NEW SYSTEM OF MARITIME NAVIGATION.

At a recent session of the French Academy of Sciences, Mr. Gustave Trouvé presented a paper upon a new system of maritime navigation with which he has for some time been experimenting. In this system locomotion is evidently possible only through the aid of floats, but as regards methods of propulsion there exists an infinite number. Now, Mr. Trouvé has always been struck with the great difference observed between the speeds of locomotives and ships. Although the latter are provided with engines that are much more powerful than those employed in terrestrial propulsion, they nevertheless attain a speed half less than that of the former. This great kinematic inferiority of ships he attributes to the enormous resistance offered to them by the water in which they are partially submerged, and it is to the diminishing of such resistance, by transforming the submerged floating portion, that he has devoted himself. But do the two functions of sustentation and propulsion each necessitate, in reality, its own particular organs? May not a single apparatus suffice for them both? It was in order to solve these questions experimentally that Mr. Trouvé, as long ago as 1885, designed the apparatus of which a side and front view is given in Fig. 1.

A light boat is carried by a sort of tricycle, whose large wheels have a submerged volume sufficient to maintain, of themselves alone, the entire system upon the surface of the water. These wheels are hollow, and the circumference alone enters the water. In order the better to ascertain whether the thrust of sustentation should be divided between the boat and the wheels or reside solely in the propeller, and, if the first case is the best, in order to determine the exact ratio of the volume non-submerged, the small boat in which the experimenter is seated may, at the will of the pilot and by means of screws, be submerged by insensible degrees in the water, and the wheels thus be relieved, or it may be raised wholly above the water along with its passenger. The two large forward wheels are set in motion through the intermedium of an electric motor placed upon the boat. The third wheel is movable at the stern and serves as a rudder. All three are provided with paddles, after the fashion of mill wheels. The results obtained with this apparatus and an accident encouraged Mr. Trouvé to complete it. In fact, at a soirée at the Paris Observatory, he was exhibiting the propelling apparatus of his electric boats to Admiral Mouchez's guests, when he perceived that all his measurements had been badly made, and that his generators of electricity were too heavy for the little boat constructed for the occasion, and caused it to sink. As it was not possible to forego his exhibition, he resolved to have recourse to an artifice.

In the first place he suppressed the two heavy generators, and, under pretense of causing his boat to produce a useful effect, he formed, through alternate plates of zinc and copper supported by corks, a small float which he connected with the boat and propelling apparatus by the conducting wires themselves. As for the liquid, wishing on the one hand to allow it to preserve the aspect of ordinary limpid water, and, on another hand, recalling the fact that sea water had already been used as a liquid in certain batteries, he contented himself with saturating his liquid with sea salt. The boat and float then sailed as well as could be desired.

A short time afterward Mr. Trouvé renewed his experiments upon a larger scale, with a sea water battery, and his new experiments showed him that the water of the ocean furnished a much higher potential than did the artificial saline solution, the electro-motive force of a single element sensibly reaching one volt. They taught him also that the water of the Mediterranean was more electrogenic than that of the ocean, owing to a greater evaporation under the influence of a warmer climate, and consequently to a more perfect saturation than that of the Atlantic, the mean temperature of which is lower. He found that the electro-motive force is, moreover, variable from day to day for the same source, and that the solubility of the salts plays here again the principal if not the only role.

In the application of this system on a large scale, a battery float is placed astern of the vessel (Fig. 2), and the elements, united in a battery, being submerged, the current is led to the motor on the vessel through the aid of two cables containing the conductors. At least five or six volts are thus obtained without any trouble. Moreover, in order to prevent breakage, care must be taken to render the connecting cables and the conductors independent, as the latter never have to undergo direct traction. During a violent tempest, and in all cases where a stoppage is usually made, the battery may be taken on board, its weight being relatively light. In order to lighten the weight of the elements in the water, Mr. Trouvé bends the copper plates upon themselves and closes the hollow mass thus formed, so that the thrust of the liquid perfectly balances the total weight of the couples.

As for the floating battery, that possesses a great advantage over steam, in that it can be immediately exchanged in a port of supplies. The exchange is effected much more quickly than is the ordinary loading with coal. Floating batteries already prepared may await the ships in a dry place.

