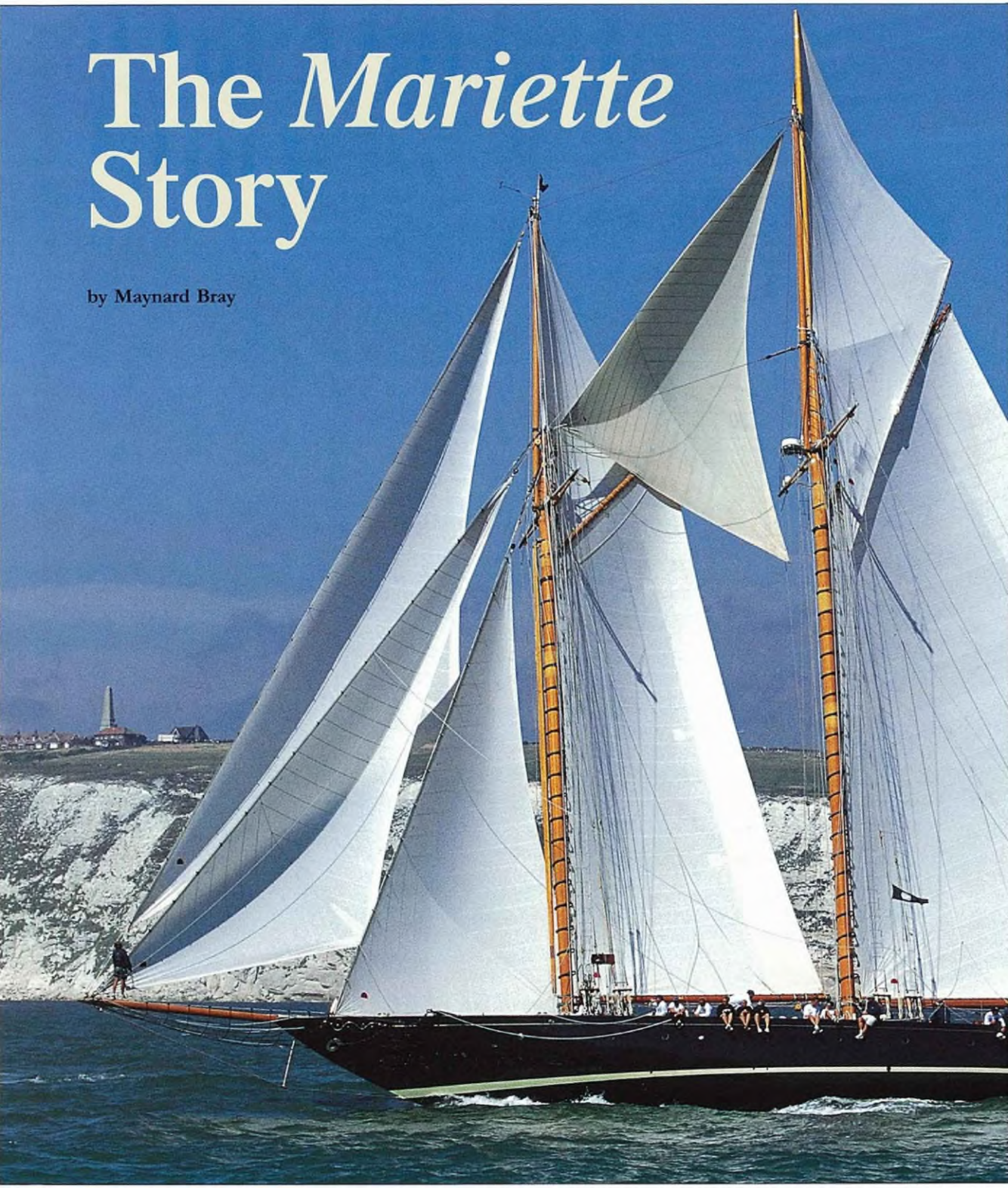
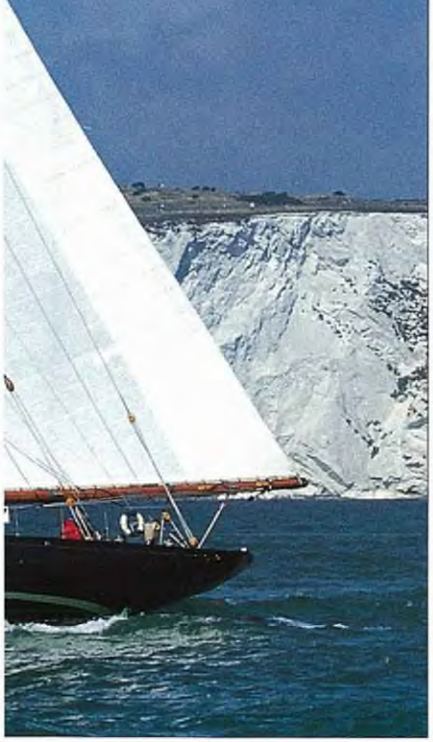
The *Mariette* Story

by Maynard Bray



The steel-hulled schooner Mariette *was launched from the Herreshoff Manufacturing Co. slipway in Bristol, Rhode Island, in 1916. Her designer was at the peak of his career and, at 109',* Mariette *was the largest sailing yacht to be built in America that year.* Mariette *survived through the decades, despite successive owners and various alterations. But, perhaps even more remarkably, her original construction drawings also survived in their entirety and it was these, as well as the yacht's extant original interior, that led her current owner to buy* Mariette *in 1994 and to complete one of the late twentieth century's most meticulous yacht restorations. Maynard Bray tells a remarkable story of a reborn classic, his text accompanied by a selection of Herreshoff's original drawings – some of which have never before been published.*



Although *Mariette* now carries her original name and rig and, except for her dark topsides, looks much as she did in 1916, the life she now leads differs vastly from earlier times. Her current owner likes to compete against other major yachts which, like *Mariette*, have benefited from Europe's ongoing restoration renaissance. As a result *Mariette*'s home waters are off the southern coast of France and east to northern Italy – very different from the venues of her early years when she leisurely cruised New England during the summers and was laid up off-season. Seemingly as restless as her owner, *Mariette* is likely to be found far beyond the Mediterranean, perhaps racing in British waters, cruising the Caribbean, or even occasionally nosing around her old grounds between New York and Northeast Harbor, Maine. Onboard, there's still a crew of paid professionals including a skipper, but now there's an owner who, besides lavishing his yacht with the very best in operation and maintenance, immerses himself in what goes on day-to-day even when he's not there in person. And he is often there – Tom Perkins manages to spend an average of three months per year with his beloved *Mariette*; he always takes the wheel, calls the shots when racing and, over the past ten years, has come to know this lovely but complicated steel schooner down to the tiniest valve, eye splice, and rivet.

Tom Perkins at the helm of *Mariette*.

Restoration to Glory

Complex projects keep Tom Perkins going and *Mariette* is only one of several that currently occupy his time, his latest being a 276' three-masted square-rigged "clipper yacht" named *Maltese Falcon* – a new Perini Navi hull that's being fitted with unstayed carbon-fibre masts and furling Dacron sails. Perkins admits to having been nuts about boats for most of his life, so when he lost his wife to cancer in the early '90s, this part renaissance, part technophile man decided to buy, restore, and campaign *Mariette*. It was 1994 and the schooner was lying at Cantieri Navali Beconcini di La Spezia on Italy's northwest coast near Genoa. The yard had already given *Mariette* a new teak-over-plywood deck, had replated her hull below the waterline, and had been her primary care giver for fifteen years. Unlike many classic yachts, *Mariette* had always been well maintained but, along the way, her original rig had been sacrificed for easier handling. Now rigged as a staysail schooner, she carried a bermudan mainsail and staysails between the two masts.

