SCIENTIFIC AMERICAN

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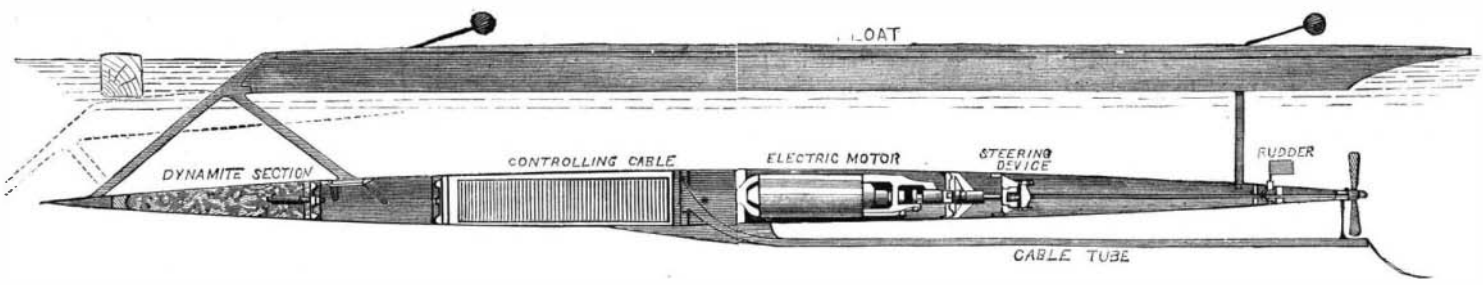
EXPERIMENTS WITH THE SIMS-EDISON TORPEDO.

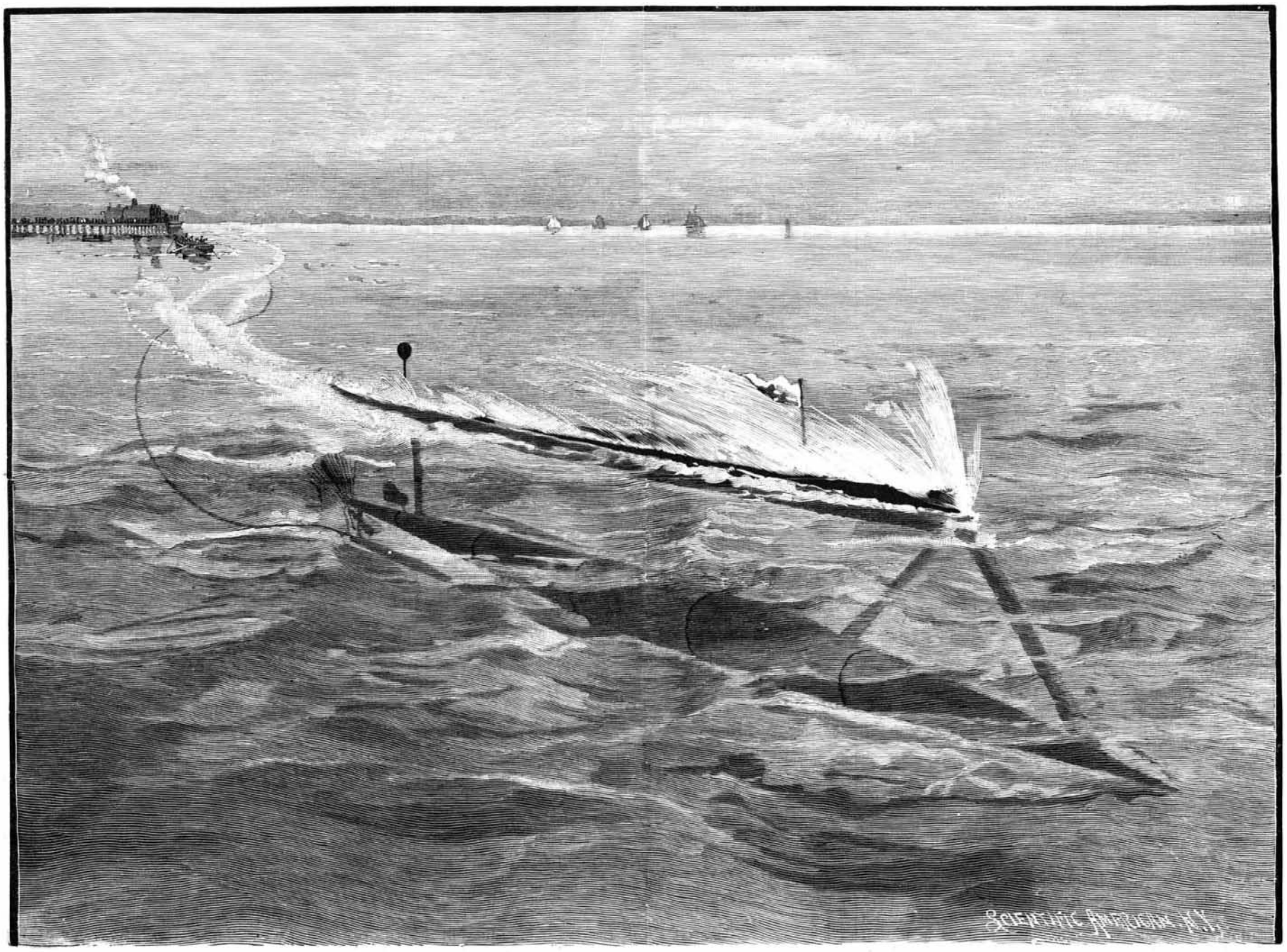
On Tuesday, July 15, an exhibition of the Sims-Edison electric torpedo was given at Willets Point, at the entrance of Long Island Sound, in the presence of a numerous gathering of representative naval and army men and other guests. We have already described and illustrated the general features of the torpedo in this paper, and we reproduce our sectional view of the same in order to recall to our readers' mind its general construction. It consists of a cigar-shaped torpedo and motor case, within which is stowed away upon a reel from one to two miles of controlling cable. The cable is led out through a tube running parallel with the axis of the torpedo and boat to a point aft of and below the propeller wheel. Above the torpedo proper, and rigidly connected thereto, is a float possessing the general outlines of a racing shell, and provided with two sighting poles by which its course can be observed. The hull, if desired, can be filled with cellulose or cork, in order to resist the effects of penetration by shot. In actual trial it has been found to be a very difficult object to hit. The cable is connected to a dynamo at the station, which may be on the shore or in a ship.

