

OXIDE OF COPPER BATTERIES.

The De Lalande oxide of copper battery, which is well known to electricians, is now widely used, and more than five hundred thousand elements have already been employed. This battery, in fact, does not wear away in open circuit and uses the products only in proportion to the energy furnished. It has, moreover, the advantage of giving a constant intensity.

The last styles of this battery contained a zinc electrode forming the negative pole, a disk of agglomerate of oxide of copper forming the positive one, and a 30 or 40 per cent solution of potassa. The generating reaction of the current is as follows: When the circuit of the battery is closed the water is decomposed. The oxygen proceeds to the zinc, which combines with the potash to form a very soluble zincate of the latter, while the hydrogen reduces the oxide of copper to the metallic state.

M. De Lalande, without changing the constituent elements of his batteries, has just introduced a certain number of improvements into their practical arrangements and a few simplifications that reduce the net cost. The oxide of copper is now placed in cylindrical boxes of perforated sheet iron and surrounded with a porous material of very feeble resistance. In this way deposits of copper upon the zinc are avoided. A few new arrangements have likewise been introduced into the form of the zinc. One of the principal peculiarities is the method of dissolving the potash. This product, placed in tin boxes, is, when the battery is in use, suspended from the top of vessels filled with water. The water enters these boxes, which are provided with a perforated bottom, and very quickly dissolves the caustic product. The result is the formation of a thick solution which falls to the bottom of the vessel. The liquid is then mixed and the pile is ready to operate.

The new arrangements adopted are shown in the accompanying engraving, which is reproduced from *La Nature*. In No. 3 is represented a small sized element of which the total height is 8 inches and the diameter 4. This style is capable of furnishing 75 amperes-hour. Its e. m. f. is 0.8 volt and the normal intensity is one ampere, but it is capable of giving from 2 to 3 amperes upon very feeble resistances. The zinc, Z, is suspended by a hook, H, from the edge of a vessel opposite the oxide of copper cylinder, D.

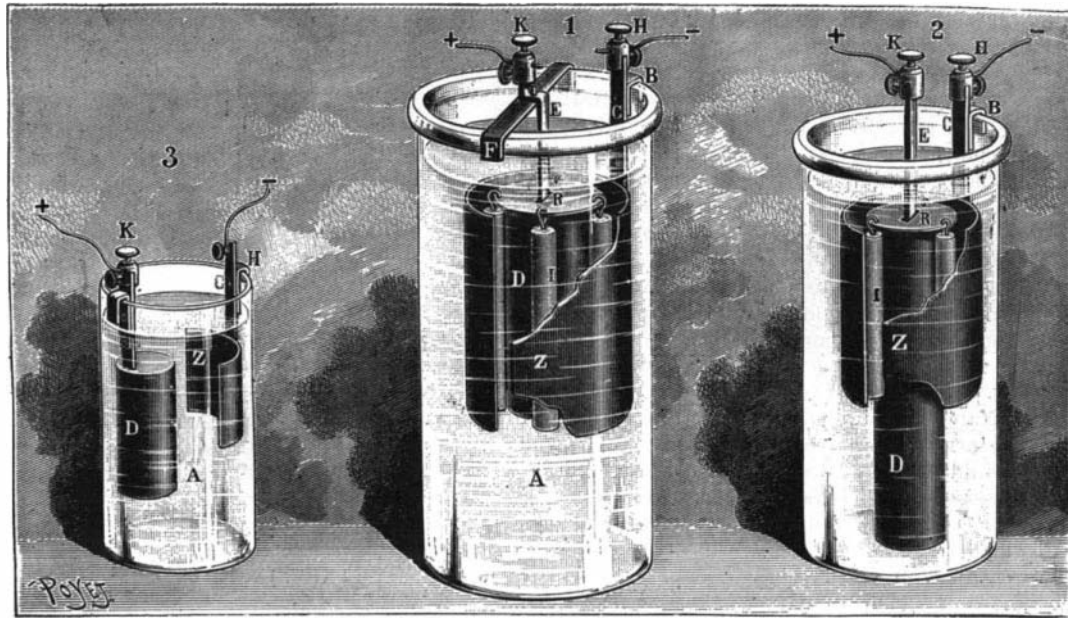
The style shown in No. 1 is the largest size. Its height is 14 inches and its diameter 7. It is capable of furnishing 600 amperes-hour at an intensity of from 5 to 6 amperes, and even a discharge of from 15 to 20 amperes. The zinc cylinder, Z, is suspended from the edge of the vessel, A, by a hook, B, and is provided with a strip, C, carrying a terminal, H. In the center there is an oxide of copper cylinder held at a distance from the zinc one by four porcelain insulators, I. The zinc cylinder is connected with a strip, E, which rests through an elbow upon a cross piece, F, and carries a terminal, K.

