A WAVE-PROPELLED BOAT.

Our illustrations describe a novel construction of a wave impulse device attached to boats for producing motion, invented by H. F. L. Linden, secretary of the Zoological station at Naples, Italy. He explains how he came to discover it in these words:

"Frequent opportunities for observing the movement of fishes in aquaria, of dolphins at sea, induced me, several years ago, to begin a series of experiments for the purpose of turning to practical uses the principle of the swimming motion of fishes. After many experiments, I ascertained the following facts:

"If powerful, resilient floats be attached horizontally, obliquely or vertically, under the water-line of a floating body, for example a boat, in such a manner that the free ends of the floats (made of sheet steel or of other elastic material, or of some skeleton covered by a membrane, like the webbed feet of aquatic birds) are directed rearwardly, then the boat will move constantly and spontaneously onward through the waves, by reason of the impact of the water on the elastic floats, the operation of the latter corresponding essentially to the action of a fish's tail.

"The resistance encountered in the water by the floats, due either to the motion produced by the pitching and rolling of the boat or to the direct pressure produced by the impact of masses of water falling on the upper surfaces of the floats, causes these elastic floats to bend outwardly to a corresponding degree; but as soon as the waves have momentarily subsided, the floats spring back to their initial position. It is evident that the striking of the masses of water against the arched surfaces of the floats, as well as the exertion of force during the backward springing, gives rise to a force which is directed toward the fast ends of the floats and which drives the boat in the direction of this impulse. Thus, by means of a continuous motion of alternate arching and backward springing, the boat is put in motion, and, as already remarked, in a direction from the free to the fast end of the floats.

"The effect of the floats is the more pronounced as the motion of the waves is stronger and more frequent.

"Owing to the resistance encountered by the floats in the water, the pitching and rolling of the boat is materially reduced."

The direction of the boat's motion is therefore independent of the direction of the waves or of the wind, and depends only on the direction given to the spontaneously moving free ends of the floats. Thus, for example, if the free thin ends of the floats are directed forwardly, then the boat is driven rearwardly; if one half of the floats used be directed forwardly and the other half rearwardly, then the action of the floats ceases, and the boat stops. It follows, therefore, from the preceding, that by disposing the floats unsymmetrically, the effect of a rudder is obtained. The boat illustrated, however, is provided with an ordinary rudder, since the latter is more easily controlled.

A long series of experiments at sea has proved that the floats must arch themselves in approximately the same curves as the caudal fins of dolphins and other fishes.

"The accompanying diagram represents the boat which I used at sea during my experiments, and which has proved itself well adapted to my purpose. This little vessel is provided at both ends with watertight compartments. Her length is 4 meters (13·12 feet); her beam, 0·95 meter (3·12 feet); her depth, 0·50 meter (1·64 feet); and her displacement about 200 kilogrammes (440 pounds). The floats taken together weigh about 40 kilogrammes, (88 pounds), the forward float being at the bow or right hand end of the boat and the after float, formed in one piece with the rudder, being at the left hand end.

"After many experiments, it has proved simplest and most expedient to use only horizontal floats secured to the ends of the boat, because the pitching is greatest at these portions. I no longer use vertical floats, because they are to a marked degree less effective than horizontal floats. They are, moreover, difficult to handle, and being fastened to the keel, increase the draught of the boat, thus rendering landing difficult.

"In the type of boat illustrated the floats may be attached and removed with equal readiness. On account of the small size of the boat, I thought it unnecessary to make the after float adjustable forwardly.

"Each float is made of four hardened steel plates 50 centimeters (19·50 inches) in length; 25 centimeters (9·75 inches) in breadth; and 1·75 millimeters (0·068 inch) in thickness, thinning out to 0·25 millimeter (0·0098 inch) at the free ends.

