ure; and so skilled do these men become, that they recognize a specimen if only a portion is exposed. They also use a staff with an iron point which is thrust into the sand as they move along, thus feeling for the objects, skillfully detecting them in this way. Another method, and perhaps the one most in vogue, is to dig a trench three or four feet deep directly through a mound and then work lateral sidings. The principal field for this work is a heap of sand, or a mound, almost a mile in length and eight or ten feet in height—a vast kitchen-midden upon which the natives of this desolate place lived for years. It is strewn with abalone shells, broken mortars and pestles, bones of human beings, in fact, every short distance are found evidences of this strange occupation. The articles as fast as collected are tossed in heaps, at night being taken to the camp and later sorted, wrapped and boxed. The vicinity of the camp is apt to resemble a Golgotha from the bones and skulls strewn about, there being a demand for human skeletons from various institutions in this country and Europe. The collection is made up of numerous articles. The largest are stone mortars weighing from ten to two hundred pounds, worn out by constant trituration with stone implements at first and later by the wear of the pestle. These mortars range from very small ones, used for paint, to the largest size and a variety of shapes. Among the ceremonial objects are clubs of stone from three to four feet in length. One in the possession of Mr. E. L. Doran, of Avalon, is a remarkable weapon, a tap from which would have crushed a human skull. In small boxes the collectors pack the beads, thousands of which are found, the gathering entailing a vast amount of labor.

The writer saw a skull uncovered at the Isthmus, Santa Catalina, in which a necklace had evidently been laid upon the face; the beads had in centuries found their way, through the decay of the bone in the eye sockets, into the skull, which held hundreds, as though they had been placed there. One of the most interesting finds of these collectors are what they term "jewelry cases." These are two large shells of haliotis, which have been reversed and joined, forming a box, the edges being sealed by asphaltum, quantities of which float ashore on all the islands. Upon shaking these boxes a rattling sound is heard, showing that something is within, and when the shell is pried open, resting in the pearly interior are found earrings of pearl, choice pearl beads, a small necklace of shells perhaps, and strange objects in stone—good luck stones, all of which were made from the choicest abalone shells. Doubtless these objects were the treasured possessions of some native maiden, and were sealed up in this manner and placed in her grave. Few objects of this ancient loot have such an attraction to the buyer as these, as each "case" is different, and few can resist the temptation to break open the shells.

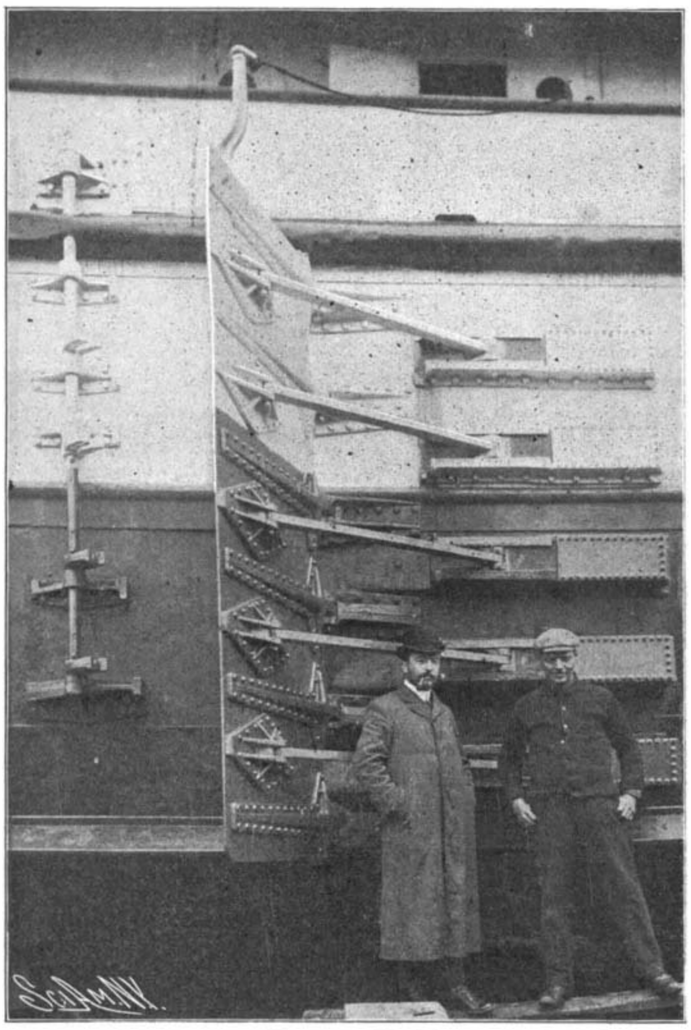
As the days go by on the collecting ground the pile of filled boxes and gunny sacks increases, and the curiosity hunters become wearied with the eternal monotony—sand everywhere, sand aloft in great whirls, now scudding along the surface, piling up against every obstruction, alternately changing the face of nature. The constant rush and roar of waves has become maddening, the lines of shags and their strange movements have long since ceased to be an amusement, and the isolated men watch and count the days when the boat shall appear; finally, when it does, they shake the dust of the island literally from their clothing and return to Avalon to take up their summer avocations as boatmen or oarsmen. The finds are divided *pro rata*, the partnership is dissolved, and the highest bidder among the curiosity dealers obtains the collection, which in a short time is spread broadcast over the country.

