Alice and Her Sister Ship *Carib II*

The Story of Their Design and Details of Construction. Illustrated by a Few Experiences Around Florida, the Bahamas and Havana

By Henry Howard

I HAVE recently completed a cruise that it has long been my ambition to make — following the sun and the warm weather in the autumn from New York to Miami by the inside route and then knocking around the Bahama keys and Cuba for a month or two.

As I am, first of all, a deep-water man and unwilling to invest in a boat that would be unsuitable for offshore

Alice, a centerboarder, designed to go off-shore with safety and comfort.

work and am without sufficient funds to justify owning two boats, this inside route had seemed closed to me until, during a visit to Miami and Coconut Grove in 1920, I had the good fortune to meet Commodore Ralph Middleton Munroe, who convinced me that it was entirely possible and, in fact, easy to build a boat about 50 feet overall with a draft of only 3½ to 4 feet that was not only suitable for following the inside route but would be the superior of most of our deep draft yachts for seaworthiness in offshore work.

This statement was so different from my preconceived ideas that I was staggered by the possibilities it opened up. However, before I was fully convinced of its accuracy it required a lot of study and investigation, as my experience had been almost wholly in deep-draft boats.

Perhaps a short review of my previous boats would be of interest as showing the background from which I was looking.

At the age of 14 I bought in Boston an old, leaky 16-foot open catboat drawing about 18 inches, in which, nevertheless, I went around Cape Cod with the assistance of an able seaman I hired in a Boston shipping office for $5.00 to go with me in lieu of any friends who were willing to take the risk. This cruise is a story in itself and, as might be expected, was full of incidents.

When I was 17 I sold the catboat and bought an old and rather leaky 22-foot keel sloop, in which I went around Cape Cod twice with my friends as crew — both trips also being replete with incidents. With this boat I also made several cruises on the Maine Coast as far as Camden, and finally sold her when I was 21, after I had bought my first really good boat, the *Elf*, designed and built by George Lawley and only two years old when I got her. She was 28′ 6″ w.l., 37 ft. o.a., 11 ft. beam and 7 ft. draft with flush deck and ballast of lead all outside. In this boat, which I owned for seven years, I made many long outside runs, including one from Marblehead to Halifax in 68 hours. She was splendidly built and an excellent sea boat.

This boat I sold with reluctance when I got married, on account of lack of funds to support both a family and a boat, and for a number of years I had to content myself with sailing with my friends or chartering for a short cruise.

The boats which I chartered, and in all of which I was my own captain were: the *Barbara*, 46 foot w.l. sloop, designed by William Fife, draft originally 11′ 6″, reduced to 10 ft. and rig changed to schooner, and the *Nebula*, 38 ft. w.l. cutter, about 8′ 6″ draft.

After a number of years of this sort of thing I bought, in 1913, the *Lehua*, a Stamford one-design schooner, when she was 4 months old, and renamed her *Alice*. She was 40 ft. w.l., 62 ft. o.a., 7 ft. draft, 11 ft. beam. I kept her for seven years, cruising outside between Eastport, Maine, and around Cape Hatteras to Beaufort, N. C. She was an excellent boat and could go to windward in fine style in very rough weather if properly handled, but was by no means ideal for offshore work on account of too long ends, too light construction and deeply placed outside ballast which made her very quick in her movements.

It will be noticed that all of the above boats were driven by sail alone, and all of deep draft except the original open catboat.

Regarding the all-important question of the seaworthiness of light draft boats we should remember:

1. The boats of the old Norsemen.
2. The vessels of Columbus.

With helm lashed for sailing close hauled.

3. The Chinese junks, a notable example of which has recently reached our waters from China.
4. The old American centerboard boats, for which we were once famous, but the building of which is now largely a lost art.
5. The remarkable seaworthiness of Chesapeake Bay Bugeyes, and numerous other examples.

Perhaps one of the most famous and striking examples was that of the *Whim* and *Cythera*.

In March, 1888, two yachts sailed from New York bound south. One was the Cary Smith-designed centerboard schooner *Whim*, owned by W. Gould Brokaw. She was 57.6 ft. w.l., 62.9 ft. o.a., 16 ft. beam and 3′ 3″ draft, tonnage 30.65 gross, 29.12 net. The other the staunch English yawl *Cythera*, owned by W. A. W. Stewart. She was 87′ 5″ water line, 100′ 9″ overall, 17′ 6″ beam and 13′ 0″ draft, tonnage 117 gross, 71.47 net.

On March 11th there occurred the still famous New York blizzard, the like of which has not been seen since, which brought everything to a standstill in the city and did untold damage to shipping along the Atlantic Coast and at sea.

