

FIFTY YEARS OF INTERNATIONAL YACHT RACING.

II. SLOOP TO CUTTER-SLOOP.

In the first, or schooner, period of the cup contests, extending from 1851 to 1881, there was no such clearly defined struggle of type against type as was witnessed in the later races of the second period, when the English yachtsmen received some consolation for their successive defeats in knowing that their American competitors, in the struggle to retain the "America" cup, have been forced to abandon the time-honored centerboard and adopt the lead-ballasted keel.

Although the shifting centerboard in the sloop, and the lead-ballasted keel in the cutter, constituted the radical difference between the two types as they existed in the seventies, they were by no means all the difference; for it is a fact that the rig and sail-plan of the two types showed as great variation as their models. This will be evident from a comparison of the two diagrams herewith presented.

RIG.—The sloop rig was distinguished by great length of mainmast and a relatively short topmast. The mainsail had a lofty hoist, the gaff was peaked rather low, and the sail was laced to the boom. There was a single headsail, which was also laced at the foot to a boom. The bowsprit was a permanent fixture in the bows and it had a pronounced upward rake.

The sloop sail plan may be described as being lofty and narrow. The cutter rig, on the other hand, was relatively low and broad. The mainmast was short and the topmast long. The mainsail had a short hoist, but the long gaff was peaked high, giving a better set to the canvas for windward work. The mainsail was hauled out taut to the end of the boom, but was not laced to the boom as in the sloop. The area forward of the mast was divided between two sails, a jib and foresail, neither of which carried a boom. The bowsprit could be reefed inboard in heavy weather.

MODEL.—The sloop was distinguished by shoal draught and great beam, as distinguished from the cutter of that day, which, under the influence of the Thames rule of measurement for time allowance, by which a penalty was placed upon beam but none upon draught, had grown to be deep and extremely narrow. This extreme narrowness, it should be said, was purely the result of the Thames rule, for the earlier English cutters were as beamy as the American sloops, as may be seen in the case of the cutter "Arrow," built in 1832, which on a length of 61 feet 9½ inches had a beam of 18½ feet, and in the "Mosquito," built in 1848, which, with a waterline length of 59 feet 2 inches, had a beam of 15 feet 3 inches. The Thames rule, adopted by the Yacht Racing Association in 1879, produced a "plank on edge" type of cutter, and the ratio of beam to length decreased until in the "Tara" the beam was only one-sixth the length. The Thames rule continued in force until after the "Genesta" and "Galatea" had raced for the "America" cup. As soon as it was replaced by a rule in which the penalty on beam was removed, we see a return to the more reasonable proportion of an earlier day, the "Thistle" (see accompanying diagram) having a beam of 20 feet on a waterline length of 86½ feet.

The sloop depended for its stability upon breadth of beam, the cutter upon outside lead ballast, bolted to the bottom of the keel. The sloop had great initial stability; but after she passed a certain angle of heel, the margin of stability rapidly decreased, until a vanishing point was reached, beyond which capsize was inevitable. The keel cutter had small initial stability, but as she heeled the righting moment of the lead keel increased, until it was at a maximum, when she ex-

perienced a "knock-down." The displacement of the sloop was relatively small, that of the cutter relatively large. The sloop, by virtue of her initial stability, could carry an excessive sail spread, that of the cutter was relatively small. The one was an ideal light-weather boat, the other was at her best in a strong blow.

FIFTH CHALLENGE—"GENESTA."

Early in the year 1885, a challenge for the "America's" cup was sent to the New York Yacht Club through the Royal Yacht Squadron by Sir Richard Sutton, the owner of the crack keel cutter "Genesta," which had defeated with comparative ease the fleetest

memorable contests in the history of the struggle for the cup. The course was twenty miles to leeward and return, and the "Genesta" rounded the outer mark fully an eighth of a mile ahead. On the twenty mile close-hauled thrash to the home mark, the wind freshened and offered a splendid opportunity to test the windward qualities of the two types of vessel. The "Puritan," seeing the probability of an increase in the weight of the wind, took in her topsail and housed her topmast; but the cutter clinging to her topsail and heeling down to the wind until the 70 tons of lead in her keel could get in its steadying effect, began to make a splendid exhibition of cutter work in the favorable cutter weather. The "Puritan" under her snigger canvas, and with the incomparable centerboard to edge her up into the wind, began steadily to overhaul her rival, and sailing up into the weather berth, she came romping home the winner of a magnificent race by the close margin of 1 minute and 38 seconds.