The power of such a battery is much greater than might be thought at first sight. In fact, if we take, for example, a vessel 100 meters in length and 16 in breadth, and suppose that the elements and their electrodes are 1 decimeter distant from each other, and that they plunge to a depth of 4 meters in the sea, the total active superficies will be 800 square meters (since the two surfaces are utilized), or, at the rate of five plates per running meter of width of float, 4,000 square meters, and, for the 16 meters of breadth, 64,000 square meters. Admitting, now, that we have at our disposal an electromotive force (and it is minimum) of 6 volts, and of an intensity of 10 amperes per square meter, let us say, in a word, 60 watts per meter of superficies, or practically 6 kilogrammeters, and we shall have at our disposal a power of more than 5,000 horses. Mr. Trouvé remarks that the energy discharged can but increase with the speed, since the hydrogen of the electrolyte is driven away by the current of water that is created between the elements, and induced currents have hardly the time to form. There is, then, in short, no polarization, and this redoubling of energy is comparable to that which we observe in a battery when the liquid is agitated.

Mr. Trouvé asserts, in conclusion, that his new system of maritime navigation with sea water battery is based upon solid data verified by the experiments that he has made, in company with Mr. De Nabat, on a boat 8 meters in length running at a speed of 8 kilometers per hour. He employs the geometrically perfect screw constructed after a new process that he presented to the Academy of Sciences on the 12th of July, 1886.

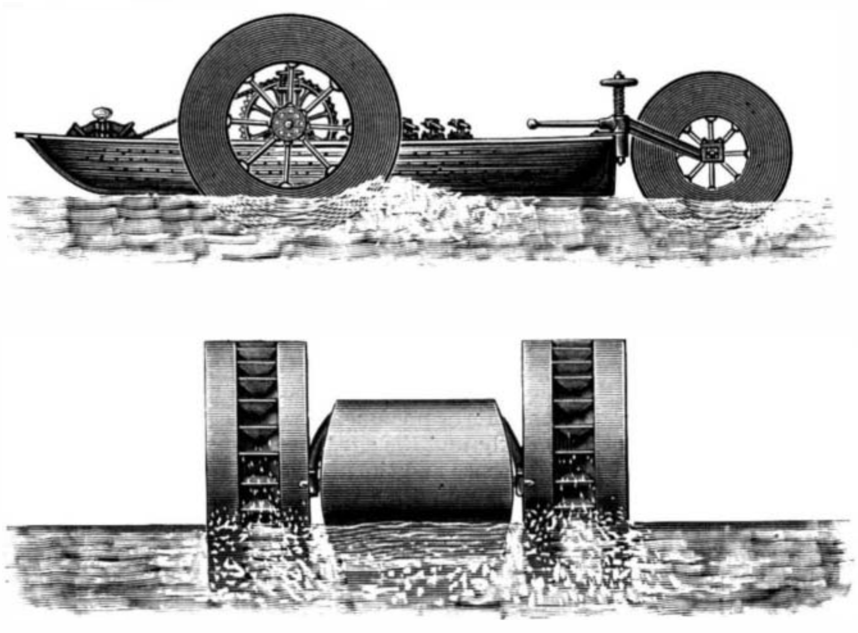

Fig. 1.—SIDE AND FRONT VIEWS OF TROUVE'S ELECTRIC BOAT, IN WHICH THE PROPELLER AND THE FLOAT ARE COMBINED.

