**A Dinghy named Boxer**

**My thoughts on the design and a description of the resulting dinghy.** There are several reasons for the name and the design:
1 The Boxers in China were a group of reactionary rebels. My dinghy has Chinese origins and as a rowing / sailing dinghy tender, is likely to be considered a reactionary design. Also, I am rebelling against the typical European idea of a dinghy.

2 I will probably have a fight to convince most readers that my design has some merit.

3 She looks like a box; but the idea that ‘form follows function’ has widespread acceptance. The famous designers, Sparkman and Stephens came up with a flat-bottomed box with no sheer and slab sides when they designed the US Army DUKU during World War 11. This tends to confirm my thinking on a good shape for getting the most load carrying capacity in a given space.

4 I think I can make a better ‘Nesting Dinghy.’

 You are welcome to reject my ideas, but before you do, you might like to remember that they are based on Chinese dinghy sampans that have probably been evolving for a thousand or more years. They knew how to build round bilged vessels but chose a flat bottomed slab sided boxy form for their dinghies.

 A reader who agrees with my ideas and is tempted to build a similar dinghy should note that the dimensions I have used were dictated by deck space on my yacht. If his handrails are further apart, he is welcome to have more beam and if he has more fore and aft space, he may choose to not use a nesting mechanism. But I would note that the two parts of a nesting dinghy are easier to carry than an equivalent dinghy in one piece. I make this comment as I want to sell a concept, not a design to be reproduced + 1 mm!

 So what is wrong with most Western dinghies? I think that it was Yachting World in the 1960’s that reported that more yachtsmen had died in the previous year after falling from their dinghies than from any other yachting related cause. I believe that the stability of the typical “Western” dinghy can be greatly improved by giving it a largely flat bottom and a nearly rectangular shape in plan view. Flaring the topsides may give a bit more righting force at large angles of heel but it also means that there is a longer step from the dinghy to the yacht. If stability and safety are related, a flat bottomed, slab sided design seems to be the best choice.

 My next problem with most designers of Western style dinghies is that they give their craft a cutaway shape at the stern to give the best water flow when it is rowed solo. This often creates a shape with a significant amount of the transom is immersed when carrying a passenger. A Vee bottom only serves to increase the problem. Dragging this immersed transom through the water is a bit like having an oar pulling in the wrong direction.

Philip Bolger created the ultimate box when viewed from above with his Tortoise and Brick designs, but some Tortoise users have complained that by raising the bottom at bow and stern, he lost fore and aft stability. Another point of interest in these designs is that the mast and daggerboard are on the side of the hull instead of the centreline. In a late GRP Tender design, Bolger uses a flat bottom over the middle third of the boat. (Design 291 in the Folding Schooner).

 So I believe we may be best served by a flat bottom dinghy with only enough turn up at both ends to give a smooth entry and to reduce the drag by avoiding an immersed transom. Also, by moving some buoyancy towards the ends we reduce the need to have a sheer line that rises towards the bow and stern. A higher sheer adds weight and windage and is only needed to keep the water out in extreme waves.

 Readers of G.R.G. Worcester’s ‘Junks and Sampans of the Yangtze’ will find two small sampans that embody my thoughts. He inspired my design and I embarked on my first design in this format after reading his book. More recently I have realised that the American Jon boats and other scows embody similar ideas.

 Most nesting dinghies come apart at about the middle, but splitting them there puts most strain on the fastenings between the sections. Also, the part that stows in the other half often sticks up and so obstructs the view more than is needed. They commonly use 4-6 bolts to fasten the sections together. It is difficult and tedious to keep the two halves in position while the first few bolts are inserted and all the bolts below the water line are potential leak points. The people who have put film of mating their dinghy on You Tube typically take about ten minutes to line the halves up to get the bolts inserted and tightened.

I have split my dinghy closer to the bow, this reduces the stress on the join and gives a bow section that stows below the sheer of the stern section when the parts are nested. The joining and locking mechanism is designed to give a quick, positive and leak-free join.

As well as normal use as a tender, I want a dinghy in which I can use for fishing trips and camping cruises in sheltered water.

My other possible use is as a life-raft substitute. For most of my cruising, only the very cautious would require a life-raft but my reading and observations leads me to believe that a suitable dinghy may be a viable alternative if a raft is needed. The Pardeys made this suggestion in ‘The Self-Sufficient Sailor’ and some who have abandoned their yacht would have been better off in a well-equipped dinghy. (Please note that my religion in this area is ‘Devout Coward’ and I will try hard to avoid this use).