SIXTH CHALLENGE—

"GALATEA."

The following year witnessed races between the cutter "Galatea," owned by Lieut. Henn, and the centerboard sloop "Mayflower," which, like the "Puritan," was owned by General Payne, of Boston. After the defeat of the "Genesta" by the "Puritan," but little apprehension was entertained regarding the

visit of the "Galatea," as she was known to be an inferior vessel to her predecessor. The victory of the "Mayflower" over the "Galatea" was complete, the centerboard sloop beating the keel cutter by 12 minutes and 2 seconds in the first race and in the second race by 29 minutes and 9 seconds.

SEVENTH CHALLENGE—"THISTLE."

The impossibility of winning the "America" cup with a yacht built under the restrictions of the Thames rule of measurement led to the adoption of a new rating rule, based on water length and sail area, which resulted in a return to the broader beam that characterized the earlier English cutters of the "Mischief" and "Arrow" type. The effect was noticeable in the next challenger, the Scottish yacht "Thistle," which with 5 feet more beam than the "Galatea," and about 20 tons less displacement, carried 2,400 square feet more sail. The "Thistle" came to America in 1887, with a record of being by far the fastest cutter in British waters, and the supreme confidence

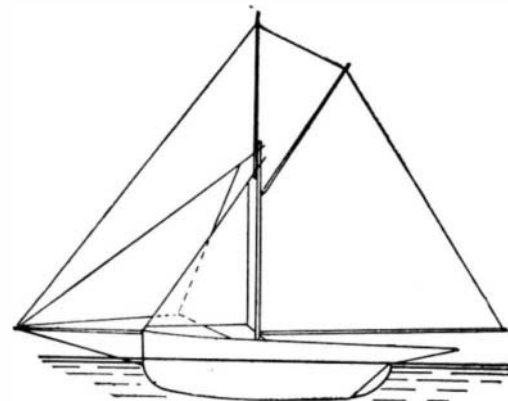
of the syndicate of Clyde yachtsmen who owned her was only equaled by the dismay which the record of her victories carried to the hearts of many American yachtsmen. The eyes of the yachting world turned instinctively to General Payne, and the brilliant designer of "Puritan" and "Mayflower," Mr. Burgess, of Boston. Results proved that their confidence was not misplaced. The "Volunteer," as the new craft was named, showed a further development along the lines upon which Mr. Burgess had worked in the "Puritan" and "Mayflower." The draught had increased to 10 feet, and the outside lead, or rather, in this case, the lead that was run into the deep, hollow keel, amounted to 50 tons. The sail plan of the "Volunteer" was by

far the largest ever spread on a "single sticker," and in the preparatory trial races she had no difficulty in vanquishing the two preceding cup defenders.

