THE "RELIANCE" UNDER SAIL.

We present a set of views of the new cup defender "Reliance," which were taken especially for the SCIENTIFIC AMERICAN on the occasion of the first trial spin of the new yacht. The view taken from off the starboard bow serves to show the truly enormous dimensions of the sail plan, which is so great that it dwarfs the hull, although the latter is the greatest ever given to a racing 90-footer. The other views, one taken off the port quarter, the other giving a view of the deck spars and general gear amidships, are of scarcely less interest. Perhaps the best way to appreciate the size of the sail plan of "Reliance" is to show how greatly it exceeds that of the new cup challenger "Shamrock III.," whose total area of sail is about 14,500 square feet. The main boom of "Shamrock III." is stated by reliable authorities in England to be 105 feet in length, which is a little over 2 feet more than the length of the boom on "Shamrock II." The distance from the forward side of the mast to the end of the bowsprit is 78 feet, which is the same as on "Shamrock II." The height from deck to cap is about 145 feet. Now, these dimensions, great as they are, are modest beside those of the new cup defender, whose boom is 114 feet in length, whose distance from forward side of mast to end of bowsprit is over 80 feet, and whose height from deck to truck is over 150 feet. On spars of this magnitude "Reliance" will spread from 1,200 to 1,500 square feet more canvas than "Shamrock III.," and her total area of canvas will be not far short of 16,000 square feet.

One naturally asks, How can it be possible for the boat to hold up to its work, in the squalls and heavy winds for which she must be prepared in a season's racing, such an immense amount of canvas? The answer is that Herreshoff has decided to take absolutely no chances in the way of lightening up on standing gear and spars, and has made everything above deck of exceptional weight and strength. This of course, involves extra weight aloft, which would have a very detrimental effect upon the stiffness of any boat of ordinary model. "Reliance," however, is a "brute" of the most pronounced type, the term "brute" being used in its present accepted sense among yachtsmen as meaning a vessel that sacrifices fineness of form to fullness, great initial stability, and large sail-carrying power; and her designer in adopting the modified scow type and producing a boat with hard bilges, full waterline, and abnormal overhangs, provided a margin of stiffness which he was able to draw upon in putting in the heavy spars, stays, and gear necessary to carry the exaggerated spread of canvas that always goes with the "brute" type of yacht. At the same time, Herreshoff, who could not design an ugly boat if he tried, has so drawn out his hull and toned down the objectionable features of the scow-type model, that he has produced a boat of unquestionable grace and beauty.

Speaking of the exceptional strength of her gear and spars, it may here be pointed out that a boat of the full waterlines of "Reliance," especially in the larger classes, is always difficult to heel down in light breezes until she is "on her sailing lines;" that is to say, until she is availing herself of all the measurement-avoiding devices in the way of exaggerated overhangs, which render the scow-type so much faster under average conditions than a more wholesome boat. The stiffness of the yacht due to her form is always more than sufficient to enable her to carry her sail in light to moderate breezes, and consequently a little extra weight aloft is a positive benefit in getting her to heel to her sailing line in light winds. Apropos of the above, probably some of our readers will have taken note of the fact that the yacht has had an extra set of club topsail spars made, which were being constructed of exceptional weight. It might be supposed at first thought that these heavy spars were for heavy weather; as a matter of fact, we can hazard a shrewd guess that they are intended for the very lightest weather, when the heeling moment of several hundred pounds of extra dead weight at a height of 120 feet above the water would do yeoman's work in pulling the yacht down to her bearings.

While praising the beauty of the Herreshoff modeling as shown in the hull, we have to make a strong mental reservation in speaking of the Herreshoff sails, which, it must be confessed, present, with the exception of the club topsail and jib topsail, but a sorry appearance. The mainsail is evidently over-large for the spars, and the leach with its battens and full roach seems to have quarreled with the rest of the sail; while there is a pronounced reversed curve, or "nigger's heel," in the foot and leach of the jib. However, there is ample time for tuning up between now and the latter part of August, and as the new boat is to have several suits of canvas, there need be no doubt that she will come to the scratch with sails in first-class shape. Among these suits, by the way, she is to sport an English set of sails made by the celebrated Ratsey firm. Since the Englishmen claim that in their attempts to win the cup, the excellence of their Ratsey canvas has been half the battle, it is to be hoped that for the sake of the purely international character of the sport, the Ratsey sails will be kept in the sail locker, and that the American champion will wear an American suit of sails when she measures paces against "Shamrock III." If so be that we are to be beaten because the challengers can make better sails, it will certainly be the wish of all patriotic Americans that our yacht should go down to defeat clothed in the homespun article.

Electrical Notes.

