

Correspondence.

The Factor of Safety in Yachts.

To the Editor of the SCIENTIFIC AMERICAN:

In reading "The Factor of Safety in Shamrock," by your English correspondent, in SCIENTIFIC AMERICAN of June 1, I am led to offer a suggestion which may explain why relief could not be given when the flaw struck the "Shamrock" which carried away her mast, the same failure of relief reaching similar result in the case of the "Constitution."

The first question any practical yachting man asks on reading of such an accident is, "Why was not the helm put down, and the ship luffed into the wind to relieve the strain?"

In the account of the "Shamrock" accident we are told that the helm was "jammed hard down," but she would not come into the wind. The reason for this state of affairs lies in the construction of these modern racing craft. Every one of them carries a lee helm, and to that degree that they are dangerous vessels. The faulty construction that involves this condition is the tremendous forward rake of the sternpost. Were this built more nearly upright, after the old manner, the rudder would get a better hold on the water, and the ship would respond to the movements of the helm.

In the modern racer, the moment she heels at all, her entire waterline is changed and lengthened, and the rudder acts merely as a narrow knife, running its point into the water, its blade insufficiently inclined to the plane of the vessel's progress through the water to have any effect in throwing her head into the wind.

The only relief from this condition is either to set the sternpost more nearly vertical, as in older constructions, or to have sheets of the head sails so that they can be immediately freed, which latter seems hardly practicable in such large craft. Crowninshield tried to overcome the difficulty in the "Independence" by means of a balance rudder. This is a good solution of the difficulty in small vessels, but strength and weight of materials forbid it in the big racing machines.

SPENCER BORDEN.

Fall River, Mass., June 24, 1901.

The Restoration of Star Photographic Negatives.

All astronomical photographers realize the importance of washing their plates thoroughly, but in spite of this fact they are very prone to fade. Negatives, of course, are carefully preserved as a record, and the plates lose their value if any of the star images have faded. Sir William Crookes, editor of The Chemical News, was called in to restore some missing star images on a valuable series of plates taken nine years before. The process which he used was his own invention, and he described it as follows:

1. Soak the plate in distilled water for three hours.
2. Prepare, in advance, two solutions, A and B.

SOLUTION A.

Pyrogallic acid .....	1 ounce.
Sodium metabisulphite .....	1 ounce.
Water .....	80 ounces.

SOLUTION B.

Sodium carbonate (crystals) .....	12 ounces.
Sodium sulphite .....	4 ounces.
Water .....	80 ounces.

Mix equal parts of A and B, and allow the plate to soak in the mixture for ten minutes or a quarter of an hour, in the dark. Wash well.

3. Transfer the washed plate to a solution of 3 ounces of sodium hyposulphite in 20 of water. Allow it to remain for half an hour, and then wash the plate in running water for three hours.

4. Prepare a "clearing" solution according to the following formula:

Alum .....	1 ounce.
Citric acid .....	1 ounce.
Ferrous sulphate .....	3 ounces.
Water .....	20 ounces.

Allow the plate to soak in this for ten minutes and then remove and wash in running water for six hours.

5. Prepare, in advance, two solutions, C and D.

SOLUTION C.

Ammonium sulphocyanide .....	100 grains.
Water .....	10 ounces.

SOLUTION D.

Gold chloride .....	15 grains.
Water .....	15 ounces.

For use take 1 ounce of each, and add 8 ounces of water. Soak the plate in this mixture for ten minutes, and at the end of that time remove and wash it in running water for half an hour. Transfer to a dish of distilled water, where it may remain for an hour. Finally drain on blotting paper and allow to dry.

The separate solutions A, B, C, D, will keep for an indefinite time, and the same may be said of the clearing solution, if kept tightly corked. But when mixed together they will not keep, so fresh mixtures should be made each time.

I have given you the full process adopted on the plates you sent me, but I think some of them may be omitted with no disadvantage. For example, I

should like to try if the soaking in hyposulphite may be dispensed with. I think it can, but I only tried leaving it out on the plates you sent that had not faded.

I always found the great secret of preventing images from fading out was to wash them very well in running water. The clearing solution allows the time of washing to be a little shortened, but not much.

The sulphocyanide and gold solution has the property of precipitating gold on the image and rendering it of a blacker color and diminishing the chance of fading. I should think you would find it useful always to use the clearing solution in your usual process.

Electrical Notes.

The municipal council of St. Petersburg is to send an electrical expert to the United States in order that he may study the telephone system of this country with a view of reorganizing the one in use in St. Petersburg.

An attachment is provided in Sweden by which the secrecy of the telephone line is assured. The apparatus, which is rented at a moderate rate, indicates whether the telephone operator is listening to the conversation or not.

Mr. Marconi has a motor-carriage which is equipped with a folding cylinder on top of the car and devices for the transmission of wireless telegraphic signaling. Motor cars fitted with this device are to be used in the forthcoming military maneuvers.

The vibrations caused by the new electric underground railway in London have been so great that a committee has been appointed to investigate this difficulty. It was found that a large proportion of the locomotives were not borne by springs and that the rails lacked rigidity. A new type of locomotive has been ordered.

All British battleships and cruisers in commission for home stations, and all vessels being prepared for the Reserve, Training, and Channel Squadrons, are to be fitted with wireless telegraphy apparatus. All future battleships and cruisers sent to the Mediterranean are also to be so equipped. Apps-Newton coils are being used.

The traffic on the new electric underground railways in London and Paris is about the same. The total number of passengers carried from July 30 to December 31, 1900, was 14,458,405 for the London road, and 15,890,526 for the Paris line. The receipts are highest for the English road, but the London road cost much more to build, the expense being \$2,806,000 per mile, while the French road cost only \$1,403,000 per mile.