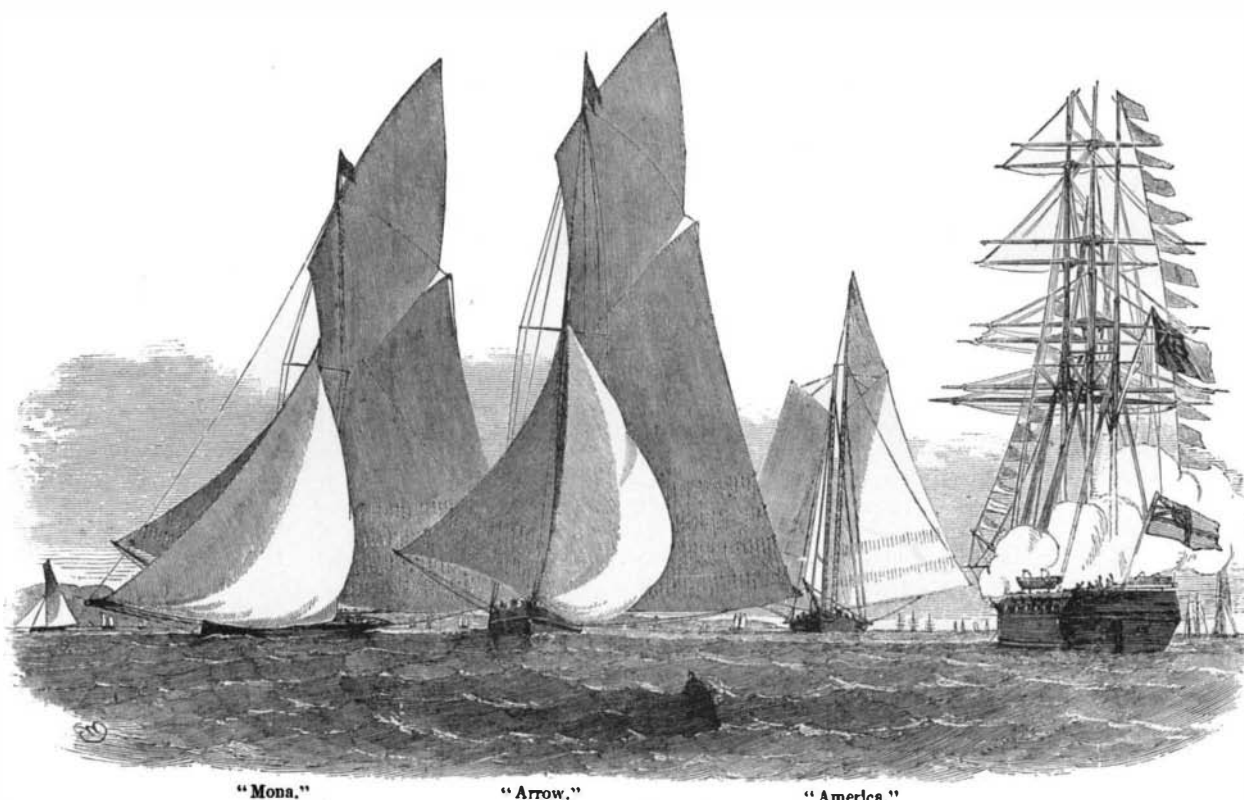
In the days of the "Thistle" and "Volunteer" contest there was the same anxiety as to the fate of the cup which is noticeable in the present "Shamrock" and "Columbia" contest. In the very first race, however, sailed in a light breeze, the "Volunteer" came home with a margin of 19 minutes and 21¾ seconds to her credit. Then, as now, the challenger was reputed to be a perfect glutton for heavy weather, and the



SLOOP RIG.



CUTTER RIG.



"Mona."

"Arrow."

"America."

AMERICA COMPETING AGAINST THE ENGLISH CUTTERS.

(Reproduced from an old print.)

in the attempt to cross her bow when the latter boat had the right of way. The "Puritan" was ruled out on the spot and the race given to the "Genesta" with the privilege of sail over, but Sir Richard Sutton, with characteristic sportsmanship, refused the privilege and set a precedent which may well govern all such unfortunate contingencies in future races. The first race ultimately came off on September 14, 1885, in a light and fluky wind, and the shallow, light displacement boat won easily by 16 minutes and 19 seconds. The second race resulted in one of the most exciting and

