THE SCHNEIDER TORPEDO-LAUNCHING STATION.

The Schneider Company is completing a structure of a novel and unique character for the launching and regulation of the automobile torpedoes which it constructs for the French navy. The mechanism of these torpedoes is very intricate and delicate, including a four-cylinder motor, an auxiliary motor for steering, many pipes, valves, and cranks, and a system of gearing by which power is transmitted from the motor to the twin screws.

In addition, there is the ingenious regulating mechanism, including a clock, a hydrostatic piston, and a gyroscope, by which the vessel is held rigidly to the prescribed course and depth of immersion.

All of this machinery is contained in a hull 23 feet long, a large part of which is occupied by the compartment containing the compressed air by which the motors are driven.

It is easy to understand that the assembling of all these delicate organs is a difficult task. It is necessary to co-ordinate the movements of the various parts and to regulate their action until the torpedo can be relied on to pursue a perfectly straight course.

The regulation is effected by making infinitesimal changes in the positions and motions of the rudders, the clock, and the hydrostatic piston, the adjustment being determined half by theory, a quarter by practical experience, and the remaining fourth by trial and error. The regulation involves a number of launchings and trial trips, which must take place under certain favorable conditions. It is necessary, above all, to select a sheltered spot, where still water can be found even when the sea is rough, and where the torpedo can accomplish its full range, about 2½ miles, without risk of encountering vessels or other obstacles or a depth of water less than 50 feet. The trial ground must also be situated near a seaport and a railway, and it must have attached to it structures suitable for the preparation, regulation, and launching of torpedoes.

A site offering the conditions requisite for an establishment of this sort is not easily found. The company thoroughly searched the Atlantic and Mediterranean coasts of France before it found a suitable location, in the fine roadstead that extends between the Hyères islands and the Mediterranean shore, near Toulon. Even this site has the defect that a depth of 50 feet is not found sufficiently near the shore to make it practicable to erect the required buildings on land. Torpedoes are usually adjusted to travel about 12 feet below the surface, but as they are launched from a considerable height they go much deeper at the first plunge and make several oscillations upward and downward before they become definitely established at their normal level. Hence it is necessary to have a considerable depth of water in order to avoid all danger of striking the bottom, and a depth of 50 feet is deemed requisite.

Under these conditions the company decided to construct, at the point where this depth is found, and whence the course extends seaward, nearly at right angles to the shore, an artificial island to support a building containing all the appliances required for regulating and launching torpedoes.

This ingenious project is now accomplished and the tourists and fishermen see a many-windowed building, resembling a commodious dwelling, rising 30 feet above the water and apparently resting on it, 800 feet from the shore. The building is made entirely of armored concrete. It was designed by the engineers of the Schneider and Hennebique firms, in collaboration, and constructed at the shipyard at La Seyne, 20 nautical miles distant from its present site. The lower part of the structure is a huge caisson with slightly inclined walls. This caisson, the construction of which was commenced in March, 1908, was launched in August like an ordinary vessel and remained afloat two months. After its completion it was towed to its destination by two tugs, very slowly and with many precautions, on a calm, still night, early in November. The emplacement had been prepared by divers, and a carefully leveled bed of stone, about 12 feet thick, had been laid on the sea bottom. The caisson was moored very exactly over this foundation and gradually sunk by admitting water into compartments designed for that purpose. These difficult and delicate operations were performed in exceptionally favorable weather and with perfect success. A few hours after the floating island had become a fixed one it was exposed to the fury of a violent tempest, which it sustained without injury, and thus gave a gratifying proof of its stability.

The structure will be completed, it is expected, during the present month.

The caisson, the greater part of which is submerged, terminates in a platform 11 feet above mean sea level. It is almost a solid mass of concrete, but contains a subaqueous water-tight chamber, in which are placed tubes for launching torpedoes under water. These tubes project through the wall of the chamber, and are fitted with water-tight joints. Their outer ends are surrounded by a lock, which, when closed and pumped dry, permits examination and repair of the tubes and their doors. At and above the water line, the caisson is protected by wooden fenders from injury by vessels, torpedoes, and other floating objects.