Not much concern was felt for the deep-draft *Cythera*, but the *Whim* was given up for lost by many as it was not believed that so light a draft boat could weather a storm that was in reality a hurricane. However, in due time the *Whim* turned up with hull, spars and sails intact, having ridden out the gale under bare poles, without solid water on deck, although naturally with much discomfort to those on board. The *Cythera* joined the ranks of missing ships and was never heard from again. Commodore Munroe's theory of the conditions that brought about the loss of the *Cythera* and the safety of the *Whim* is simple and logical. Assume that both boats were hove to and a breaking wave was approaching, the *Whim* with only 3′ 3″ draft would be swept to leeward for the moment at a velocity approaching that of the rapidly approaching crest of the sea, thus giving her time to climb on top of it, or at least making the blow she finally receives a comparatively light one. On the other hand the *Cythera* with her deep draft had her keel immersed in water which was relatively stationary as compared with the crest of the wave. This would naturally check her leeward movement, thus resulting in an enormous increase in the force of the blow she would receive from a breaking wave. In a sea like that in the 1888 blizzard the differences in the punishment that must have been received by *Whim* and *Cythera*, assuming they were equally well handled, might easily account for the latter's loss.

A fresh breeze in the Gulf Stream, crossing from Havana to Key West.

This argument carried to its logical conclusion will indicate that without a sea anchor you will ride out a gale more comfortably than with one, the true function of a sea anchor being to prevent a too rapid drift to leeward, especially when short of sea room, and possibly to provide a point directly to windward from which oil may be spread by hauling an oil bag out to the sea anchor. This latter advantage I believe is more theoretical than practicable, as it involves too much gear, which would almost certainly become fouled owing to the occasional rotation of the sea anchor and the consequent twisting of the lines connecting it with the boat.

That these remarks are borne out by experience are indicated by Nutting's experience in the *Typhoon* in the gale after he lost his sea anchor. This for the first time permitted the boat to drift freely with the wind and sea, and immediately resulted in a greatly improved behavior of the boat.

In spite of all the above, the question naturally arises what would have happened to the *Typhoon* when she had her terrific knockdown in this same gale, if she had been light draft with no outside ballast. I put this question up to the commodore and sent him a copy of *The Track of the "Typhoon"* to read before answering. His reply was that a properly designed and handled light draft boat would never have gotten the knockdown but would have been on top of the wave and moving with it.

A few years ago I discussed this same question with Levi Jackson, a well-known and expert fisherman of Edgartown, who does much of his fishing on Georges Bank. Jackson said he did not use a sea anchor in a gale but would lash together and throw overboard some of his gear and then ride to it with two lines, the main hawser from forward as with an ordinary anchor, and a second line leading to the after bitt, this latter line hauled in enough to make the boat lie at an angle to the wind and oncoming sea. He said that without this second line, the boat heading directly into the wind and sea would frequently be swept from stem to stern by breaking seas, while when lying at an angle to the wind and sea the boat would ride much easier and take much less water on board.

Alice, showing midship section.

In discussing this same question a few days ago with Admiral Sims he said that the modern torpedo destroyer would ride out a heavy gale most comfortably with engines stopped and drifting to leeward in the position she naturally takes, which is with the wind and sea on her quarter. Her stationary propellers act as a drag. Sims said that in a heavy gale any attempt to keep one of these vessels weather-bowing the sea by means of slowly running her engine, would result in great discomfort and in being continually swept by the seas. On the other hand, as soon as the engines were stopped and the natural drift to leeward established, no more seas came aboard, and the vessel rode out the gale in safety and in comparative comfort.

I have mentioned all the above facts because I think they make it clear why the correctly designed light draft vessel is so comfortable at sea in rough weather.

I have repeatedly spoken of properly designed light-draft boats. This is a necessary qualification, because many of the modern light draft yachts have been built for enclosed shallow water and are of light construction

totally unsuited for outside work. A recent and notable example of a properly designed boat is the *Windjammer*, with her interesting cruise from New Jersey to the West Indies and return last winter.

In talking to Irving Cox on this subject I found him much interested in Commodore Munroe and his work and he said that with Cary Smith dead, Munroe was, perhaps, of all living designers, the one possessed of the greatest amount of actual experience and data in the building of light draft seaworthy sailing craft.

A recent convert to the light draft boat for ocean cruising is Connor O'Brien who has just cruised in a small boat from England to Australia and home again, around the world. His boat, the ketch *Saoirse*, is 38 ft. l.w.l. and 12 ft. beam. O'Brien wrote in the English *Yachting Monthly* for June, 1925, criticizing the design of a deep-draft cruiser given in a previous issue of that journal. He says in part:

"I find my 7 ft. draught a nuisance, and my itinerary depends considerably on docking facilities. . . . On the question of ballast, I say the less of it the better. Generally, I consider it more important to keep heavy water off my deck when running than to trim my ship to drive through a head sea — an uncomfortable and unprofitable occupation. A lightly ballasted wooden vessel is a revelation in the Roaring Forties to people who think of running down their easting as a continuous submarine stunt, as it is in a deep loaded steel ship. But I do not know that we should be so dry or comfortable with six tons of lead on our keel as with the same amount of scrap-iron very loosely stowed inside. Moreover, I should be very much afraid of straining a vessel with outside ballast; and I am sure she would ruin me in spars and gear."

