

Wilfey concentrators with tables about 3½ feet by 8 feet, slightly inclined; upon these tables, running lengthwise of them, are wooden strips about ½ inch wide and ½ inch thick. These tables have a vibratory motion; water trickles over them, and as the crushed ore pulp is washed over and across them, the heavier gold-bearing particles are caught against the strips and are carried to the catch basin, while the lighter non-gold-bearing particles are washed over and pass off as waste.

At the mill a 50 horse power motor runs the two Huntington mills; a 20 horse power motor the Dodge crusher; a 100 horse power motor the stamps; a 15 horse power motor the Wilfey concentrators, and a 10 horse power motor a rotary pump which supplies water from Tanyard Branch Lake to the stamp batteries. In addition to these there is a 125 horse

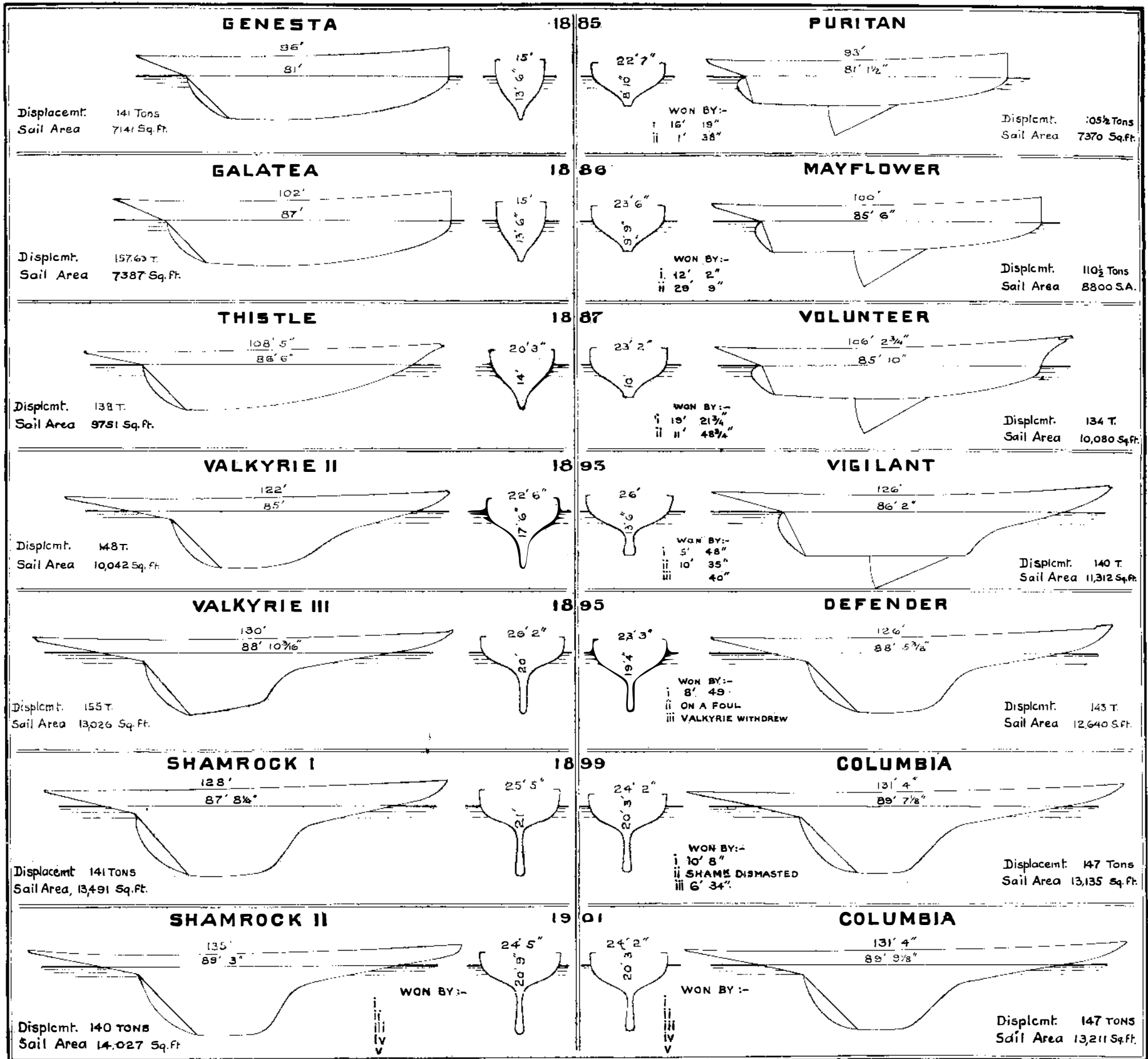
tions per minute, delivering 568 amperes per phase. The current is generated at 440 volts, transformed to 12,000, three-phase, and transmitted over three No. 6 wires twelve miles to the mills, and thirteen miles to the pumping station; and at both the mills and the pumping station it is again transformed to two-phase, 400 volts, at which pressure it is used on all the motors. There are lightning arresters at the power plant, at the mills, and at the pumping station.