The idea of restoring *Mariette* to her gaff rig with fidded topmasts, two gaff topsails, three headsails, and inherent complexity appealed to Tom Perkins, as did the fact that below decks the yacht was still original and in decent condition. All this, combined with the knowledge that the complete set of Herreshoff Manufacturing Company construction drawings (over 150 sheets) were available at MIT (Massachusetts Institute of Technology, Perkins's Alma Mater), convinced him to forge ahead. It would be almost a year before *Mariette* was just right and, while the work took place, Perkins himself spent hours carefully stripping and refinishing her walnut-panelled main saloon. In that time he also came to know his new yacht intimately as she fulfilled his quest for an all-consuming project.

Although Perkins personally took part in *Mariette*'s transformation he couldn't be on site all the time, so he hired Tom Eaton (formerly of the schooner *Puritan*) to oversee the work and, later, to be *Mariette*'s professional skipper. So, under Eaton's supervision the yacht's rig was pulled out and her original gaff rig was authentically re-created and installed – complete with new varnished wooden spars by Spencer Rigging (of Cowes, Isle of Wight), new polished cast-bronze fittings, 180 new, wood-shelled blocks, new beautiful hand-sewn, cream-coloured, narrow-panel sails by Ratsey and Lapthorn, downwind and fisherman sails by Doyle France, and some of the best examples of marlinspike seamanship I have ever seen.

Mariette was at Cowes, Isle of Wight, for the Jubilee of the *America*'s Cup, August 2001. She is seen here racing in the Solent under full sail.

The re-rigging was the biggest single job, but *Mariette* also ended up with a pair of Caterpillar diesels driving Luke feathering propellers, a sunken cockpit for steering, and a new enclosed on-deck lounging and dining area. She was also given handsomely outfitted below-deck accommodations and deep-blue topsides with a mirror-like Awlgrip finish. Simply put, she was stunning!

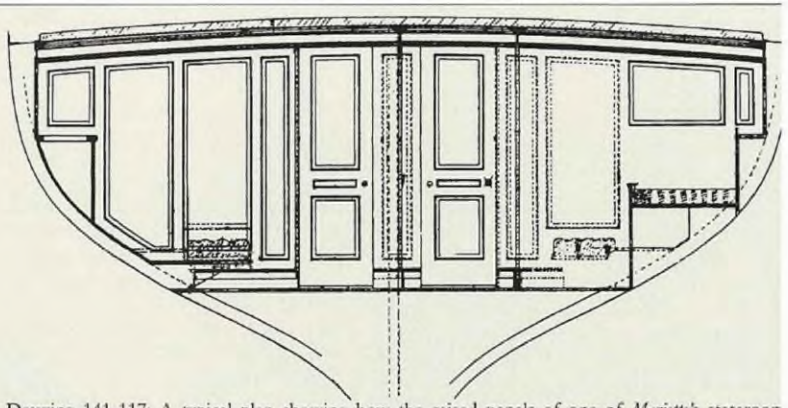
Mariette's return debut took place in 1995.(*). She emerged a tribute to Nathanael Greene Herreshoff (NGH) and to the many past owners, crews, and other professionals who had kept her so well over the past eighty years. Since 1995 she has been raced hard and often.

In May 1997 *Mariette* returned to Bristol, Rhode Island – back to where she was built. That year she went on to enter the Atlantic Challenge Cup Race (a race from New York to the Lizard, the southernmost tip of England). In 1998 Perkins raced in the Antigua Classics where *Mariette* was voted that year's most photogenic and best professionally maintained yacht. She also won second place and best elapsed time in her class. She was there again in 2000 and garnered more awards. Her European winnings have been – and continue to be – just as impressive.

Winning is high on Tom Perkins's list of priorities. He exudes the kind of nervous energy and perceptive intelligence that made him one of the most successful venture capitalists (founder and partner in Kleiner, Perkins, Caufield & Byers) in all of Silicon Valley. Still based in San Francisco, but now retired and in his early seventies, Perkins is tall and fit and personally much involved in whatever his current projects happen to be. The need to fully understand and campaign a yacht of *Mariette*'s complexity with her myriad lines and sails engages him, he says, and keeps him stimulated. Needless to say, his racing crew – some twenty volunteers as well as the eight permanent paid hands – is well organized. We hear the crew tell of gybes under full sail in no more than a minute, helped during such manoeuvres by the self-powered, Dutch-built Meissner sheet winches – specially built with drums that closely resemble those designed by Herreshoff.

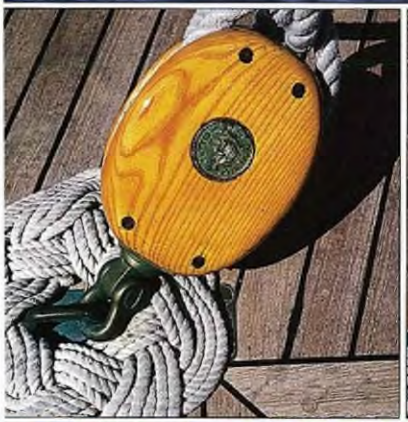
Despite a deep commitment of time and attention, first to restoring, then to managing and sailing *Mariette*, Perkins

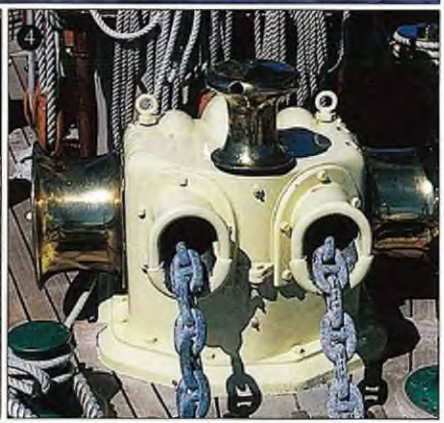
(*) An unfortunate collision marred *Mariette*'s first year's racing when, off St-Tropez, France, she became trapped in starting line congestion and ran over and sank the 6-Metre sloop *Taos Brett IV*. Tragically, one of the 6's crewmen drowned.

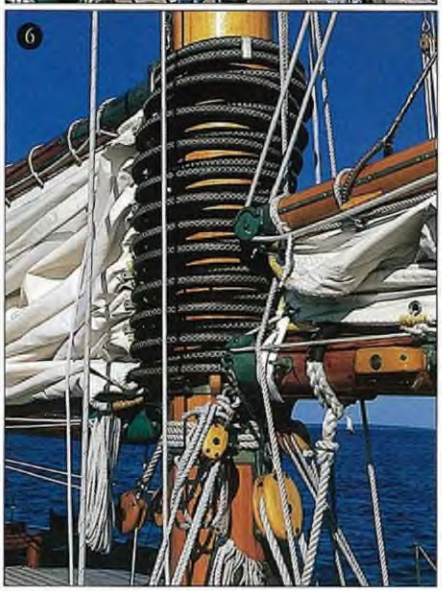


Drawing 141-117: A typical plan showing how the raised panels of one of *Mariette*'s stateroon are arranged. The interior woodwork is hard against the steel frames of the hull. Most of what shown on this plan would have been built in the HMCo cabinet shop, although such work w occasionally subcontracted out – *Vagrant*'s master and guest cabin specifications were prepared b the New York architectural firm of Walker & Gillette. (All the numbered drawings in this artic are from the Herreshoff Manufacturing Company and kept at the Hart Nautical collections/MI

The steam-yacht *Atlantide* passing the Needles, Isle of Wight.







remained restless. Another project was needed. One was to commission Rob Eddy to build a 5,100-hour rigged model of the schooner, complete with lit interior (see Eddy's website <www.yacht-models.com>). Then came *Atlantide*, the steel-hulled, clipper-bowed, Mylne-designed diesel yacht of 1930 that Perkins discovered and refurbished to become *Mariette*'s tender. Since being finished in 1999 she has accompanied *Mariette* everywhere and, in her way, is equally impressive. Nearly identical in length, she is painted the same deep and shiny blue. *Atlantide* is where *Mariette*'s guests and owner take their post-racing meals each evening and where the extra crew sleeps.

For the season of 2001 *Mariette* joined a fleet of classic yachts in the Solent to celebrate the *America*'s Cup Jubilee. In the summer of 2002 she and *Atlantide* graced New England waters to take part in the International Yacht Restoration School's classics cruise and the New York Yacht Club's cruise to Maine as well as afterwards engaging in some Down East cruising on her own.

