was a teen. He recently restored an SS90 (Super Sport) for the New Zealand Piaggio Distributor.

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
30	31					1
2	3	4	5	6	7	8
9 Taranaki Anniversary Day	10	11	12	13	14	15
16	17	18	19	20	21	22
23 Otago Anniversary Day Shed ON SALE TODAY	24	25	26	27	28	29

April 2026

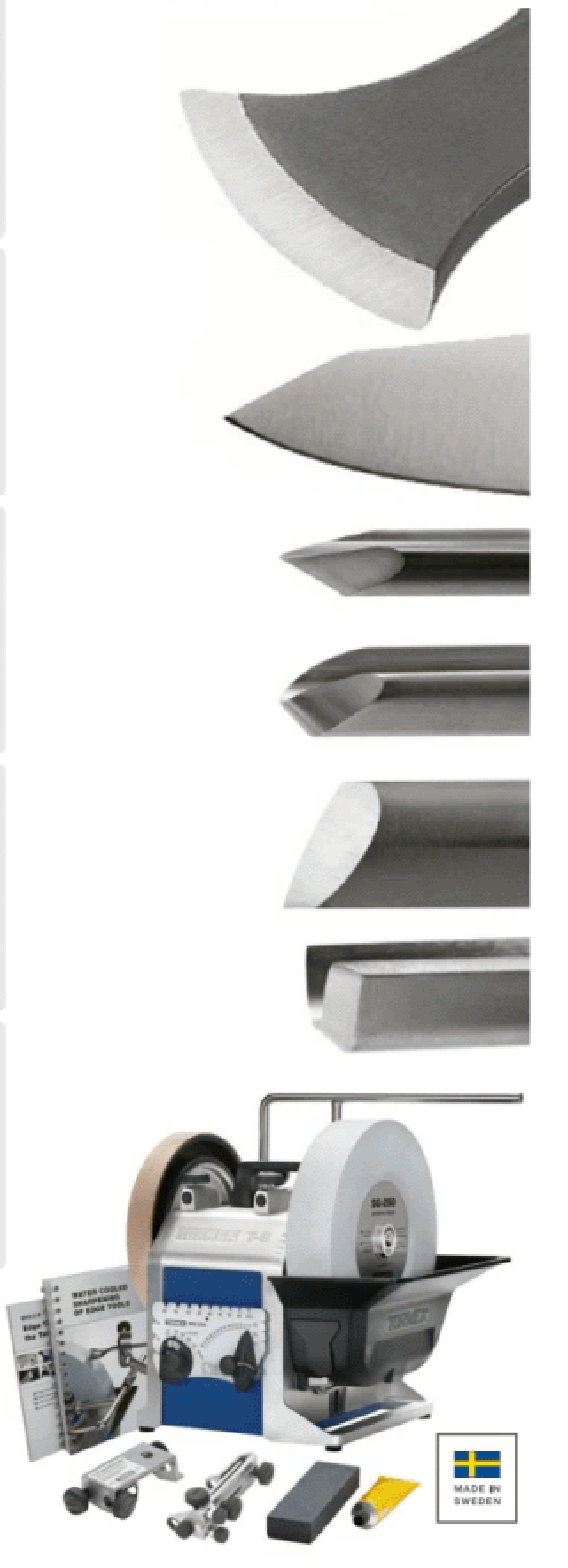
With the genealogy of five generations of South Island engineers in the family, Ross Hayes thinks nothing of rebuilding Land Rovers for fun, family and farm in his well-equipped workshop. Ross' uncles owned Land Rovers; his father owned Land Rovers; his brother owned a Land Rover; and his grandfather, Clive, owned a Land Rover as well.

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
		1	2	3 Good Friday	4	5 Daylight saving ends Easter Sunday
6 Easter Monday	7 Southland Anniversary Day	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25 Anzac Day	26
27 Anzac Day (observed) ClassicCar ON SALE TODAY	28	29	30			

Vintage hand-tool collector Des Barnes. While Des is attracted to an array of ageless apparatus, his initial collection was founded on necessity rather than a predilection for heritage handcraft – Des began buying tools as soon as he started his apprenticeship as a cabinetmaker and joiner in 1958.