Portions of the plant have been running for several weeks, but since August 29 the entire plant has been in operation, and in every detail the equipment is working perfectly.

**FIFTY YEARS OF "AMERICA" CUP CONTESTS.**

Once more the waters of Sandy Hook are witnessing a friendly contest between the representative

both in model and sail-plan, from the English yachts of that day, which were built on the "cod's head and mackerel tail" theories, according to which the greatest beam of a yacht was placed at a point considerably forward of amidships. The British designers of those days believed that a bluff entrance and a long, finely-drawn-out run and quarters were conducive to speed; and it is a remarkable fact that the challenger "Shamrock II," after fifty years of development in yachting, should show, as a result of the tank experiments on which she is modeled, some of the features of the early model, her point of greatest beam being rather far forward, her forebody rather full, and her afterbody relatively long and fine. The "America" had a long, sharp bow, and those broad, flat quarters which for many a decade were destined to be a distinguishing feature of Amer-



FROM CUTTER AND CENTERBOARD TO CUTTER-SLOOP.

power motor which operates an air compressor, that supplies air for drilling, pumping, and hoisting from two shafts that are being sunk on regular ore veins. All of these motors are Westinghouse, two-phase, constant-speed, induction type.

The power plant is located near Seabolt Shoals, on the Chestatee River, about twelve miles from the mills. The waters of three mountain streams are united by two canals, each about two miles long, but no dams are required. A fall of 97 feet is secured. From the bulkhead of the canal a wooden tube 5 feet in diameter conveys the water to the wheel, a Stillwell-Bierce, Victor type, capacity 800 horse power. The generator is a Westinghouse, two-phase, 500-kilowatt, 440 volts, direct connection on the water wheel shaft, excited by a 7½-kilowatt, 110-volt exciter. The velocity of the wheel and dynamo is 514 revolu-

yachts of England and America for the possession of the "America" Cup—unquestionably the most famous trophy in the history of yachting. The Cup itself—for the possession of which so many millions have been spent, and over which, it is no exaggeration to say, the whole world is periodically aroused to enthusiasm—is a rather insignificant piece of plate, whose claims to distinction are certainly not based upon its artistic beauty. It was won in the year 1851, at the time of the great World's Fair in London, by the schooner-yacht "America," which was designed by George Steers for John C. Stevens and others of the New York Yacht Club, for the purpose of crossing the water and engaging in yachting contests with the British boats of that day. She was 88 feet on waterline; 94 feet over all; 22½ feet beam, and her draft was 11½ feet. She differed very widely,

ican yachts. The English yachts of fifty years ago were poorly canvassed and the beautifully-setting sails of the "America"—which, in the case of the mainsail and jib, were laced to a boom—were a source of great admiration to the Cowes yachtsmen. The cup for which the "America" sailed was one offered by the Royal Yacht Squadron, and the race was sailed without time-allowance. The course of 60 miles was laid around the Isle of Wight, and the "America" defeated the fleet of competitors—which varied from the big three-masted schooner "Brilliant," of 392 tons, to the little 47-ton cutter, the "Aurora"—with the greatest ease, coming in 24 minutes ahead of the "Aurora," which was the second vessel in a race which lasted 10 hours and 34 minutes. Had the race been sailed according to the modern method, which allows time according to the

difference in size of the competing yachts, the "Aurora" would have been beaten by one or two minutes only.

