

The Hammond Radio Controlled Torpedo Boat

Although numerous and multifarious hair-raising inventions are claimed to be in use by foreign governments in the present titanic struggle for the supremacy of Europe, it is doubtful whether there is a more promising invention than that of the young American, John Hays Hammond, Jr.

Most of us have read in the daily papers

sible complete control of the movements of the boat.

The United States Government has detailed from time to time naval officers at the various trials conducted at the Hammond wireless laboratory at Gloucester, Mass. They have been highly pleased with the performance of Mr. Hammond's truly marvelous radio-mechanical craft, which

tire rights to this radio control scheme, as worked out by young Mr. Hammond and his associate scientists and engineers. It would be of inestimable value for the protection of harbors, and as it can carry as much as 4,000 pounds of high explosives and as it also could be directed from shore directly at or toward any hostile warship it is seen that a very powerful weapon is

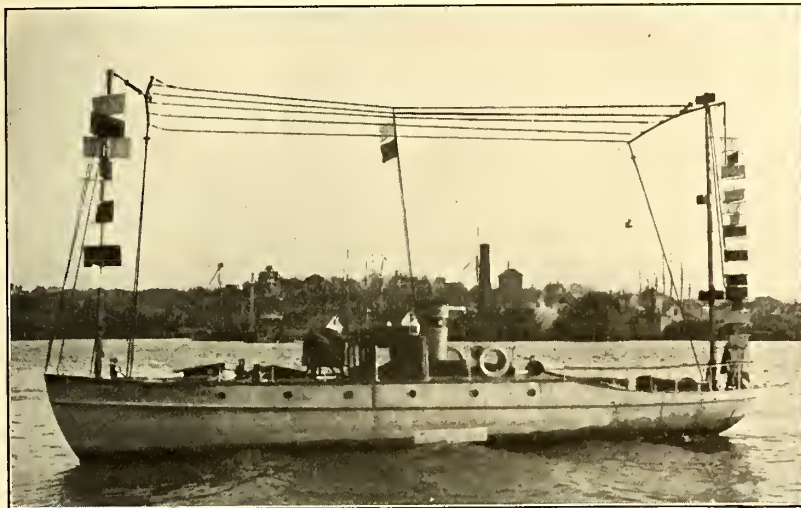


Photo (c) by International News Service.

The Hammond Wireless Torpedo Boat Controlled from Shore Station (At Right) Through Special Radio Waves. It Has Covered 28 Miles Without a Human Being on Board.



from time to time of the wonderful wireless control effected by Mr. Hammond's invention, and we present herewith a photo of his latest torpedo boat, "The Natalia." The other photo shows Radio Operator Lee manipulating the wireless key at the Hammond laboratory on shore which controls the emission of wireless waves of various lengths, which when received by the radio antenna on board the automatic torpedo boat serve to make pos-

seems to inherit almost superhuman intelligence. This may be better appreciated if we mention that from the time the boat has started from the pier until it returns from its run, which in some cases has totaled 28 miles, no human being is aboard. Truly uncanny is this meritorious device, and it bids fair to revolutionize modern warfare methods.

The United States Government is seriously considering the purchase of the en-

thus placed in the hands of our coast defense corps.

It has been reported of late that the Japanese Government has been negotiating for the exclusive rights to this invention, but undoubtedly the American naval authorities will be wide awake to the far-reaching merits and properties of such a system and we hope that it will take up the matter very shortly, so as to control all rights thereto in the proper manner.

ON THE CAUSES OF IONIZATION OF THE ATMOSPHERE.

By J. A. Fleming, M.A., D.Sc., F.R.S.

There has been much discussion among radio engineers regarding the possibility of an upper ionized strata of atmosphere which might affect long-distance day and night wireless transmission. After some explanatory remarks Dr. Fleming goes on to say: "Since quartz is not transparent to wave lengths of less than about 1,850 A.U. (Angström wave length units), and since this quartz light will not ionize air, the proof is tolerably complete that no true ultra-violet light ionization of air can take place at low levels in our atmosphere. If there is any such ionization as proved by the electric conductivity, then it can only be due to photo-electric action on dust, ice particles, or to radioactive matter in the sea or soil, or some indirect photo-electric process which yields negative ions.

"On the other hand, solar light, owing to the high temperature of the photosphere, probably does contain rays of short wave length lying within the Schumann (2,000 A.U. to 1,000 A.U.), and Lyman (1,000 A.U. to less) regions. Hence, even although the ionizing potential of oxygen, nitrogen, hydrogen and helium is 9 volts and upward, a true ultra-violet light ionization may take place in the levels of the atmosphere lying perhaps above 10 km. or 20 km. height.

"This, however, does not explain the pos-

sibility of a permanently ionized layer. It would merely account for a diurnal layer ionized by day or in the side of the atmosphere facing the sun and disappearing by night. To account for the permanently ionized layer, which it has become the custom, though as the writer thinks somewhat unappropriately, to call the Heaviside layer, it is essential to show cause for the production of ions of one sign only at some high level in the atmosphere. Good reasons have been given for supposing that the photosphere of the sun principally consists of carbon, probably condensed into flakes of soot or granules, and that the temperature, at any rate of its outer portions, is about 6,000 to 7,000 deg. C. Now we know that such incandescent carbon not only sends out ether wave radiation but emits positive and negative electrons, chiefly the latter.

"It is a comparatively easy matter to calculate the velocity and time of passage from the sun to the earth of such ions of various sizes under the action of solar light pressure. We start with the known facts that the Maxwell light pressure in dynes per square centimeter is numerically equal to the light energy in ergs per centimeter cube, and that the best value of the solar constant is 2.1 gram calories per square centimeter per minute, or 1.47×10^8 ergs are imparted per second to a perfectly black surface by normally incident bright sunshine corrected for atmospheric absorption. Hence it follows that the light en-

ergy per cubic centimeter is 49×10^{-8} ergs, and the light pressure nearly 5×10^{-8} dynes per square centimeter at the earth's surface. Light intensity at the sun's surface is, however, 46,000 times greater than at the earth's surface, and hence the light pressure at the sun is 2.3 dynes per square centimeter. These figures show that one cubic mile of sunlight at the earth's surface contains light energy equal to 14,710 foot-pounds, and the light pressure is 2.8 pounds per square mile. At the sun's surface the light is 58 tons per square mile and the light energy per cubic mile is 302,300 foot-tons, or energy enough to throw 20 of H. M. S. 'Queen Elizabeth's' 15-inch shells over the top of Mont Blanc.

"According to the most recent mathematical investigations by Prof. A. E. H. Love, who has confirmed results obtained by Prof. H. M. Macdonald, the full discussion of the problem of diffraction of long electric waves round a sphere seems to indicate that with waves 20,000 feet in wave-length diffraction alone will account for the daytime propagation of radiotelegraphic waves over such distances as 3,000 miles. Whether this be so or not, it is perfectly certain that some additional agency is at work in the night time. The onus rests on those who reject the theories built on atmospheric ionization to substitute for them some other valid explanation of the irregularities and generally greater range of night-time signaling.—*The Electrician*, London.