My previous effort at a dinghy in this style was a partial success. It came apart at the bow and stern thwarts and the two ends stowed in the centre section. My mating system did not work well and it took too long to assemble. The thin rubbing strips on the bottom did not give much lateral resistance, so when it was towed on a reach in strong winds, the dinghy was often blown sideways and tracked well to leeward of the expected track. But it was more stable than my friend’s dinghies and it was faster to row when there were two on board. It also sailed well, so I felt I had made some progress. I was working on a revised version when the JRA competition was announced.

My earlier design was entered in a competition and the main criticisms were of the flatness of the centre part of bottom and the lack of sheer in the bow. I am unrepentant on these points. The flat bottom is stiffened in the centre and at each end by the frames and it is supported from below by the two keels/handrails and by the topsides on the outer edges. So it is divided into six small portions with supports on all their sides; so I believe it does not need a curve for stiffness.

 I also see no evidence of the need for flare to the topsides. The slope of the bow above the waterline is intended to deflect any wave downwards, and when partly immersed by a wave, there is enough buoyancy to pitch the bow up and over the wave. If I am wrong, I would prefer to have a removable splash board or a canvas spray cloth and skirt that gives the bow a temporary turtle back.

**Some details of the design and suggested construction.**

The hull shape is shown in the plans, Figs 1 and 2, in an effort for lightness the bottom is 6 mm plywood and the topsides and bulkheads are 4 mm. The plywood sheets are 122 cm wide and the first 4 mm sheet is to be cut into two strips that are 36 cm wide for the topsides. The rest of the sheet is not wide enough to be divided to give two strips that are 29.4 cm wide for the bulkheads that support seats that are to be 30 cm high. Both my wife and I are past 70 and don’t bend well, so these seats are higher than normal, four bulkheads are needed, one at the forward end of the stern thwart, one at the aft end of the forward thwart and two in the dividing bulkhead. The first sheet of 4 mm ply provides two bulkheads and the timber that is glued in two layers for the bow and stern transoms. The second sheet of 4 mm ply provides the rest of the bulkheads and other components.

I intend to build the dinghy on an old table with the flat centre section cut to shape and fastened down on the table with a couple of temporary screws.

My suggested building order: First mark and cut the sheet for the bottom and seats.

The half breadths for the sheet are as follows:

Transom 50 cm 1 M 1.5M 2 M 2.4 M ( Bow)

 476 mm 530mm 542 mm 520 mm 450 mm 383 mm

Plot these measurements on to the sheet of 6 mm ply. The two ends will later be used for the seat tops.

Fair the resulting curves with a batten and cut to the lines. My first use of this ply is to provide the foundation where chocks can be clamped to allow lamination of the inner gunwales to follow the curve on this sheet. I prefer to laminate the inner gunwales from 3 layers of 8 mm x 40 mm. If it was made from a single piece of 24 x 40 mm, considerable stress will be locked into the timber and tend to compress the centre frame. By laminating these members, this is avoided and the dinghy should be stronger.

I note that most dinghies lack places to tie equipment and cargo into the boat. I have decided to drill pairs of holes about 5 cm apart on the inner gunwale. Then a light line can be run through these holes and used to secure the required object to the dinghy. As I cannot guess if or where you may wish to have them, I have not marked them on the plans, except on Fig 5, the diagram of the gunwale and rope fender. I will be placing two pairs on each side near the bow for securing a spray cloth and then a pair about every 50 cm along the inwales.

 When the inner gunwales have been laminated, the two ends of the sheet can be cut up to provide the centre section of the bottom and the ends that are reserved to be seat tops. Then the chines are glued to what will be the outer edges of the centre section of the hull.

The moulds for the forward face of the aft thwart, the mid-section frame, the aft end of the forward thwart and the two part frame of the splitting section are to be made. Then all except splitting section frame can be glued to their appropriate position on the bottom sheet.

The frame that is the aft face of the forward seat requires limber holes to allow drainage.

I want to have the area forward this frame for stowage and also to be able to put some buoyancy into this compartment. So it requires a hatch, not an inspection port. My solution is shown on the drawing of the bulkhead. Australia sells wine in casks where the wine is stored in a robust Polyethylene bladder that typically holds 4-5 litres. I have accumulated enough bladders to fill this compartment when I want it to have buoyancy. The hatch can be hinged with thin cord that is wound back and forth to get a series of figures of eight. This bulkhead needs to be fitted now as it provides the support for the aft face of the forward seat. It would be easier to cut the hatch opening before positioning the bulkhead and to to fit the components for the rowlocks and the mast support that go on the bottom of this compartment before the seat is glued down.