The medium sized battery represented in No. 2 has sensibly the same arrangements. The oxide of copper cylinder, D, rests here upon the bottom of the vessel. This element, which is 13 inches in height and 6 in diameter, has a capacity of 300 amperes-hour and is capable of furnishing from 3 to 4 amperes in a normal operation.

Such are the new arrangements of the De Lalande battery, in which the drawback to the use of potassa is greatly diminished by the recent improvements. It remains the sole type of a primary battery of large discharge that does not wear away in open circuit. All

the parts are so calculated as to wear away at the same time.

This battery is much employed for actuating indication coils and for the ignition of gas and gasoline motors. One battery will actuate for a year an induction coil operating ten hours a day. It likewise renders great services in all cases where there is needed



NEW ARRANGEMENTS OF THE DE LALANDE OXIDE OF COPPER BATTERY.

a source of feeble electric energy for constant or intermittent use.

AN ANCIENT CACTUS HEDGE.

BY C. F. HOLDER.

When, in 1771, the Spanish explorer Potola made his overland march from San Diego to Monterey, he determined to found a mission in the San Gabriel Valley. Despite the threatened hostility of the natives of the Indian village Sibanga, the mission of San Gabriel the Archangel was established in August of that year by Padres Cambon and Somero with a guard of twenty-one men.

This mission rapidly increased in wealth; but, the mission building being injured by an earthquake, it was deserted and replaced by another on a different location in about 1775. The mission became a power in the land and one of the most interesting in the remarkable ecclesiastical chain which tells the story of Spanish courage in this country.

It is interesting to note how the early Spaniards utilized the material of the country. One of the most striking instances is the old tuna hedge or fence which in early days entirely surrounded the San Gabriel Mission property, portions of which are intact to-day, and form a striking feature of the landscape in the vicinity. The hedge was planted by Father José Maria Zalvidea in 1806. The grounds of the mission embraced



ANCIENT HEDGE IN CALIFORNIA.

hundreds of acres, and owing to the hostility of the Indians, it was necessary to fence them in. Timber was very scarce, the only available material being the fine oak forest in which the mission was built, which gradually disappeared, probably as fire wood. Other timber was to be found only in the mountains, seven, eight or ten miles distant. Zalvidea had noticed the

tuna, or Cactus opuntia, growing in great masses all over the country, saw that it was impenetrable and that its fruit was eaten by the natives; so he ordered the latter to collect and plant the cactus along the boundaries of the mission property. The opiny plant grew rapidly, and in a few years was an impenetrable chevaux de frise, a perfect fence and barrier which the

domestic animals could not pass nor an invading force easily cut down. To-day the remnant of the great hedge constitutes one of the historical points of interest in the San Gabriel Valley and is visited by hundreds yearly.

The accompanying illustration shows several hundred yards of the old fence. Its height ranges from 6 to 10 feet, and it was probably higher when cared for by the natives of the mission. The original fence was undoubtedly several miles in extent, but has been broken by the passage of roads and streets, the disconnected portions being widely scattered but still vigorous, telling a most interesting story of the energy of the early settlers of the region. This cactus is one of the most economical hedges on a cattle range.

In this connection it is interesting to note the plants which are utilized in this way. The spiked leaves of the century plant are often employed. The plants are placed 4 or 5 feet apart, the leaves soon meeting and forming a hedge which is almost impossible to penetrate without serious injury. The name of this agave is a misnomer, especially in California, where it blossoms in from ten to twelve years, then dying down, the leaves falling away on all sides, deprived of life and vigor to supply the rapidly growing flower stalk.

In strange contrast to these warlike fences in California are the hedges of flowers found in the cities and towns. Thus one of the commonest hedge plants is the calla lily, which grows with the pertinacity of a weed and forms a beautiful hedge when in bloom. Geraniums and heliotropes are alone employed for this purpose. A fence or hedge of the latter on the island of Santa Catalina is nearly 5 feet in height, with woody matter sufficient to make it of value beyond a mere ornament.

Rose hedges of the rarest climbing roses are common everywhere in Southern California, those of the Cherokee and Gold of Ophir roses being especially beautiful when in bloom, the latter forming solid masses of color; while the Cherokee, with its broad-petaled white blossoms, presents a striking contrast against the glossy dark green of the leaves. The old tuna hedge will, in all probability, soon disappear. The gradual increase

of population, the building of towns, will necessitate its removal, and thus one of the interesting landmarks of the country will have passed away.

The Identification of Our Soldiers.

A new plan has been adopted for identifying the men in the regular and volunteer United States armies who may go into action. They will wear around their necks little tags of aluminum, by which they may be identified if found on the field of battle. In the last war it was often impossible to properly identify the dead soldiers, and thousands were buried in graves marked "unidentified." The War Department

has prepared this system of identification, and each tag will bear the numeral assigned each man on the muster rolls, with the letter of his company, battery or troop and his regiment.

It takes 72,000 tons of paper to make the post-cards used in England each year.