May 2026

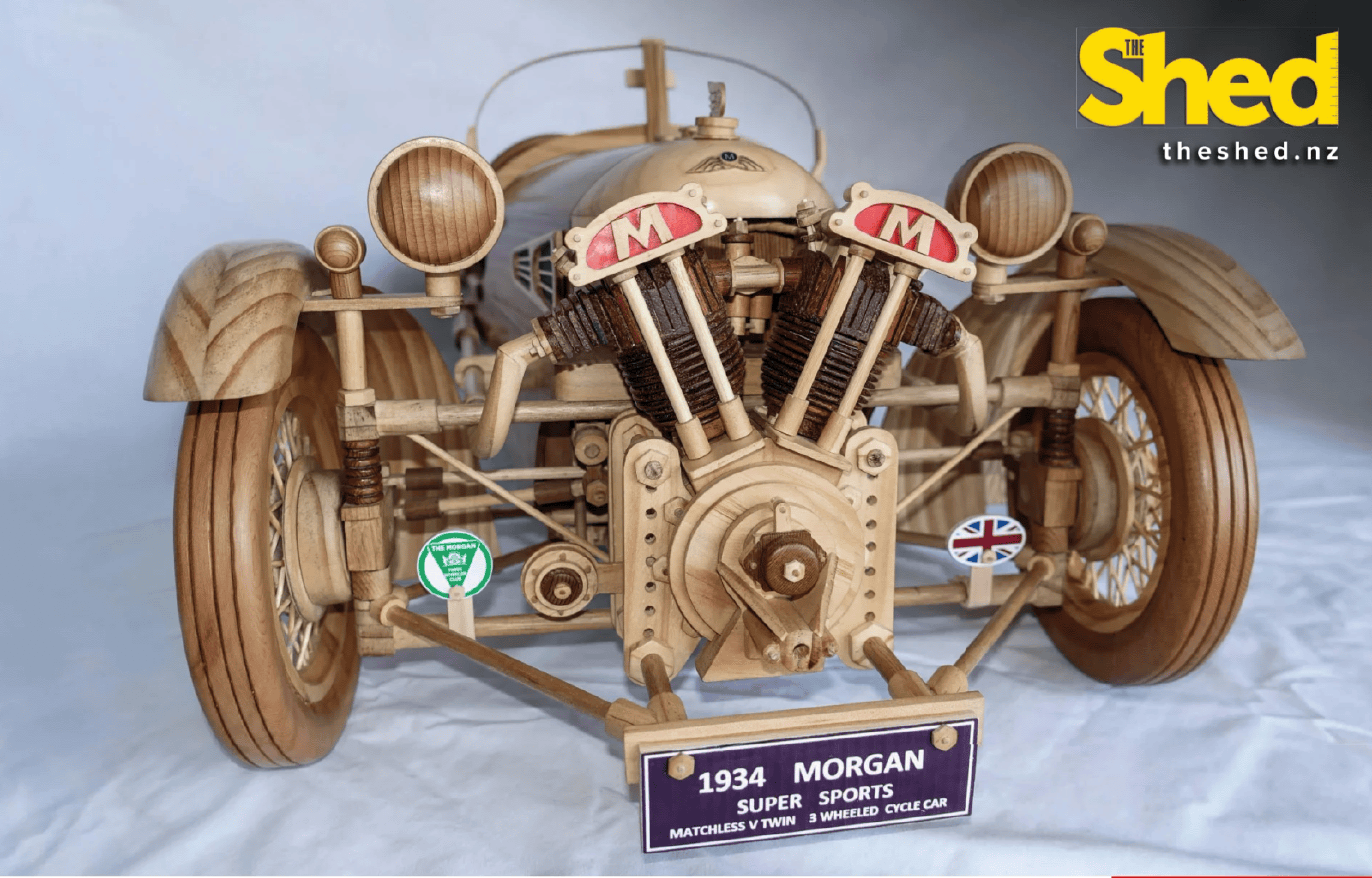
MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
				1	2	3
4	5	6	7	8	9	10 Mother's Day
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25 Shed ON SALE TODAY	26	27	28	29	30	31