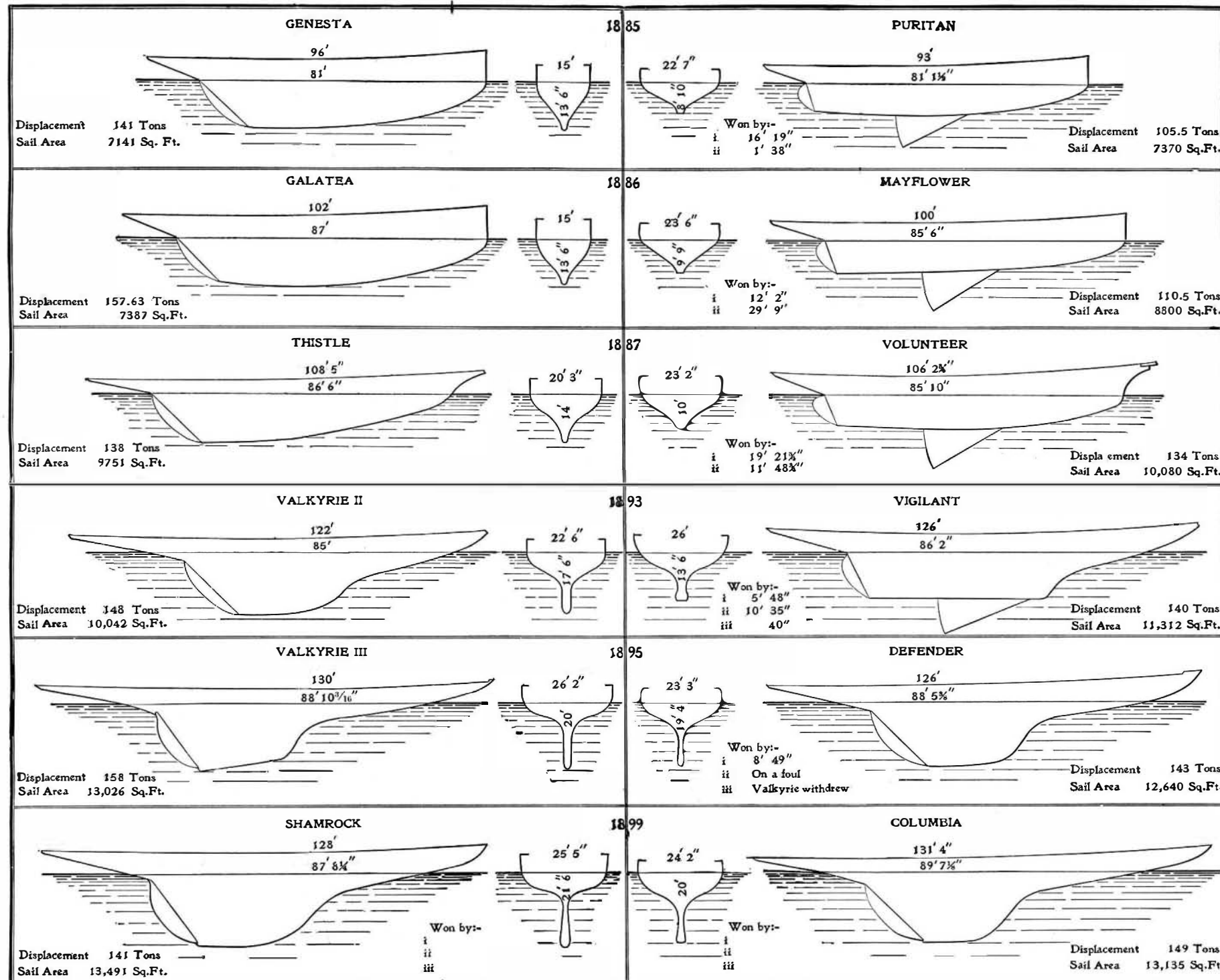
"Thistle" contingent prayed for the strong wind which was necessary to drive the Scottish champion to victory. It came in the second race, which was held over the outside course; and in a thrash of fifteen miles to windward and return it was found that the "Volunteer" liked a piping breeze just a little better than the "Thistle." She lay so much closer to the

wind and footed so much faster than the cutter as to turn the outer mark 14 minutes ahead. She lost somewhat on the run home, but finished in the lead by 11 minutes and 48 3/4 seconds.

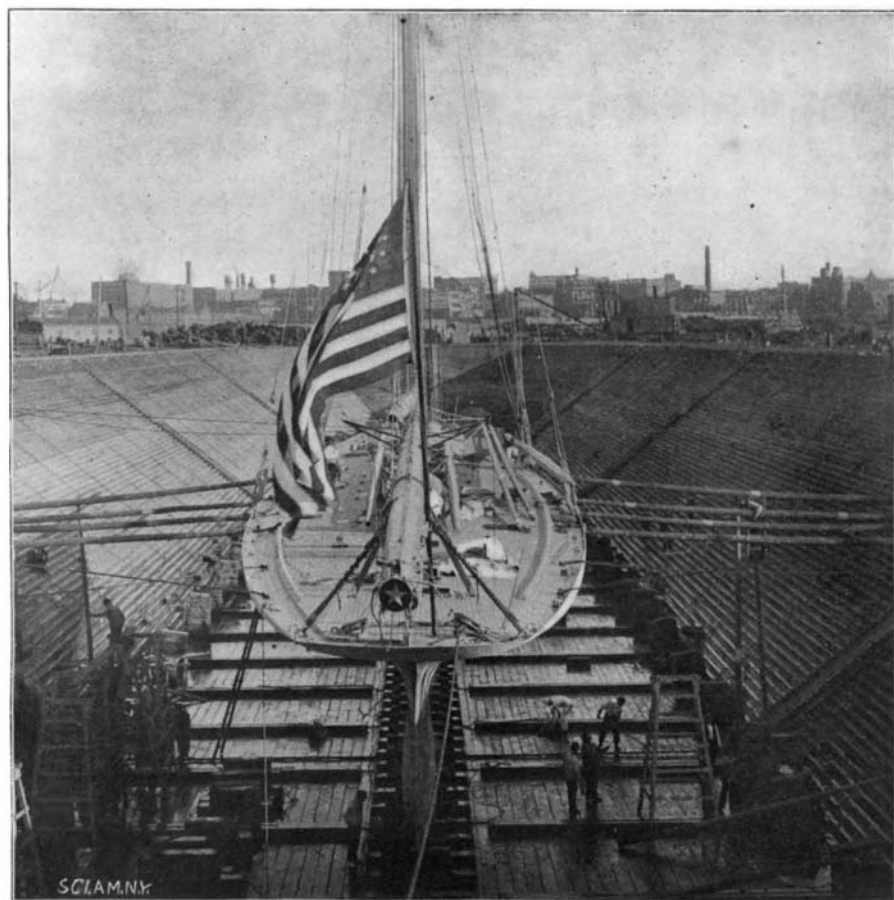
EIGHTH CHALLENGE—"VALKYRIE II."