A few large corporations have for years maintained laboratories and skilled specialists to test their materials, supplies and apparatus, but small buyers have not been able to afford the equipment and expense necessary. For the benefit of these small buyers the Lamp Testing Bureau has equipped at No. 14 Jay Street, New York, a general electrical and photometrical testing laboratory to test electric lamps, electricity meters, electrical instruments and apparatus, and to provide incandescent lamps accurately calibrated as secondary standards of candle-power, amperes, and watts, and Clark cells for use as standards of E. M. F.

An interesting innovation, and a reversal of the common practice of stringing electrical wires, is about to be tried in a 150-mile transmission plant of the Guanajauto Power and Electric Company, Mexico. The current will be transmitted at a voltage of 60,000, and the wires will be strung on steel towers placed 440 feet apart instead of poles at more frequent intervals. Electricians have been considering the advisability of making this change for some time, and it was stated in a recent number of Cassier's that a proposition was being considered by the projectors of another power scheme, to string the wires on poles sixty feet high and placed 1,000 feet apart. It is argued that the fewer the poles the easier and more economical it will be to take care of them.

Consul-General Guenther, of Frankfort, speaking of Mr. J. Fuchs, a wine producer of Elba—presumably the island—says: "He planted, some years ago, four fields with native grapevines, in the midst of a district infested with phylloxera, and treated two of these fields with 'air electricity.' The difference in the development of the grapes of the fields was apparent; those treated with electricity yielded better results, both in quantity and quality, and were not infected with phylloxera, while the other fields were. Mr. Fuchs has demonstrated, it is said, that electricity increases the fertility of the soil. It is not sufficient simply to conduct air electricity to the earth, but there should be a direct metallic connection of the electric conduit with the main stem of the plant. On a field of about 2½ acres, five masts are erected, the tops of which are supplied with an arrangement for accumulating atmospheric electricity. These accumulators are connected with each other by wires. Wires are laid in the soil about 1½ feet deep, forming an evenly distributed metallic net. Every accumulator is connected with this metallic net by a wire running along the mast. Short wires connect with the plants, the free ends being stuck into the stem or into the main root thereof."

A Belgian electrical engineer has just brought out an invention, of which German experts seem to think most favorably, relating to electric switches, particularly to those used for controlling electric motors. Its object is the construction of a switch in which the arm is retained magnetically upon a certain contact, or upon any contact of a series, and in which it will return to its "off" position upon the failure of the current, so acting as a minimum switch. The switch consists of the following essentials: The contact brush passes over contacts arranged round an arm of the circle, of which the spindle of the contact arm is in the center. A magnetizing coil is placed on the switch spindle, which is of iron, causing the bobbin on which it is wound to act as a bearing for the spindle. The switch arm, or part of it, and the rear flange of the bobbin are also of iron, and a pole piece projects from the switch arm, which comes into magnetic contact with the rear flange at any point or points where it is desired to retain the switch arm magnetically. The pole piece passes across the face of the magnetizing coil of any convenient width, and even to inclose the whole of the coil. For motor starting, an iron pole piece is fitted to the back flange at the "full on" position, and arranged so that the switch-arm pole piece touches the back flange only at that point, so that the switch arm can be retained only in the "full on" position. In the case of regulating switches, the arm pole piece is made of such a length as to come into contact with the back flange throughout its travel, so that it can be retained in any desired position. The bearing bobbin, with its back flange, may be constructed of cast iron, and may form part of an iron back plate for the switch, or of any material except its back flange, which must be of iron. The iron spindle should preferably be in contact with the back flange. The spring for bringing the switch arm to the "off" position, and other details of construction, are arranged as is customary in such switches.

Automobile News.

During a railway strike recently in Holland, trains were not run for 48 hours. The strikers hoped that, by stopping altogether the movement of trains, they would succeed in gaining their demands. As soon as this fact became known, the proprietors of several of Amsterdam's enterprising daily papers organized an automobile service for delivering their journals in the principal cities; and, the slowness of trains in the Netherlands being proverbial, the readers were delighted to receive their papers four and five hours sooner than was customary.

A singular accident occurred recently in Paris, wherein two persons narrowly escaped asphyxiation by the fumes exuded from the gas motor of the vehicle. The motor car was tightly closed and the driver happened to observe the two passengers lying unconscious on the floor of the vehicle. The car was stopped. When the door of the carriage was opened, the gas fumes were so overpowering that it was with difficulty that the two passengers were extricated and restored to consciousness. The peculiarity of this accident emphasizes the danger of the gas motor when employed in connection with closed carriages, unless ample precautions are taken to divert the noxious fumes into the outside air.