 Measurements of the frames have been made on a full size lofting and may assist a builder. The measurements of the aft transom are at the outer surface of the plywood and extra timber needs to be added for the increase in depth and beam going forward. As this depends on the width of the framing timber, the sizes at the aft surface are supplied. Beam to inside of side ply 952 mm, side angle out 5 degrees. Depth to inside of bottom ply 248 mm angle downwards 18 degrees. Consider cutting a curve on the top edge to match cabin camber.

Forward face of aft thwart, which is 375 mm forward of aft side of transom. These sizes are the maximum dimensions, Beam 1032 mm angle out 4 degrees. Depth 376 on aft side 374 on forward face because of change in bottom ply thickness. Angle up going aft 18 degrees, no slope going forward.

Centre frame, 925mm from aft side of transom Beam 1088 mm angles 2 degrees in towards stern. Depth 374 mm, bottom is flat here.

Forward edge of flat bottom, and aft face of forward seat, 1475 mm from transom, Beam 1048 mm, angle in towards bow 6 degrees. Depth 374 mm on aft face 376 mm on forward face, angle up towards bow 6 degrees.

Splitting frame, 1650 mm from transom to splitting line, beam 1012 mm angle in towards bow 9 degrees. Depth 359 mm angle up towards bow, 6 degrees. The timber backing on this frame needs to be wider near the chines to support the lower locking plates (See Fig 4?). A plywood gusset is needed on the sides away from the split to spread the load from the mating system

Bow transom. Forward face of bow is 2400 m from aft transom, dimensions are at forward face of ply. Beam 766 mm, angle out towards stern 10 degrees. Depth 80 mm angle down towards aft, 34 degrees

Then two temporary timbers are fastened to the top of these frames. These timbers are to be straight along the bottom edge and placed about 30 cm out from the centre line. They are to extend fore and aft to support the bow and stern transoms until sides and rest of the bottom are in position. The splitting frame can now be put in position. The position of the top edge of this frame is to be level with the other bulkheads that provide support for the seat tops.

The stern transom is made from 2 layers of 4 mm ply with the frames indicated on the drawing with extra timber to support the rudder gudgeons. More support can be added after the seat is installed for the possible use of an outboard. I need a curve on the upper edge of the transom to match the curve of my cabin top and allow the inverted dinghy to bed down with minimal gap to the cabin. If you have a flat cabin top you might wish to give the transom a flat top or even a curve up at the centreline for a stylish look.

I intend to mount the timber backing pieces for the bow transom on the forward side of a fibreboard transom as a temporary fix. This will allow the inner gunwale and the seat support timbers to run to the inner face of the bow transom and then to be cut to length and correct angle at the bow before the permanent bow transom is fitted. It will be necessary to bevel the inner forward edge of the topsides so the transom can be fitted in place. A U shaped cut out in the centre of the bow transom will serve two purposes. When the bow is stowed in the aft section, this U is over the centre frame and the top edge of the bow section can rest on the bottom of the stern section. When the dinghy is anchored or tied up, it can act as a fairlead.

Once the transoms and bulkheads are in place, the seat supporting stringers and the inner gunwales can be fitted.

The dimensions of the plywood sides are shown in the table below. The extra length round the curve compared to straight line distance between the outer faces of the transoms is about 10 mm. This is the reason for the length of the sides from this sheet being 241 cm long when the dinghy should be 240 cm long. The top of the sides is a straight line. In the table below, the top line of figures are the distances forward of the transom and the second line are the distances from the top of the side to the chine / inner edge of the bottom ply. The positions where two depths are given are the points at each end of the 6 mm ply centre section where the bottom planking changes to 4 mm ply.

Transom. 37.5 cm 1.46 M 1.99 M 2.2 M 2.41M (Bow)

 22.1 cm 37.6>37.4cm. 37.4 cm> 37.6 cm 32.6 cm 23.6 cm 8.2 cm

 These sides are then glued to the chines, the seat supporting stringers, the frames and the transoms. I will use flat headed screws as temporary fastenings.