The "America's" cup was destined to repose in the lockers of the New York Yacht Club undisturbed for

the next six years, or until the year 1893, when "Valkyrie II," owned by Lord Dunraven and designed by G. L. Watson, was sent over the water with the Godspeed of all England behind it. The "Valkyrie II." was a further development in the direction of greater beam and shallower under-water body. In her profile she showed the growing tendency among

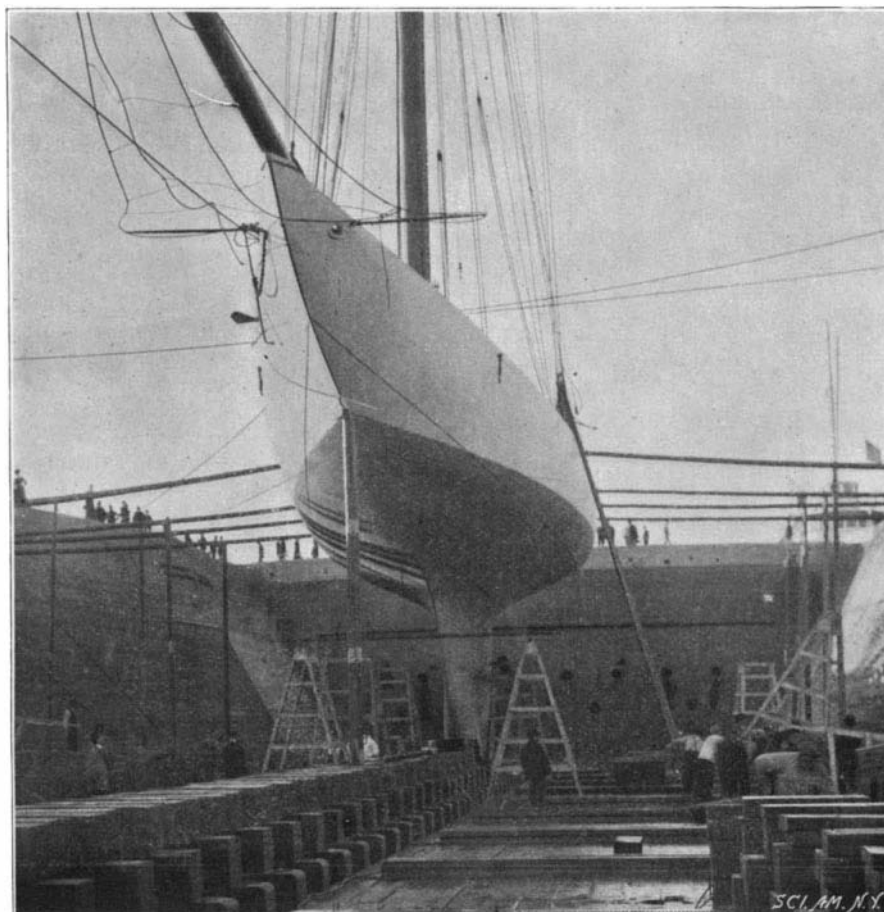


DEVELOPMENT OF THE INTERNATIONAL RACING YACHT.



Copyright, 1899, by E. Muller.