It was at the conclusion of these events that I arranged to visit and examine *Mariette*. She and *Atlantide* were rafted together in Camden's outer harbour when photographer Ben Mendlowitz and I came alongside, boarded, and were greeted by Tom Perkins, his professional skipper Chris Gartner, and mate Graham Wilkinson. Perkins was about to catch a flight back to San Francisco and had been going over work lists with the crew, but upon our arrival led us on an informative tour on deck and below. There was much happening that day. *Atlantide* was about to cast off to fuel up in nearby Rockland before heading south for shipyard work, and *Mariette* would be leaving within a day or two for Newport, Rhode Island, where she'd be hauled out for exploratory surgery of her lower bilge. Then it was off to cruise Grenada and the southern Caribbean for the winter before returning to the Med' for more big boat racing. Chris would be relinquishing his post within a week to oversee work on Perkins's *Maltese Falcon* project, and mate Graham would be taking over as *Mariette*'s skipper.

I had expressed an interest in seeing some of *Mariette*'s original riveted topsides construction – this being best

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Tom Perkins used Herreshoff's plans – more than 150 sheets – to complete *Mariette*'s restoration. 1- The owner's cabin. 2- The saloon. 3- A wood-shelled block with turk's head mat. 4- The windlass. 5- Air vent and opening skylight. 6. Luff hoops for the great gaff mainsail.

seen in the bow and stern where not hidden by furniture or panelling. The lazerette turned out to be ideal for the purpose, and Perkins had his crew clear it out – a considerable job for which I was most grateful. On deck, *Mariette* looked as good close up as she did from a distance.

Creation of a Classic

So much for *Mariette* today – and long may her current way of life continue – but we have some history to deal with here that goes back many years. We also should address how this riveted steel beauty was built in the first place.

Let's begin with her launching in the spring of 1916, only a few months after Jacob Frederick Brown signed the contract for his new 109' steel schooner on 7 October. He was confident that he had come to the right place: Herreshoff Manufacturing Company (HMCo.) was a yard known throughout the world for the quality and performance of the yachts it turned out. Nowhere was there a better place for obtaining the kind of craft that Brown wanted. This, indeed, was a happy day for him.

A Boston-based businessman, Brown (Fred to his friends, according to his grand nephew J.F. Brown II) imported wool for the hungry Massachusetts textile mills and, in this endeavour, had profited handsomely. He had grown up racing Massachusetts Bay 21-footers (named for their waterline length), but now in middle age had switched to larger craft – yachts that were big enough to accommodate his family and friends. Although this beautiful new schooner was his largest yacht to date, Brown was no neophyte: he had owned at least two other sizeable sailing yachts – his most recent being an 87' wooden schooner built for him in Gloucester, Massachusetts, ten years earlier.

Following his marriage Brown's yachts always carried the name *Mariette* – after his wife – and in his final year, 1936, he simultaneously owned three yachts of that name. None, however, exceeded this 1916 schooner in either size or grandeur.

The Herreshoffs assigned hull number 772 and built Brown's yacht of riveted steel in their usual elegant manner. Both the designer and builder were at their peak. Nathanael Greene Herreshoff, at the age of sixty-seven, was the country's, if not the world's, undisputed leading yacht designer with four successful *America*'s Cup defenders to his credit. (*Resolute*, the fifth and final, would prove herself in 1920.) And, since its formation in 1878, the HMCo had launched hundreds of boats, yachts, and vessels of widely varying size and description in wood, metal, and a combination of the two known as composite.

By the time of *Mariette*'s completion, six of an eventual nine steel schooners had already been launched from the yard. *Ingomar*, the first, had been launched a dozen years earlier in 1903, the same year as the mighty Cup defender *Reliance*.

Contract	HMCoHull	Name	LOA	LWL	Beam
1903	#590	*Ingomar*	127'	86'	24'3"
1906	#657	*Queen*	126'	92'6"	24'
1909	#692	*Westward*	135'4"	96'	26'8"
1910	#706	*Elena*	136'6"	96'	26'8'
1912	#719	*Vagrant*	109'	79'1"	23'8"
1913	#722	*Katoura*	162'	115'	30'
1915	#772	*Mariette*	109'	80'	23'8"
1919	#827	*Ohonkara*	109'	80'	23'8"
1922	#891	*Wildfire*	95'	68'	20'6"

Queen followed her in 1910 and then, in rapid succession, came the near-sisters *Westward* and *Elena*. In 1913 came *Mariette*'s progenitor known as the "big" *Vagrant*, followed in 1914 (the same year as the Cup defender *Resolute)* by what would be their largest-ever sailing yacht, the 162' steel schooner *Katoura*. *Ohonkara* and *Wildfire* came later.

NGH arrived at his hull shapes by precisely carving, then carefully measuring, wooden half models. He produced a new model for most of the above schooners – the exceptions being *Westward* and *Elena*, for which there was but a single model, and one other. That intriguing exception was his use of an existing half model for the near-sisters *Vagrant*, *Mariette,* and *Ohonkara*. For these he rescaled the model he had made in the spring of 1910 for Harold Vanderbilt's first *Vagrant* – a composite 76-footer with steel frames and a wooden backbone and planking. The rescaling resulted in a 43% increase in length and a 35% increase in beam, draught and freeboard. (The actual model, on display along with all the other magnificent NGH half models at the Herreshoff Marine Museum, measures 38 1/2" in length.) NGH frequently re-cycled half models to produce variations, because doing so not only saved carving a new model but also enabled both designer and owner to tweak what had already proven successful. I suspect that Vanderbilt acknowledged his satisfaction with the first *Vagrant* and that his primary requirement for the new one was that she be larger. Thus not only was the new *Vagrant*'s shape established, but so too were *Mariette*'s and *Ohonkara*'s.

Compared with other large sailing yachts by Herreshoff, the *Vagrant/ Mariette/ Ohonkara* half model (the Vanderbilt model) shows a perfectly straight fore keel much like the smaller 12 1/2-footers and Fish class sloops, and

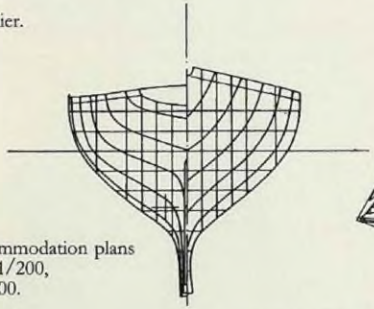
Mariette's sister-yacht *Vagrant* on her launching day in the spring of 1913. This was Harold Vanderbilt's second schooner of that name and it looks as if he's invited the entire yard crew to ride down on deck.

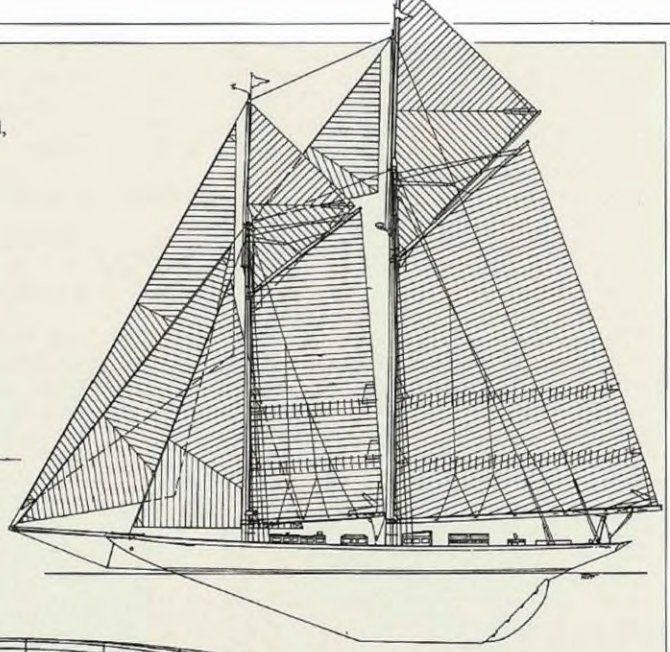
Mariette

Designed Nathanael Greene Herreshoff.
Built Herreshoff Manufacturing Company, Bristol, Rhode Island,
1915-16