The credit for issuing the first challenge for the "America" Cup, as it has come to be known, belongs to Mr. James Asbury, and the first race took place on August 8, 1870. Mr. Asbury sent over the "Cambria," a deep-keeled schooner which was launched from Ratsey's yards at Cowes. The "Cambria" was 108 feet on the waterline, 21 feet in beam, and had a draught of 12 feet. In a race across the Atlantic against James Gordon Bennett's "Dauntless," the "Cambria" won by 1 hour and 17 minutes. The race for the "America" Cup was sailed against a fleet of American schooners, which included six keel schooners and sixteen centerboard schooners. It was won by the "Magic," which beat the "Cambria" by 27 minutes and 3 seconds, actual time. On corrected time the "Cambria" was beaten by 39 minutes and 12 seconds, the old "America," which was one of the defending fleet, beating her by 13 minutes and 47 seconds.

By no means discouraged, Mr. Asbury built a second schooner, named "Livonia," whose dimensions were as follows: Waterline length, 115 feet 2 inches; beam, 23 feet 7 inches; draft, 12 feet 6 inches. Mr. Asbury asked for and secured from the New York Yacht Club the concession that the "Livonia" should sail against one selected vessel and not against a whole fleet. The first race took place October 16, 1871. There was a light wind blowing, and accordingly the "Columbia," a fine light-weather boat, was selected. She drew steadily away from the "Livonia," and won by 25 minutes and 28 seconds. The second race was won by the "Columbia," by 10 minutes and 33 seconds. For the third race there was quite a fresh breeze blowing, and accordingly the deep-keeled schooner "Dauntless," a heavy-weather boat, was chosen to meet the challenger. Just before starting she was disabled, and the light-weather "Columbia" was sent out in her place. The strong wind proved too much for her, and after a series of mishaps she came in 15 minutes and 10 seconds behind the "Livonia." In the fourth race, the challenger was beaten by the deep-keeled schooner "Sappho," of 310 tons and 120 feet on waterline. She beat the "Livonia" by 30 minutes and 21 seconds, and again, in the last race, the "Livonia" was beaten by 25 minutes and 27 seconds.

The next two challengers came from the Royal Canadian Yacht Club. Before these races were arranged, Canada secured a second important concession, to the effect that a single Cup defender should be chosen several days before the day of the first race. The challenger was a centerboard schooner of an overall length of 107 feet, called the "Countess Dufferin," and she was met by the centerboard schooner "Madeline," of 106 feet length over all. The Canadian boat did somewhat better than the "Cambria" and "Livonia," as was to be expected of a shallow, beamy centerboard craft. She was beaten by 10 minutes 59 seconds in the first race, and in the second race by 27 minutes and 14 seconds. The first race of the series took place August 11, 1876.

The fourth challenge came from the Canadians, who this time came to the line with a 64-foot centerboard sloop named "Atalanta." The New York Yacht Club instituted a series of trial races and selected from among the competitors the "Mischief," designed by A. Carey Smith, a centerboard sloop measuring 61 feet on the waterline, 20 feet beam, and 5 feet draft. The Canadian yacht was badly beaten in the first race by 28 minutes and 20¼ seconds, and in the second race by 38 minutes and 54 seconds.

The sloop races of 1881 introduced a new phase in the Cup contests, as from that time on the races were all between single-masted vessels of either the sloop or cutter type. The fifth race took place in the year 1885, when Sir Richard Sutton brought over his cutter "Genesta," one of the fastest racing yachts in British waters. To meet the "Genesta" two sloops—the "Priscilla" and "Puritan"—were constructed, and after a series of races the "Puritan" was selected to defend the Cup. At this time the "Genesta" and "Puritan" were distinctly typical of the widely divergent ideas of yachtsmen as to the best type of yacht for racing purposes. The cutter, under the influence of the Thames measurement rule—which put a limit upon beam, but none upon draft—had grown to be very narrow and deep in proportion to her length. On a waterline of 81 feet the beam of the "Genesta" was 15 feet and the draft 13 feet 6 inches. The ballast was carried outside in the form of a mass of lead bolted to the keel, and on a displacement of 141 tons she carried a sail area of 7,141 square feet. In the "Puritan" we begin to see that compromise between the American and English ideas, which in later years was to become so marked; her rig being the cutter rig in its entirety, and the bulk of her ballast being carried on the outside, in the shape of 22 tons of lead bolted to the keel. Her cross-section was that of the typical sloop; for, on a beam of

22 feet 7 inches, or 50 per cent more than the "Genesta," she had a draft of 8 feet 10 inches, or more than 50 per cent less than that of "Genesta." With 36 tons less displacement than the cutter, she carried 229 square feet more sail. As was to be expected, in light weather the small-displacement and large-sail-area sloop showed decided superiority to the large-displacement, moderate-sail-area cutter. The "Puritan" won the first race in a light breeze by 16 minutes and 19 seconds. In the second race, of 20 miles to leeward and return, sailed in a strong breeze, the easier form of the cutter enabled her to gain a few minutes in running down to the outer mark; but in the thresh homeward against the wind she was passed by the sloop, which won the race by 1 minute and 38 seconds. Sir Richard Sutton secured immediate popularity in America by his sportsmanlike refusal to take one of the races which was awarded to him because of his being fouled and disabled by the "Puritan" when starting for the line.