DECK VIEW OF "COLUMBIA," LOOKING FORWARD.



Copyright, 1899, by E. Muller.

BOW VIEW OF "COLUMBIA," SHOWING THE DEEP KEEL AND BULB-SHAPED LEAD.

English designers to reduce the wetted surface of the boat, and hence the "skin friction," by removing all useless "dead-wood." The keel forward was cut away until little was left but the hull proper, and the helm was placed well in toward the center of the boat and given a rake approaching an angle of forty-five degrees. This reduction of the lateral plane resulted in an under-water form which offered a minimum of resistance to turning when the boat was coming about; a quality which stood "Valkyrie II." in good stead when she was maneuvering for the start, or when she had the "Vigilant" placed under her lee in the windward leg of a race. The "Vigilant" was a still further development along the sloop cutter lines. On a water-line length of 86 feet 2 inches, her beam reached the unprecedented width of 26 feet, and the great draught for a sloop of 13 feet 6 inches, which, by the way, was equal to that of any previous challenger. Her total sail spread was 11,312 square feet, or 1,270 square feet more than that of "Valkyrie II." She had 55 tons of lead in her keel in addition to 29 tons of inside ballast. The "Vigilant" served to introduce Mr. Herreshoff as a builder of cup defenders, and she contained many of the original features which had characterized Mr. Herreshoff's past boats, the "Gloriana," "Wasp" and "Navahoe." She had exceptionally long overhangs and measured 126 feet over all. She had lofty topsides and in every way was a marked departure from the model of Mr. Burgess' sloops. Her under-water body was built of Tobin bronze and her topsides of steel plating.

The first race, which should have been to windward and return, was marred by a change of the wind, which veered so as to make the race a reach in both directions, and "Valkyrie II." was beaten 5 minutes and 48 seconds. The second race over a triangular course was sailed in a strong wholesail breeze, and the "Vigilant" drew away steadily from the very start, winning by 10 minutes and 45 seconds. The third race, 15 miles to the windward and return, was sailed in a reefing wind and a rather heavy sea. It proved one of the greatest surprises in the history of yachting, for to the astonishment of the advocates of the centerboard, the deep keel cutter not only began to beat out to windward of the centerboard, but she footed faster through the water, and the crowds on the assembled excursion boats were treated to the unwonted sight of a centerboard boat being beaten on her strongest point of sailing. "Valkyrie II." turned the outer mark with a lead of 1 minute and 55 seconds, and as they started away for home, the wind increasing, it became a question whether the big sails of the "Vigilant" would enable her to overhaul her smaller opponent. She gained rapidly, but would have failed to close the gap and save her time allowance of 1 minute and 33 seconds, had it not been for the extraordinary ill luck of the challenger; for the "Valkyrie's" spinnaker, which had been torn slightly in setting, was blown to shreds in the strong wind, and a second spinnaker met with a like fate. The "Vigilant" passed her and managed to save her time allowance with just 40 seconds to spare.

The year 1893 was certainly a banner year in respect of the great influence which it exerted upon the science and art of yacht designing and construction, particularly with regard to the famous keel and centerboard controversy; for it happened that while Herreshoff and Watson were fighting it out with "Vigilant" and "Valkyrie" at Sandy Hook, there was a battle royal in progress in the English Channel between two other creations of these designers, the "Navahoe" and the "Britannia," which were practically sister boats to those two yachts. The outcome was strongly in favor of the keel cutter. The "Navahoe" was built by Herreshoff for Mr. Royal Phelps Carroll, for the purpose of challenging for several well known English cups, but particularly for the purpose of winning back the Brenton's Reef and Cape May cups, which had been carried across the water by the challenger of 1885, the "Genesta." The results, especially when the "Navahoe" met the "Britannia," proved the superiority of the keel type. When pitted against the "Satanita" and Fife's "Calluna," the "Navahoe" could hold her own, but in windward work against "Britannia" she was hopelessly outclassed. In the contest for the Royal Victoria Yacht Club cup the "Britannia" won the first race, sailed over a 50-mile course, by 16 minutes and 30 seconds. The second race "Britannia" won by 34 minutes and 30 seconds, and the third race by 15 minutes and 8 seconds. In her next race, which was for the recovery of the Brenton's Reef cup, the "Navahoe" was more successful. The course was from the Needles across the English Channel to Cherbourg and back, a distance of 120 knots, and the race was sailed in a strong beam wind and a heavy sea, both boats having their mainsails reefed down. It was a reach from start to finish, and the boats were never separated by more than a few boats' lengths. The "Britannia" finished a few seconds in the lead. The cup committee, however, had moved the stake boat into a more sheltered position within the Needles, and Mr. Carroll having entered a protest, the cup was awarded to the "Navahoe." The race for the Cape May cup was sailed over the

same course, and was won by the "Britannia" with 36 minutes and 23 seconds to spare.