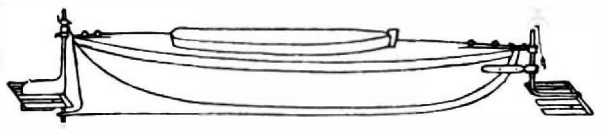
"The spaces between the plates can be spanned with smooth canvas, thus increasing the area of the upper surface of the floats from 1 square meter (about one-third of the surface in contact with the water when the boat is afloat) to about 1·25 square meters (13·455 square feet). The resiliency of the floats can be increased or decreased by means of steel tongues. Since the floats considerably reduce the rolling of the boat, I take but little ballast on board, even though the water be very rough. As a rule, the floats are placed at such a depth that, so long as the boat is afloat, they shall always be under water.

"Many experiments with different sized models have demonstrated that the speed is increased with the length of the boat, without a corresponding increase in the area of the upper surfaces of the floats. Floats of the size mentioned have been proved strong enough to propel boats of larger size than the one described. They were used last summer on a 5½ meter (18·04 foot) caique, which towed at the same time two smaller boats each 3 meters (9·84 feet) in length against the 'imbatto' or midday wind.

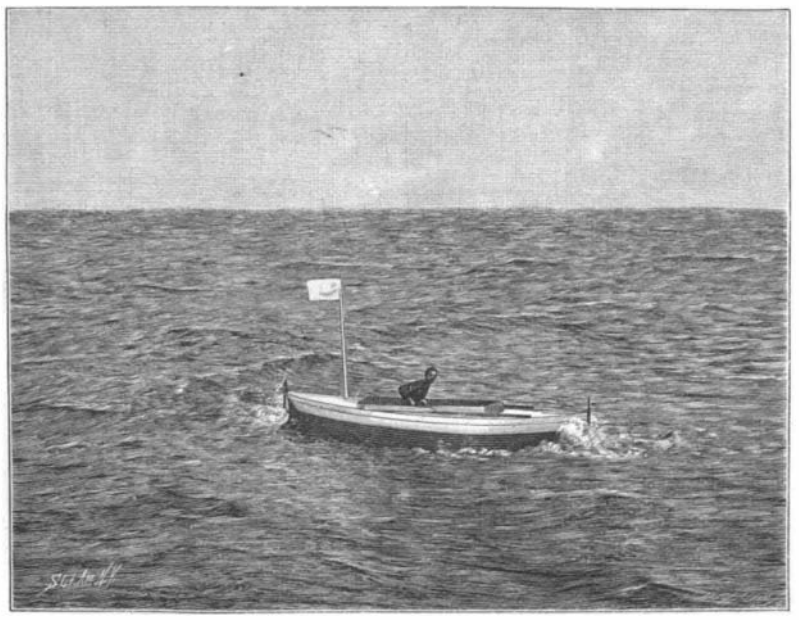
"It is a question of the future to what extent this type of motor can be practically used on larger vessels under various conditions, such as storm, calm with moving seas, etc."

A series of interesting experiments were made at the German fishery exhibition in Berlin not long ago on the river Spree, with small wave motor boats to be used to carry oil bags for spreading oil on the water surface in advance of the approach of larger fishing vessels, giving them smoother water to pass through.

It was found to be quite feasible, and the direction of these miniature oil-spreading boats or planks was regulated by having more weight on one side than the other, and also by the use of rigid thin metal flags inclined at varying angles to the axis of the boat. The boat should be comparatively heavy, in order that it may not be overturned by the high waves.



THE WAVE MOTOR BOAT AND PROPELLING FINS.



THE WAVE-PROPELLED BOAT—SPEED, 2½ MILES PER HOUR.

The larger engraving (reproduced from a photograph) shows a wave motor boat working against the waves and a south wind towing a 1½ inch plank nearly 5 feet long at a speed of about 2½ miles an hour; the white flag indicates the direction of the wind. It is certainly a very curious kind of power and a most interesting experiment.

