

# The First To Fly

Or

## How We Learned to Plane

By Dave Gerr, © Copyright 2014 Dave Gerr

*Oh, some PTs do seventy-five  
And some do sixty-nine  
When we get ours to run at all  
We think we're doing fine. . .  
PT Boat Crew's Lament*

**T**oday, everybody does it. Does what? Well fly, or at least plane. Ocean-going sportfishermen, outboard-powered skiffs, all-varnished runabouts, police patrol boats, fast ferries and high-speed fishermen all hoist themselves—virtually by their own bootstraps—and skim over the surface of the waves. But who did it first, when, and how?

This is an interesting question, and one that has—oddly—more than one answer. You see, there were a veritable passel of gadgeteers, boatbuilders, and designers (here and in Europe) trying to make boats go faster. They didn't always know what they were doing. They often didn't know what anyone else was doing (especially on the other side of the Atlantic—whichever side that was). And they were all fighting a handicap . . . power. You see, the internal combustion engine didn't really become light and compact enough for high-speed vehicle power until just after the turn of the century.

### The Right Reverend Ramus

This was the difficulty faced by the rector of Playdon, Rye. The right Reverend C. Ramus, was the honorable (presumably), and clever (most certainly) inventor who first specifically proposed that a hull moving fast enough and striking the water at a slight angle might lift up and skim along at a very high speed. Ramus's proposal was that a paddle-wheel ship of 2,500 tons, 360 feet long, and driven by a 1,500-hp engine, could do 30 mph cruising, and a neat 50 to 60 mph on “extraordinary occasions!?” Her hull bottom would be square and flat, with two built-in inclined planes.

William Froude, who was—and still is—one of the towering figures in marine speed-and-powering research, was asked by Ramus to investigate. Froude, however, quickly realized that any engine producing that much power would be too heavy (then anyway), and that such a large vessel would need far, far, far more power than Ramus called for in any case. Still, Froude went on to say:

“I must admit that it had seemed to me certain that at *some* assignable speed the skimming action would become so perfect as to obliterate, or virtually obliterate, water resistance.”



*Turbinia* on display at Newcastle Discovery Museum

<http://www.twmuseums.org.uk/discovery.html>

## First To Fly Continued

It was 1872, and already the seed had been sown. Skimming (planing) would work if only you had the power plant to do the job, and could find the right size and type of boat to employ it on.

### Early Speed

Still, even back then, boats were being pushed surprisingly fast. Here in the U.S., Captain Nat Herreshoff—the estimable “Wizard of Bristol”—was building fast launches and spar torpedo boats propelled by sophisticated double-action, multiple-expansion, compound, reciprocating steam engines. (All these “doubles,” “compounds,” and “multiples” were clever dodges to wring every last smidgen of oomph from the steam.)

By 1876, Captain Nat had already derived a hull with the basic shape that would get planing boats off the ground: a sharp bow, combined with a broad flat surface in the underbody aft. (This form is now known as the *double-wedge* shape, and it’s one of the standard configurations of planing hulls—in many variants—though the term is seldom used in general advertising.)

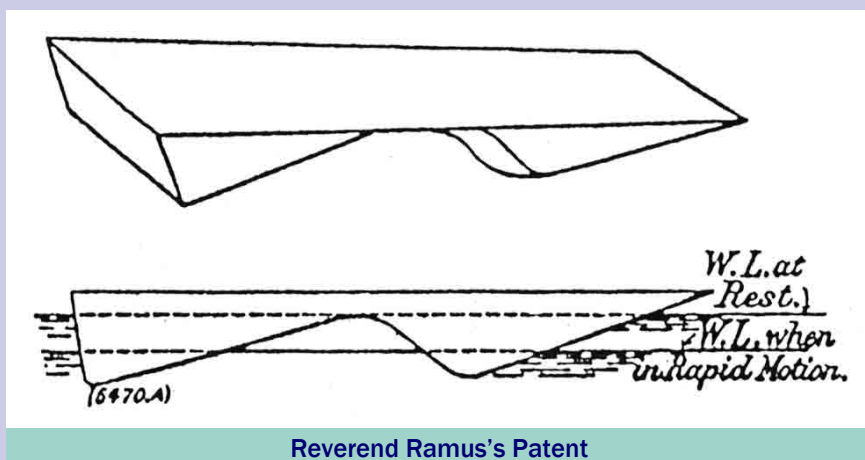
Herreshoff, you see, was working from the practical side. A successful (possibly the *most* successful) and very busy boat builder and designer, he already knew that if you tried to make a boat go very fast, it would lift its bow and sink its stern. It seemed clear to him that a wide flat stern would control this tendency. It also seemed obvious to him that allowing some small inclination of the hull would cause the water to strike it from underneath and lift it some. By 1887, the Herreshoff designed *Now Then*—an 85 footer with double-wedge form—made the passage from Newport to New York City averaging 21.2 knots. This is a speed length ratio of 2.3, which is not quite fully planing, but darn close.

