BEETLE PHOTOGRAPHY.

BY H. C. HOVEY.

Certain beetles have a peculiar apparatus, enabling them to execute remarkable somersets when laid upon their backs, whence they get their common name of spring beetles or snapping bugs. Their generic name of *Elater*, from the same root as the word *elastic*, is suggested by this power of leaping into the air and alighting again on their feet. This feat is accomplished by having the prosternum elongated into a spine, which fits into a cavity of the mesosternum. The insect, lying on its back, first bends itself upward so that it rests on its head and the tip of its abdomen. It then unbends itself suddenly, the spine enters the hollow described, and thus the back strikes the floor with force enough to throw the creature ten or twenty times its own length into the air. This maneuver is repeated until it finds itself on its feet.

Several species of the *Elateridæ* are luminous in the dark. The common firefly, or lightning bug, of the United States is too well known to need a special description. But its powers are feeble compared with the so-called "lantern flies," or "cucuyos," found in Cuba, Brazil, and Mexico. M. Michelet records the most extraordinary stories of these natural lamps hung on the trees in the dark southern forests. He says that a Spanish battalion, about to disembark, were deterred from doing so, mistaking the cucuyos for matches which they supposed native soldiers were ready to apply to their arquebuses. He also tells us that persons traveling by night are accustomed to pick these fire beetles from the bushes, and fix them on their boots, so as to show the pathway, and put to flight lurking serpents. In the morning the insects are carefully replaced on other bushes, so as to be at hand for the next lonely tourist that may need their aid. Mexican ladies are said to mount the cucuyos as gems in their hair, string them as living diamonds around their waists, or, imprisoning them in gauze bags, tastefully dispose of them amid their robes, where they blaze or pale according to the condition they may happen to be in.

A living specimen of the *Elater* (or *Pyrophorus*) *noctilucus* was recently presented to the Bridgeport Scientific Society, whose curator, Mr. F. C. Smith, has kindly given myself and others the opportunity to experiment with this interesting representative of the *Coleoptera*. It resembles closely the *E. oculatus*, which is the largest of our common snapping bugs. Its length is about one inch and a half, and its prevailing color is a dark brown. On each side of its thorax are oval spots, looking like eyes, which, however, they are not. In the dark these oval spots throw such a strong greenish light as to seem like a pair of tiny electric lamps in full glow. The cucuyo also emits light from between the segments of the abdomen. Placed on a watch dial, its light enables one to tell the time of night. It is sufficiently strong to illuminate a small printed page so that the words are clearly legible. Its radiance appears to be, to some degree, under control of the will. When a jet of gas is rapidly turned on and off, the insect does his best, whether from rivalry or some other cause.

Being desirous of seeing what might be done in the line of photography by this novel phosphorescence (or whatever this peculiar natural light may be), Mr. Smith suggested to Mr. L. Farini the possibility of taking pictures of small objects by this means. The experiments performed in the presence of the writer and other witnesses were surprisingly successful. Finally, at my request, and especially to illustrate this article, Mr. Farini made the accompanying copy of a family portrait. He used a Seed plate, sensitometer No. 24. The *Elater* was held in the fingers within one inch of the original to be copied, and in such a position as to allow the rays to fall perpendicularly on the negative. The time of exposure to bug light was thirty seconds. The subsequent development was by the usual process. Mr. Farini thinks it possible to photograph the fire beetle by its own light, but has not yet done so. What he has already accomplished, however, is certainly a great novelty in photographic art.

It may be added that, in its Cuban home, the *Elater* feeds on the sugar cane, and its larva does much mischief by devouring the roots of the various kinds of tropical plants. It seems to thrive in its northern captivity, eats the food provided for it with avidity, and takes kindly to the scientific experiments in which it is called to share.

BEETLE PHOTOGRAPHY.

CALMING THE SEA WITH OIL.