The peculiarities of its action as developed by these features may be summarized thus: As the torpedo progresses the cable is fed from out its body. The result of this is that there is no cable to be dragged through the water; the torpedo progresses, but the cable remains stationary, so as not to impede its speed. As the source of electric power is in the station, there is no limit beyond that imposed by the size of the cable and electric motor to the power which may be transmitted. The active explosive agent is contained in the submerged torpedo case, and in advance of the bow of the float. It, therefore, is the first portion to come in contact with the hull of a ship. The instant it touches the hull the motion of the craft will be arrested, and the electric instruments on shore will at once testify to such arrest of its course by the increased mechanical strain put upon the motor, which would at once affect the current. Finally the raking bow connection, which is seen in the illustrations, enables it to give under obstacles. This maneuver has been subjected to a severe test, and the action of the torpedo in this way has been found to be very perfect.

As it was exhibited on Tuesday, it was worked from a shore station as shown. The torpedo was lowered in the water and the current turned on from the switch board. At once the craft started into action, and at a rapidly increasing rate of speed ran out into the stream. Before it stopped it had completed its course of about a mile. Under complete control of the operator on shore, it emerged from the station, and describing a long and circuitous route in the water, returned nearly to its starting point. The mile of distance was completed in about three minutes, indicating the attainment of a very high rate of speed. When in full action the hull became nearly buried, while quite a wave was thrown from the rapidly advancing bow. In some observations it has been noted that the boat went so fast as to run away from the wave it generated. All through its course triangulation observations were taken at exact intervals, in order to determine its speed. These were in charge of the corps of engineers attached to Willets Point.

The torpedo is built in four sections, which can be taken apart or assembled in fifteen minutes; none of the parts weighs more than 500 pounds. The motor at full speed can absorb over 30 horse power available for propulsion. A speed of 22 miles an hour has been obtained by it. The charge of 250 to 500 lb. of high





THE SIMS-EDISON ELECTRIC TORPEDO—THE TORPEDO AT FULL SPEED—SECTIONAL VIEW OF THE TORPEDO.