My talk with the commodore in 1921, combined with my subsequent study of the question, convinced me that my "dream ship" was a possibility, and the following were the general specifications which I wanted her to fulfill:

1. Seaworthy enough to ride out with safety any storm at sea, with good handling.
2. Large enough for my wife, myself and two guests to live on comfortably for long periods of time.
3. Not exceeding 4 ft. draft fully loaded.
4. Moderate auxiliary power without gasolene.
5. No gasolene on board.
6. Easily handled under sail by one able seaman and myself, even in heavy weather.
7. Ability to carry enough stores and supplies of all kinds to make me independent of any base of supplies for considerable periods (at least two months).

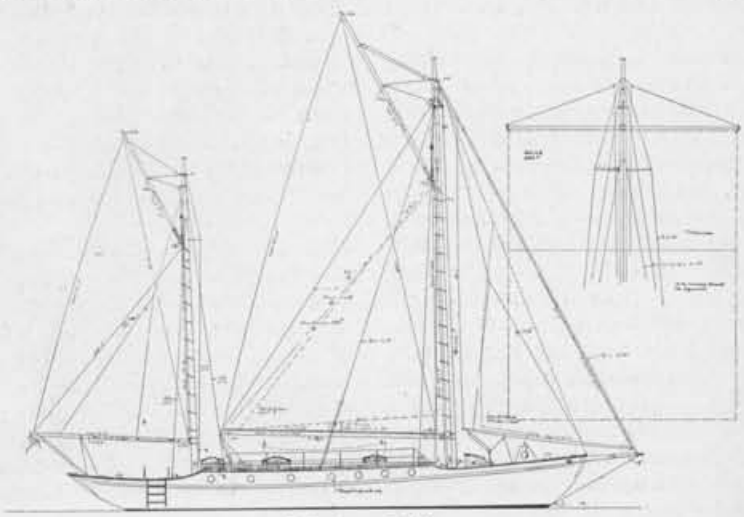
Commodore Munroe thought that a boat about 42 ft. water line, 52 ft. overall, 13 ft. 7 in. extreme beam and 3 ft. 6 in. to 4 ft. draft would be about right and recommended following the lines of the *Carib*, a boat which he had built for the late Mr. Haigh, an Englishman who formerly owned Cat Cay in the Bahamas. Mr. Haigh had used the *Carib* for cruising around the West Indies and Caribbean Sea, and both this and her subsequent career in the north as a fishing boat used for offshore winter fishing between Jersey and Hatteras had proved her to have been unusually seaworthy.

This sounded pretty good to me so I asked the Commodore to let me have the lines and as many drawings as he could get together. As Munroe had given up active yacht designing for a number of years he explained that it would be impossible for him to make complete plans. I, therefore, engaged John Alden to work up the cabin plan in accordance with my sketches and a detailed framing plan in accordance with Munroe's specifications. Mr. Alden's assistance was a great help and he worked out several structural details that were greatly appreciated by both Commodore Munroe and me, but made no changes in the Commodore's lines or sail plan.

The Design

The basic features of the design are:

1. A midship section which has considerable deadrise for a light draft C.B. boat.
2. Moderate beam which makes her easy to drive with a small sail plan.
3. Raised deck amidship which gives excellent room below, increases the structural strength and adds greatly to her stability and righting moment in case of a knockdown.
4. Comparatively short overhangs with a good sheer and a bow that will never pound under any conditions.