The sixth challenger, an 87-foot steel cutter called the "Galatea," was met by the centerboard sloop "Mayflower," built by Burgess, the designer of the "Puritan," and was easily defeated in the first race by 12 minutes and 2 seconds, and in the second race by 29 minutes and 9 seconds.

The seventh challenge was destined to arouse more apprehension in the minds of American yachtsmen as to their ability to retain the Cup than any race that had preceded it. The removal of the restrictions of the Thames measurement rule and the substitution of a rule based on water length and sail area gave Mr. Watson, the designer, a freer hand than his predecessors had, and he sent over the cutter "Thistle," which had a waterline length of 86 feet 6 inches, a draft of 14 feet, and beam 5 feet greater than that of "Galatea" and "Genesta." The effect of the increased beam was seen in the reduction of displacement from 157 tons to 138 tons and an increase in the sail area, as compared with the "Galatea," from 7,387 square feet to 9,751 square feet. To meet the "Thistle" Burgess designed the "Volunteer," a steel sloop of 85 feet 10 inches waterline, 10 feet draft, 23 feet 2 inches beam, and a displacement of 134 tons. The sail area was about 300 feet greater than that of "Thistle," and she was provided with the usual centerboard. In the first race, sailed in light weather, she showed the usual superiority to the challenger, winning by 19 minutes and 21¼ seconds; in the second race, sailed in a strong breeze over the outside course, the "Thistle" was beaten in a race of 15 miles to windward and return, by 11 minutes 48¾ seconds, 14 minutes of this gain being made in windward work, and a few minutes being lost on the run home. The failure of the "Thistle" was a bitter disappointment to British yachtsmen. It is evident that her poor performance was due to her being badly balanced for windward work. She could not be sailed as close to the wind as "Volunteer," and the fact that there was nothing wrong with her model was proved by the fact that she gained considerably on the run home of 15 miles.

The eighth challenger was a composite sloop designed by George L. Watson and owned by Lord Dunraven. To meet this yacht no less than four prospective Cup defenders were built. Two of these—the "Vigilant" and "Colonia"—were built for New York yachtsmen by Herreshoff, and the "Jubilee" and "Pilgrim" were built by various members of the Boston yacht clubs. The "Vigilant," which was subsequently chosen as the Cup defender, was built with steel frames and Tobin bronze plating, Tobin bronze being chosen for its great strength, its anti-fouling qualities, and its ability to take a fine polish. The "Colonia" was a keel schooner, the "Jubilee" a centerboard bulb-fin craft, while the "Pilgrim" had a shallow-hulled canoe-like hull with a small bulb of lead carried on a fin of exaggerated depth. The first race between "Valkyrie" and "Vigilant" was sailed to windward and return in a somewhat fluky wind and "Vigilant" won by 5 minutes and 48 seconds. In the second race, over a triangular course, sailed in a fresh breeze, "Vigilant" drew steadily away from "Valkyrie," winning by 10 minutes and 35 seconds. The last race, sailed to windward and return, in a 20 to 25-knot breeze, furnished one of the greatest surprises in the history of these cup contests; for the English cutter showed undoubted superiority to the centerboard in the beat to windward, rounding the outer mark with a lead of about 2 minutes. Running home, she had the misfortune, in setting her spinnaker, to catch it on her anchor bits and make a tear which extended right across the sail as soon as it was spread. She immediately set a light weather spinnaker, but this was blown to shreds and fell across the bows, checking the way of the yacht for several minutes. While this wreck was being cleared away "Valkyrie" was passed by "Vigilant," and, although she made a forlorn hope by setting a staysail, she was beaten on corrected time by 40 seconds.