Admiral Cloue, who, as well known, has occupied himself with the question of calming waves with oil, has recently published upon this subject a most interesting study in which he has reproduced and rendered complete the curious observations already presented by him in a communication to the Academy of Sciences. The author in the first place recalls all the historic notices left by writers or transmitted by tradition among certain maritime populations, showing that the effect of pouring oil on water was well known to the ancients, but has been neglected in modern times through a forgetfulness that it is difficult to explain.

We shall not dwell upon these citations; but, as the manner of spreading the oil on the sea presents a great importance from a practical point of view, we shall give by preference a few details as to the arrangements that have already been tried to this effect.

For sea-going vessels, says the Admiral, it seems up to the present that it is in sailing before the wind or standing ahull that the action of the oil is most certain. We have, adds he, seventy-four examples of ships sailing wind astern and seventy-two ships ahull that have succeeded in protecting themselves from the lashing of the sea with a minimum output considering the importance of the result obtained, say with an average of less than six quarts per hour.

Several ships, moreover, have been enabled to use the oil effectively with the waves and wind coming from the quarter, and two are even mentioned that have been able to continue their course with the wind and a rough sea athwart.

The most difficult case is that of a ship sailing head to the waves, and despite the astonishing rapidity with which the oil spreads over the sea, it seems that no success has been obtained in calming the breakers by this means, since the oil has not the time to get ahead of a ship under way. The sole exception that the Admiral is able to cite is that of the English steamer Concordia, which appears to have effectively employed oil for running ten knots against a heavy sea—an example to which was later added that of the German packet Main; but these are isolated, exceptional cases, so to speak, and there are interesting experiments to be made from this point of view, in order to assure a practical distribution of oil around a ship sailing head to the waves.

The reservoir most generally used for spreading the oil is a strong canvas bag of about five gallons capacity. This is filled with oakum saturated with oil, its mouth is tightly closed, and several holes are made in the side with a sail needle. When the wind is astern, one of these bags is often allowed to trail from each angle of the stern, or from a point a little further forward. Certain captains, however, says Admiral Cloue, prefer to attach the bags to the catheads. The bow of the ship, in plunging and repelling the sea, thus spreads the oil and widens the path where the breakers are suppressed. This arrangement appears to be very efficacious.

The bags used have various forms. They are generally cylindrical, with a basal diameter of eight inches for a length of twenty, but they are sometimes more elongated or have the form of a double cone, which facilitates the towage. In principle, it is well to endeavor to obtain a feeble but continuous and regular flow, owing to which the sheet of oil extends to a distance better than by an abundant and too sudden a flow. In addition to bags, it is possible to employ other and less primitive arrangements for spreading the oil, especially a piston apparatus. This latter has the advantage of operating solely through the pitching motion of the vessel. Its operation is certain, but it is somewhat delicate and discharges a little too much oil.

Fig. 2.—LIFE-BOAT WITH OIL BAG.

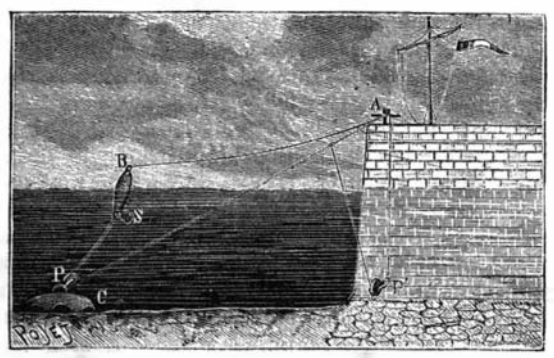


Fig. 3.—OIL BAG AT THE ENTRANCE OF A PORT.