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explosive is to be exploded electrically by reversing the current. The steering is also done electrically through the agency of a polarized relay.

Its operation from a shore station is limited in extent by the length of the connecting cable. In the large torpedoes this will be two miles. In operation from a war ship, it is proposed to run two or more boats along a parallel course with the ship and close to it, receiving their motive power from the ship's electric plant. Here, as the ship and torpedoes will all progress alike, and as the electric plant on board can supply power for an indefinite period, the ship and torpedoes can keep company for almost any number of miles. When the enemy is approached the course of the ship can be arrested or its speed can be slackened, and the torpedo sent ahead or to either side at high speed, in order to destroy the enemy. For fort use a special form of casemate with conning tower and other necessary features have been planned by the company. There is little question that a number of these torpedoes could do much to defend New York harbor, at the end of the East River, between Willets Point and Fort Schuyler, and at the Narrows, from entrance by hostile vessels. Our thanks are due to Mr. Everett Frazar, the president of the company, for courtesies received.

A Liquid Volatile Nickel Compound.

Nickel seems destined to startle the modern chemical world. From being a comparative rarity, except on plated goods, it became a common laboratory material but a little while ago, then its title to be considered an element was impugned, and now it is both triumphantly reinstated and its vapor density, for the first time, determined. These results have followed from the researches of Mr. Mond and Drs. Quincke and Langer, which were recently made the subject of a paper before the Chemical Society. The investigation owed its origin to the need for removing carbonic oxide from producer gas, in order to use it in the gas battery described in Mr. Mond's presidential address at the annual meeting of the Society of Chemical Industry last year, nickel and cobalt being found to effect this object.

Working in this direction, it has been found that a direct compound of nickel and carbonic oxide, viz., $Ni(CO)_4$, exists, the new substance being a *colorless liquid*, volatile at ordinary temperatures, boiling at 43° C., having a specific gravity of 1·3185 at 17° C., soluble in alcohol, benzine, and chloroform, and not acted upon by dilute acids and alkalies. Its vapor explodes when heated to 60° C. Its vapor density determined by Victor Meyer's method is 6·01, instead of the theoretical value, 5·9; from this, the atomic weight of nickel is found to be 58. The metal itself can be obtained from it in the form of brilliant metallic mirrors of such purity as to form a splendid raw material for the redetermination of the atomic weight. The mean value obtained by reducing nickel oxide from this source by heating in a stream of electrolytic hydrogen was 58·61, corresponding closely with that previously accepted, viz., 58·52. This proves conclusively that Kruss and Schmidt's assertion that the metal hitherto considered to be pure nickel is contaminated with another element, and that all data concerning it consequently need revision, cannot be sustained, and replaces nickel as we have always known it among the elements.

The constitution of the compound $Ni(CO)_4$ is still the subject of the keenest speculation. Mr. Mond declined to be "drawn" on this point, admitting the temptation to represent it by some fascinating ring formula, but contenting himself at present with a statement of the facts. In connection with this curious body, it is to be noted that no similar cobalt compound can be obtained, thus establishing another method of differentiation and separation between it and its twin brother nickel.

Interesting and Useful Books.

Several years ago the writer, traveling abroad, visited a monastery, and among other curiosities shown him was a series of bound volumes, the sides of which were made of polished boards from the forests of the country, showing the grain of the woods.

At first sight the volumes presented the aspect of bundles of wood. But after a more careful examination it was found that they contain a detailed account of the trees that they represent. On the back, the bark has been detached in order to describe the title of the book by its scientific and its common names.

One of the pages is formed by a broken piece of the wood of the tree, showing its fibers and natural fractures; the other shows the wood when it has been polished and varnished. At one of the ends the fibers are seen as they remain after the passage of the saw, and at the other, the wood finely polished. Upon opening the book, the fruit, the grain, the leafage and other productions of the tree, the moss which generally grows on the trunk, and the insects which live on its different parts are seen. Added to this is a well printed description of the habits of the tree, the places where it grows, and its method of growth.

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Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF SCIENTIFIC AMERICAN SUPPLEMENT No. 760.

