

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 Cloué 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 cat-head. 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 life-boats (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 Cloué proposes the following arrangement as one that can be very easily carried out:

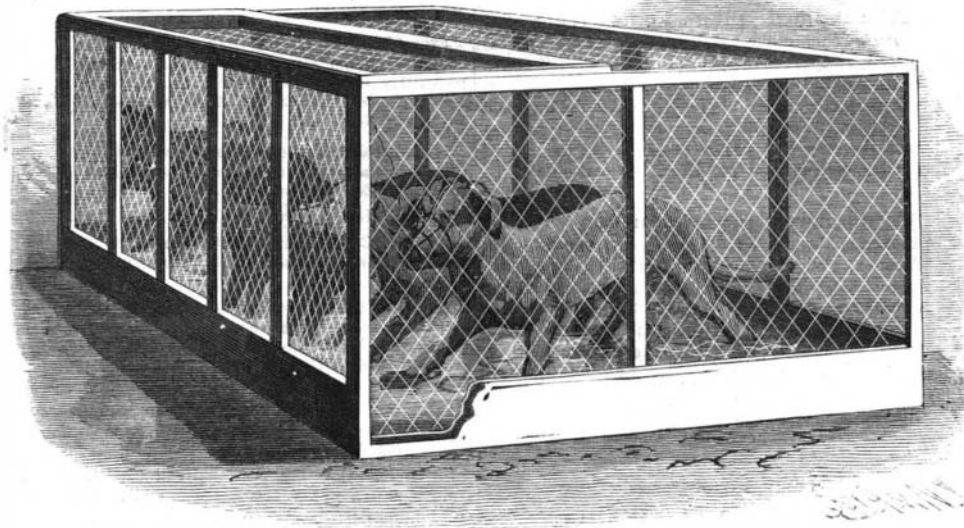
A cast iron hemisphere, P (Fig. 3), weighing one or two thousand pounds, would be placed in front of the jetties on the shallows that are covered with breakers in bad weather. A pulley, P', receives a chain, the extremities of which reach the front of the mole, and which serves for maneuvering the oil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

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



PRELIMINARY EXPERIMENTS UPON THE LOWER ANIMALS.

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

ments 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.

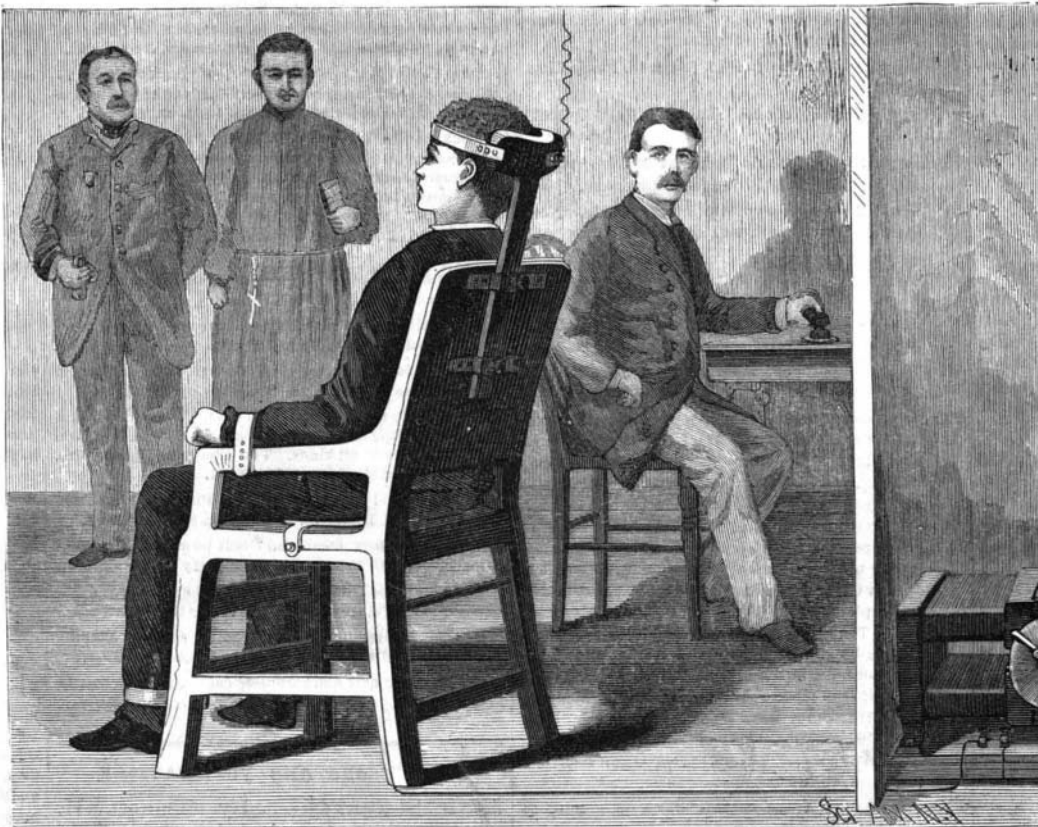
It will be some months yet before the practical results of the use of electricity as a means of execution can be essayed, but of the enormous and deadly influence of a strong current there are constant proofs in the fatal results that have so often occurred in accidental contact with the electric light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



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

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 experi-

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."