After the topsides are in place, the outer gunwales can be fitted. Note that if you intend to use the suggested rope fendering (see Fig 5) the timber could be 15 mm x 15 mm and placed with the upper edge 12mm down from the top of the topsides. At some stage, it needs to be drilled to take the lashings that secure the fenders.

We now have a hull with no bottom at the forward and aft ends. I intend that the ends of the bottom be covered with 4 mm ply strips. It would be feasible to fit these to the topsides as a stitch and glue construction but I intend to fit short lengths of timber as chines to allow a wider rounding of the bottom to topside corner. The inner surface of the ply bottom is to be covered with glass cloth and epoxy resin to increase the impact resistance. The stitching and filling part of stitch and glue technique can be used to fair the joins across the inside of the forward section as the pull of the stitches can help reduce any bumps and hollows. In my dinghy the strips to cover these parts of the bottom will have the outer grain running across the bottom. Any gaps in the joins on the outside of the bottom will be filled and then the area will be glassed, with the glass carried round the chine to above the waterline.

After the bottoms of bow and stern sections are in place, the next task is to remove the supports that held the transoms in place and dry fit the plywood seat tops. These can be cut from the sheet of 6 mm ply that provided the centre section of the bottom. It will be necessary to split the seat tops in half along the centre line with butt straps below them to allow them to be fitted to the inner edge of the topsides. A gap is also needed at the section where the bow and stern sections will eventually separate. This gap and the gap between ply faces provides a guide for the saw when cutting the dinghy in half, or possibly I should say into 2/3 and 1/3 because of the position of the cut.

I intend to coat all the interior surfaces of the dinghy with two coats of liquid epoxy to reduce water absorption and the risk of rot. The buoyancy compartments need to be treated before the seats are fastened down.

I have shown the bow thwart as a continuous bench from bow to the join; others may choose to have a narrower thwart and some foot space. The choice will not cause much difference in the weight of the dinghy.

If any special ideas are to be fitted inside the buoyancy compartments, they probably need to go in before the tops are fitted in place. It is optional to glue the tops down or use a gasket sealing compound and screws. You will probably also decide to fit inspection ports. One is needed in the bow compartment for adjusting the lower locking bolts.

After the seats are fitted, the upper locking bolts and keyhole plates and their supports need to be fitted. My choice of fenders is to use 20mm diameter 3 strand rope. Your choice of fendering will determine what is needed for the outer gunwales. A shelf for the rope, or possibly a round section for a split plastic hose fender. At this stage you need to fit the support for the rope fender if that is the fender you decided to use.

Now it is probably time to cut the dinghy in half and glass the bottoms and lower sides. Then finish the project with outer keels, paint, rowlock sockets etc.

**Some less obvious design and construction details.**

 The bow and stern are joined by bolts that protrude from the bow section and lock into keyhole shaped slots on the stern section. When the bolt heads are in the narrow part of the keyhole the two parts lock together. To aid in positioning the bow for joining, I intend to have a strip on the seat top that extends aft from the aft edge of the bow section. The height of the strip means that when it is resting on the aft section, the bolts are at the right height to engage. Then pushing the bow section to starboard to the limit allowed by the length of the strip, lines each bolt head up with the round hole in its keyhole. Then pulling the bow aft and sliding it to port causes it to lock and the port end of the strip causes the slide to stop when the two parts are in position that gives a faired hull. My memory aid is port = permanent and starboard = slips. A barrel bolt on the seat locks the halves together. With this, I aim for a mating or separation time of a few seconds and to have no leaks and no bolts and nuts to lose!

A most important part of building this system is the positioning of the holes for the bolts that fit into the slots. All of them must slip out of their slots at the same time or it won’t separate. My intended way to achieve this is as follows. The two sides of the splitting frame are constructed and then four bolts are fitted to lock the frames together with the gap needed to accommodate the saw that will cut the dinghy into two parts.