In a paper read recently before the Société Internationale des Electriciens, M. Picou, who was the engineer-in-chief for the electricity supply service at the Paris Exhibition, gave some figures as to the output and power consumption. The total duration of the electricity service was 2,756 hours, during which public lighting was supplied for 909 hours, and the average number of hours of running of the generators was 713.5. The total connections to the mains represented 11,265 kilowatts—practically 20,000 horse power. The mean daily output of the generators was 25,336 kilowatt hours.

The Chicago & Milwaukee Telegraph Company has announced that it will transmit telegrams between Milwaukee and Chicago at the rate of ten cents for ten words, and one cent for each additional word, says The Railway Review. The lines of this company have heretofore been used almost exclusively for board of trade business, but have now been opened for a general commercial business. The company accepts and sends any message at the rates quoted, which can be delivered by telephone either in Chicago or Milwaukee. No arrangement has been made for the delivery of messages in any other way than by telephone, but they will be mailed to the persons for whom they are intended if they cannot be reached by telephone.

A new telegraph cable has been laid between England and Germany, reaching from Bacton in North Norfolk to Emden via Borkum, one of the Frisian Islands, making the third cable by this route. The cable is the property of an English company, but owing to the German government's having contributed to the cost of laying the same, the new German cable-laying steamer "Von Podbielski," belonging to the Norddeutsche See Kable Company, and which was described in the SCIENTIFIC AMERICAN SUPPLEMENT a few months ago, was chartered to undertake the work. Owing to the rough sea that was raging off the coast of Norfolk, it was found impossible to haul the heavy cable ashore in the usual manner by towing, so a warp was brought to land, and the cable itself floated to land by means of a number of huge red buoys. A body of one hundred men then hauled the cable along the trench to the small cable station. This task completed, the "Podbielski" set out for Emden, trailing the cable from her stern.

Engineering Notes.

At a recent meeting of the Paris Academy of Sciences M. Berthelot stated that he had found in a metallic box, covered with inscriptions and dated from 700 B. C., that a portion of one of its characters was made of an alloy of platinum.

The damage done by fire to a Russian shipyard at St. Petersburg was \$5,000,000. The fire occurred at the Galley's Island shipyards. The cruiser "Wipjas" and other vessels were burned, as well as many government buildings and military warehouses.

The statue "La Parisienne," which surmounted the monumental entrance to the Paris Exposition, has come to an untimely end. It was being loaded for transport to Budapest when it was broken by a fall, so that only the head of the figure was left intact.

A large department store in Brooklyn has recently put in a cold storage plant for the protection of furs against moths. Usually the furs are sent to one of the large cold storage warehouses, but it is an innovation for dry goods establishments to have such a plant on their own premises.

The work of erecting the structure of the Boston Elevated Railway was completed on the 12th of May. The length of the road is seven miles, running from Sullivan Square by way of Main Street, Atlantic Avenue and Washington Street to a loop in Douglas Street.

Recent experiments with acetylene appear to indicate that much of the discomfort attending the combustion of unpurified gas, which was formerly ascribed to phosphureted hydrogen almost entirely, is really due in great measure to the presence of sulphur compounds other than sulphureted hydrogen, which compounds are not extracted from the gas by materials that are competent to remove H<sub>2</sub>S.

A simple device has been put into practice in the U. S. for truing up railway carriage wheels, and it is said to have been attended with considerable success. It consists of a brake shoe, which is formed with pockets filled with a grinding material. When a wheel becomes flattened it is necessary only to remove the regular shoe and replace it with the truing shoe, run the carriage, do the braking as usual.

The railroad between Beirut and Damascus is sufficient for the traffic between the different towns along the route. Considering the heavy indebtedness of the road, together with the fact that the company must add nearly \$100,000 each year to the running expenses, it is a question if it will be long-lived or not. Work on the Haifa-Hauran-Damascus Railroad has been stopped, and it does not look as if the present promoters would complete it.

Consul Hughes, of Coburg, April 26, 1901, says that, according to Russian official publications, the old wooden boat bridge over the Amu Davja, on the Middle Asiatic Railroad, near Tschardjni, will be replaced by an iron bridge 5,000 feet in length. The new structure, continues the Consul, is to be built in such a way as to prevent the river from shifting the bridge foundations. According to the plans published, there are to be twenty-four piers, each about 185 feet apart. The total weight of the structure will be about 5,190 tons, and, it is estimated, the cost will be about \$2,558,500. The Consul suggests that this may be an opportunity for American bridge builders, if immediate action is taken.

The Bavarian State Railroad is establishing a preparatory school for employes at Munich. Attendance at this school for at least one term will be obligatory upon all who wish to obtain employment. Candidates who have passed the one-year army volunteer examination and who are desirous of competing for the higher executive in mechanical branches in the railroad service are allowed to have two months' practical experience in railroading before taking a course in the school, in order that they may be better able to understand the theoretical teaching which they will receive. Candidates are to be allowed partial pay while attending the school. This also includes the telegraphic course.

The handling of large crowds in parades and other gatherings is always a difficult matter. San Francisco has solved the problem of keeping the streets clear of crowds for parades without the usual cordon of police, and also without disturbing pavements by the insertion of poles in the pavement upon which to string wires. The device was recently illustrated and described in The Municipal Journal and Engineer. Metal sockets are sunk in the street pavement just outside the curbs and 50 feet apart. They are conical in shape. These sockets are embedded and surrounded by four inches of concrete. The socket is open at the bottom, permitting drainage. A cast-iron removable cap fits into the sockets when not in use. Into these sockets when parades are held are inserted wooden posts of Oregon pine; and the wire cable is attached to these posts.