For the Week Ending July 26, 1890.

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IT PAYS TO ADVERTISE IN THE SCIENTIFIC AMERICAN.

In a letter to the publishers of this paper G. M. Robinson, Esq., president of the Charter Gas Engine Company, Sterling, Ill., writes that they are overwhelmed with orders, and that "inquiries from the SCIENTIFIC AMERICAN advertisement are so numerous and from so many points, both foreign and domestic, that we often wonder if there will ever be an end to them."

THE GYPSY MOTH IN MASSACHUSETTS.

The ravages of the gypsy moth (Ocneria dispar) in Massachusetts have been of such a very serious nature that, in March last, the legislature passed a bill creating a commission of three members, who were called upon by the terms of the act to carry into execution all possible and reasonable means and measures to prevent the spreading and to secure the extermination of the pest. Twenty-five thousand dollars was appropriated to defray the expense of the commission, and this sum has been increased by a subsequent appropriation to $50,000.

In June, 1889, several caterpillars were sent to the Hatch experiment station, at Amherst, which is a part of the Massachusetts Agricultural College. Prof. C. H. Fernald, of the Division of Entomology, was absent in Europe, but Mrs. Fernald, who had charge of the entomological work during her husband's absence, immediately designated the insect as the gypsy moth (Ocneria dispar, Linn.) of Europe. In November, 1889, Prof. Fernald issued a special bulletin in which the following interesting facts regarding the history of the moth appear.

The gypsy moth is abundant in nearly all parts of Europe, Northern and Western Asia, and it even extends as far as Japan. In 1817 the cork oaks of Southern France suffered severely from the attacks of this insect. One of the papers of that time stated that the beautiful cork oaks which extended from Barbuste to the city of Podenas were nearly destroyed by the caterpillars of the gypsy moth. After having devoured the leaves and young acorns, they attacked the fields of corn and millet and also the grape lands and fruit trees. In 1878 the plane trees of the public promenades of Lyons were nearly ruined by the same insect. In regard to his personal observations in Europe, Prof. Fernald says: "Only last summer I saw the moths in immense numbers on the trees in the Zoological Gardens in Berlin, where the caterpillars had done great injury; and the European works on entomology abound with instances of the destructiveness of this insect."

Authorities seem to agree in stating that the introduction of the gypsy moth into this country was accidental. In 1870, Mr. L. Trouvelat, a Frenchman residing at Medford, was experimenting with silkworms, and a few of these caterpillars were among the silkworms, and some of them escaped. It is a curious fact that, although the insect has been in this country since 1870, it did not become a pest until last season, and according to the entomologists of the United States Department of Agriculture, had not, up to about March 1, found its way into the collections or been mentioned in the check lists.

One of the first acts of the commissioners appointed to conduct the campaign against the gypsy moth was to advertise for specimens, for the purpose of ascertaining if they were to be found in any other portion of the State than about Medford and Malden. A number of specimens were received, but none proved to be the gypsy moth. It is therefore deemed to be certain that they are only found in this country in the same region where they were originally liberated twenty years ago. The section which has been devastated by them extended last season three miles in length and one in width, but this season the territory has been extended until it is fifteen miles long and four wide.

As the depredations of this insect and the means which are being used to check them are attracting wide attention, the following minute description by Prof. Fernald in its various stages of development may be of interest, especially as the vigorous measures which have been adopted in Massachusetts may result in driving it to other localities.

This insect was first described by Linneus in 1758, in the tenth edition of his Systema Naturæ, Vol. 1, page 501, under the name of *Bombyx dispar*, and while it has retained the specific name of *dispar*, the European entomologists, since the time of Linneus, have given several different generic names, as *Liparis*, *Hypogymna*, *Porthetria*, *Ocneria* and *Psilura*, but I have adopted that given by Staudinger in his Catalogue of the Lepidoptera of Europe—*Ocneria dispar*.

Several different common names have also been given to it in Europe, as the sponge moth, the gypsy moth, the great-headed moth, the fungus moth and others, but I have adopted the one used by the English entomologists—the gypsy moth.

The males are of a yellowish brown color, with two dark brown lines crossing the forewings, one at the basal third, the other on the outer third, somewhat curved, and with teeth pointing outward on the veins,

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