Parappa NEWSLETTER

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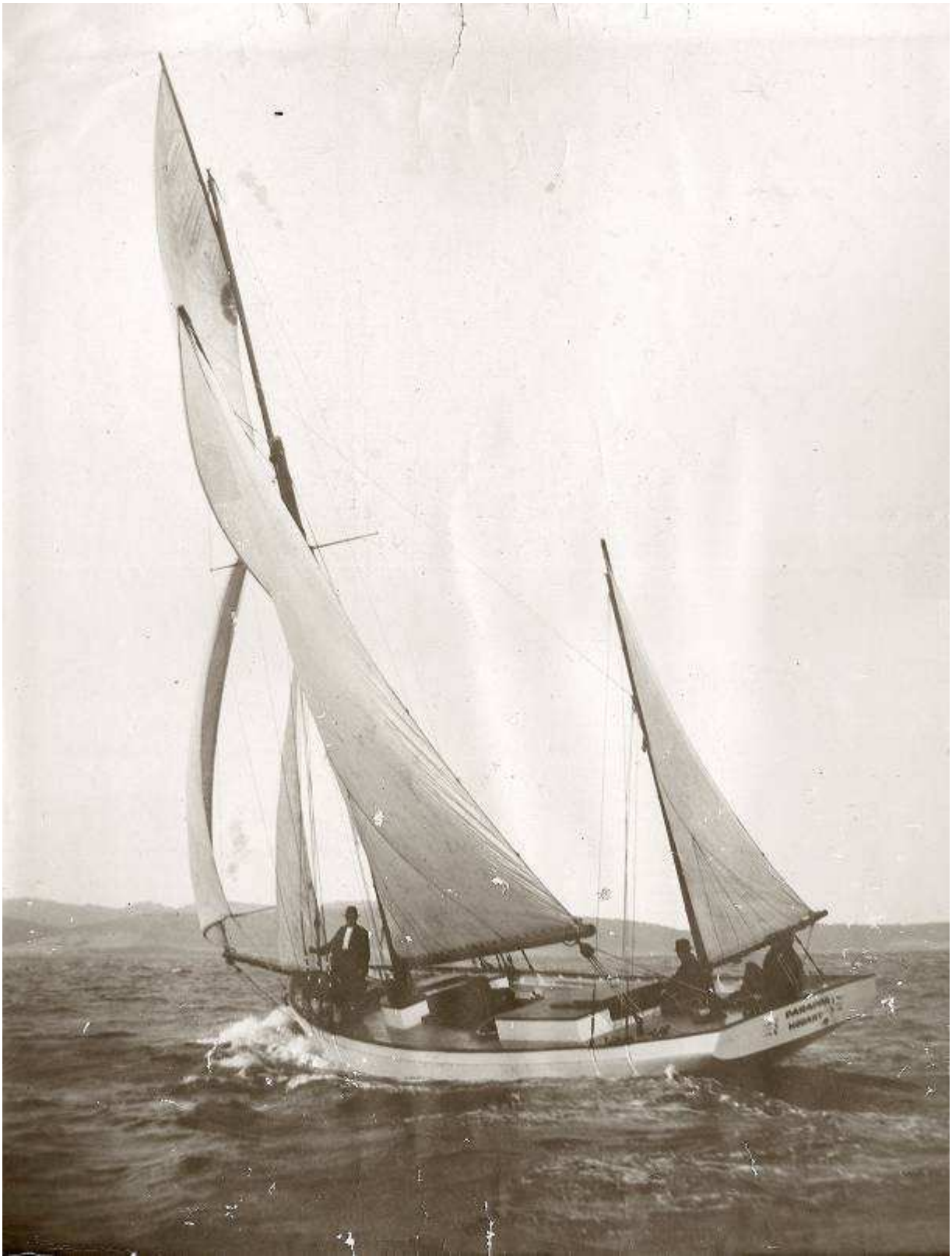


Parappa on the Derwent, 1915-1921
(Photo from Lorraine Archer, grand-niece of Ned Pulfer, the joint first owner of *Parappa*)

A New Engine for *Parappa* in 1937

When *Parappa* was built in 1915, a Union brand petrol engine was installed, as described in Newsletter 2. That engine was of 10 horsepower, and managed to push the boat along at five knots, if there was no wind, so Handy Jager told me. It must have been used mainly for close manoeuvring, such as coming up to a wharf or getting away when the wind was in the wrong direction.