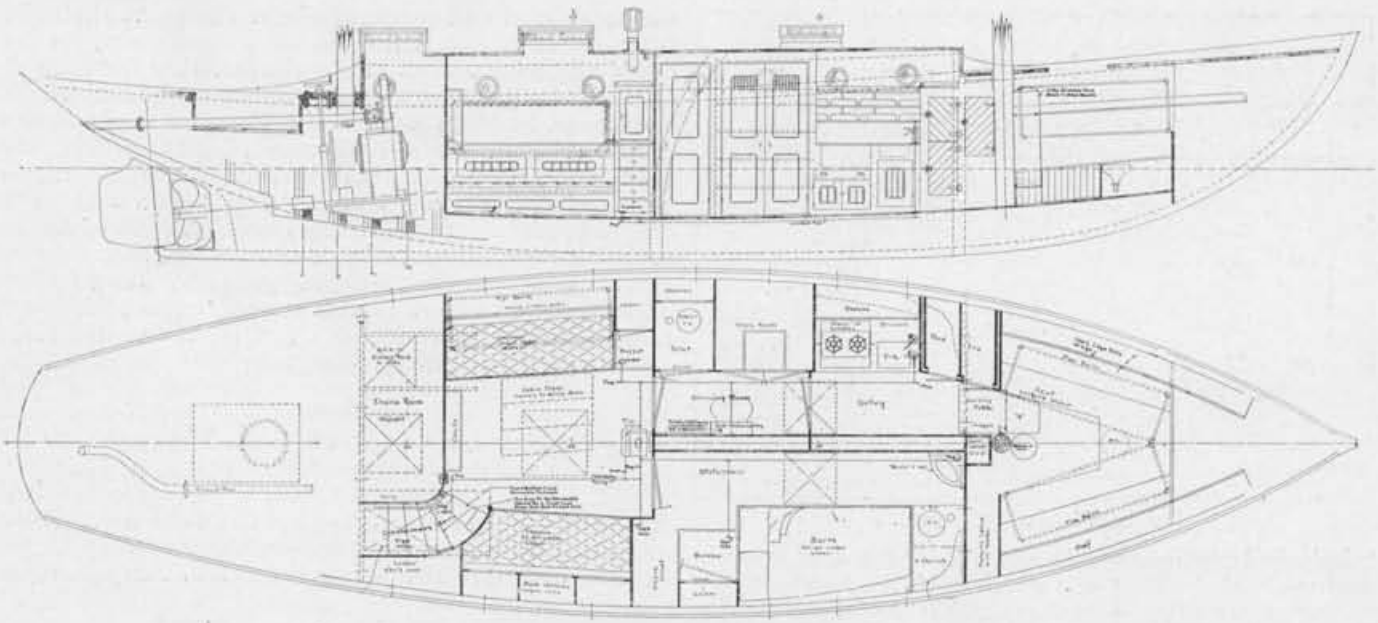


Sail plan of *Alice*.

The above points have combined to make a hull that has proved extraordinarily easy in a seaway.

Last March I drove her across the Gulf Stream from Havana to Key West in the heaviest norther of the winter, under mainsail and engine, making the distance, about 95 nautical miles, from Morro Castle to the wharf at Key West, in 21 hours. The run was almost dead to windward and anyone familiar with the Straits of Florida in a winter norther will agree that it can kick up a rather nasty sea. The boat behaved wonderfully, however — did not pound at all and we steered her with a tiller with the greatest ease. The most surprising thing was the way she would get on top of the very steep head seas, into which she was being driven by both engine and all the sail she could carry to advantage. No solid water came over the bow or on deck and a number of times, both day and night, I stood forward by the mainmast to better enjoy her performance.

After having decided on the type of hull, the next all-important question was the rig. I had been much pleased with the schooner rig on my Stamford schooner *Alice*, designed by Cox & Stevens. In this rig the main boom only extended two feet beyond the taffrail, and with no bowsprit everything was inboard and easy to get at. The requisite sail area was obtained by increasing the height of the rig, which placed the sail area where it would be most effective. I had also been much impressed by Claud Worth's arguments in favor of a sloop rig with mast stepped pretty well aft and the main boom extending at the most, perhaps two feet over the taffrail, although I notice that he has sold *Tern III* and his latest boat is a yawl!



Accommodation plan and inboard profile.

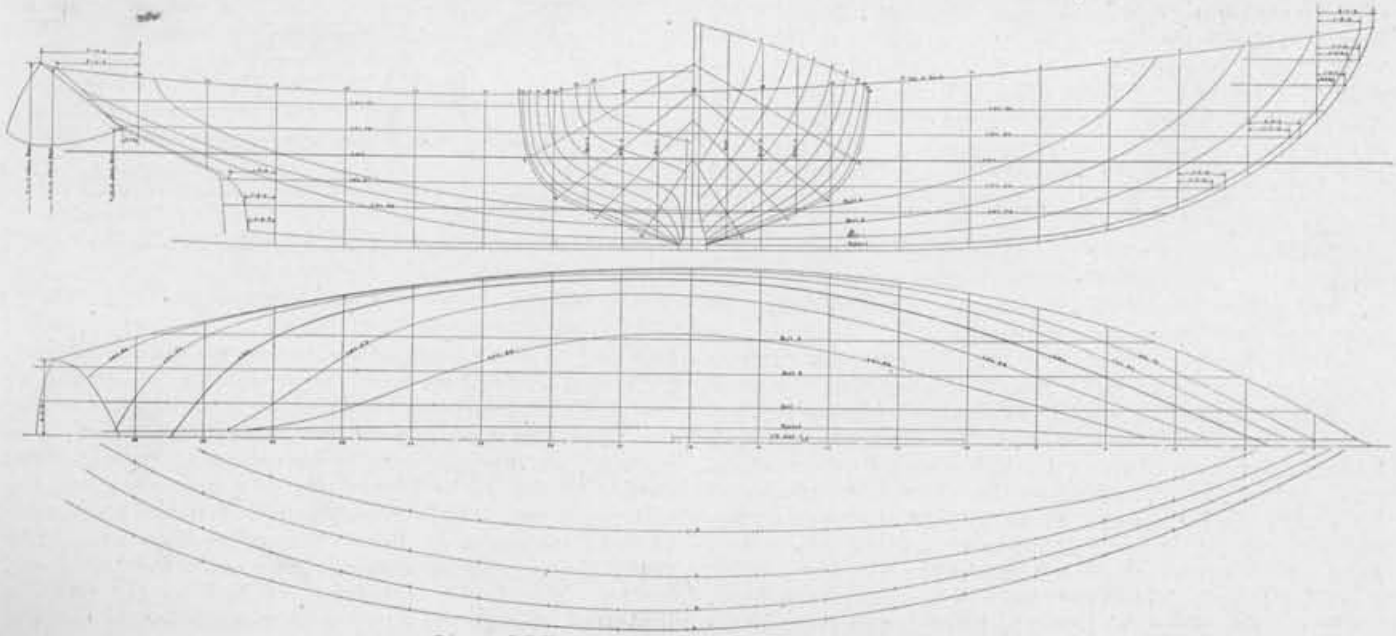
Everything in the design of a boat is a compromise of one factor against another and the greatest skill is shown in the development of the best all-around design for the purposes for which the boat is desired.