June 2026

While most people use sheet-metal tools for fabrication, Hamiltonian Mike Mason takes things to a whole new level by using a bead roller to create custom works of art. Mike is a rarity these days, a true craftsman who can create almost anything out of sheet metal.

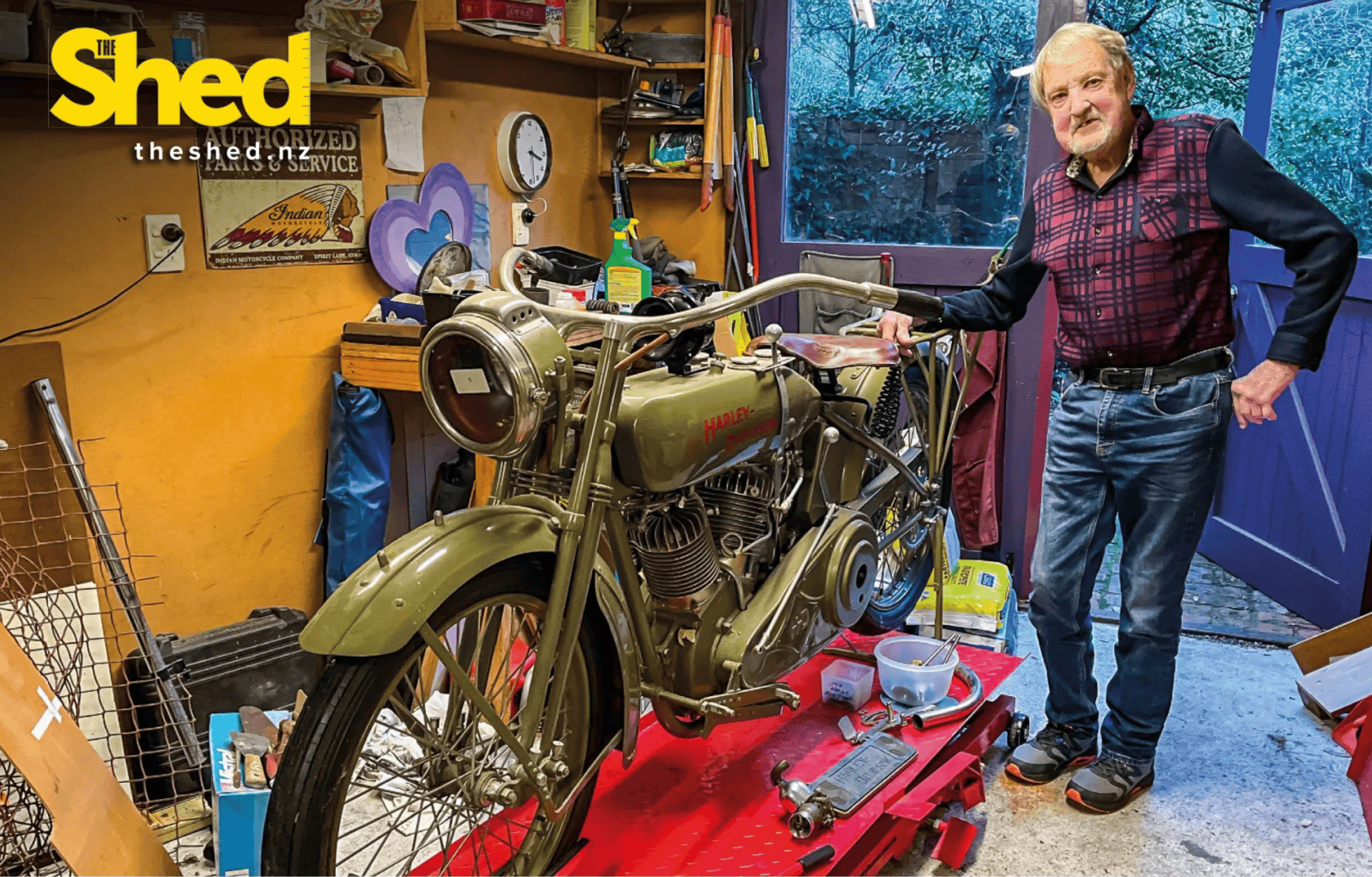
MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
1 King's Birthday	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22 ClassicCar ON SALE TODAY	23	24	25	26	27	28
29	30					