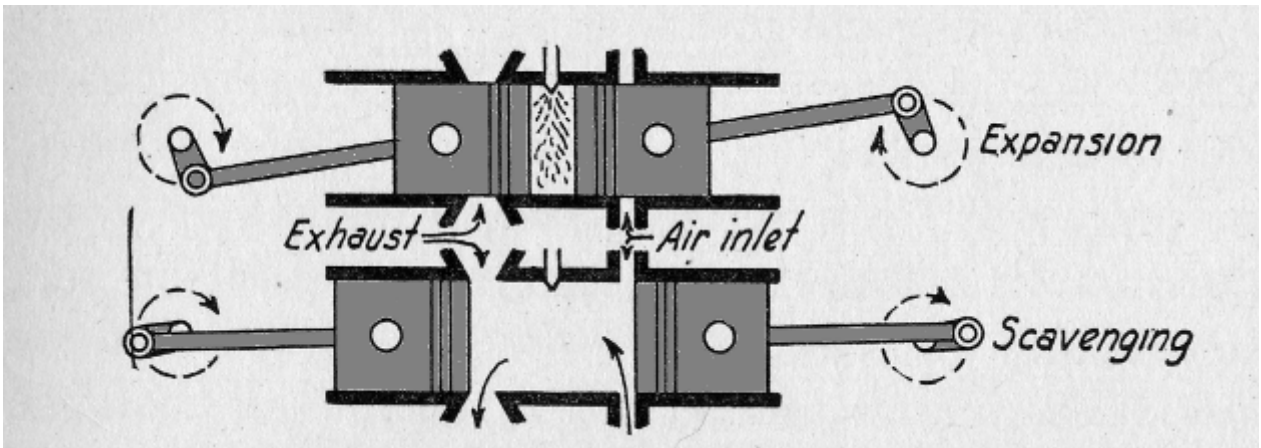
The Union engine weighed 850 pounds (390 kg), and only produced 10 horsepower. That was 85 pounds weight per horsepower, which by today's standards is amazingly inefficient. It ran at 360 rpm, had a 5 ¼ bore and 6 inch stroke, so was large as well as heavy.

The Jager family of Lune River bought *Parappa* in 1936, and one of the first things they did was to replace the engine with a Junkers 25 horsepower diesel engine. This was one of the first modernisations for P*arappa;* modernisation and improvement have been continuing for this boat ever since she was built, to keep her up-to-date, workable and profitable as a fishing boat.

When I talked to Bob Jager in 2006, he told me that the Junkers engine was bought from Farm and Pastoral Supplies, in Victoria. Bob's memory of the installation is pretty hazy, as he was only 10 years old at the time! But he subsequently had a career as a marine engineer, and still has in his shed a Junkers engine identical to the one that was in *Parappa.*

Bob Jager with a piston from a Junkers engine

The Junkers engine is a very interesting design - a twin cylinder, opposed piston 2-stroke diesel, that operated at 1500 rpm. Lets take the parts of this specification one at a time. The twin cylinder part is straight forward, as is the diesel. The opposed pistons means that there were two pistons in each cylinder, so the engine had two cylinders and four pistons, as shown in the diagram below. (The diagram is from *ABC of Diesel Engines*, published in 1936, so it was right up to date with Junkers engines!). The charge of fuel was burnt in the cylinder between the two pistons, forcing them both away from the centre at the same time. The cylinders were vertical (rather than horizontal as in the diagram), with the lower piston connected to the crankshaft in the normal way, and the upper piston also driving the crankshaft via two long connecting rods. The 2-stroke operation means that there was one power stroke every single cycle of the piston, common in small engines today but less frequent in large engines. The operating speed of 1500 rpm was considered to be a high speed engine at the time, but is slow by 2007 standards.



Operation of the Junkers engine, with two pistons in the one cylinder. Top: a fuel charge is introduced when the two pistons are central. Bottom: the exhaust outlet and air inlet are between the two pistons

These Junkers marine engines were available in three models, the HK65, HK85 and HK108, (where the number is the cylinder diameter in millimeters), and in one, two or three cylinder models. The one installed in *Parappa* was the smaller version, the HK65 twin cylinder version. Junkers engines were built in Germany, and Bob told me that parts were hard to get during and after the war, so *Parappa's* engine was fairly soon replaced with a Stirling petrol engine.

Bob Jager's HK65 Junkers engine. There are two cylinders vertically arranged, with two pistons in each cylinder.

The original Union engine installed in *Parappa* operated at 360 rpm and produced 10 horsepower, while the new Junkers operated at 1500 rpm and produced 25 horsepower. Speeding up the engine 4 times resulted in a power increase of 2.5 times. The best way to obtain more power without an increase in weight is to increase the number of power strokes per minute, and this is what engineering achieved between the 1915 Union and the 1937 Junkers.