In my case a great deal depended on comfortable and livable arrangements below deck, as the boat was intended to be used as a home for long periods as well as for offshore cruises. The trouble with both the schooner and sloop rig was that they both necessitated moving the centerboard considerably farther aft, where it would have seriously interfered with the interior arrangements I desired. This left the choice between the ketch and yawl rig; naturally I chose the ketch.

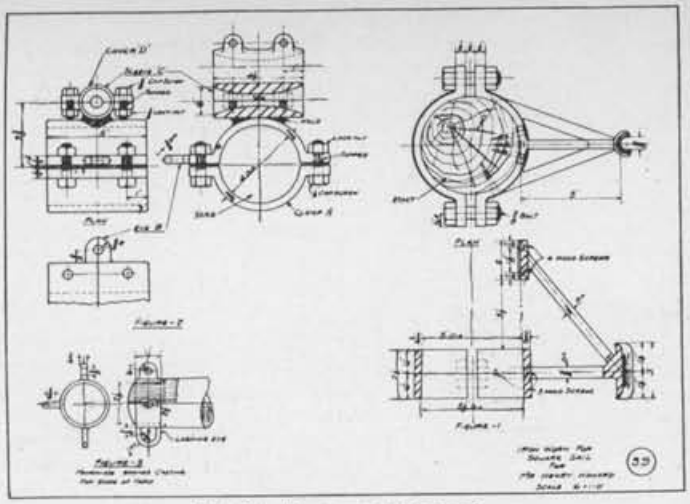
The suitability of the ketch rig for deep water cruising has been so much discussed that I have little to add. Almost any rig can be trimmed to steer automatically with tiller lashed on any course from wind abeam to close hauled. In a well balanced schooner, by the wind, the head sails and foresail are flattened down, the mainsail trimmed pretty wide and the tiller lashed amidships. When she begins to pay off the leach of the mainsail fills and causes her to luff, but with the head sail flat and tiller amidship she will not come about and in a few minutes will settle down to a steady course following naturally any changes in the direction of the wind and making exceedingly good progress to windward although, of course, not as good as if she were steered by hand with mainsail flattened down. On my Stamford schooner *Alice* we habitually did this at meal times if we had sea room, and then all hands would go below and let her take care of herself for an hour or two while we ate a good meal and had a quiet smoke out of the wind.

The ketch rig does this same thing more efficiently because the head sails and mainsail may be flattened down and only the mizzen eased off.

For running dead before a heavy wind and sea any fore and aft rig is, of course, most uncomfortable, and there is always the danger of a jibe with, perhaps, disastrous consequences. No one who has not tried it can appreciate the comfort of a good squaresail under such circumstances. The ketch rig is especially well adapted for this sail. The tall mainmast fairly well forward enables a



Lines of *Alice*, showing seaworthiness on light draft.



Details of iron work for yard.

relatively large squaresail to be set, and this is in such position that the boat will steer herself dead to leeward.