### Slender Slim

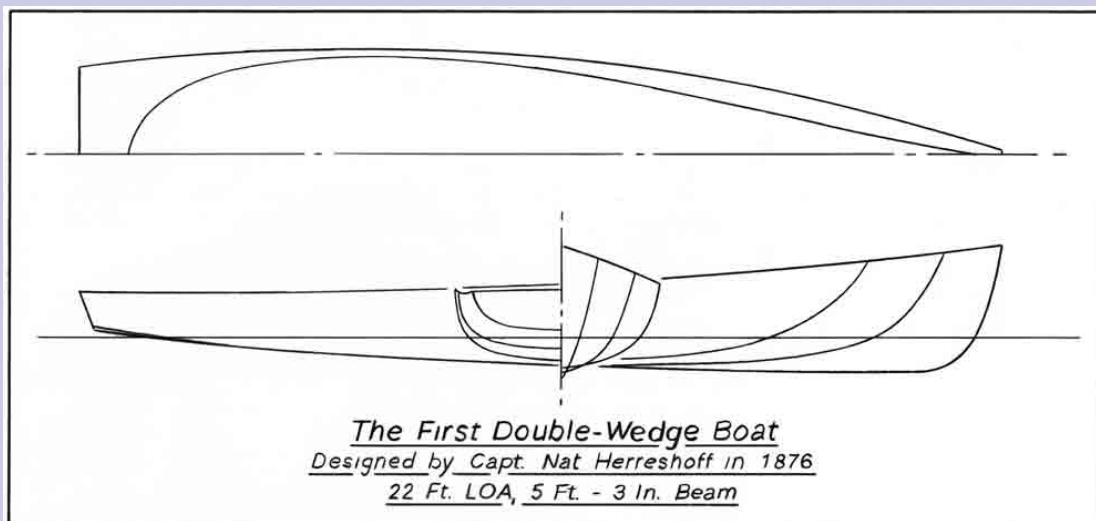
Still, most fast boats of the day (here and in Europe) were long and narrow wave piercers, rather than skimmers. There’re actually some good arguments for these ultra-slender, round-bilge speedsters. One is that they can be run at nearly full speed in very rough water because their slender hulls cut the waves, reducing pounding greatly.

Another is that they’re very efficient; they need far less power to achieve full speed, and full speed

could be quite fast indeed! The *Ursula*, was about the last of these long slender racers. Designed and built in England by S.E. Saunders, she was launched in 1908. Forty-nine feet overall (and exactly the same on the waterline), she weighed 11,800 pounds, and was a mere 6-foot 6-inch beam—slender isn’t the word! *Ursula* was clocked at 35



Reverend Ramus's Patent



The First Double-Wedge Boat  
 Designed by Capt. Nat Herreshoff in 1876  
 22 Ft. LOA, 5 Ft. - 3 In. Beam

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knots, powered with a single 760-hp gas engine. This is a speed-length ratio of 5, which according to some means she was planing.