July 2026

You might call Wayne Nicholls the quintessential craftsman. "I don't really want to make life easy for myself. If it's hard, that makes it worth it," he says. It all started with a tissue box that blossomed into a model-making spree that saw Wayne become the king of craft shows in Victoria, Australia.

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
		1	2	3	4	5
6	7	8	9	10 Matariki	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27 Shed ON SALE TODAY	28	29	30	31		



August 2026

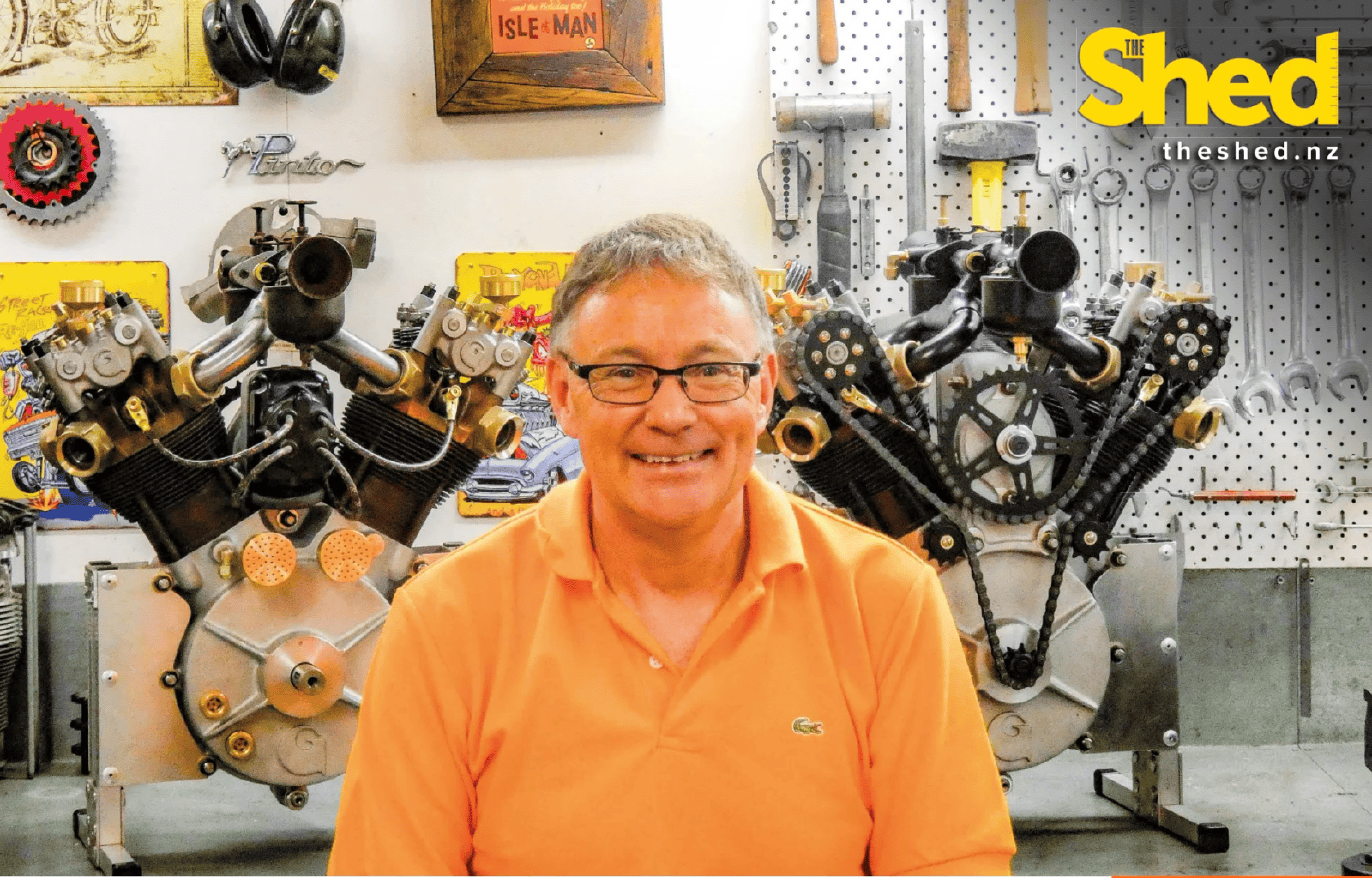
Bill Jackson's dad was an engineer and decided that his son should attend university to study law, unlike the rest of the family. However, strong engineering genes shone through, and in the '50s, Bill accidentally became interested in restoring American motorcycles. The result: a sheddie was born.