Artificial Electrification of the Earth Globe.

The fact that, in spite of the curvature of the earth's surface, electrical waves are capable of traveling over enormous distances is scarcely to be accounted for on current views as to the mechanism of wireless telegraphy. E. Lecher has shown that a possible explanation of these phenomena is afforded by the hypothesis that the waves are propagated on the conducting surface of the earth in the same manner as electric oscillations will be transmitted along conducting wires. This explanation, which some time ago did not exclude other hypotheses, seems the only admissible one at the time being, on account of Marconi's radiotelegraphic transmission through the Atlantic. Herr Lecher therefore in a lecture recently delivered before the Prague German Mathematical Society, once more discusses this interesting question, exposing his previous theory in a form essentially identical, though somewhat simplified.

The question as to whether it would be possible to produce telegraphic signals at distant points, by electrifying the earth globe in an artificial way, though involuntarily arising, has so far been put off because of the difficulty, nay impossibility, of a similar undertaking. Yet, in a certain sense, there occurs such an artificial electrification of the earth in wireless telegraphy. After being thrown away from the earth by the transmitting antenna and traveling through the latter a way superior to 50 meters, either electricity will return to the earth to be repelled once more, and soon. As every antenna is connected to the earth either directly or by means of a condenser, the earth at this point will be charged periodically alternately with positive and negative electricities by the oscillations produced in the long vertical wire, termed antenna. Now these electrical charges will be propagated along the surface of the earth in a manner perfectly analogous to the transmission of water waves on a water surface. The receiving antennæ will thus as well receive alternately positive and negative charges that will give rise to oscillations influencing the coherer.

In order to understand these phenomena, it is neither necessary to discuss the question of ether nor that of ether waves, nor will Maxwell's theory necessarily have to be resorted to. That, in fact, these alternative charges of the different points of the surface will be attended by vertical oscillations in the dielectricum, that, to put it in the language of that theory, ether waves will be produced, goes without saying; with the explanation suggested by Lecher, however, this is a fact of only secondary importance.



SHIP BRAKE FOR PREVENTING COLLISIONS AT SEA.

The following experiment is suggested by this theory: Two points a and b being given on the surface of the earth, so that $a\,b$ is in the direction of the transmitting antenna; if $a\,b$ be equivalent to one-half of the wave-length, a and b will alternately be charged positively and negatively with the same period as that of the oscillations themselves. Placing in a and in b horizontal metal plates of a certain extent and uniting both points by means of a horizontal wire, will give rise to electric oscillations in this wire.

A similar experiment would be interesting not only as affording a means of testing Lecher's views; supposing that electrical waves could be detected in this way, this scheme would show some technical advantages as well. The wire $a\,b$, in fact, will act only when accurately directed toward the transmitting station. Moreover, it would be possible to devise similar contrivances, affording a means of testing the absorption of oscillating charges by the earth and sea.