### The Ratio of Speed

What is speed-length ratio? Simple. Take any boat's length on the waterline, in feet, and get the square root of that. In *Ursula's* case the square root of 49 feet is 7. Then divide the boat speed, in knots, by the result. Again, for *Ursula*, we get 5—a speed-length ratio of

5 (35 knots  $\div$  7 = SL Ratio 5). The important thing here is that convention says that any boat going faster than an SL Ratio of 3 is planing, regardless. This, though, is too crude a way of looking at it.

Indeed, a light flat bottom skiff, may well plane at a S/L ratio of just 2.2, while a heavy deep-vee craft may not reach full planing until an S/L of 3.2. By the same token, an ultra-narrow round bilge boat like *Ursula*, achieves a substantial portion of her speed by wave piercing rather than by skimming or planing. It wouldn't be fully accurate to call her a planing boat, even though she certainly does experience some Ramus effect at high speed. (Reverend Ramus wasn't forgotten. Magazine articles and books of the early 1900s sometimes referred to planing as "the Ramus effect.")

### Turbo!?

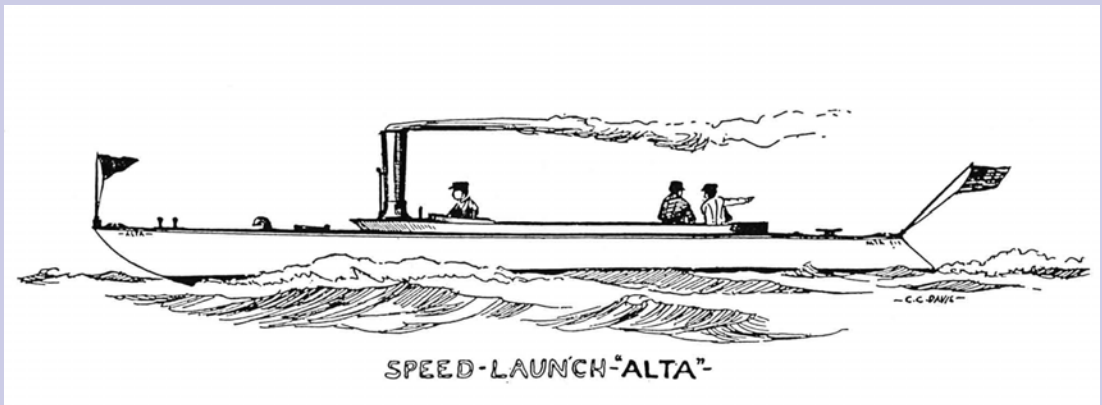
While *Ursula* was one of the last of the ultra-slender racers, the most famous craft of this type was Sir Charles Parsons's *Turbinia*.

Launched in early 1896, *Turbinia* was 103 feet 9 inches overall,

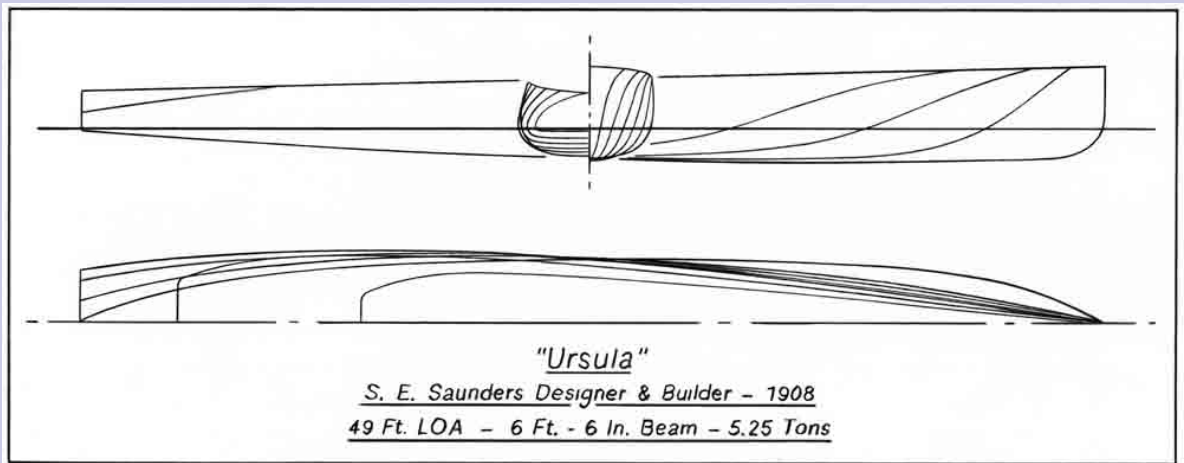
an amazingly narrow 9-foot beam, and displaced 44.5 tons. She did 34.5 knots, powered by three axial-flow steam-turbines delivering a total of 2,100 horsepower. Her engines turned three prop shafts, each fitted with three props—strange. The boat initially didn't make expected speed with a single propeller due to cavitation problems. The unusual propeller arrangement was to get sufficient blade area with limited diameter. (The turbine engine was the first of its kind in a boat, hence her name). Speed-length ratio works out to 3.5 (supposedly planing, but not really so for this ultra-narrow round-bilge hull). It did, however, make *Turbinia* the fastest boat in the world.