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
31					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17 ClassicCar ON SALE TODAY	18	19	20	21	22	23
24	25	26	27	28	29	30

Tony Ashton's shed in Bell Block, New Plymouth, is a showcase for the efficient use of space. This shed is immaculate. Everything is in its place – visible and easy to reach. When the New Plymouth MenzShed set up a woodwork competition for members, Tony won gold.

September 2026

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
	1	2	3	4	5	6 Father's Day
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21 Shed MAGAZINE ON SALE TODAY	22	23	24	25	26	27 Daylight saving starts
28 South Canterbury Anniversary Day	29	30				



For most of us, building or restoring a motorcycle would be a mammoth undertaking. Not so for Chris Gordon – he decided to build three. For many years, Chris has had the idea of making a trio of early racing motorcycles: two with twin-cylinder engines, the other with a single cylinder.

October 2026

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19 ClassicCar ON SALE TODAY	20	21	22	23 Hawke's Bay Anniversary Day	24	25
26 Labour Day	27	28	29	30	31	

November 2026

Growing up near a railway station sparked Greville Wills' lifelong love for trains. Throughout his working career, he has experienced a diverse range of jobs. Today, he identifies as an old-school tinkerer, a model engineering enthusiast, and a "Mr Fixit".

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
30 Chatham Islands Anniversary Day, Westland Anniversary Day						1
2 Marlborough Anniversary Day	3	4	5	6	7	8
9	10	11	12	13 Canterbury Anniversary Day	14	15
16 Shed ON SALE TODAY	17	18	19	20	21	22
23	24	25	26	27	28	29

December 2026

“If you know what your passion is, then it’s simple,” declares metal-shaping guru Neville Gadd – and that passion has fuelled his life. In his workshop, he spends most of his days imparting his fabrication and problem-solving skills to the builds and restorations of other people’s rods and customs.