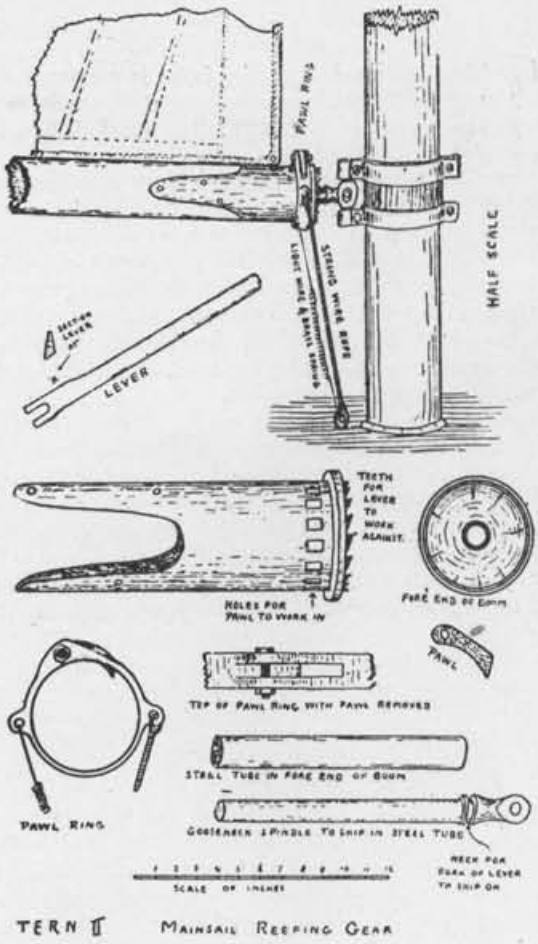
The method of rigging a squaresail as carried out by the Geo. Lawley & Sons Corporation is simple and hard to improve upon, where such sail is to be used as auxiliary to the usual fore and aft sails. So far as I know no description has ever been given of these details before. My experience is with a squaresail installed by Lawley on my schooner *Alice* and used on my cruise from Boston around Hatteras to Beaufort and return. It was rigged on a jack stay attached to the foremast. The yard was about 24 ft. long and when hoisted way up the foot of the sail cleared the deck by about 5 ft. When hoisted, the yard was held rigidly in position, first by the halliard which was hooked into the iron work, by means of which the yard was attached to the jackstay. (This iron work is an important detail which will be described later.) The halliard consisted of a double block at the masthead and a single tail block with hook for attaching to yard iron work. The yard is also provided with two lifts, each consisting of a single part of 12-thread manila made fast by shackling with a ¼-inch shackle to iron work at the extreme ends of the yard, and from there each leading through a small block, or even a thimble, at the masthead and thence down to the deck. These lifts are partly for the purpose of holding the yard steady and partly to resist the buckling of the yard by the downward pull of the sail. In addition, there are the braces, one of which is shackled to the iron work at each end of the yard, and each one of which consists of a pennant of light wire rope with a large solid round thimble spliced in at the lower end through which is rove the manila hauling part, one part of this manila rope being permanently attached to some suitable place on the rail, and the other, or hauling part, to a suitably located cleat.

The sheets also have a standing part and a hauling part, the standing part being suitably fastened to some permanent point on the vessel and then rove through the cringle in the clew of the squaresail.

All the above may appear to be unnecessarily complicated, but it is essential in rough weather that the yard be rigidly secured in position, otherwise serious chafing will result. It will be seen that the lifts prevent any horizontal motion of the yard which would otherwise be produced by rolling, and that when both the weather and lee braces are set up taut so as to hold the yard at the desired angle, this yard becomes almost as steady and rigid as a part of the mast, which results in a most remarkable stabilizing effect on the motion of the boat.

On the schooner *Alice* we carried this sail from Five-Fathom Bank lightship to Block Island in a breeze from the southward and eastward about one point abaft the beam. The strength of the wind was about 6 and the sea quite rough for a boat of our size, causing the gaffs to lurch out badly to leeward and the booms to lift as each wave passed under us. As soon as the squaresail was set, it felt as if we had moved onto a boat of double the tonnage and the extent of the rolling was reduced to perhaps 25 per cent of what it had been before. This was due to the fact that the rigidly braced yard checked the rolling of the boat to a much greater extent than the fore and aft sails with their swinging gaffs and lifting booms. To take this squaresail in, it is merely necessary to lower away on the halliard and lifts, furl the sail on the yard, disconnect it from the jackstay, slip into its sail cover, which consists of two long narrow bags, one slipped over each end of the yard and lapping each other in the center. The yard is then lashed to the deck. The iron work for fitting the jackstay, etc., is as follows:

The jackstay should be of extra flexible galvanized wire rope of best quality such as is used for running rigging. This is so that it will not break, owing to the bending caused by the thrust of the yard. The jackstay is



TERN II Mainsail Reefing Gear

fastened to the masthead by an eye spliced at the end. This then leads down over a strut which is placed two or three feet above the point to which it is desired to hoist the yard. This strut is braced in two directions (see Figure 1, Drawing No. 39) to enable it to withstand strains to which it will be subject in a heavy sea with the squaresail set. It will be noticed that if the strut were placed close to the yard at its hoisted position it would be required to withstand the end thrust of the yard produced by heavy rolling of the boat while, if in the position indicated, part of the strain will be taken by the topping

(*Continued on page 82*)

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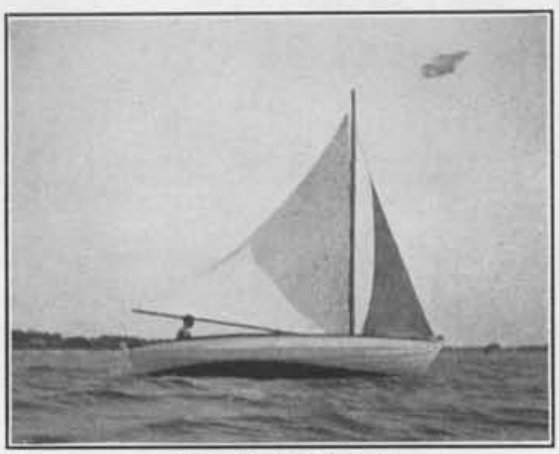

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Alice and Her Sister Ship *Carib II*

(*Continued from page 58*)

lifts. The jackstay is made fast at its lower end to an eye bolt passing through the mast partners just forward of the mast wedges. Between the jackstay and the eye bolt, however, there should be a turnbuckle so that the stay may be always set up good and taut.