A two-story building is erected upon the platform. The lower story contains tubes for launching torpedoes above the water level and is connected with the chamber beneath by a large opening in the floor. After each torpedo has finished its course it will be picked up by a vessel, brought back to the station, hoisted to the platform by tackle running on a concrete beam and received in a large recess in the first story, whence it will go to the regulating and repair room for further adjustment. All the hoisting, conveying, and other machinery, including a series of railways, a pump for emptying the subaqueous chamber, and air compressors for charging the torpedoes, will be operated by electricity furnished by two generators, driven by petroleum motors.

The upper story of the building will contain offices, lodgings for caretakers, and an observation room placed directly over the launching tubes, and supported on cantilevers outside the wall of the building. This room will have a bay window with a glass floor, so that the moment at which the torpedo leaves the tube can be noted, for the purpose of determining the velocity. The observation room will be surmounted by a signal tower from which communication can be held with observers stationed on floats at various points of the course.

The Amateur Wireless Operator.

Some time ago, when the fleet was on its last lap of the famous around-the-world trip, trouble was experienced by the operators of several naval wireless shore stations scattered along the Atlantic coast. Complete messages could not be received by these stations, because amateur wireless operators would interfere. Their periodicity was nearly the same as that of the ships of the fleet, that is, 425 meters wave length, and many of them have as strong a sending apparatus as the ships.

Take Washington, D. C., for instance. There are at least fifty well-equipped stations. Their operators range from twelve to fifty years of age. They may not be able to send as far as the naval station, but when it comes to receiving, they get everything that is in the ether. Many of them at times hear distant stations calling the navy yard, and when no answer is heard, these young operators then call the naval station, and report that a distant station is calling them. It is claimed that the operators on watch never respond to these favors, and go on with their regular business. It certainly seems as though the naval operators were not appreciative.

Complaints are sent in every day at the Navy Department. If this continued interference keeps up, the wireless amateurs will get themselves into trouble. Two plans to regulate these youngsters are under consideration. One is to limit them to certain hours of the day, when they can do their talking. The hours most likely to be adopted will be from 3:30 to 7. Another plan is to license these stations, as they do over in England.

About a year or so ago, a high school student, who had a wireless station, thought he would have some fun by sending fake messages to the navy yard and sign the "Dolphin." The operator on watch later caught the guilty offender. A report of this occurrence was immediately made to the Navy Department, which referred the matter to the District Attorney. It was found that nothing could be done with the young man, who promised to "be good" when it was explained just what damage his mischievous pranks with wireless might do.

The Current Supplement.

A new method and a machine for degreasing wool continuously are described in the opening article of the current SUPPLEMENT, No. 1733. Dr. Robert Grimshaw exposes some wire-nail fallacies. Prof. Reginald Fessenden's paper on Wireless Telephony is continued. John S. Fielding writes on "Safety Factors in Dams." San Francisco's new fire-protection system is exhaustively described. Brimming with many a quaint bit of historical information is Franz Feldhaus's "Submarine Experiments of the Past." A. E. H. Tutton contributes an excellent paper on the Crystallization of Water. In a paper entitled "The Untilled Field of Chemistry" Arthur D. Little dwells on the stupendous stores of potential energy bound up in matter. In 1885 the distinguished physicist Helmholtz wrote a paper entitled "Theoretical Speculations Concerning Dirigible Balloons." For the benefit of aeronautical inventors we publish in the SUPPLEMENT a translation of this paper.

Magnesium is now being employed to some extent as a deoxidizer in brass manufacture, having the advantage over phosphorus that an excess may be used without harm, and, indeed, may improve the quality of the brass. Magnesium is a metal which belongs to the same family as zinc. Ordinarily the addition of 0.05 per cent of magnesium to the brass is sufficient for deoxidizing purposes.

Correspondence.

GENERAL FORMULA FOR COMBINATIONS OF NUMBERS.

To the Editor of the SCIENTIFIC AMERICAN:

I was much interested in Dr. J. G. Bland's letter in the issue of February 13th, as I had made some researches in a similar direction. I was seeking combinations of numbers that would bring any finite results in problems illustrating Euclid's proposition No. 47, Book I.

In the (Boston) Journal of Education of September 5th, 1907, and April 2nd, 1908, appeared communications from me bearing on this.