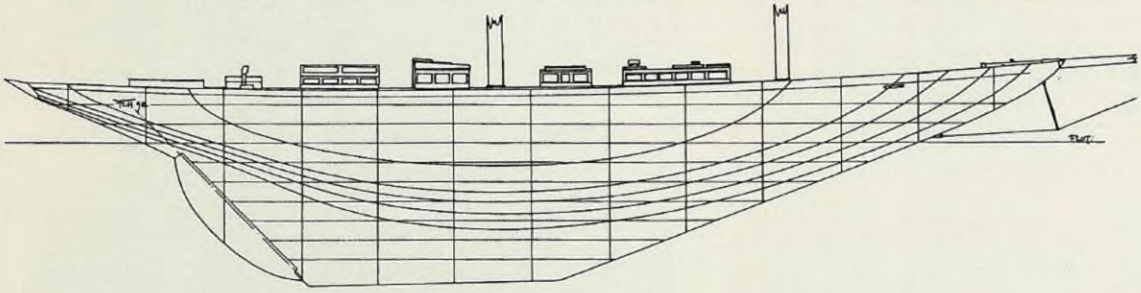
LOA	109'0"
LWL	80'0"
Beam	23'8"
Draught	14'10"
Sail area	807m²

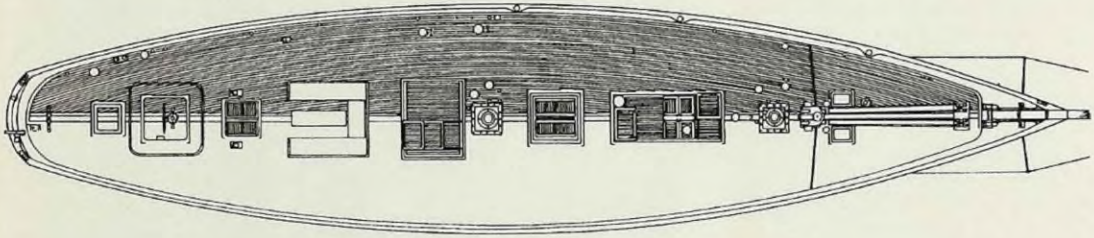
Plans redrawn
by François Chevalier.

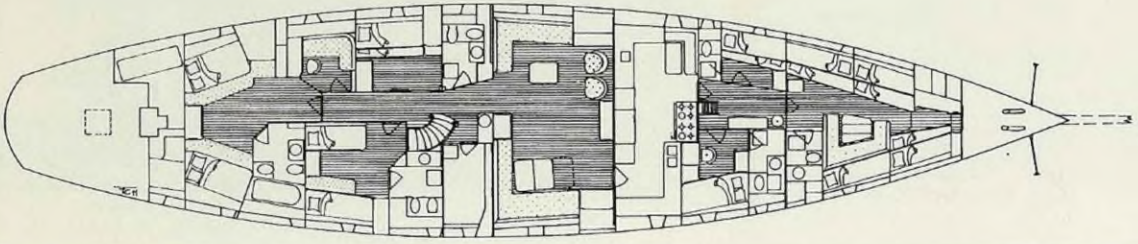




The lines and accommodation plans
are at the scale of 1/200,
the sail plan is 1/400.







not too far from the shape of the New York 40s, a dozen of which were built the same year as *Mariette*. On the other hand, Herreshoff's other schooners, Cup defenders, big sloops, and cutters have noticeable hollows in their forebody underwater profiles.

I suspect that the profile of the Vanderbilt model came about from a desire to obtain standing headroom further forward. (Vanderbilt's earlier trunk-cabin cruising sloop *Trivia*, now at the Herreshoff Marine Museum, had only crouching headroom forward.) Thus, his first *Vagrant* – the schooner for which the Vanderbilt model was made – would be given relatively high freeboard and a straight forebody profile along with the customary flush deck. (The three later and larger schooners, which included *Mariette*, would echo these same characteristics.)

Although both Fred Brown and Mike Vanderbilt were skilled racers and regularly competed with their schooners, it is apparent that they also sought good, comfortable, seaworthy cruisers – ones that, because of less racy hull shapes, were steadier on the helm at sea. Brown's confidence in his choice of this particular design surely received a boost from the news of *Vagrant*'s seagoing passage earlier in 1915 when, beginning 3 February from New London, she headed south and visited fifty-one Cuban and Caribbean ports, then, in a homecoming gale, "sailed like a witch" averaging at times 13½ knots – passing other sailing craft and even some steamers – before making port off Staten Island on 10 April.

Built to Lloyd's Rules for Steel Construction (which, among other things, established the size and spacing of frames, thickness of hull plating, and size and spacing of rivets), *Mariette* cost $75,000 according to the Herreshoff Construction Record, *Vagrant* some $5,000 less, and *Ohonkara* a whopping $133,300 – the result of post-war inflation. (In the same period, the ever-popular 12½-footers also jumped by nearly as much percentage-wise.)

Mostly because of her Van Blerck auxiliary engine and tankage, *Mariette* slightly outweighed *Vagrant*, resulting in 6" more draught and a longer waterline. *Ohonkara*, too, showed this increase.

From Peak to Irresolute Years

The May issue of *The Rudder* anticipated "a glorious season of yacht sailing" for the year 1916 and its prophecy proved to be true. The Herreshoff New York 40s (see Maritime N°18) were the big news of 1916, and, in the media, overshadowed *Mariette* even though she was the largest sailing yacht to be built that year in the United States. *Mariette* took part in the 1916 New York Yacht Club cruise, sailing in company with (but not competing against because of being in a different class) *Vagrant*, *Atlantic*, *Katoura*, *Elena*, *Invader*, *Amorilla*, *Enchantress*, *Constellation*, *Sea Fox*, *Irolita*, *Flying Cloud*, *Guinevere* and *Katrina* – all great schooners, "the likes of which cannot be found in any other club in the world", claimed *The Rudder* in its extensive September review of this signal event. What a grand initiation for *Mariette*, to sail among that classic fleet of magnificent schooners and sloops, including New York 30s, 50s and the 40s!

For the Herreshoffs 1916 was a fine year, as had been the three previous. Besides *Mariette* and the twelve 59'-LOA NY-40s, the first fleet of two dozen 20'-LOA Fish class sloops came out that year and attracted a good deal of attention. Then there was J.P. Morgan's 114' twin-screw

Mariette in her first season, painted white and carrying working topsails and two of her three headsails. This first suit of sails was from the HMCo sail loft. Originally the helmsperson stood on deck without benefit of a cockpit and, in the beginning, the settee near the boarding ladder housed two cylindrical gasoline tanks for *Mariette*'s eight-cylinder Van Blerck engine.

Cleopatra's Barge II (ex-*Mariette*), 1934.

commuter *Navette*, Harold Vanderbilt's 63' tug/tender *Magistrate*, and the 58' power cruiser *Lady Gay*. Earlier, for the season of 1913, the nine 72'-LOA New York 50 class sloops had been created, followed in 1914 by the 162' two-masted steel schooner *Katoura* and NGH's final Cup defender – the 106' *Resolute*. (Although these two big yachts stole the show that season, HMCo's equally significant launchings included the three 36' Newport 29 class sloops, five 32' Buzzards Bay 25 class sloops, five Buzzards Bay 15 class sloops, and the first of the two dozen 12½-footers delivered late in 1914 and throughout 1915.) In 1915, the year before *Mariette* took to the water, HMCo launched the 60' composite schooner *Haswell*, NGH's personal power cruiser *Helianthus II*, and the 50' motorsailer *Shadow*.

These were good times indeed, but a long shadow loomed over the HMCo and yachting in general. World War I had to be fought and won, and the newly instituted income tax was being increasingly felt. Despite the armistice of 1918, it would not be until the 1920s that the golden age of yachting would resurface – beginning with the 1920 resumption of the postponed *America*'s Cup contest between *Resolute* and *Shamrock IV*.

