A NEW CONSTANT CURRENT PILE.

Dr. E. Obach, while experimenting with his movable bobbin galvanometer, had need of a battery that should furnish an intense and constant current of long duration, and was therefore led to devise and construct the pile which is shown in the accompanying cut.

This apparatus is nothing else than a Bunsen battery, employing zinc, water acidulated with sulphuric acid, carbon, and nitric acid, and so arranged as to secure a continuous renewal of the liquids. The internal resistance of each element is, on an average, 0·07 ohm, and the electromotive force is 2·09 volts. It is able, then, to furnish nearly 30 amperes in a short circuit.

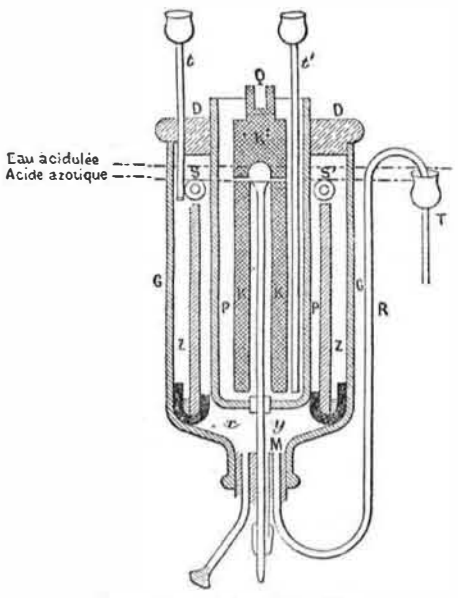
G G is a jar, 20 centimeters in height and 12·5 in diameter, placed in an inverted position over a proper support, and the bottom of which has been removed and replaced by a wooden cap covered with paraffine. The porous red earthenware vessel, P, which is held in place by a cork ring, is 23·5 centimeters in height and 6 in internal diameter. The choice of the porous vessel is very important, and the proper working of the element depends much upon the quality of it.

Those employed by Dr. Obach became entirely saturated one minute after having been filled with water, this giving the measure of their porosity.

The porous vessel is closed with a cork saturated with paraffine and traversed by a carbon, K. This latter, which is retort carbon, is 22·5 centimeters long by 3·5 in diameter, and contains in its center an aperture 15 millimeters in diameter and 18 in length. In its upper part there is a series of small radiating holes; and a glass tube, M, whose upper extremity is funnel-shaped, reaches its summit and traverses the porous vessel as well as the cap of the jar. The bottom of the porous vessel is paraffined, as is also its upper edge and the head of the carbon. Upon the bottom of the jar there rests a gutta-percha ring which forms a channel, *x y*, that is filled with mercury, and into this dips the lower part of a zinc cylinder 16 centimeters in length, 6 in diameter, and weighing 2 kilogrammes. Through the cork at the lower part of the jar there pass two tubes, R and *r*, and through the wooden cover the two funnel tubes, *t* and *t'*. The former of these, *t*, terminates in the upper part of the zinc, while the latter runs to the bottom of the porous vessel.

The liquids circulate as follows: The fresh nitric acid reaches the bottom of the porous vessel through the funnel tube, *t'*, while the spent acid flows off through the radiating holes in the carbon into the central tube, M, and into a receptacle placed at the lower part. The water containing sulphuric acid enters, on the contrary, at the upper part, at *t*, and, being rendered denser through the formation of sulphate of zinc, flows through the siphon tube, R, into the tube, T. The level of the liquids is not very different (as may be seen in the figure), but that of the sulphuric acid water is a little the higher of the two in the external vessel. S S' in a section of a glass tube bent into a circle and arranged at the upper part of the liquid, where it is warmest. This tube is traversed by a current of cold water in order to keep the liquid at a constant temperature. The tube, *r*, serves to empty the pile, and is always kept corked while the latter is in operation.