I would now submit an equation in harmony with which must be all problems, which secure finite results, illustrating this proposition:

$$(ln)^2 + \left[l\left(\frac{n^2}{2m} - \frac{m}{2}\right)\right]^2 = \left[l\left(\frac{n^2}{2m} + \frac{m}{2}\right)\right]^2$$

FRANK JEROME, SR.

Boston, Mass.

ACCURACY IN SCIENTIFIC DICTION.

To the Editor of the SCIENTIFIC AMERICAN:

Prof. S. A. Mitchell's article in the SCIENTIFIC AMERICAN of February 6th contains a number of inaccuracies that should not pass unnoticed.

First, the extremely loose way in which the terms "temperature" and "heat quantity" are used is to be deprecated. It should be remembered that the thermometer measures temperatures, and that such terms as "degrees of heat" have no meaning.

In explaining the action of the thermopile Prof. Mitchell says: "When heat strikes a thermopile it alters the resistance offered to an electrical current passing through it, and this change of resistance is measured by the galvanometer." The most elementary text-book shows that the action of the thermopile is nothing of the sort.

Further on we find: "Where the strength of the solar heat is the large number 10,000,000 that of the moon (i. e., reflected solar radiation) is only 12; or in other words the sun shines with an intensity 800,000 times that of the moon." It would be pleasing to learn what justification there may be for the term "strength" as applied to solar heat. This sentence, however, commits the graver fault of treating two distinct propositions as identical. It may be that the sun shines with an intensity 800,000 times that of the moon, the comparison being made with the photometer, but when the total radiations of the two bodies are compared the ratio is about 180,000 to 1, and the latter is the ratio here involved, as nearly as I can make out.

What is meant by the "intensity of the corona at 1.5 millimeters from the sun's limb," etc.? We may guess that Prof. Mitchell means the rate of radiation of the corona at the above-mentioned distance from the edge of the solar image (size not specified) given by his particular apparatus, but as the language stands it really means nothing at all. It is an extremely dangerous practice to use scientific terms in other than their exact and accepted signification.

C. C. HUTCHINS.

Bowdoin College, Brunswick, Me.

FROM THE TRACK-WALKER'S STANDPOINT.

To the Editor of the SCIENTIFIC AMERICAN:

The unveiling of disagreeable facts sometimes helps to needed reforms. In a late editorial you bore down heavily on the antiquated railroad spike as out of place in the modern American roadbed and track, and only fit for a museum of railroad antiquities; at the same time commending the general excellence of the best modern American roadbed and track.

I venture the assertion that there is as little of such bed and track in proportion to the whole as there is of the best American highway.

The locomotive is said to be the most perfect and useful or satisfactory machine that man has made, and the ordinary wheeled vehicle, to say nothing of the automobile, has also reached a high state of perfection. Yet they both run upon roads that in general are full of defects.

In all the controversy between the railroads and the railmakers over the weakness and imperfections of the rail, the railmen have always acted upon the defensive, whereas they might well, and with perfect safety, have carried the war into the camp of the enemy. Rails are sometimes defective, it is true, but the treatment they receive, and the abnormal strains to which they are subjected and in the main endure without injury, entitle them to be called one of the very best products of the American manufacturer.

The rail as delivered to the consumer is a straight piece of steel, and is intended to lie flat, with more or less rigid connections, upon a comparatively unyielding surface. It is actually placed upon a bed almost as yielding in proportion as the packed soil of the ordinary highway yields to the carriage wheel. In most cases it very soon assumes a bent condition, usually lowest at the joints, and in many cases very much depressed, so that in looking along the line from a little above its level, it seems to be made up of arcs of circles. These are short in perspective, and so they are in the rapid transit of heavy wheels over them, making the shock of impact very abrupt. Moreover, they do not lie still, but a wave of depression passes along them as the wheel advances. In a short time, as you say, the vertical motion has loosened the spikes, and the depression at the joints increases. How hard it is to make a level joint appears from the fact that on many bridges and trestles where the foundation is timber and not soil, this joint depression is plainly to be seen.

In the electric traction experiments at Berlin, it was found that high speed was so destructive to the track, that an entirely new system of road building had to be devised. It may come to this for the use of our fast and heavy locomotives before safety can be assured. The imperfections mentioned would seldom be noted by the unpractised eye from the level of the car, but from the level of the trucks they are only too apparent.