 The 50 mm square plates adjacent to the chines are installed in the aft section with a pilot hole at the centre of the round part of the keyhole. The holes for the six bolts that hold each plate in place need to be treated to avoid water damage to the plywood. I intend to fit the plate and drill the holes, then I will enlarge three holes and fill them with a runny epoxy/ filler mix. When the epoxy is set, I will redrill those holes and then repeat the process with the other three holes. Then the bow frame is shifted 10 mm to the right and new holes are drilled through the existing holes in the aft part of the bulkhead and into the forward part of the bulkhead so it can be fastened 10 mm to starboard of its previous position. Then the pilot holes that marks the centre of the circular part of the keyholes in the aft section are extended into the bow section frame, this will be the location of the lower bolts that will protrude from the bow section. To avert water damage, the pilot holes in the bow section will be enlarged and filled with an epoxy/ filler as outlined above. Then these holes are drilled again to the 8 mm or 5/16” required for the locking bolts. The nut shown is to give the bolt something to pull against and for the bolt to seal around. The holes that fixed the move of the bow section 10 mm to starboard will be used again later to place the bow in the slipping position while the upper locking components are fitted in the same way as above. These go in after the seat tops are in position. Fig. 4 is an attempt to illustrate the linking mechanism.

Mast and Sail. I want the mast to come apart in the middle, so each half can stow within the 1.65m length of the stern half of the dinghy. A slightly longer mast is shown in Fig 3 with the mast in two halves that stow in the dinghy plus a timber top section to facilitate the fitting of sheaves for the halyard and lazy jack adjustment.

Dudley Dix specified a 50 mm Aluminium tube with 2mm walls for his Argie Dinghy. With an ignorance on strength calculations and a desire for a good safety factor, I plan to use a 55 x 3 mm wall tube. My supplier only deals in 6.5 m lengths so there will be tube to spare for a boomkin etc.

I plan to make a GRP rod to join the mast sections. This will be made by taking a thin dowel 650 mm long and wrap it with woven fibreglass cloth that has been coated with polyester resin until it is a solid rod that is slightly thinner than the inner diameter of the mast tube. This will need to be produced by a series of laying ups to avoid excessive heating. The aim is to produce a GRP rod 600 mm long that is a close fit to the inner surface of the mast tube Later, two screws will be fitted in the middle of the mast plug that protrude 3 mm and will locate in slots in each part of the mast to stop the upper section rotating.

 The mast has been placed on the aft side of the splitting bulkhead and to port of the centre line over the bilge keel to allow me to row with the mast stepped. To avoid drilling the mast to mount cleats on it, I intend to have a turning block mounted on the bow thwart on each side of the mast and then cleat the halyard and down haul on cleats on the aft end of the bow thwart.

Sail: Until the JRA competition came along, I was intending to use a balanced lugsail from my previous dinghy. This sail is a cut down Mirror Dinghy mainsail that cost one bottle of wine to pay a racing sailor who had a spare main he did not need! I was looking at the JRA Web site for ideas on using a junk rig as an alternative when I became aware of the competition.

As my ignorance on junk rigs is huge, the plan submitted in Fig 3 should be considered as first draft and suggestions on improvements are welcome. It is proposed to make each section of the sail as a separate piece of fabric with a curve cut into the top and bottom and bolt ropes on these edges. It is suggested that the battens be made from a 45 mm x 20 mm timber that is cut in half and a pair of sail grooves be cut in it and then the timber be glued back together; as shown in the side detail. Holes at the ends of the battens allow the sail sections to be tensioned and for the sheets to be attached. Other holes can take reef points. It is intended that a 25 mm webbing loop be fastened to the battens, boom and yard, on the starboard side close to the forward end. It will wrap round the mast and join with a Fastex snap buckle to provide a quick method of keeping the sail close to the mast.

I am wondering if it might be possible to make the sail from a King Size Dacron bed sheet. The standard reason to not use sheeting is that a rectangle of fabric will easily distort into a parallelogram. But what if strips are sown to the sail to join the opposite corners with strips of fabric with the fibres running along the strip, as shown on the panel with the sail plan? It should stop distortion sand would provide a cheap sail from a soft fabric that could be easily stowed.

It is intended to use links from a 6 mm plastic chain for all the blocks in the sail sheeting except for the block at the end of the boomkin. These links are light and only cost a few cents. I presume a boomkin will be needed with the aft end of the sail being close to the transom

Some Leeboard options. I hope that the two handrails/keels will provide adequate resistance to leeway. If they don’t, the ballasted leeboard shown as Option 1 in Fig 2 is my next choice. Option 2 will be tried if Option 1 is not successful. For Option 1, a rope at the bow/top corner of the board leads to the centreline bow fairlead. A rope from the top/aft corner of the board leads to a soft eye on the centreline just aft of the split in the bow thwart. The lengths of the two ropes are adjusted so that the top of the board is held at the gunwale at the position desired. The ballast will cause it to sink below the intended water line.