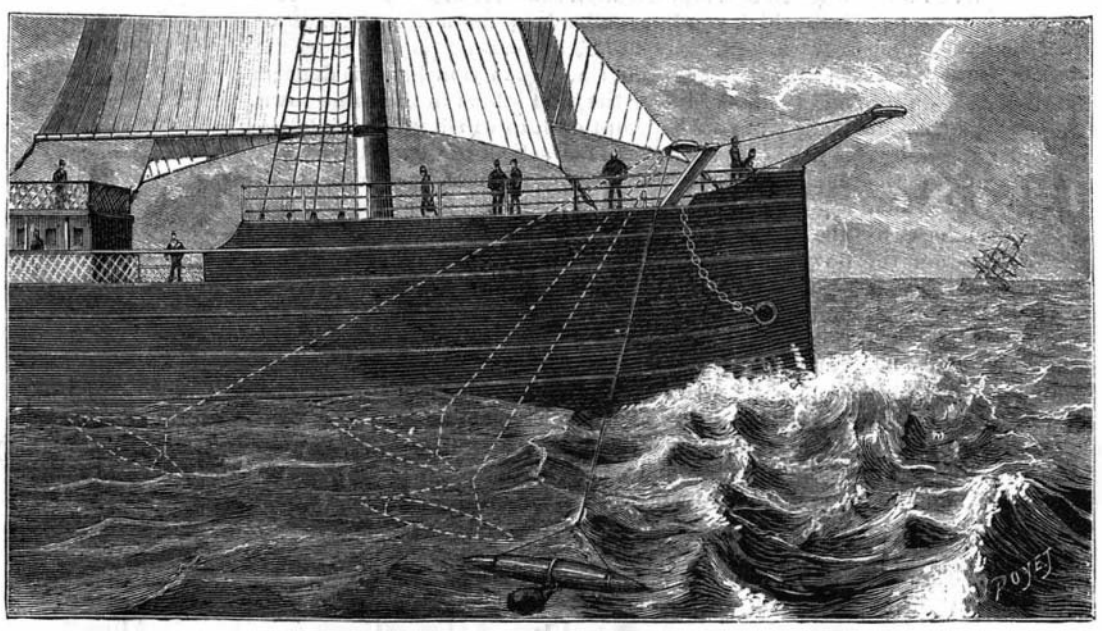


Fig. 1.—SHIP PROVIDED WITH A FLOAT CARRYING AN OIL BAG.

Mr. Townsend, who has recently made an interesting communication on this subject to the Franklin Institute of Philadelphia, proposes the use of a hollow metallic sphere, ten inches in diameter, partially full of oil, to be thrown into the sea with a rope. This sphere would be steadied by a compartment in the interior. The oil chamber would be provided with two valves, one beneath for the admission of water, and the other above for the outflow of the oil, which the water would gradually replace. These valves would permit of regulating the flow in advance, at the moment of throwing the sphere overboard.

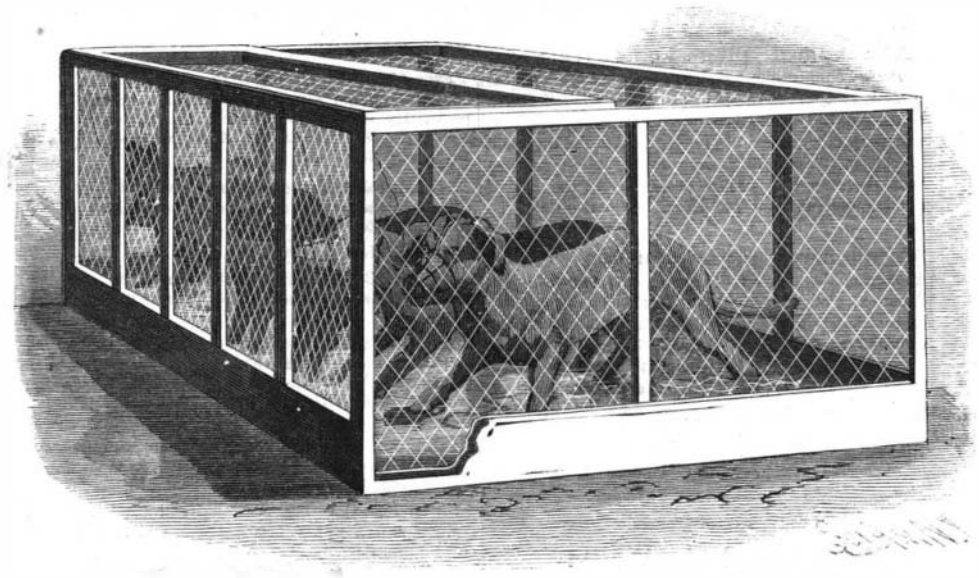
In order to be thoroughly efficient, the apparatus must be capable of being placed at a certain distance off on the sea, and be so arranged that the outflow can be regulated for running with side or rear winds, especially if, as is usually the case, the ship has not a rounded bow. At present, a continuous layer of a certain width is thus spread around the ship, and the latter evolutes in it freely, but it is necessary, in addition, to have the possibility of regulating the outflow as