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
	1	2	3	4	5	6
7 ClassicCar ON SALE TODAY	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24 Christmas Eve	25 Christmas Day	26 Boxing Day	27
28 Boxing Day (observed)	29	30	31 New Year's Eve			

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Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7
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29		29	29	29	29	29	29	29	29	29	29
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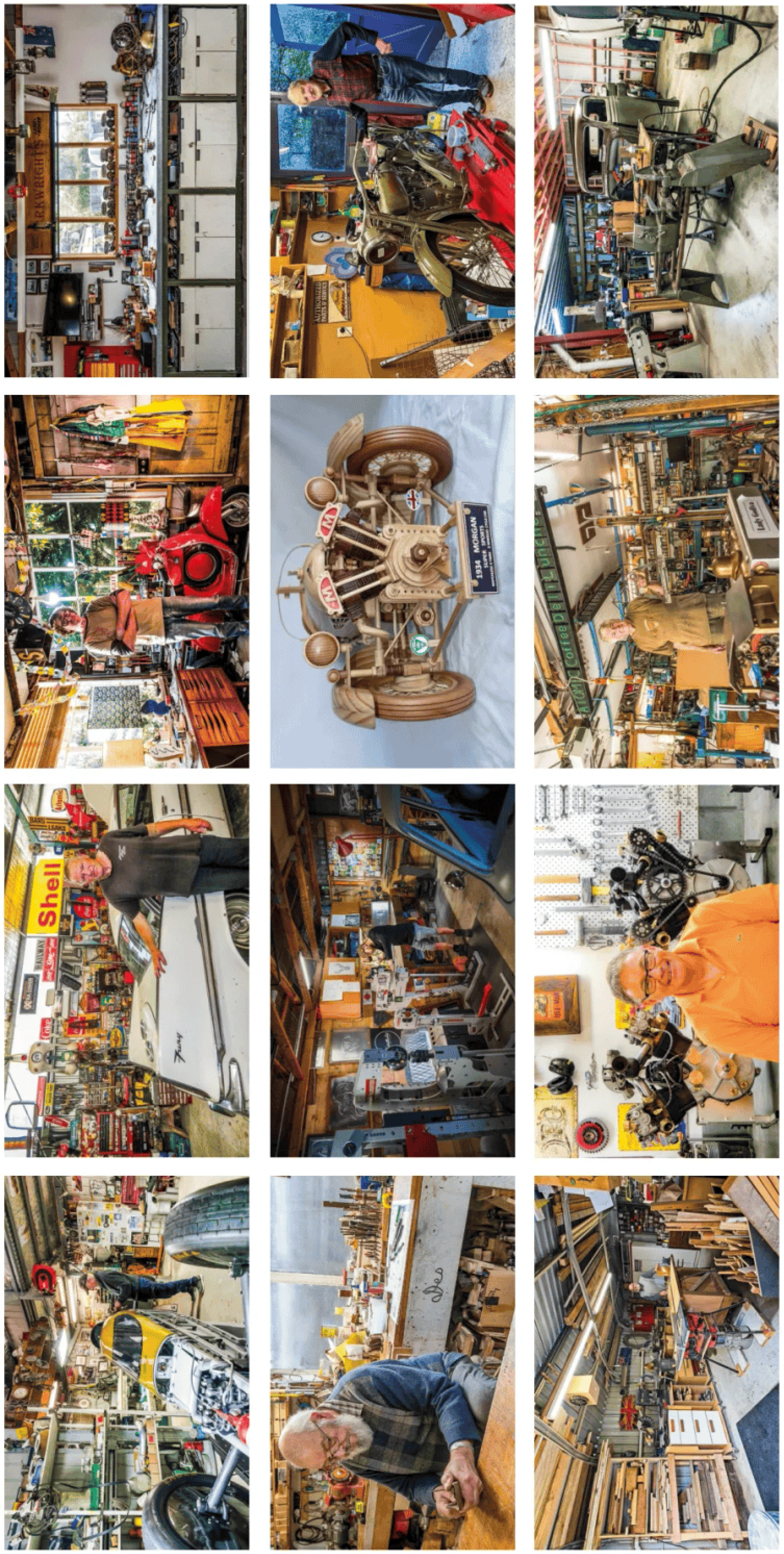
2026

2026 Calendar



The Shed

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FREE 2026 The Shed CALENDAR

The Wellington shed of magazine reader Dave Goodwin does double duty as a man cave and a workshop for projects and his two racing Hondas*