For the detail of the iron work on the yard, refer to Figure 2, Drawing No. 36. The clamp A is permanently attached to the yard at the center. The eye, B, is used for attaching the halliard block, and the split sleeve, C, provides the attachment to the jackstay. To disconnect this split sleeve, it is only necessary to remove four bolts which allows the cover, D, to be removed. The length of this sleeve and the flare at each end of the sleeve is extremely important. This prevents any sharp bend in the jackstay caused by the thrust of the yard even should the jackstay be allowed to get too slack.

The ordinary method of attaching the yard to the jackstay, as I have been told by one of the designers of modern ocean cruisers, is by means of an ordinary shackle and I have been informed that at least in one case this caused the jackstay to break owing to the continual sharp bending to which it was subjected.

Construction

There is a saying that you must build two or three boats before you get what you really want. As I am an engineer by profession and therefore used to making and reading plans, I decided to see if I could not make my changes on paper before starting to build and, therefore, made detailed drawings of practically every part of the boat above and below deck. This study took about a year of my spare time and was incidentally lots of fun and, of course, developed many slight changes in interior arrangements and finally developed into 30 drawings in addition to the six made by John Alden.

As the drawings progressed I built up my specifications, which included 149 separate items and 24 typewritten pages. These specifications were most carefully prepared in consultation with Munroe, John Alden, S. S. Crocker, the builders, A. C. Brown & Sons, and the Bolinders Company, builders of the engine. They were incidentally the most complete the builders had ever seen and, combined with the drawings, enabled me to make contracts covering the complete boat ready for sea. They also resulted in cutting down my bill for "extras" to less than 3 per cent of the estimated cost of the boat and kept the total of all bills for the completed boat, footed up after I started my cruise, to just under 7 per cent more than my original estimate. And last, but not least, all argument as to what each contractor was to furnish under his contract was avoided.

The specifications are too voluminous to be given here in full but the following items giving the principal details of the hull construction will be of interest:

Dimensions: Length overall, 51′ 10″; length water line, 43′ 11″; beam (extreme), 13′ 7″; beam at water line, 12′ 11″; draft, 4′ 0″; ratio of length to beam at water line 3 1/3 to 1.

Keel: White oak, 4″ deep, sided as per line plan. Bottom of keel, stem and deadwood, and 2″ up on each side, to be sheathed with 16-gauge copper, fastened with 7/8″ cast brass nails 3″ apart on flat surface and 1″ apart on edge.

Stem: Locust sided 6″. Knight heads of locust.

Transom: Longleaf yellow pine, 1¾″ thick. Planking bevelled to it. Oak fashion pieces to receive plank and fastenings.

Frames: White oak below l.w.l., locust above — double sawn Moulded 2 3/8″ at heads and 3¼″ at heels. Sided 1 7/8″. Well fastened together with 3/8″ dia. galvanized bolts. Frames spaced 16″ on centers.

Floors: Locust or white oak, sided 2–½″, except those under engine which will be sided 4″. To be moulded as shown. Floors as far as possible to be through-bolted with one ½″ dia. Tobin bronze bolt in the ends of the yacht, and two ½″ Tobin bronze bolts where possible amidships. Just forward of the engine bulkhead there is to be worked

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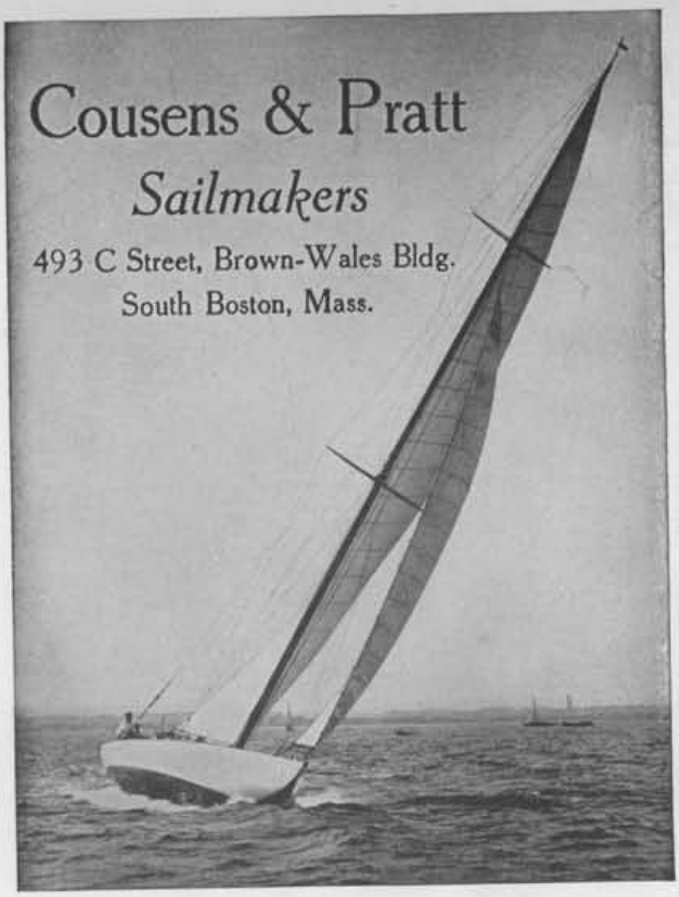
Size of Picture, 17" x 12", Size of Paper, 25½" x 20½".