need be. Unfortunately, the problem is far from being solved; but, adhering to the use of bags, the outflow from which cannot be regulated, Admiral Cloue thinks that it would be very advantageous to fix these upon floats that might, after a manner, be directed at will and sent to some distance from the ship. Fig. 1 shows the arrangement proposed by him to this effect. The float employed, which receives the bag in the center, is 8 feet in length, and is provided with a rope girdle, to which is attached a tow line, passing through a pulley fixed to a boom firmly attached to the cathead. The tow line comes on board by passing over the bowsprit. If such a float be put into the sea, it will, through the very speed of the ship, gradually come to a position in which it will efficiently protect the front by furnishing a layer of oil extending all along the vessel. An analogous arrangement may be very advantageously applied to lifeboats (Fig. 2). These latter should be so arranged as to receive the bags either at the bow or stern, or at the sides, suspended from the extremity of a spar if need be.

In some British ports, especially at Peterhead, Aberdeen, and Folkestone, different experiments have been made, with the object of rendering the entrance practicable in bad weather. Here, too, oil has been found an efficient agent for arresting the waves, but the method first proposed for distributing it over the surface was deemed too costly, and it was abandoned in favor of canvas bags attached to buoys. At Peterhead, a particularly exposed port on the coast of Scotland, a pipe whose extremity contained numerous small apertures was sunk in the port and extended as far as to the bar at the entrance. Oil was forced into this by means of a pump, and, rising to the surface, calmed the waves, so that vessels could enter the port without accident. The output of oil amounted to 350 gallons, and the result was most remarkable, for the stratum of oil lasted for a long time and formed on the surface a covering that the wind merely stirred without breaking.

The use of oil, then, would absolutely prevent the occurrence of high waves in the interior of ports, and it would be interesting if an appropriate, but less costly, arrangement could be devised, to which recourse could be had in case of necessity. To this effect Admiral Cloue proposes the following arrangement as one that can be very easily carried out:

A cast iron hemisphere, P (Fig. 3), weighing one or two thousand pounds, would be placed in front of the jetties on the shallows that are covered with breakers in bad weather. A pulley, P', receives a chain, the extremities of which reach the front of the mole, and which serves for maneuvering the oil bag, S. This latter is fixed to a buoy, B, which is attached to the chain.—*La Nature.*



PRELIMINARY EXPERIMENTS UPON THE LOWER ANIMALS.

EXECUTION BY ELECTRICITY.

The State of New York may pride herself in the fact that the gallows is to be banished and a more humane and scientific method of executing criminals is to be instituted. On June 4, Governor Hill signed the bill authorizing that criminals should be put to death by an electric shock. The bill is to go into effect on January 1, 1889, and the new method of execution will be applied in the punishment of crimes committed after that date. The passage of this bill is due principally to the efforts of the commission appointed by the legislature to investigate and report on this subject. The commission consisted of Messrs. Elbridge T. Gerry, Alfred P. Southwick, and Matthew Hale, who deserve much credit as having fathered and engineered this bill at Albany and for having brought it to a successful issue. The subject of execution by electricity has been long argued before the public, but New York State stands as the first government that has undertaken to make the experiment of its practicability. The failure and barbarity of the old system have been amply demonstrated by the sickening scenes that so often characterize our public executions.