A muffler or silencer has been devised by an engineer named Henz, who was formerly connected with the Daimler Motor Car Company, by means of which lost heat from a petrol motor is converted into electricity. Only 18 per cent of the heat units generated in a motor are transformed into power; 17 per cent escape into the exhaust, while the remaining 65 per cent is carried away by the cooling water. It is the 17 per cent of heat units lost through the exhaust that this inventor turns to profitable account, and for the purpose of converting this waste heat into electricity he has contrived a special apparatus. The current obtained from this source the inventor claims to be of sufficient potential to be utilized as a head light to the vehicle, or to be stored away in an accumulator for use in connection with the electrical ignition.

The Electrical World and Engineer digests certain statistics which have been made public by Mr. A. Elliott Ranney on the comparative costs of operating automobiles and horse vehicles. Mr. Ranney says that the cost of a fashionable driving outfit used during the winter and spring for shopping, calling, park use, etc., is found to range from $3,030 to $6,610, as follows: Brougham, $1,200 to $2,000; victoria, $800 to $1,800; two horses, $600 to $2,000; double harness, $300 to $500; single harness, $100 to $250; stable clothing, stable tools, halters, etc., $30 to $60. Total cost, $3,030 to $6,610. The expense of maintenance for stable, feed, etc., but not including hire of coachman, would be about $100 a month. A similar motor outfit will cost from $3,800 to $7,500, as follows: Electric brougham, $2,000 to $4,000; electric victoria, $1,800 to $3,500. Total cost, $3,800 to $7,500. The monthly cost of maintenance, however, not including coachman, should not exceed $70, and in addition the electric outfit is capable of four times the daily mileage of which the best horses would be capable. In other words, a lady could have her carriage at the door every day after breakfast to convey her children to school and her husband to his office, back to the house before 10 A. M. for her to shop, back (after the mistress and coachman have lunched) for calling, receptions, and a park drive, back (after the owner's family and coachman have dined) to go to the theater, supper, and return home about 12 P. M., and yet no exhaustion of the power, no lame horses, and an ability to repeat the performance day in and day out. The coachman, moreover, has no horses to clean or feed, no harness to wash, no necessity for going constantly to the farrier and wasting the precious time of his mistress while the horses are being shod, and no good excuse to offer why he should not always be on hand at the request of his employer. He cannot keep for himself, as his little perquisites, his monthly commissions on feed, stabling or shoeing, nor can he get his percentage on all new horses bought to replace lame or sick ones. He cannot buy sponges, soap, currycombs, brushes, etc., by the score, nor keep his employer's bank account constantly depleted with bills for new harness, new blankets, repairs, etc. In the case of a light driving outfit for park or suburban use the advantage of the motor vehicle is much greater. The horse outfit will cost from $660 to $1,630, as follows: Buggy or runabout, $250 to $400; horse, $300 to $1,000; harness, $100 to $200; whip, $5 to $10; stable clothing, halter, etc., $5 to $20; total cost, $660 to $1,630. The monthly cost of maintenance would be about $40. A steam carriage capable of covering several times the daily mileage of the horse would cost from $600 to $950, or a gasoline runabout from $650 to $1,300, and the monthly cost of maintenance should not exceed $25, giving a considerable advantage in favor of the motor vehicle, not only in operating expenses, but in initial cost as well.