In the following year the "Vigilant" crossed the ocean to avenge her twin sister; but she met with six successive defeats in the first races in which she engaged, at the hands of the same "Britannia." In later races, however, she did better, the final score between the two boats standing at eleven in favor of the "Britannia" against six for the "Vigilant." It was the same remarkable quickness in stays and the same fine windward qualities shown by the other Watson boat, "Valkyrie II.," that carried "Britannia" so frequently to victory against "Navahoe" and "Vigilant." Mr. Herreshoff was aboard the "Vigilant" during the third race against "Valkyrie II." in 1893, and he was aboard her frequently in 1894, when "Britannia" so often had her under her lee, and the lesson of this experience was not likely to be lost in subsequent cup races. It was evident that the day of the centerboard in the "America" cup contests was over, and it was with no surprise that yachtsmen learned in 1895 that the new defender of the "America" cup was to be a keel boat.

NINTH CHALLENGE—"VALKYRIE III."

The next challenger, "Valkyrie III.," was an enlargement of "Valkyrie II.," with greater draught, 20 feet as against 17½ feet, with an increase of over 3½ feet in the beam, and the enormous increase in sail area of 3,000 square feet. It looked, indeed, when "Valkyrie III." appeared in these waters, as though Mr. Watson had determined to out-Herod Herod in the matter of beam and sail area, for the new cutter was of a greater beam than any previous cup defender, and for the first time in the history of the cup races the challenger possessed the greater sail area. She was in every way an extreme boat. The midship section of "Valkyrie III." shows the influence of the "Vigilant" on Mr. Watson in the matter of extreme overhangs and excessive beam. Following along lines on which he worked in the "Thistle" and "Valkyrie II." he had greatly increased the beam, cut further into the lateral plane, both fore and aft, and increased the draught by 2½ feet, the maximum draught of "Valkyrie III." reaching the great depth of 20 feet.

On the other hand, the influence of the races of 1893 and 1894 on Mr. Herreshoff is seen in the comparison of the midship section and sheer plan of "Defender" with that of "Vigilant" and "Valkyrie II." As compared with "Vigilant" he has abandoned the great beam, moderate draught (moderate as compared with the deep keel cutters), the long, straight keel, the small rake of the stern post and rudder; and as compared with "Valkyrie II." he has adopted the moderate beam, the deep draught (in the case of the "Defender" no less than 5½ feet more than that of the "Vigilant"), the short rockered keel, and the raking stern post placed well in under the boat. But as a final and most startling innovation of all in an international "America" cup champion, he has thrown out the national, time-honored centerboard. The genius of Mr. Herreshoff and his originality, however, were shown in the matter of the construction, in which his knowledge of the strength of materials and their structural possibilities gave him a vast advantage, and, indeed, practically won a race for the "Defender" before the ships had crossed the starting line. By using a high quality of bronze for the under-water body of the ship and an aluminum alloy for the topsides, the deck frames and general fittings, he saved at least 7 tons dead weight in the structure of the hull. It is safe to say that the "Defender" was by far the lightest sailing yacht that had ever been constructed in the history of yacht-racing.

In the first race, which was to have been 15 miles to windward and return, the wind shifted, as it so frequently does over this course, so as to change the windward and leeward work into reaching. Going to the outer mark, in what windward work there was the boats seemed to be very evenly matched; but immediately on turning the mark, the "Defender" in a reaching wind literally ran away from "Valkyrie III." and won the race by 8 minutes and 49 seconds. In the second race over a 30-mile triangular course, "Valkyrie III." in straightening for the line fouled the "Defender" and carried away her topmast starboard spreader, springing the topmast and seriously crippling the boat. The "Defender," however, sailed over the course and actually gained 15 seconds on one leg and 1 minute and 17 seconds on the last leg of the trial, losing the race by only 48 seconds. This was a virtual victory for the "Defender" and removed any doubt as to her superiority. At the last race of the series, Lord Dunraven, the principal owner of "Valkyrie III.," crossed the line under reduced canvas in order to make the race count as one of the series, but immediately withdrew, his ostensible reason being that the course was overcrowded with excursion boats. This brought to a close the most disappointing and unsatisfactory series of races in the history of the "America's" cup; but that the "Defender" is a superior boat to the "Valkyrie

III." was proved to the satisfaction of all yachtsmen who witnessed the contests.