After a tack, I will pull the leeboard up and transfer it to the new lee side and drop it in. The ropes restrain it and the weight causes it to sink, hopefully in the required position. On each tack, the leading edge will be angled to windward because of the shape of the hull. I am not sure if this will give negative leeway, but it will be fun to try it. With this leeboard, the CLR will move forward and the rudder will be required to take some of the side force. The use of a centreboard in front of the mast in a sampan was described in Rudder, July 1917 and the article was reprinted in ‘The Rudder Treasury.’

Leeboard Option 2 is based on some of Jim Michalak’s ideas on leeboards. He often uses a board that is pivoted on a bolt that is positioned midway up the topside at the point of maximum beam, his book ‘Boatbuilding for beginners (and beyond)’ gives details of this in some of his designs. My derivative from this is shown as Option 2. I am still using ropes to restrain the board against the hull, but instead of tacking the board as in Option 1, now the board is positioned on the starboard side for both tacks.

I want to be able to fasten my yacht’s fenders against the dinghy so that are out of the way and so they can provide extra buoyancy, also so they can be used as rollers to move the dinghy over sand or mud. This will need a method of securing the fenders that holds them close to the hull and restrained against vertical movement. The restraint to stop them floating up could be two loops, one forward and one aft of the fender that fasten round a bolt that screws into a blind hole in the chine, then a line from the end of the fender is run through these loops and tied off. Similar tie offs can be run from the outer gunwales to hold the upper leads to the fenders. I believe that the leeboard can be restrained by a line that runs between the two lower loops and is tensioned to hold the board against the hull at the chine. If the board is on the starboard side of the hull, on starboard tack, leeway will hold the board against the hull at the gunwale and the line along the chine will stop the board from swinging away from the hull. The rope running between the two fender loops at the gunwale can hold the board in place on port tack.

The suggested lee board size is 90 cm x 30 cm. This allows it to be stowed flat against the forward face of the aft thwart, or on the foredeck until it is needed.

I prefer these leeboard options to a daggerboard trunk because of the saved weight and the reduced risk of hull damage in a grounding. But hopefully the two keels/handrails will provide adequate resistance to leeway and a leeboard won’t be needed.

The Rudder (Fig 6) The rudder shown uses another of Michalak’s ideas and has the stock on one side. Eye bolts are used as the hull gudgeons. They are used for economy, for safety when climbing in over the stern. And because they allow the rudder to turn to 90o from the centreline without straining the gudgeons. The fitting process is to slide the tube upwards into the upper eye until the bottom end of the tube can be dropped into its eye. Then the Retaining clip, or similar device is inserted to stop the rudder sliding up and off the lower eye nut.

Some other points.

A result of the higher seats is that the rowlocks must be higher than the gunwales, otherwise there won’t be enough distance between the oar handles and the rower’s legs. The system I have used in the previous dinghy is shown in fig. A stainless tube 12mm ID is glued in the centre of a 25 x 25 mm x 3mm Aluminium square section. This section extends from the Rowlock to the bottom of the hull. See Fig 5

An angle on the rowlocks is needed to put the ring at right angles to the oars as this reduces wear on the oar buttons. I put the eye loop of a ring rowlock with a 12 mm shaft in strong vice and then used a rowlock socket and some brute force to bend the shaft so that the angle between the shaft and eye is about 15o.

Two places for the rowlocks are needed. When there is a passenger on the aft thwart, the rower will need to sit more forward and use the centre frame for a foot brace. In this position, the rowlocks will need to go through the compartment at the forward end of the aft section as shown on the plan view. When alone, the rower will need to sit with his bottom on the aft end of forward thwart. Here we need rowlocks that are about 30 cm aft of the stern end of the forward thwart. For these rowlocks, upper part of the support needs to be hinged so that the square hole and support does not stick out and get in the way when the bow is nested inside the stern section.

For sculling, a rowlock can be mounted in a pipe that fits into the eye nuts used for the hull rudder gudgeons. I suspect that sculling will be faster if the pipe places the rowlock about 20 cm above the transom than having it at the level of the transom.

I know of several people who have had dinghy related problems that could have been avoided by considering them at the design stage and incorporating an answer in the dinghy. One chap capsized his dinghy and then bailed it out while hanging on to the boat, but when he tried to get back in, he swamped it again and there was not enough buoyancy to support him while he bailed it out, he had to swim to the shore towing the dinghy, this swim may be OK in Sydney in summer but could be fatal in cold water. I have reacted by putting the seat tops higher to get more buoyancy and by making the aft thwart wider than it would otherwise need be to get more buoyancy. The extra comfort of a higher seat is a bonus.