### High-Speed Hijinks

In fact, Sir Charles took her (uninvited) to the naval ship parade at Queen Victoria's Diamond Jubilee and caused quite a ruckus. He zipped in, around, and past every single boat, from the largest battlewagons to the fleetest escorts—most ungentlemanly. Several of the fast escorts even tried to chase *Turbinia* down to head her off (one couldn't allow proper decorum to be ignored, after all), but all were hopelessly unable to catch her. Not long after, even the stuffed-shirt admirals (they'd



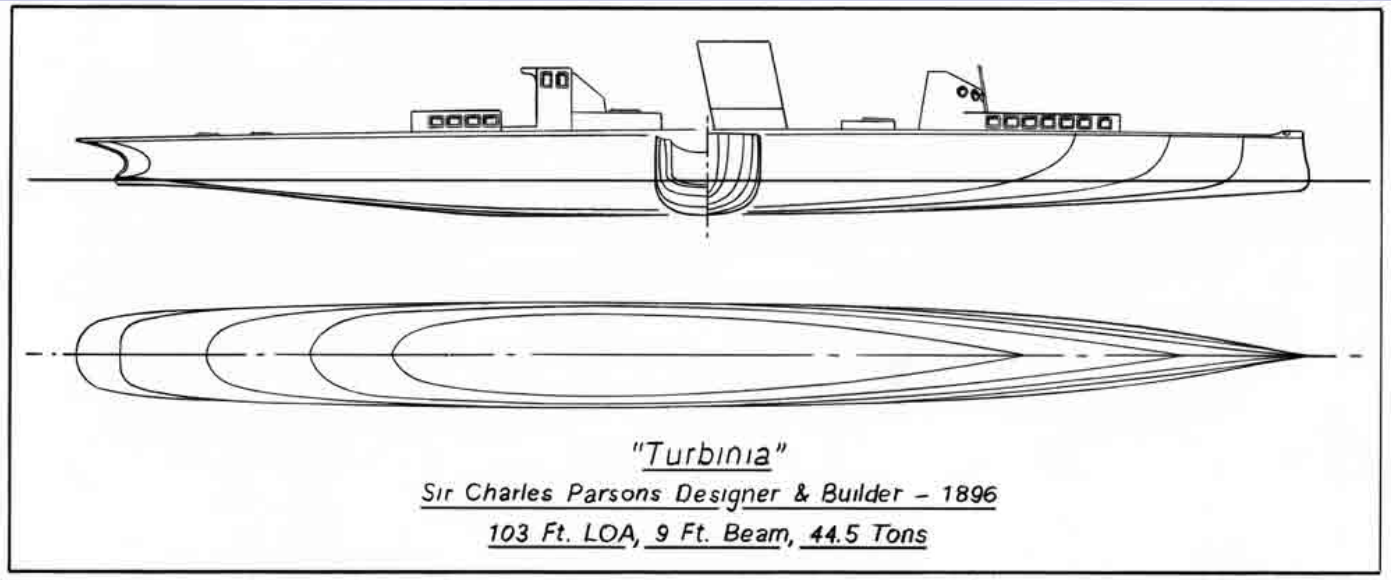
SPEED-LAUNCH "ALTA"



"Ursula"

S. E. Saunders Designer & Builder - 1908

49 Ft. LOA - 6 Ft. - 6 In. Beam - 5.25 Tons

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had no use for small fast craft previously) caved in and ordered several *Turbinia*-type patrol and torpedo boats. From who? From Sir Charles, of course!