Lord Dunraven came again in 1895, this time with a boat of extreme dimensions, both as to sail plan

and hull. "Valkyrie III." had enormous overhangs, the deep draft of 20 feet, the exceptional beam of 26 feet 2 inches, a shallow hull, very hard bilges, and the unprecedented sail spread of 13,026 square feet. She was a fast light-weather boat, but her form proved too hard for driving at high speed, and she was easily beaten in a strong breeze by the old "Britannia" just before she left for America. The builders of "Vigilant" were commissioned to build a defender, and Herreshoff, profiting by the lessons of the last two seasons' racing, when the centerboard "Vigilant" was beaten to windward by the keel-boat "Valkyrie," and in England lost 11 out of 18 races to the keel-boat "Britannia," boldly abandoned the centerboard; added 6 feet to the draft as compared with "Vigilant," narrowed the beam down from 26 feet to 23 feet 3 inches, and to these changes of form added a system of construction which was probably the lightest ever attempted, or ever to be again attempted, on a yacht. The underbody was built of aluminium bronze, the top sides of aluminium plate, and aluminium was used in framing, deck strapping and miscellaneous fittings, wherever it could possibly be introduced. With 15 tons less displacement than the "Valkyrie," the "Defender" carried about 360 square feet less sail. In the first race, to windward and return, she won by 8 minutes and 49 seconds. In the second race "Valkyrie III." won by 47 seconds, but the race was given to "Defender" on a foul, "Valkyrie" having accidentally touched the topmast shroud with the end of her main boom, as she was straightening for the line. In the third race, "Valkyrie," after crossing the line, withdrew.

After an interval of three years, Sir Thomas Lipton challenged for the cup and commissioned William Fife, Jr., to build a 90-foot cutter. "Shamrock," as she was called, was built of steel and bronze, with top sides of aluminium, and with her was introduced the novelty of a steel deck. She had somewhat less beam than "Valkyrie III.," more draft, and about 460 square feet more sail area. To meet her Herreshoff designed an improved "Defender." The "Columbia" has about a foot more beam, a foot more draft and 500 square feet more sail area than her predecessor. In the trial races she showed undisputed superiority to "Defender," and after a long series of inconclusive races, she defeated "Shamrock" by 9 minutes and 47 seconds in a beat of 15 miles to windward, and by 24 seconds on the 15-mile run home. Allowing for a difference at the start, and her allowance of 6 seconds to "Shamrock," she beat that boat by 10 minutes and 8 seconds corrected time. In the second race, over a triangular course, "Shamrock" was dismantled; and in the third race, 15 miles to windward and return, "Columbia" won by 6 minutes and 34 seconds, five minutes of this time having been gained by "Columbia" on a beat back to the starting line. It will be seen that "Columbia's" victories over "Shamrock" were due to her greatly superior windward work, a quality which was to stand her in good stead in the trial races of two years later.

After waiting a year Sir Thomas Lipton challenged again. This time it was intrusted to George B. Watson to build a cup-challenger. The lines of "Shamrock II." were not laid down until Mr. Watson had made several months' exhaustive tests with models of previous English yachts in the towing tank at Denny's yard, Scotland, to determine which was the fastest and most easily-driven form. "Shamrock II." is built of Inmadium bronze; she is 135 feet over all, being the longest "single-sticker" ever built. She measures 89 feet 3 inches on waterline; has a beam of 24 feet 5 inches and draft of 20 feet 9 inches. To meet the "Shamrock II." Mr. Herreshoff was instructed to build a new 90-foot yacht. "Constitution," as she is called, is modeled closely on the lines of "Columbia," the chief difference being that she was given about a foot more beam. She has also 1,300 square feet more sail area. In the series of races sailed between the two yachts, although "Constitution" showed decided superiority in light airs, she was so frequently beaten by "Columbia," which maintained all of her old-time steadiness and uniformly good performance, that the challenging committee decided that "Columbia" was the better boat to send against so formidable a competitor as "Shamrock II." "Shamrock II.," after several weeks' sailing against "Shamrock I.," was tuned up to a point at which she was able to beat the earlier vessel by from 8 to 10 minutes over a 30-mile course.

It appears that Germany is to follow the example of France in prohibiting automobile races upon the public routes. A decree to this effect has lately appeared in the journals, signed by Baron von Hammerstein, Minister of the Interior. It is said that this decree has been provoked by a few accidents which have recently occurred, especially those of the Paris-Berlin race. The police of all localities of the Empire have been given orders not to permit any races of automobiles.