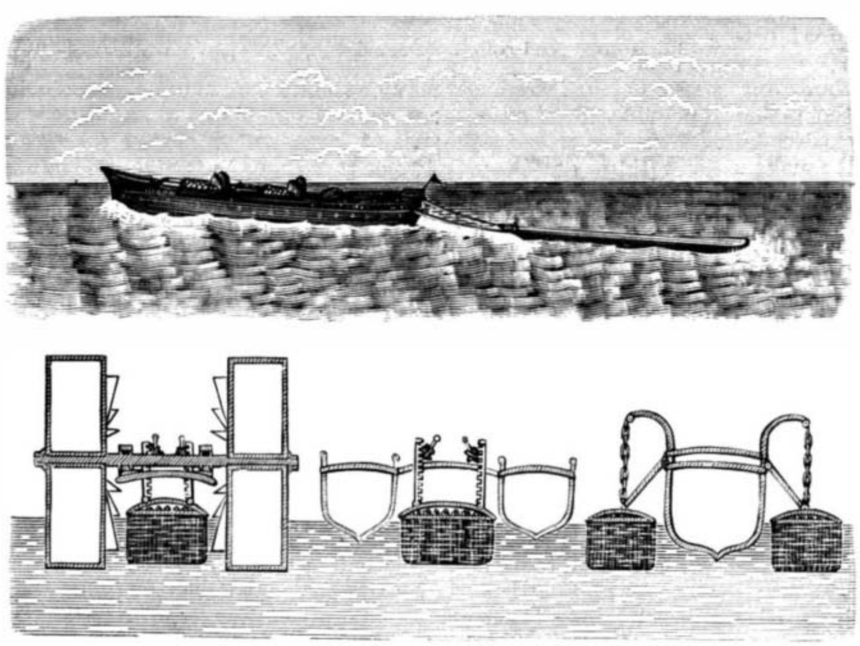

Fig. 2.—FLOATING BATTERY TOWED ASTERN OF A BOAT, OR ARRANGED UPON THE FLOAT PROPELLER.

Electricity in Paper.

No discovery has yet been made, and no contrivance has been introduced, says the *American Art Printer*, that will absolutely dissipate or nullify the disturbing effects of electricity in paper, either latent or generated by the revolutions of the press. Many employers have paid out considerable money to electrical experts and others who claimed to have discovered or to be in possession of infallible remedies for this trouble; but not one of them has squarely fulfilled the terms of this contract. We have studied the effect of wires connected with batteries and of wires connected with gas or other pipes leading to the ground; the latter on the principle of the lightning rod. While these do to a certain extent help to modify the action of electricity or the generation of it, they fall far short of doing it effectively and completely, and for that reason do not justify the outlay of much money upon them.

Again, many printeries throughout the country, beyond the reach of those who could help them with the appliances described, are at an expense which, as we have just said, the modicum of benefit that would be desired would not justify. It is for this reason that we recommend to all who have trouble with electricity in paper the adoption of the simple and inexpensive but surprisingly effective remedy we now present.

In nearly every printery a bottle of glycerine is kept for one purpose or another. Take this bottle and a clean rag or other cloth, wet the cloth with water and wring it out well until it is only damp, then pour a little glycerine upon the damp cloth, and wipe the surface of the tympan sheet with it, only on that part of the sheet where the impression is, as it is there that the reaction is effected—at the point of pressure. Do not put on too much glycerine, as it will wrinkle the sheet too much. Simply go over it as you would in oiling the sheet to prevent offset, but do not saturate it. If you find that one application or wiping will not stop the trouble, go over the impression parts again in the same manner. Some kinds of stock are more susceptible than others, and call for an additional application.

This is the simplest and cheapest of all the remedies, and as good as any hitherto known.—*American Art Printer.*

Irrigation in Montana.

Census Bulletin, No. 153, the fifth of the series devoted to irrigation in the arid States and Territories, has been prepared Mr. F. H. Newell, special agent of the Census Office for the collection of statistics of irrigation, under the direction of Mr. John Hyde, special agent in charge of the Division of Agriculture, and relates to the State of Montana, in which there are 3,706 farms that are irrigated out of a total number of 5,664. The total area of land upon which crops were raised by irrigation in the census year ending May 31, 1890, was 350,582 acres, in addition to which there were approximately 217,000 acres irrigated for grazing purposes. The average size of the irrigated farms, or, more strictly, of irrigated portions of farms on which crops were raised, is 95 acres. The average first cost of water right is $4.63 per acre, and the average cost of preparing the soil for cultivation, including the purchase price of the land, is $9.54 per acre. The average present value of the irrigated land of the State, including buildings, etc., is reported as $49.50 per acre, showing an apparent profit, less cost of buildings, of $35.33 per acre. The average annual cost of water is $0.95 per acre, which, deducted from the average annual value of products per acre, leaves an average annual return of $12.01 per acre.

The farms or stock ranches in Montana irrigated merely for grazing purposes have therefore not been taken into account in this bulletin beyond the foregoing statement as to their approximate total area.

The Proposed Columbian Tower.

We have received from Chs. Baillargé, C.E., one of the competing architects for the London tower, a communication favoring the idea of a gigantic globe for a monument instead of the servile imitation of the Eiffel tower. By inclining the axis so as to lie in parallelism with that of the earth the visitor would, at the highest point, emerge out at Chicago, and see near him the models of Columbus' galleys approaching the unknown coast. He proposes that the interior should represent the firmament, with incandescent lamps of varying power representing the stars.