TENTH CHALLENGE—"SHAMROCK."

Four years have elapsed since "Valkyrie III." was dismantled and laid up to rot in an English yard. The present revival of interest in the cup contests is due to Sir Thomas Lipton, whose challenge was sent through the Royal Ulster Yacht Club of Belfast. It was the intention of Sir Thomas to have the challenger built in Ireland and manned by an Irish crew. Hence she was given the suggestive name of "Shamrock." It was realized, however, that in order to construct a yacht to match the constructive skill of Herreshoff, it would be necessary to go to a builder of torpedo boats, and accordingly the order was placed in the Thornycroft yards. The "Shamrock" introduced another designer into the cup contest in the person of William Fife, Junior, whose success in the smaller classes has placed him in the very front rank on the other side of the water. The order for the American yacht was of course given to Herreshoff, and the result was the most beautiful example of yacht designing and construction ever seen in the history of the contest.

The two boats are so fully discussed in our editorial columns that it is unnecessary to add anything further in the present article. We will close by drawing attention to the fact that, in the form of their hulls, the American and English yachts of 1899 exhibit a curious transposition of ideas as compared with the "America" and her competitors of 1851. The rather full bow, the deep body and the long, fine run and tapering stern of the "Columbia" are somewhat suggestive of the cutter model of half a century ago. On the other hand, the long, sharp entrance, combined with the full quarters and stern of the "Shamrock," are equally suggestive of the old "America." This comparison is drawn, of course, without any reference to the deep fin-keels, and is merely offered to show that, as regards many features in the form of the hulls, the types have crossed in the gradual development of the past fifty years.

A Double Conduit for Street Railways.

A difficult piece of track conversion is being carried on in New York, where both the Metropolitan Street Railway Company and the Third Avenue Railway Company possess the right of way through the same street. To operate the latter company's line by independent power system required a separate pair of power rails in separate conduits. The Metropolitan conduit had already been installed for a year and a half, so the Third Avenue Company is pushing the present conduit over to one side to give room for the other conduit beside it, between the two rails of the track. The difficulties are numerous in view of the fact that the track is kept constantly in service for the Amsterdam Avenue cars, so that the men have to work alongside rails which are constantly charged. The pavement is first removed and the concrete foundation and conduit wall are broken up and removed from around the yokes and conductor rail. The track is shored up to carry the cars which are constantly running over it. Temporary wooden yokes are inserted to maintain the gauge of the track, and the old yokes are loosened and pushed to one side, carrying with them the old slot rails, insulators and conductor rails. The conductor rails are then removed in single lengths and the free ends are fitted with slippers to prevent the shoes on the plows from being carried away. The old yokes are promptly removed and replaced by new ones fitted for the two conduits which are symmetrically placed between the track rails. While each company will have its own source of power, both will use the same rails.

A Prize for a Beet-Lifting Machine.

Among agricultural implements needed in cultivating the sugar beet no machine is more valuable than a good beet-digger. In fact, some device of this kind is absolutely indispensable. Quite a number of such machines have already been put on the market, but in order to determine which is the best the Deutsche Landwirtschaft-Gesellschaft has offered a prize competition. The premium amounts to \$130. The examination of the competing machines will be held in the fall of 1900. An additional prize will be given to a machine which will raise and top the beets at the same time. This prize may, at first sight, seem rather small for an important piece of agricultural machinery, but it is to be supplemented by prizes offered by the Verein der Deutschen Zuckerindustrie, or the Association of the German Sugar Industry, which has offered prizes amounting to \$1,904 and \$2,380. Our United States consul at Magdeburg says that these prizes will be given to machines that are not only the best that are exhibited in the competition of the farming association, but that in addition must come up to certain other requirements and specifications which will be set forth later on. The competition is not restricted to German manufacturers, and foreigners will also be admitted. This is one of the instances in which there is a legitimate prize offered for an invention.