How to Postpone Old Age.*

Anatomical experiment and investigation show that the chief characteristics of old age are the deposits of earthy matter of a gelatinous, fibrinous character in the human system. Carbonate and phosphate of lime, mixed with other salts of a calcareous nature, have been found to furnish the greater part of these earthy deposits. As observation shows, man begins in a gelatinous condition; he ends in an osseous or bony one—soft in infancy, hard in old age. By gradual change in the long space of years the ossification comes on; but, after middle life is passed, a more marked development of the ossific character takes place. Of course, these earthy deposits—which affect all the physical organs—naturally interfere with their functions. Partial ossification of the heart produces the imperfect circulation of the blood which affects the aged. When the arteries are clogged with calcareous matter, there is interference with circulation, upon which nutrition depends. Without nutrition there is no repair of the body. None of these things interfere with nutrition and circulation in earlier years. The reparation of the physical system, as everyone ought to know, depends on this fine balance. In fact, the whole change is merely a slow, steady accumulation of calcareous deposits in the system. . . . When these become excessive and resist expulsion, they cause the stiffness and dryness of old age. Entire blockage of the functions of the body is then a mere matter of time. The refuse matter deposited by the blood in its constant passage through the system stops the delicate and exquisite machinery which we call life. This is death. It has been proved by analysis that human blood contains compounds of lime, magnesia, and iron. In the blood itself are thus contained the earth salts. In early life they are thrown off. Age has not the power to do it.

Hence, as blood is produced by assimilation of the food we eat, to this food we must look for the earthy accumulations which in time block up the system and bring on old age. . . . Almost everything we eat contains more or less of these elements for destroying life, by means of calcareous salts deposited by the all-nourishing blood. Careful selection, however, can enable us to avoid the worst of them. Earth salts abound in the cereals, and bread itself, though seemingly the most innocent of edibles, greatly assists in the deposition of calcareous matter in our bodies. Nitrogenous food abounds in this element. Hence a diet made up of fruit principally is best for people advancing in years, for the reason that, being deficient in nitrogen, the ossific deposits so much to be dreaded are more likely to be suspended. Moderate eaters have in all cases a much better chance for long life than those addicted to excesses of the table. Fruits, fish, poultry, young mutton, and veal contain less of the earthy salts than other articles of food, and are therefore best for people entering the vale of years. Beef and old mutton usually are overcharged with salts, and should be avoided; a diet containing a minimum amount of earthy particles is most suitable to retard old age, by preserving the system from functional blockages. . . . The daily use of distilled water is, after middle life, one of the most important means of preventing secretions and the derangement of health. As to diluted phosphoric acid, it is one of the most powerful influences known to science for shielding the human system from the inconveniences of old age. Daily use of it mixed with distilled water helps to retard the approach of senility. By its affinity for oxygen the fibrinous and gelatinous deposits previously alluded to are checked, and their expulsion from the system hastened.

To sum up: Avoid all foods rich in the earth soils, use much fruit, especially juicy, uncooked apples, and take daily two or three tumblerfuls of distilled water with about ten or fifteen drops of diluted phosphoric acid in each glassful. Thus will our days be prolonged, old age delayed, and health insured.

* Dr. W. Kinnear, in The Humanitarian.

The Current Supplement.

The current SUPPLEMENT, No. 1193, is of extraordinary interest. The first article is "The Paris Opera House," which contains views of the façade of the Opera House, a full page view of the grand staircase, and longitudinal sections through the entire building, showing the location of all the various rooms in the entire building. "The German Maneuver Fleet in a Storm on the Baltic Sea" is a spirited full page engraving. "Official Report on the Naval Operations in the West Indies" is an elaborate article prepared from an advance copy of Admiral Sampson's report. It contains many items of interest which will appeal to all naval men and to those who have closely followed the operations of the fleet. The report is in the form of a running diary of events which took place from May 4 to July 2, so that it gives a résumé of the anxious work of almost two months which culminated in the total destruction of the squadron of Admiral Cervera. The article is accompanied by an elaborate chart showing the movement of the North Atlantic Squadron, the Flying Squadron, and the squadron of Admiral Cervera; the order of cruising, the first, second, and third orders of battle, and the day and night formation are also given This article is a most important and interesting one, and we feel sure it will be welcomed by our readers. Among the other articles are "Anthropology," the first address by E. W. Brabrook read before a meeting of the British Association. "The Dignity of Analytical Work" is the presidential address of C. B. Dudley, delivered at the Washington meeting of the American Chemical Society.

Contents.

(Illustrated articles are marked with an asterisk.)