A. G.

Dispatches from Widewater, Va., state that Prof. Langley is still pursued by the ill-luck which has marked his recent experiments with his aeroplane. On September 3, a spark coil gave out, a valve broke in the motor, and its erratic working seemed to indicate that another failure might be looked for. The next day the port propeller, while revolving at a high rate of speed, succeeded in wrecking itself among the rods and bars of the machine.

A SHIP BRAKE.

Mention has already been made in these columns of the fact that the Canadian government has recently equipped one of its vessels—the steamer "Eureka," plying on inland waters—with a ship brake; and we are now enabled to present an illustration which shows very clearly the nature and operation of the device. As the name indicates, the brake is intended to check the speed of a vessel. It can also be utilized to assist in turning about in a limited shipway. During a recent trial made in the St. Lawrence River, near Montreal, the steamer was driven ahead at an indicated speed of eleven knots an hour. Steam was then shut off, and, simultaneously, the brake on each side opened. The vessel came to a full stop within a distance equal to her own length. The brakes were then closed, the vessel sent ahead until the original rate of speed was attained, when the engines were reversed and the brakes opened, with the result that all headway ceased after she had gone but fifty feet—about half her length. In maneuvering the "Eureka" at full speed, she was turned also within her own length, with one brake thrown open. An examination of the hull and brake mechanism after the tests showed apparently no harmful strain or other damage, and in operating the brake, no jar or vibration was observable by those on board.

This new form of brake, as will be seen from the illustration, is placed on the sides of the hull, and in its construction and method of attachment to the ship resembles somewhat an ordinary rudder. It extends downward from the extreme load line of the vessel to the bilge keel, convenience of stowing and handling the necessary area being secured by making the brake relatively deep in proportion to its width. The "gate," as it is called, consists of a stout plate of steel, heavily reinforced, which is hinged verticaly to the vessel, and normally, when not in use is folded snugly against the side of the ship. A series of heavy steel struts are pivotally attached to the back of the gate near its outer edge, and also to a series of sliding plates which are arranged to move horizontally in covered ways, built into the structure of the hull. When the gate is folded forward against the side of the ship, the sliding plates are, of course, at the forward end of the covered ways, but as the gate is released, and thrown open by the pressure of the water as the ship travels forward, the sliding plates travel backward in their pockets and compress the water that is contained within the covered ways. At the rear end of these ways is a number of orifices, which allow the water to escape gradually as the gate, in opening, pushes the slides backward. The forward edge of the gate is secured in place, when the brake is not in action, by a series of catches arranged on a vertical shaft. The rod on which the gate is hinged is provided with a bevel gear by which the gate may be started to open. The method of operation is as follows: When it is desired to stop the vessel suddenly, as in the event of a collision, or when making a landing, the catches that hold the forward ends of the gate are released, and by means of the bevel gear, the gate is slightly opened. The pressure of the water then catches on the forward edge of the gate, swings it out to the full-open position, sudden jar or shock being prevented by means of the water cushions at the back of the slides. The movement of the brake can be controlled entirely either from the bridge or from the engine room, as may be desired.

Simultaneous Manufacture of Sodium Nitrite and Massicot.

The lead and sodium nitrate employed must be quite pure. The lead especially should be free from antimony and copper. The sodium nitrate should not contain more than 1 per cent of impurities. The operation is conducted in a cast-iron vessel furnished with an agitator. At first 350 kilogrammes of sodium nitrate are introduced and heated to the fusing point, and the temperature of the bath raised to 400 deg. The lead is then added in successive portions, and the agitator put in motion. When about 950 kilogrammes of lead have been introduced, the agitator commences to rise, which indicates that the resistance of the bath is becoming too strong. The addition of the lead is then stopped and the agitation continued to end the reaction. The mixture is afterward flowed into slabs about 1 meter in length by 0.50 by 0.10 meter. These slabs are broken and treated with water, which dissolves the nitrite and deposits lead oxide. The solution of nitrite is evaporated to crystallization and yields crystals of 98 or 99 per cent of purity.

The lead oxide is separated from the lead by levigation, dried, calcined, and packed. The lead, which remains as a residue of the levigation, is introduced into a reverberatory furnace having two chambers, giving a temperature of 700 or 800 deg. C., where it is oxidized and yields litharge.—La Revue des Produits Chimiques.