The prolific HMCo began a slump that closely coincided with *Mariette*'s launching. J.B. Herreshoff died suddenly the summer before and, although you could still get the very finest designs from NGH, with JBH's passing the company lost the co-founder who had the business acumen and the drive to keep new orders coming in. Most historians agree that, with JBH gone, the company began to lose ground as it entered what Llewellyn Howland has called "the irresolute years". A major part of the HMCo was purchased by a group of yachtsmen, among whom was Fred Brown himself. His stock certificate now hangs on the wall of the Herreshoff Marine Museum. In their desire to see the company continue to build and service yachts, the stockholders did their part by placing orders – most of which initially were for World War I patrol boats. Although Fred Brown didn't commission a new patrol boat, he did have a 90' shallow-draught houseboat built in 1922. And guess what he named her? This gave him two Herreshoff-built *Mariettes*, and it appears that for five seasons he kept both in commission.

A Succession of Owners

Brown sold the schooner *Mariette* in 1927 to another wealthy Boston yachtsman by the name of Francis Boardman Crowninshield (aged fifty-eight and brother of B.B. Crowninshield, the well-known yacht designer). He changed her name to *Cleopatra's Barge II* and painted her black with a white boot-top, and a gilded stripe to accent the sheer. The original black-painted *Cleopatra's Barge* of 1816 was also a Crowninshield vessel – reputed to have been America's first yacht – and has been immortalized in words and illustrations and the full-size replicated cabin at the Peabody-Essex Museum in Salem, Massachusetts.

Frank Crowninshield, and his wife Louise Evelina duPont Crowninshield, sailed aboard their newly acquired schooner in the grandest of style until the

US Navy requisitioned her as one of its coastal patrol vessels in 1942. For the fifteen years that the Crowninshields owned *Cleopatra's Barge II*, she became their summer home – and, it is said, the most important thing in Frank's life, save his wife Louise who was known to all as "the Queen". Although the yacht was moored in Marblehead, the couple's winter home of Boca Grande, Florida, was listed in Lloyd's Register as the *Barge*'s home port. Each season the schooner sailed lazily, but formally, in the best yachting tradition, up and down the East Coast with frequent stops at New London, Newport, Northeast Harbor, and cruised at least once to Chesapeake Bay, while Louise accumulated antiques to be shipped home and Frank satisfied his movie-going passion. The idle rich doing their thing? You bet! And to record it for posterity, Frank had the *Barge*'s logs privately published in hard cover.

Believing that the Democrats (whom he loathed as passionately as he loved his wife, his schooner, and the movies) had ruined his yacht, Frank declined to take her back after the war, and she passed rapidly through several owners, accumulating on the way a new diesel engine, a bermudan staysail rig with new sails, and the names *Gee Gee III*, *Evening Star*, and, when bought in 1953 by Mrs Edgar Palmer, *Guinevere* – home port Oyster Bay, New York.

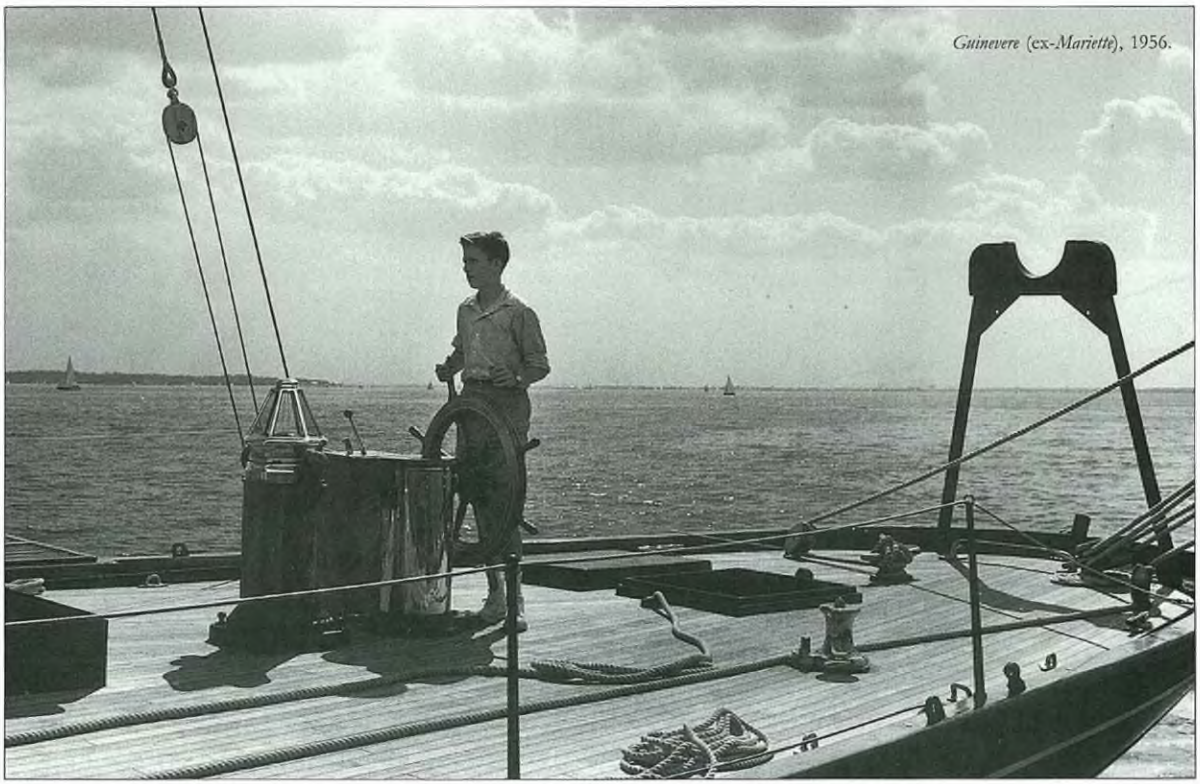
An entrepreneurial charter captain named Walter Boudreau bought the schooner in 1960, renamed her *Le Voyageur* and, with his family, sailed her to his Caribbean island, from where he offered sailing charters. Within five years, Boudreau was talked into selling the schooner to one of his guests, but regretted the move and bought her back again in the late '60s, this time renaming her *Janeen* after his daughter.

In the hiatus between his two ownerships, Boudreau discovered *Mariette*'s slightly younger sister (the previously mentioned *Ohonkara)* for sale in San Diego, bought her, sailed her to Lunenberg, Nova Scotia, and converted her to carry three masts for easier handling in his Caribbean charter trade. Sadly, while under command of a hired delivery skipper, *Ramona* (her name at the time) ended up on the rocks north of Bermuda – a total loss.

After a second stint of chartering, Boudreau sold *Janeen* to Swiss-Italian bankers in 1975 who took her to the Mediterranean and chose Monte Carlo as her new home port. Italian publisher Alberto Rizzoli bought the schooner in 1979 and eventually took her to La Spezia for a new deck and bottom – carried out under Ugo Faggioni's supervision. Rizzoli sold *Mariette* to Wolf Chitis in 1990, but by then classic-yacht gatherings on the northern Mediterranean coast were gaining momentum and *Mariette* became a familiar sight – a sight not missed by American yachtsman Thomas J. Perkins.

Remarkably, *Mariette*'s other sister *Vagrant* survives (she is reported to be in Trieste), as does their common ancestor, the "little" *Vagrant* (later and better known as *Queen Mab)*, thought to be somewhere in Japan. In this, the halcyon era for classic yachts, I wouldn't be surprized if sometime in the future the three surviving schooners built to N.G. Herreshoff's Vanderbilt model showed up together in one of the yachting world's now familiar classic regattas. And, of course, there's the new *Eleonora*, the Dutch-built *Westward* replica (see Maritime N°4 & 9) sailing somewhere between Antigua and the Med. ■

Maynard Bray is a contributing editor of *Maritime Life and Traditions.*



Guinevere (ex-*Mariette*), 1956.