In another incident, a lady fell into the water while getting into a dinghy from a yacht. She and her husband could not get her back into the dinghy and she had to be towed into shallow water. I suggest a rope and a weighted timber stirrup that hangs down from the transom when needed, to act as a boarding step and so avoid this problem. The stirrup will be 80 cm below the top of the transom to match the length needed by my wife to climb in.

Another problem with dinghy capsizes is the frequent loss of oars and rowlocks. I use two-part oars that can be stowed between the seats and in brackets to retain them there.

I want to keep the dinghy at home so it is available for fishing and dinghy cruises. But access to my yacht from the car park requires the dinghy to be moved about 200 metres and down a staircase.

My answer is to fit a set of stair climber wheels to a fitting that locks into the rudder gudgeons. This uses three wheels that mount in a triangular arrangement that allows them to pivot round a bolt at the centre of the triangle. When going along a path, two wheels are in contact with the paving, when the front wheel hits a step, the triangle plate rotates and the third wheel lodges on the step and continued rotation of the triangle allows the assembly to climb the steps. A similar system with two sets of wheels is used by removalists to move heavy objects up and down stairs Fig 7 is an attempt to explain how it should work.

Other builders may choose to reject any or all of these ideas but they are offered here for their consideration.

Key to the figures

 Fig 1 **Boxer** Plan view Scale 1 : 10

Key

1 Aft buoyancy with inspection port 2 Bow section in stowed position

3 Aft rowlock socket (hinged) 4 Buoyancy/ stowage compartment

5 Splitting point 6 Mast socket

7 Leeboard option 1 (stowed) 8 Bow buoyancy with inspection port

9 Leeboard option1 ( for port tack) 10 Forward rowlock socket

 11 Leeboard option 2 12 Forward compt. Tie rope from frame

 13 Leeboard option 2 (stowed) 14 Fender rope.

Fig 2 **Boxer** Profile view and a cross section Scale 1:10

Key

1 Aft thwart and buoyancy 2 Leeboard in Option 2. 3 Leeboard in Option 1

4 Bow thwart and buoyancy 5 Optional shape change consider if not intending to split.

 6 Ties for fenders/rollers. 7 Keels/handrails 8 Rudder with possible balance area

9 seat top 10 Rowlock support 11 Mast position. 12 Hatch

 Fig 3 **Boxer** Sail plan Scale 1 : 20

The CLR marked is for the hull with keels/ handrails. The upper side drawing is of the proposed panel shapes with the reinforcing strips for a sail made from sheeting. The lower side drawing is of the proposed batten section. (Scale1:2)

Fig 4 **Boxer** Hull joining mechanism Scale 1:1

Fig 4 a is a side on view with the two parts separated.

Fig 4 b is a view of the plate with the keyhole slot and the six bolts that hold the plate in place.

Key

1 Aft face of bow section 2 Frame timber 3 Backing gusset

4 Locking bolt 5 Nut to lock bolt 6 Forward face of stern section

7 3 mm S Steel plate 8 Keyway slot 9 6 bolts secures the Keyway plate

10 Gap for Locking bolt head 11 Side Plywood 12 Chine timber

13 Bottom Plywood

Fig 5 **Boxer** Gunwale at the aft rowlock area Scale 1:1

Key

1 Inwale 2 Rope fender 3 Fender lashing

4 Outer gunwale 5 Plywood side 6 Stringer to support thwarts

7 Rowlock support stowed 8 Rowlock support in use 9 Al Square section tube

10 S/s Tube Rowlock socket 11 Socket for Al Sq section 12 Bottom plywood

13 Proposed tiedown hole

Fig 6 **Boxer** Rudder and Transom Scale 1 : 2

Key

1 Tiller 2 Rudder stock 3 Rudder up haul

4 Rudder pivot bolt 5 Rudder blade 6 Possible balance area

7 Lower Eye nut 8 Rudder shaft 9 Hold down pin

10 Upper Eye nut 11 Rudder downhaul

Fig 7 **Boxer** Transport wheel Scale 1 : 2

Key

1 Transom 2 Pin locks it to eye nuts 3 Plate to take weight

4 The three wheels 5 Pivot point for wheel hub 6 Spacer bush