All the communications are established by mercurial con-



OBACH'S CONSTANT PILE.

tacts. The zinc cylinder is connected with a strip of copper contained in a glass tube that traverses the cover, and which dips into the mercury in the gutta-percha trough. The square end of the carbon is hollowed out at Q, and the cavity is filled with mercury which serves to establish communications with the external circuit.—*La Nature.*

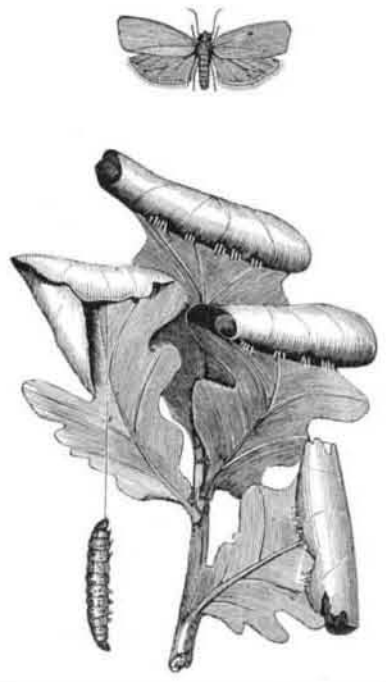
Fatal Shock from Supposed Snake Bite.

That imagination may prove fatal receives fresh proof from the case reported in the *Med. Press*, April 25, 1883, by Dr. C. R. Francis. The patient, awakened from his sleep by something creeping over his naked legs, immediately jumped to the conclusion that it was a cobra, went into a state of collapse, and died, though it was discovered, even before death, that the supposed cobra was a harmless lizard.

GARDEN DESTROYERS.—THE OAK LEAF ROLLER MOTH.

The caterpillars of this pretty little moth are very destructive to the leaves of oak trees, particularly in the south of England, and they occasionally occur in such extraordinary numbers that they entirely divest the trees of their foliage. When this is the case, the trees suffer very much; in some seasons not only are a few trees here and there attacked, but acres and indeed miles of woodland are covered with swarms of this pest.

This insect is by no means very abundant every year, but, as is the case with many insects, for several years they may be positively scarce, and then for some reason, whether the absence of their natural enemies, or particularly favorable weather at a critical period of their existence, or some other



OAK LEAF ROLLER MOTH AND CATERPILLAR AND ROLLED LEAVES.

circumstance is uncertain, they make their appearance in very great numbers for one or more seasons, and then suddenly disappear as mysteriously as they came.

The birds, as usual, help immensely in destroying these caterpillars. The ichneumons and other parasitical flies attack them with great vigor, and on one occasion it was found that more than half the caterpillars were infested by some parasites.

The year before last I received a box full of caterpillars that were found feeding on the oak leaves and stripping the trees; they were in such a state of decomposition when they reached me that it was impossible to say what they all were, but no doubt there were some of these oak leaf roller caterpillars among them; in the box were also a number of hair-worms (a species of Mermis, one of the Gordi), some of which were seven inches in length, and as thick as a piece of twine. As far as I could judge, nearly every one of the caterpillars must have been infested with one of these worms, which had no doubt left their victims at their death.

The moths appear toward the end of June, and lay their eggs on the twigs or buds; the caterpillars are hatched in the following spring when the young leaves are just appearing. They almost at once begin to roll up the leaves into a kind of tube, which forms a protection for them against the weather and their various enemies. This would seem an almost impossible task when we consider the minute size of the caterpillars and the comparative stiffness of the leaves, and that each caterpillar works alone on a separate leaf. Many, if not all, caterpillars are provided with the means of spinning a silken thread, as silkworms do, being furnished with two internal tubes containing a thick gummy fluid (liquid silk, in fact); these two tubes are joined together, and terminate in one very fine one, which projects slightly from the head just below the mouth. When the insect wishes to form a thread, it touches the object to which it is to be attached with the end of this tube and ejects a drop of the fluid; then, drawing back its head or letting itself fall, a fine stream of this sticky fluid is drawn out, which immediately hardens into a strong thread. When the young caterpillar wishes to roll up a leaf, it attaches a thread to the under side of the edge of the leaf, and fastens the other end to the leaf a little way from the edge. The thread in some way becomes tighter, causing the leaf to curl slightly. Some say the caterpillars tighten the thread by pressing it down and reattaching it, or by pressing it down and spinning a fresh and tight thread which holds the leaf in a bent position. I am of opinion that the threads contract as they dry, and my own observations bear out my views. It is quite possible that both theories may be correct; the result is, however, the same. Subsequent threads attached in the same manner cause the leaf to curl more and more; others are then attached to the outside of this roll, which eventually presents the appearance of those shown in the figure. Within this shelter the caterpillar lives in comparative safety, feeding on the internal coils of the roll. If disturbed by the entrance of any enemy at one end of its dwelling, it very quickly makes its exit at the other, letting itself fall, but still attached to the leaf by a thread, by which, when it considers all danger is over, it climbs up and regains its old quarters. When a branch infested by these caterpillars is shaken, large numbers may almost immediately be seen dangling at the end of their lines some feet in length. The caterpillars attain their full size about three weeks after they are hatched; they then become chrysalides within the curled-up leaves; in the course of about a month the moths appear, and after pairing lay their eggs as before mentioned.