The practicability of this method has been studied and experiments have been made under the commission's directions. The result of this has been the method suggested by the commission and recommended in their report, and which is illustrated in the accompanying engraving. The criminal is seated, bound to a chair having a metal seat connected with one pole of the current. At the back of the chair there is an adjustable head rest, having a metal plate on its face and a metal band, which passes around the forehead of the criminal. The wires may be connected with the dynamo, which, according to the bill, may be of any approved type, or the current may be supplied from an electric light plant, or there may be a private plant arranged especially for that purpose at the place of execution. Sponges or dampened cloths should be applied at the points of contact with the convict to render the connection more perfect. At the proper moment the switch is turned by the officer, and instant death ensues. The current passes along the spinal column and attacks the brain and nerve centers. The current may be left on a few moments to bring about complete exhaustion, and to assure against the possibility of resuscitation. In respect to the action produced upon the subject physiologically, Prof. Elihu Thomson says that "in most cases, death seems to be the result of nerve exhaustion and asphyxia, and in others may be due to rupture of blood vessels or injury to the valves of the heart, as a consequence of violent contraction under the enormous stimulus of powerful currents. Broken or interrupted currents or alternating currents, the waves of which are abrupt in character, are, without doubt, the most powerful in injurious effects upon the animal system. I think it would be quite possible to construct a small machine to give the requisite currents by induction from a small storage or other battery current, or a small machine run by hand or by water motor might be employed, which machine would be designed for the most powerful physiological effects, the nature and strength of the current being selected in accordance with this object."

To the end of testing the effect and efficiency of the electric current in destroying life, a number of experiments have been conducted upon the lower animals, under the supervision of the commission. A number of dogs were procured, and the general method employed was as follows: A pine box was provided having a zinc lining, which was connected with one pole of the electric light current which was employed in the experiments. The other pole was connected with a muzzle placed over the head of the dog, and having a copper or iron bit passing through his mouth. As soon as the switch was turned completing the circuit, instantaneous death was produced. The box was partly filled with water during the experiment to render the connection more perfect.

It was desired to watch the effect of the shock upon the functions of the heart, and to that end an experiment was made by making an incision into the trachea of a dog, into which a tube was inserted, connected with a bellows for maintaining artificial respiration. The walls of the thorax were then removed, so that the heart and lungs were exposed to view and their action could be watched. The forced respirations were kept up by means of the bellows. The dog was then placed in the zinc-lined box, and the muzzle and bit were adjusted as above. The current was then applied and the action of the heart was instantly arrested, and became as it was described "a mere mass of quivering flesh," in which not the least resemblance to the rhythmical movement of the heart was observable. Other experiments of the same nature were made, but in each case with the same result, and in no instance was it possible by keeping up the forced respiration to produce resuscitation.