Building *Mariette*

Done well, a riveted hull with nicely tapered strakes can be as lovely to look at as one built of wood. But it requires a skill that has all but disappeared, having been replaced by electric welding. With welding comes distortion, and distortion from welding is often so great that even low-sheen paints cannot hide it – and in a yacht, this is unacceptable. Great quantities of fairing compound are resorted to, but it is a rare welded hull that is sufficiently fair for gloss paint to be applied.

Behind the scenes, where frames attach to deck beams or floors, riveting also outshines welding, although it is a somewhat heavier form of construction because the various steel members are lapped rather than butted together. Riveting was slow, noisy, hard work and hot – heating made rivets easier to peen over and, as they cooled, they would shrink and draw the two pieces together even more tightly.

While traditional plank-on-frame wooden construction possibly could have been used instead of composite for Vanderbilt's first *Vagrant*, clearly his second *Vagrant* (and *Mariette*, *Obonkara*, and other craft of this size and larger) exceeded the upper limit for wood in those days before epoxy and cold-moulding technology. Steel, and occasionally bronze and aluminium, became the favoured materials for major yachts and all were put together, piece by piece, with thousands of rivets.

For the Herreshoffs steel hulls were nearly as commonplace as wooden ones. Indeed, one of their two big shorefront building sheds known as the south construction shop was set up for steel construction. It was there that the metal-hulled steam yachts, Cup defenders, USN torpedo boats, and big schooners were usually built.

Since present-day readers are apt to know more about wooden construction than riveted steel, I've tried to relate the two in the following description.

For *Mariette*'s frames, bulb angles take the place of square-section oak, but both have to be precisely bent to give the hull its shape, and bevelled to whatever degree is required in order for the planking or plating to fit well against them. Oak frames become sufficiently flexible through steaming, steel frames went into HMCo's 28'-long, oil-fired furnace for softening. After they reached a sufficiently high temperature, they were pulled from the furnace and laid on the nearby cast-iron perforated bending slab where they were coaxed around and wedged against a series of posts that defined the outline of each particular frame. Bevelling followed, while the frame was still hot.

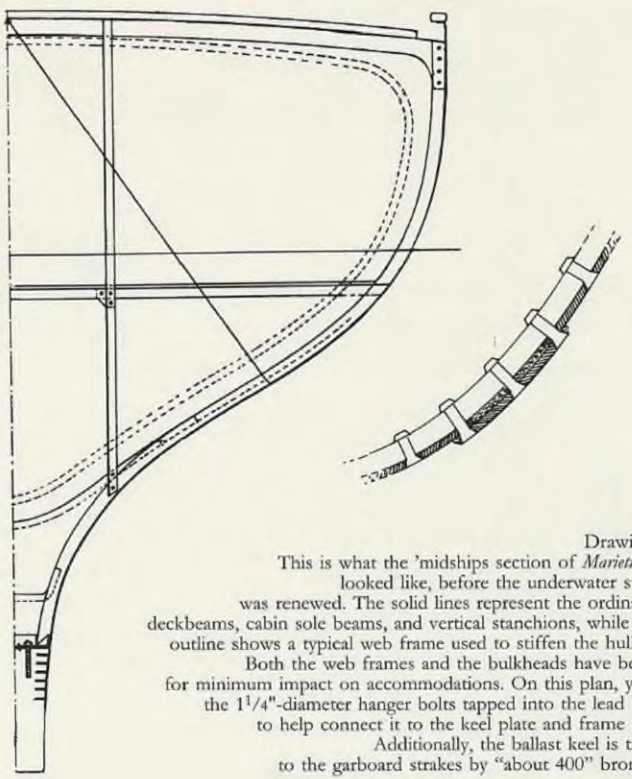
In both wood and steel construction the amount of bevel, expressed in degrees, comes from the full-sized lofting and for steel frames the bevelling has to be especially accurate because it cannot be easily altered after the frames are set up. At HMCo sledgehammers gradually opened the 90° cross-section of the bulb angle frame until the specified bevel was achieved. Most likely this would be a winding bevel in which the angle changed along the length of the frame – and, needless to say, hammering to achieve this took great skill as well as physical might and endurance. Specialists at this operation were known as anglesmiths, and their work fell under Mr Guisler's supervision in his capacity as chief blacksmith.

Each pair of steel frames had its own particular shape and bevel; and each individual frame had to be a mirror image of its partner. Amidships in *Mariette*, where the frames are longest and need the most strength, they are larger in cross-section than at the bow and stern: 5 x 2 1/2" amidships versus 3 x 2 1/2" at the ends. Shapes of these NGH-designed bulb angles are shown at the top of page 53.

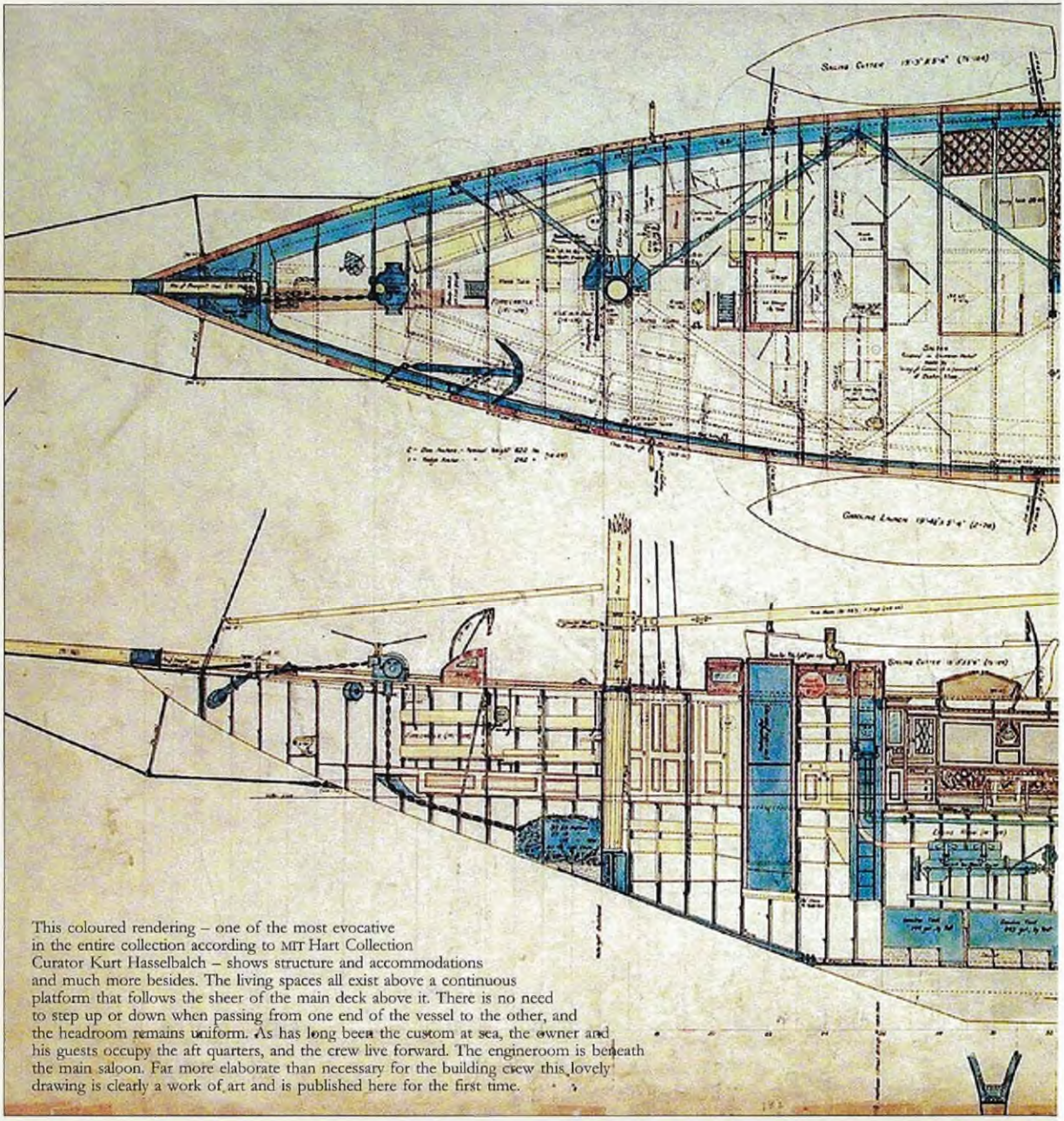
Mariette's deckbeams are also steel bulb angles and similarly diminish in cross-section towards the bow and stern, but the necessary curvature (camber or crown) is small and uniform, so the builders had no need for heat – a stationary rolling machine could do the job.