NATKA

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a cross floor timber up to height of cabin floor, making practically a water tight compartment between the engine and the main cabin under floor.

Overhang Frames: 2" yellow pine, as shown, riveted to deadwood with 3/8" diameter galvanized iron and extending 3 frames forward on deadwood, well spiked to it.

Deck Beams: To be of yellow pine, sizes as shown on construction plan.

Deadwood: Yellow pine or white oak.

Shaft Log: Locust or white oak. All to conform to the requirements for a Bolinder 16 H.P. single-cylinder starboard engine, blue print of which is submitted herewith.

Bedpieces and Keelsons Combined: White oak, 4" x 14", extending fore and aft as far as possible, rabbetted through keel, showing 1 3/8" on under side, notched down over frames and floors, dovetailed for frames in wake of centerboard. Through bolted to keel with ½" Tobin bronze at every frame and between, clinched ringed and plugged on under side. Lip of rabbet spiked to keel with composition. Bedpieces and headblocks before putting in place to be sheathed with 16-gauge copper, fastened with 7/8" cast brass nails not over 3" apart on flat surfaces and 1" apart on edges. Fore and aft center keelson fitted in between bed piece keelsons and well bolted to them with galvanized 9/16 iron.

Head Blocks: Locust, 4½" x 3 5/8", fastened through keel and bedpieces with 9/16" diameter Tobin bronze, clinch ringed. To be sheathed with 16-gauge copper, fastened with 7/8" cast brass nails not over 3" apart on flat surfaces and 1" apart on edges.

Centerboard Casing: Yellow pine finished 1¾" x 8", fastened with 5/16" copper or bronze rivets at ends, and edge bolted to each other and to bedpieces not more than 16" apart, with ½" copper or bronze.

Centerboard: Lower plank white oak, 3" x 10"; balance yellow pine fastened with ¾" galvanized iron bolts, 12" apart and staggered. Brass shoe as shown and hung on 1½" bronze bolt, nut and washer each end, with brass bushing in the board. Fastenings for shoe to be cast brass. A 5/8" hole to be bored through casing and board 2" below its top edge well aft for pinning board when renewing pennant, also a 1½" hole 2" below top near forward end for use in taking center board in or out of boat.

Sheer Clamp: Yellow pine, 2¾" x 8", tapered to 2¼" x 6" at ends, run full length of boat, scarphed at after quarters. Through fastened as customary with 3/8" dia, galvanized rivets well plugged in wales.

Raised Deck Shelf: Yellow pine, as shown, fastened with 3/8" diameter galvanized rivets. To be kneed off at ends, as shown.

Ceiling: Yellow pine, 7/8" matched from floor up to sheer clamp; white pine or spruce to raised deck shelf. Air streaks left under both clamps and below water tanks under transoms and stateroom berth.

Planking: Yellow pine, 1½" finished thickness, except rail and sides of house to be finished 1¼" thick. Wale strakes 5" wide. Garboard of oak 1¾" finished thickness; edge bolted to keel between every frame with 9/16" diameter Tobin bronze forward and aft of C.B. and at Centerboard where it is possible to pass other fastenings. Butts copper riveted. Rest of fastenings to be ¼" x 3¼" galvanized hatch nails, square fastened. Butts on adjacent frames to have at least four strakes between them. Butts in adjacent strakes to have at least three bays between them. All fastenings to be bunged with same material as planking. To have three fastenings in every frame in the wale strakes, and in wider strakes to be square fastened according to width of plank. At the bow in addition to the usual fastenings of the hood ends, an inch or two further aft, a 3/8" copper bolt is to be put through the middle of each plank, through the apron, and through the corresponding plank on the other side, clinch ringed on the surface of the planking.

Ends of House: Forward and after ends of house to be yellow pine, finished 1¾" thick. To be edgebolted with ½" galvanized bolts, at least every 20", to and through deck beams underneath. Bolts to be securely riveted both ends over galvanized washers.

(*To be continued*)

Rainbow IV Smashes All Records for 24 Hours

(*Continued from page 51*)

On the first days run, October 2nd, a clogged gasoline line caused a delay of almost half an hour, holding *Rainbow* down to an average of 49.93 miles an hour. On the second day everything went on without a hitch, so that 594.88 miles were covered in 11 hrs., 27 min., 1 sec., bringing up the average speen to 50.78 miles for the 24 hours.

Mr. Greening was relieved of driving at intervals by Herbert Ditchburn, who built the record smasher, Dave Reid and C. F. Chapman. As the run was held under the auspices and with the sanction of the American Power Boat Association, tee record is official.

The necessary stops for fueling are included in the running time, which makes *Rainbow's* record all the more impressive, and one that looks as though it would stand until Mr. Greening himself went out to shatter it.