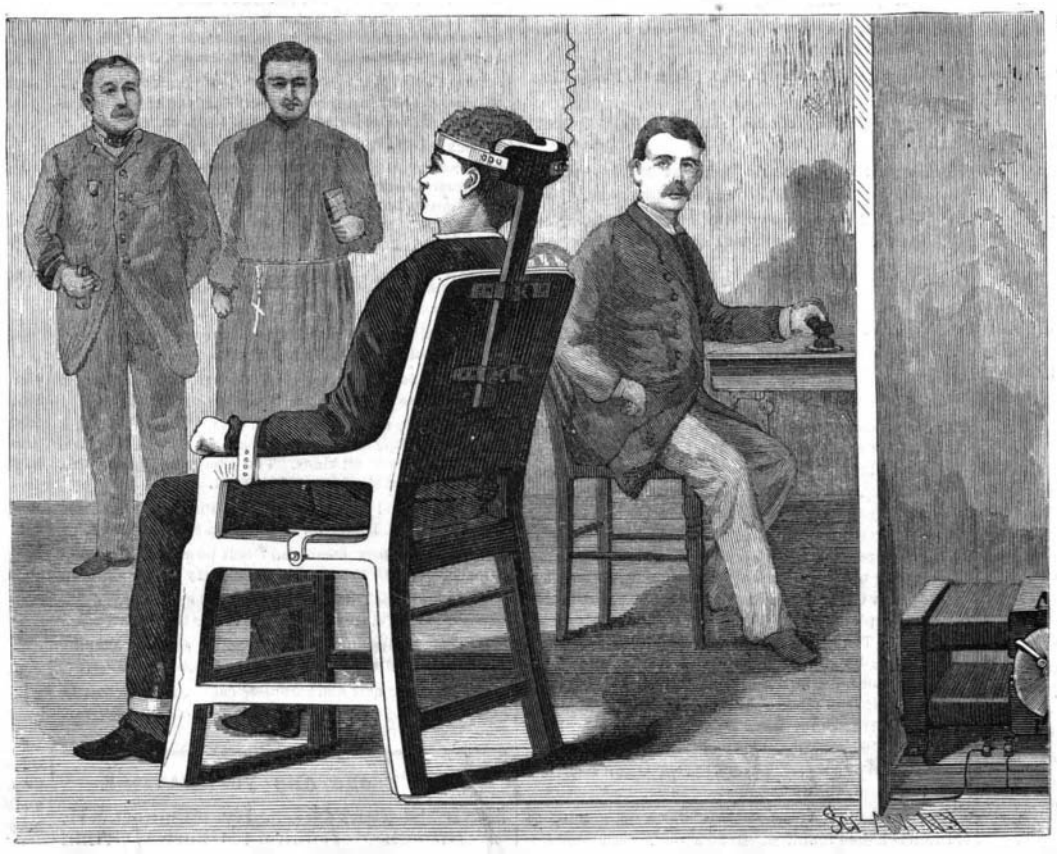
It will be some months yet before the practical results of the use of electricity as a means of execution can be essayed, but of the enormous and deadly influence of a strong current there are constant proofs in the fatal results that have so often occurred in accidental contact with the electric light wires in the streets of our great cities.

There are several other changes in the methods of treatment of the condemned which will be put in practice under the new law. Under the new code the prisoner is to be sentenced to death without the assignment of any specific date. The week only will be named in which the crime is to be expiated, but the day and hour is to be decided upon by the agent or warden of the prison in which the execution takes place.

The announcement of the day and hour will be made only to the persons permitted to be present at the execution. No one can visit the condemned without an order from the court, except the officers of the prison, his counsel, physician, priest, and members of his family.

Many years ago this subject of execution by electricity was introduced and discussed by the SCIENTIFIC AMERICAN, and ever since the question has been one that has been more or less prominently brought before the public. It has now become a law. As a conclusion is appended an extract from an editorial published in this paper in 1873, and which is of some interest in view of the passage of the bill:

"The objection that electrical executions would be free from the horrible impressiveness of hangings might be easily obviated. The criminal, for instance, could be exposed upon a platform, in full view of the assembled witnesses, and manacled to a chair, his irons being connected with a battery and Ruhmkorff coil capable of giving say an 18 inch spark. The mode of closing the circuit might be a simple button, to be pressed by the finger of the sheriff. Then, when the usual formalities conclude, the latter official establishes the current, the convict instantly expires, and all is over. There would be no slipping nor breaking of ropes, no black caps, no suspension of a writhing form for twenty minutes or half an hour, none of the grim watching for death by the medical attendants, nor any of those hideous surroundings which now only serve as food for sensation mongers, and prove that a relic of barbarism can still be retained in the laws of a civilized country."



EXECUTION BY ELECTRICITY, SHORTLY TO BE INTRODUCED IN N. Y. STATE.