Holes for the rivets were quickly formed by a floor-mounted punch press, but each hole had to be laid out in such a way that the pre-punched shell plating would exactly line up to accept the rivets. This was also true of the beams, but here the fastenings were mostly the lag screws to be driven upwards into the 2 1/2"-thick white pine deck planks.

Mariette's hull originally showed its seams where the run of each strake lapped its neighbour so the two could be fastened together. Just as in wooden lapstrake planking, the exposed edges had to be fair and eye-sweet while the strakes tapered from their widest amidships towards the bow and stern. Instead of arranging the strakes clapboard fashion as in wooden work, an alternating in-and-out pattern was used. This slightly separates every other plate (the outer ones) from the frames, so carefully cut and punched steel fillers of



Drawing 141-86.
This is what the 'midships section of *Mariette* originally looked like, before the underwater steel plating was renewed. The solid lines represent the ordinary frames, deckbeams, cabin sole beams, and vertical stanchions, while the dotted outline shows a typical web frame used to stiffen the hull and deck. Both the web frames and the bulkheads have been located for minimum impact on accommodations. On this plan, you can see the 1 1/4"-diameter hanger bolts tapped into the lead ballast keel to help connect it to the keel plate and frame assemblies. Additionally, the ballast keel is tied directly to the garboard strakes by "about 400" bronze screws.

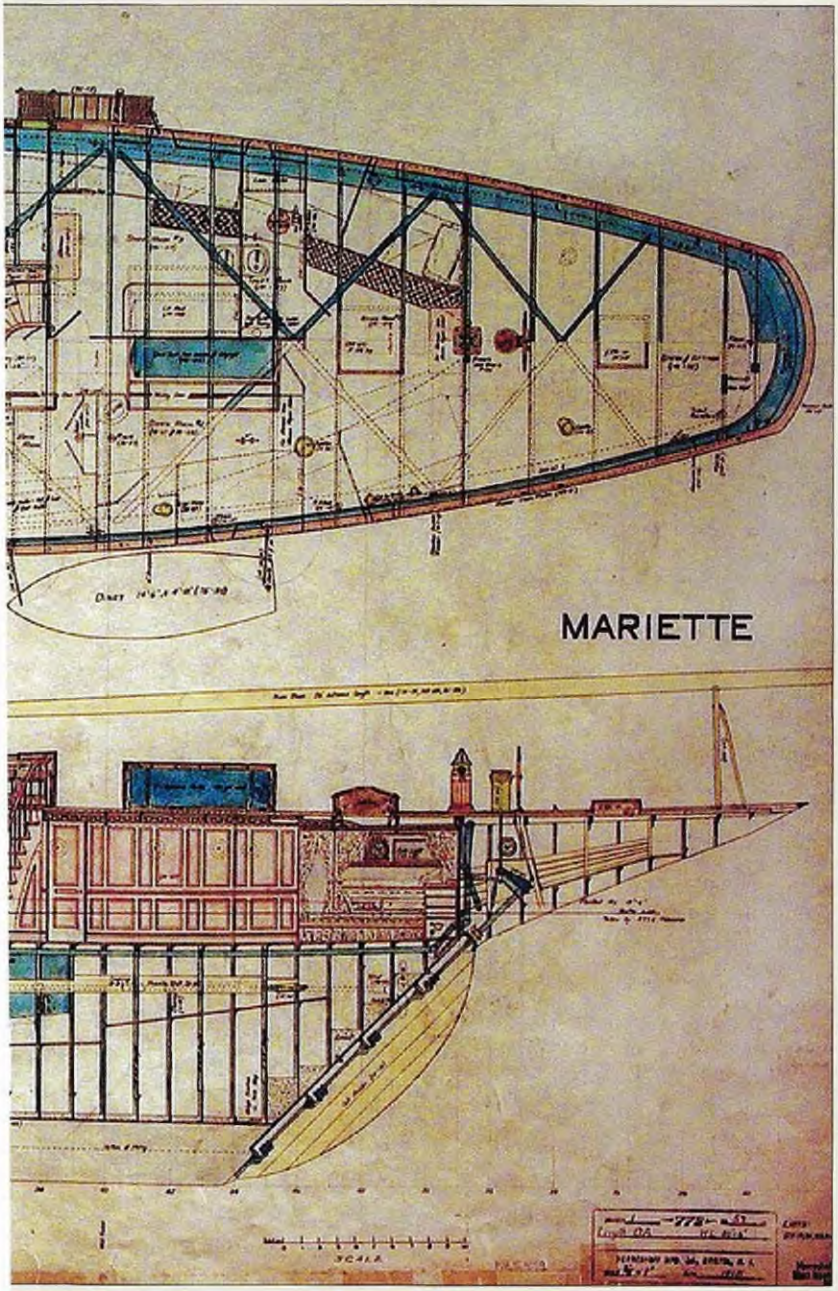


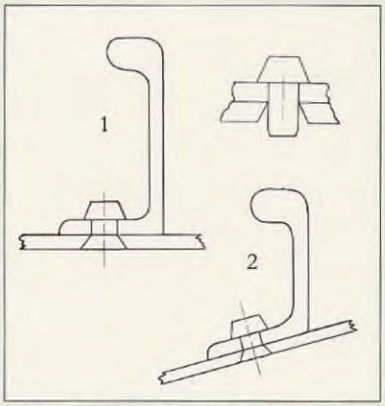
This coloured rendering – one of the most evocative in the entire collection according to MIT Hart Collection Curator Kurt Hasselbalch – shows structure and accommodations and much more besides. The living spaces all exist above a continuous platform that follows the sheer of the main deck above it. There is no need to step up or down when passing from one end of the vessel to the other, and the headroom remains uniform. As has long been the custom at sea, the owner and his guests occupy the aft quarters, and the crew live forward. The engineroom is beneath the main saloon. Far more elaborate than necessary for the building crew this lovely drawing is clearly a work of art and is published here for the first time.

shell plate thickness filled the gap and allowed metal-to-metal riveting.

Wooden patterns and templates, fashioned from the lofting or sometimes directly from the hull itself, are indispensable in steel construction. Unlike wood, steel cannot be planed or chiselled in situ, so the fit has to be proven on each wooden template – rivet holes and all – before reproducing it in steel.

It has been said that the head of Herreshoff's steel hull fabrication, Mr Brechin, was the best in the business. The steel, or in some cases bronze or aluminium, formed into shell plating under his supervision was almost perfectly fair and needed no subsequent "tin knocking" or fairing compound. The US Navy was so pleased with the Herreshoff-built steel-hulled torpedo boats (vessels of 100' to 176' in overall length) that USN Lieutenant A.P. Niblack at the November 1898 meeting of the Society of Naval Architects and Marine Engineers was recorded as saying: "It has been my good fortune to see practically every torpedo-boat in four or five foreign navies.... Herreshoff is as much a master in boat-building in general as Edison is in the field of electricity.... It is only grief that Herreshoff





1- Rivet is driven hot through reamed and countersunk hole between two steel members to be joined.
2- Rivet after peening the projecting end which mushrooms and completely fills the countersunk space. Subsequent grinding brings the rivet flush with the outer surface.

does not build all our boats or that we do not copy his models and fittings."