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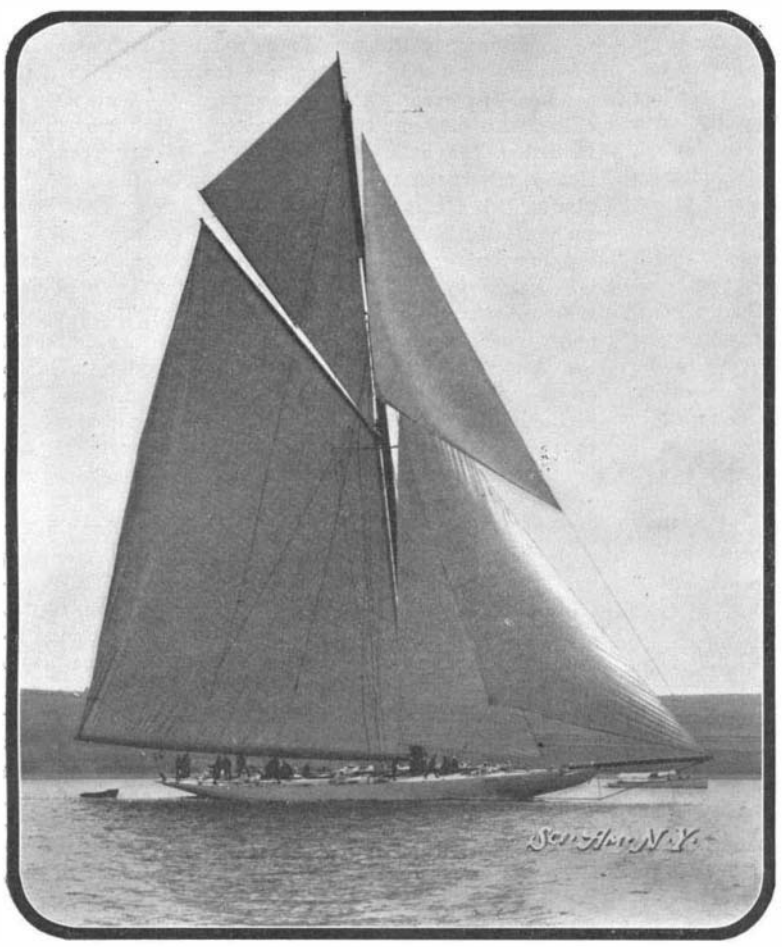
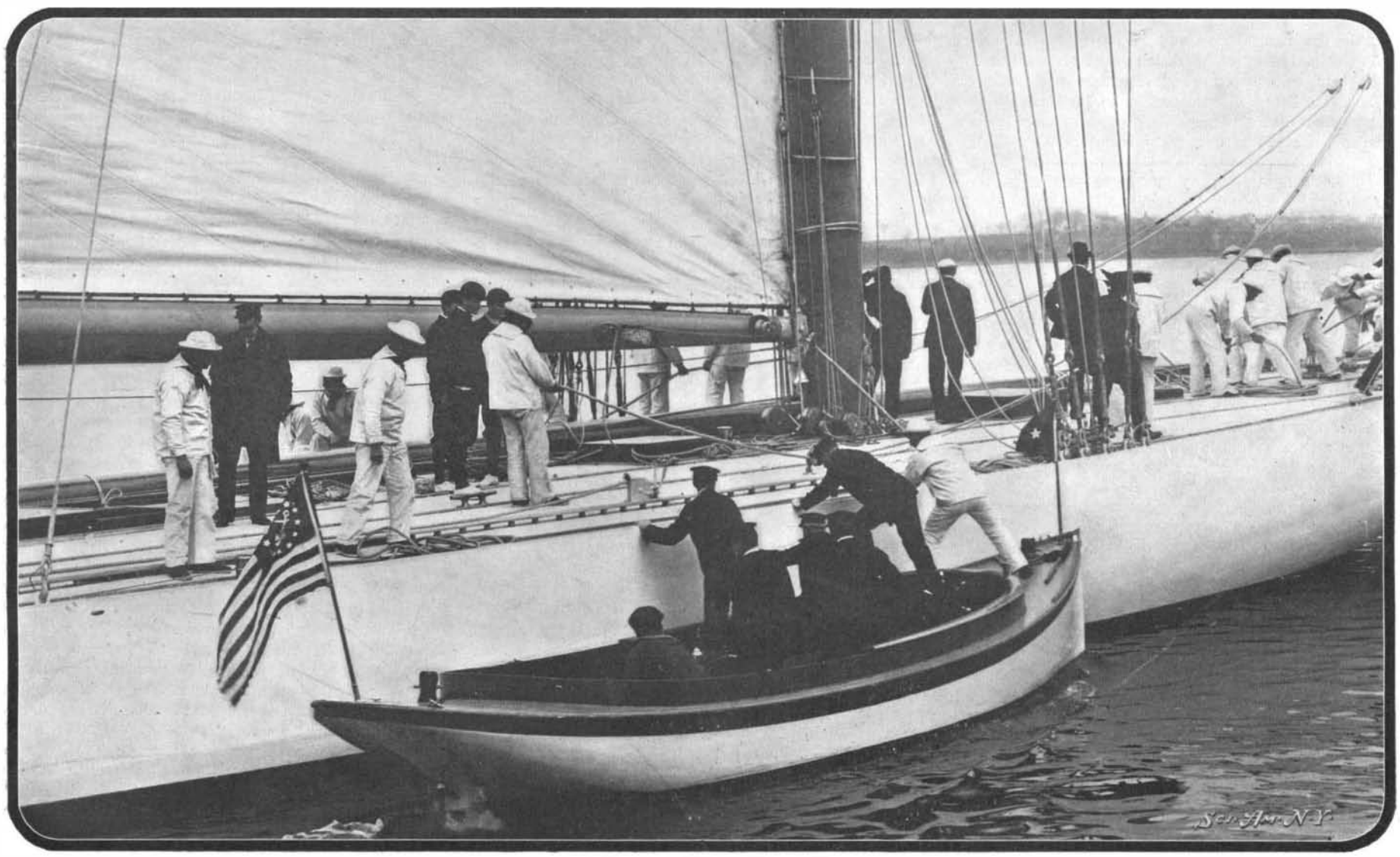


"Reliance" Shows Her Enormous Sail Spread.

A Council of War.



The Committee Inspect the New Cup Defender.

TRIAL TRIP OF THE CUP DEFENDER "RELIANCE."—[See page 354.]