The caterpillars are about five-eighths of an inch in length when full grown, and are of a dull green color with brownish spots; they are provided with a pair of legs on the first three, the sixth, seventh, eighth, ninth, and last six joints of the body. The chrysalis is of a very dark brown color. —*G. S. S., in The Garden.*

Hardwoods for House Finishing.

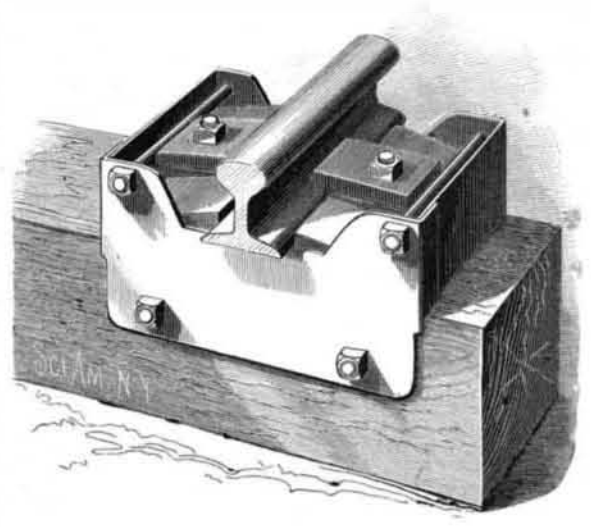
At the West, as well as in our Eastern cities and towns, the consumption of hardwoods for interior finish in buildings is a most important factor in the trade in such lumber. The woods in use by Chicago building contractors, says the *Northwestern Lumberman*, are mainly embodied in the following list: Birch, butternut, calico and white ash, sycamore, white and red oak, cherry, beech, walnut, whitewood, white maple, yellow pine, mahogany, Manila, prima vera, and coffee wood. Sycamore, white oak, and beech are the principal woods that are used quarter-sawed. On account of the growing scarcity of cherry, and the high prices charged for good lumber, other woods are sought after that will answer as a substitute, affording a similarly rich grain. Cherry is imitated with gum, and quarter-sawed beech is named as the lumber likely to take its place to some extent. Calico ash is obtained principally in Indiana and Michigan. White maple is a designation applied to the sap of the ordinary maple, which is sought after for finishing purposes. Mahogany has latterly been used to quite an extent in fancy buildings. Very often from six to a dozen different kinds of lumber are used in finishing an aristocratic residence, the plan being to have every room finished in a different wood. Walnut is less used for finishing, because of its high price, and the developing tendency to employ light shades in wood, to produce a cheerful and refreshing effect, rather than one of somber elegance. Calico ash costs about $35; quarter-sawed sycamore, $50; quarter-sawed white oak, $60; quarter-sawed beech, $50; white maple, $35; Manila, $150; and mahogany from 10 to 20 cents a foot.

IMPROVED RAILWAY RAIL CHAIR.

The rail chair shown in the engraving consists essentially of an iron bed plate, upon which the rail is securely clamped, an India-rubber block between the bed plate and tie, and a strong inclosing box bolted to the tie.

The advantage of this combination will be apparent to every engineer. The bed plate receives and retains the rail, and is itself securely held by clamps secured by bolts passing through the tie.

The rubber block upon which the plate rests takes up the vibrations, so that no pounding or shock is communicated to the structure beneath. The iron box containing the rubber block prevents the rubber from spreading out under con-



WODISKA'S RAILWAY RAIL CHAIR.

tinued use, and holds all of the parts securely in position. This construction will effect a great saving of rails and ties. It will also be of immense benefit to rolling stock. It will prevent the destruction of bridges and elevated railway structures by taking up the jar and vibration produced in the track by the rolling stock, and, finally, it certainly commends itself to public favor, as it will in a great measure, if not entirely, stop the noise and jarring of elevated railways now so much complained of, and will prevent in a great measure the abrasion that produces metallic dust, which is the cause of so much iron rust on the line of the elevated railways.

This invention might be applied with advantage to the New York and Brooklyn bridge, as it would protect the structure against the bad effects of jarring by the cars.