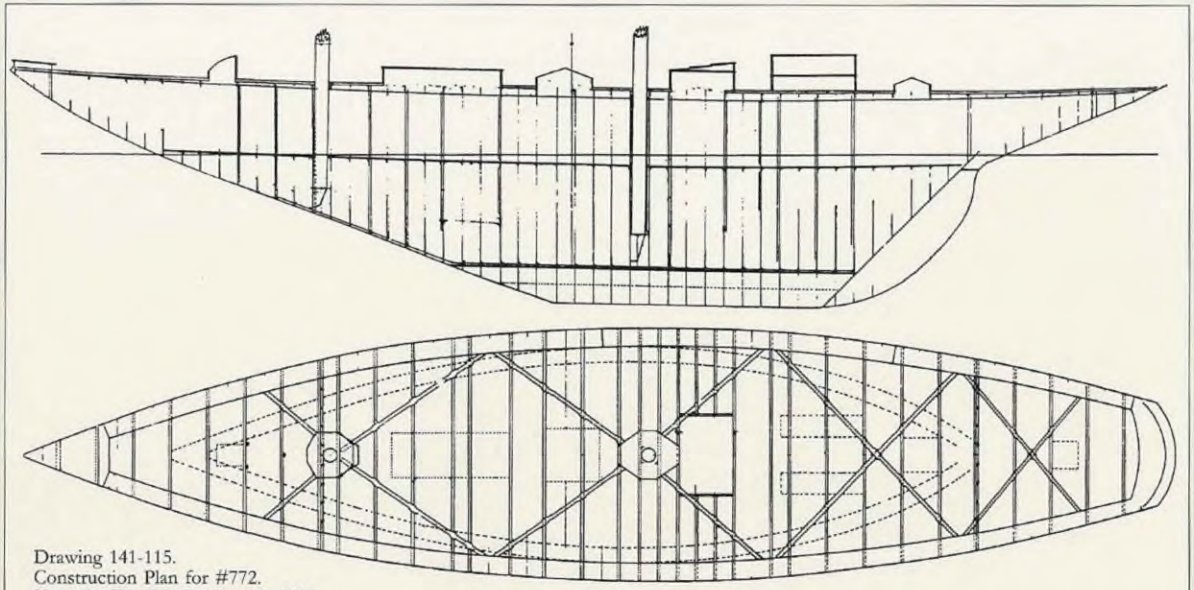
Like the fuselage of an aeroplane *Mariette*'s steel shell plating became a stressed skin after riveting and could resist deformation but, being planked with long strakes of white pine that were not directly attached to one another, her deck gained its diagonal strength from zigzag steel cross bracing. (*Mariette*'s present plywood sub-deck gives additional resistance to wracking, but the diagonal braces are still with her and still carry the bulk of such stresses.)

As you can see from *Mariette*'s construction drawings and, I hope, from the foregoing, her hull is closely similar to a hull built entirely of wood. Its framing is transverse and the plates attach to one another along their edges as in a clinkerbuilt dinghy. To further help the hull retain its cross-sectional shape, NGH called for two watertight bulkheads (one at the foremast and another aft) and three web frames, one of which he placed by the mainmast. If considered from above, the hull shape is further reinforced by the steel margins that border the edge of the deck, and by the platform that forms the cabin sole.

As to the rivets themselves, they are mostly 1/2" or 5/8" diameter depending on the thickness of the plates or shapes (angles, channels, T-bars, etc). The rivets have pan heads as shown at the top of the page and, for attaching the shell plating, are driven and backed up from within the hull, then air-hammered from the outside to flare out their projecting points until they sufficiently mushroom to fill the countersunk recesses. When the process is complete, each rivet should be flush, barely visible from outside the hull, and completely watertight.

Plates to be riveted were cut by shearing, then sometimes machined smooth, just as the planks of a wooden hull would be. Edges of the hull plating were also caulked after riveting. But, while it uses the same terminology as with wood, it's a different technique. Instead of driving cotton or oakum into a V-shaped caulking seam between two adjoining planks, laps in the steel shell plating are caulked by cold chisel. First a shallow notch is formed all along the edge of the outer plate. This gives approximately 1/8" or so of plate edge that can then be driven hard against the neighbouring plate to form a watertight seal.

If you've looked at old photos of Herreshoff's *America*'s Cup boats, you may have noticed that *Vigilant*, *Defender*, and

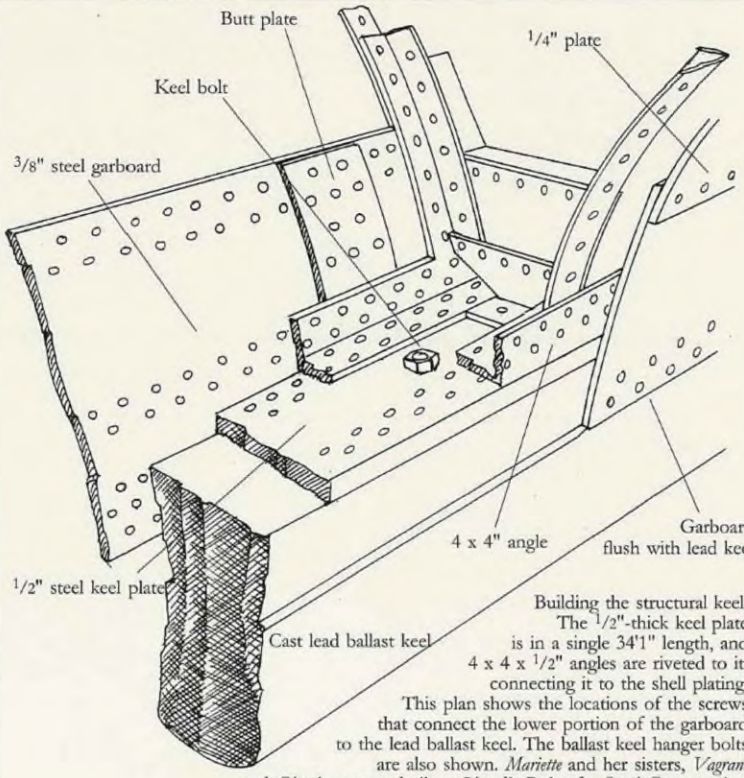


Drawing 141-115.
Construction Plan for #772.
Herreshoff MFG Co. Oct. 26, 1915.

Columbia show the same kind of lapped shell plating as *Mariette*, but that *Reliance* and *Resolute* (as well as the contender *Constitution)* are smooth. That's because the latter three are framed in what was then called longitudinal construction (invented by NGH long before aircraft technology adopted it). If you've ever built a model airplane with its wide-spaced frames and fore-and-aft stringers let into them, you have the picture. In the later Herreshoff Cup boats, the hull plating could be butted and riveted to those fore-and-aft stringers to make a smooth and potentially faster hull that showed no plate laps.

Mariette's shell plating is thickest down low at the garboard where it joins to the lead ballast keel and then diminishes from 7/20" to 6/20" at the broad strake just above the garboard, then to 5/20" for the remainder of the plating until it increases again to 7/20" with the sheerstrakes. Thus, *Mariette*'s shell thickness ranged from just under 3/8" (7/20") to 1/4" (5/20").

In Italy, *Mariette*'s original shell plating from the waterline down to the top edge of the garboards was found to have thinned through rusting and had to be cut away and renewed. Since riveting skills all-but vanished with the introduction of arc welding around the time of the Second World War, the new plates were butt-welded together edge-to-edge and fillet-welded to the frames. It's not as pretty to look at as the original, but it is functional and hidden from view except when she's out of the water. Thankfully, the topsides remain riveted and intact. **–MB**



Building the structural keel. The 1/2"-thick keel plate is in a single 34'1" length, and 4 x 4 x 1/2" angles are riveted to it, connecting it to the shell plating. This plan shows the locations of the screws that connect the lower portion of the garboard to the lead ballast keel. The ballast keel hanger bolts are also shown. *Mariette* and her sisters, *Vagrant* and *Obonkara*, were built to Lloyd's Rules for Steel Construction and were given a 100A rating. This kept insurance rates low and assured owners that their yachts were built to widely accepted standards.