One of the engineering developments that allowed higher speed engines was the development of better alloys. With early engines, the only material available was cast iron, and the way to build stronger engines was to use thicker cast iron. But by 1930, steel alloys had been developed that allowed cylinders strong enough to stand the higher compression of diesel engines without increasing the weight. So the Union engine weighed 85 pounds (38 kg) per horsepower, but the Junkers reduced this to about 34 pounds per horsepower.

The Junkers diesel required a much more elaborate fuel supply system than the Union petrol engine. A diesel requires a precise fuel pump and injectors, to inject an accurately measured drop of fuel, about the size of a grain of wheat, into the cylinder 25 times per second. This only became possible with more accurate machining techniques and better alloys. The development of diesel engines was accompanied by the development of high quality diesel fuel, as carefully refined as petrol. Another advantage of changing to diesel fuel on *Parappa* was safety. Diesel is not flammable at ordinary temperatures, but petrol must be managed very carefully on a boat as the threat of fire due to fumes accumulating in the bilge is a constant problem.

The Junkers engine, like the Union before it, was started with a crank handle. There were no starting aids, not even decompressors, as the small bore made it easy to turn over with the crank handle.

Bob Jager told me how the engine was connected to the propeller:

"The drive was through the old reverse gear from the Union engine. This didn't last long as the revs were much too high. After that gave out a solid shaft was fitted for direct drive. There was no neutral so you had to judge how far the boat would run when the engine was stopped. It was no trouble to start the motor if you were short of the mark—it was just a matter of setting up the crank handle and planting your foot on it, as she started very easily when warm. The only controls were a string on the throttle and another on the stop lever.

"Engines in those days were used to travel to and from the fishing ground. The actual fishing was done from motor dinghies. It wasn't until after the war that better and more powerful engines came on stream that the work was done from the deck of the boat".

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Published by Des Beechey
26 Malga Avenue, East Roseville, NSW 2069
Phone: Sydney (02) 9417 4980
Mobile: 0402 002 042
Email: desbee@optushome.com.au

Parappa today: Caulking the hull

Parappa is still on the hard stand at Oyster Cove Marina, Kettering, with work continuing on the "90-year service". The hull is being splined below the waterline and caulked above the waterline. Splining was started over a year ago but is still only about 80% complete. Caulking above the waterline has been done in the last two months and is almost complete, apart from sanding and painting.

To stiffen the hull before splining and caulking, the huon pine planks were re-screwed to the internal ribs with stainless steel screws, countersunk and capped with huon pine plugs. The original fixing was with copper nails, which have loosened and sometimes partly corroded away, making the hull overly flexible. Below the waterline two 316 grade screws were put in at every intersection of planks and ribs, about 3500 screws in total. Above the waterline it was considered sufficient to put one screw for every second rib on each plank, requiring only 500 screws.

Caulking is the process of hammering in cotton rope between the planks to make the hull watertight. When a wooden-planked boat is built, the external planks are nailed onto the internal ribs leaving a gap of a few millimeters between the planks. The gap is then filled with caulking cotton, which is a loosely wound cotton rope, that expands when wet to completely fill the gap. Putty is then pressed in on top of the caulking, and the hull eventually painted.

Cutting grooves between planks with a circular saw

The first stage with *Parappa* was to cut out the old putty and any old caulking with a circular saw. Where the planks were close together this formed a smooth-edged groove 4 mm wide and 12 mm deep between the planks. But many of the planks were already further apart, up to 12 mm in a few cases. This job took about three days work for all the hull above the waterline..

Once the grooves were cut, the caulking cotton was hammered in, not too tight and not too loose. For the 4 mm wide grooves a single thickness of cotton was suitable, but for wider grooves two or occasionally three thicknesses were twisted together to fill the seams. The equipment used is a caulking iron, similar to a cold chisel with a wide working edge, and a wooden mallet. Once the cotton is started in the groove, the caulking iron is kept in the groove and advanced by about a centimeter each blow, hammering the cotton firmly into the bottom of the groove. This is also a fairly slow process, and took about three days for all the topsides.

Hammering in the caulking cotton

Pressing putty into the seams on top of the caulking.

Once the caulking was hammered in, a coat of wood primer was applied to keep it in place and to provide protection. Then the grooves were filled with linseed oil putty over the caulking, and smoothed off. After the putty has firmed up for a few weeks the hull will be sanded off and painted.

Parappa on the hard at Kettering, November 2007