**Heavy Power/Costly Power**

A critical fact about *Turbinia*: She weighed 44 tons, but her engine weighed 22 tons! Yes, fully half her weight was power plant! By comparison, Diesels delivering the same 2,100 hp today would weigh in at something a bit over 3 tons—a 660 percent decrease in weight! Racing gasoline engines would weigh still less.

Steam had yet another drawback: It was a glutton for fuel—more weight and big fuel bills to boot. An 1890 steam-launch owner complained:

“One who has never been off for a day’s pleasure in a small steam launch cannot imagine the amount of misery one of those craft is capable of. The trip is usually extended beyond the capacity of the supply of fuel, with the result that the boat arrives home minus seats, locker, and floor boards.”

This poor fellow must have been having a particularly bad day. As anyone who’s ever enjoyed watching Humphrey Bogart kick at his old *African Queen*’s steam engine knows: Reciprocating steam has much to offer. Still, steam is heavy, messy, inefficient, and fuel hungry; our disgruntled skipper had a point.

**The Right Combo’**

By now, the trend is becoming clear. Lighter, more-efficient internal combustion engines coupled with relatively small craft (not Ramus’s big ships) would en-



*Turbinia*, on display at the Newcastle Discovery Museum, showing her unique triple-shaft, triple-propeller arrangement.

<http://www.twmuseums.org.uk/discovery.html>

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able high speed on the water. All that was required was to refine the two.

Most likely, the magic combination was first achieved by a French builder named Campet; the year was 1905. The boat was still round-bilge but considerably wider and flatter aft than the ultra-slender hulls, and she had enough power to driver her. A 1908 refinement of this approach, the German *Donnerwetter*, was built by Otto Lürssen. (Lürssen would go on to build German yachts and patrol boats through two wars, and the company's still active today.) *Donnerwetter* was 26 feet by 5 feet beam—proportionately *much* wider than the previous ultra-slender boats. Power was a single 20-hp Daimler gas engine. She did 16.5 knots or an S/L ratio of 3.2. This—with *Donnerwetter's* wider flat bottom aft—was true planing. Like Campet's craft, and most others at that time, *Donnerwetter* was round bilged. It hadn't occurred to many that hard chines would actually help speed. After all, those sharp corners would seem to increase resistance.

If you look back at Captain Nat's double-wedge boat of 1876, you'll see that *Donnerwetter* is quite similar—a double-wedge form. The Wizard of Bristol, had indeed hit on the right shape some thirty-two years earlier! He was just too far ahead of his time to have light-enough engines handy. Interestingly, for rough water work, the narrowish (by modern standards) *Donnerwetter*, with her round bilges would still be hard to beat. You could drive her at higher speed than a wider hard-chine craft in rougher weather. She'd also run comfortably and economically at low speed. The only significant change I'd make would be to add a spray knocker forward, and a couple of spray strips on her bottom. Of course, if it's all-out speed you're after, hard chines are the way to go.

### Running Runabouts

This is why it really is impossible to say with certainty who was first to build a modern planing boat. The combination of light engines and small, light flattish hulls was quite suddenly available worldwide. In the U.S., for instance, designer William Hand, Jr. built a true V-bottom hull, in 1906. It was moved along by a 24-hp machine that gave her 18.2-knot top speed. (Believe me, in those days this was *flying!*) Billy Hand even referred to his boat as a "runabout," and by 1909 manufacturers like X-Celo and Hacker were offering planing runabouts in their catalogs. The modern planing boat was here at last, and available to everyone.

Well, we've achieved planing, but all the above is only half the story. In fact, there was yet another inventor who would significantly influence planing boat development: William Henry Fauber. His ideas would literally be the next step. We'll see what he got up to and where it lead in the next article.

