

kilogrammes (1,980 pounds) an hour. The second motor is fastened to a bed-board and is portable. It has a horse power of three-quarters and drives a centrifugal cream separator having a capacity of 450 liters of milk per hour, or a mechanical winnower placed in the wheat bin.

TATTOOING.

BY RANDOLPH I. GEARE.

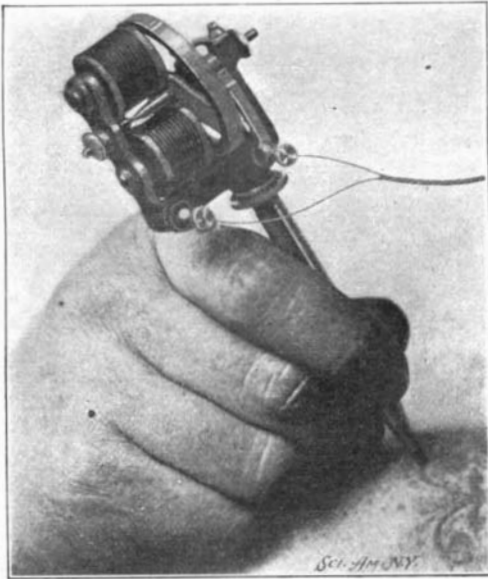
The custom of tattooing originated among savage people, and was primarily established, it is believed, as a substitute for writing and as a means of permanently recording facts in their lives. The word "tattoo" is derived from the Polynesian *tattaw*, and was

arose the practice there of tattooing the men instead of the women.

There are two principal methods of tattooing, i. e.,

the skin which is afterward pricked in, and to which various coloring matters are applied, so as to produce a permanent picture. Tattooing has its modern votaries among civilized people, and that it may be made a lucrative business seems proven by the fact that some years ago a device was originated by O'Reilly, of New York city, for making tattoo marks. Briefly stated, it consists of a hollow ink reservoir surrounding a suitable set of needles which are reciprocated by electric power. This implement is here shown; and that its inventor had no difficulty in obtaining customers is indicated by the examples illustrated in this connection.

For lack of space only two or three methods of tat-



The Electric Tattooing Needle.



Marquesas Warrior.



Head of a Savage in Goettingen Museum, Showing Large Amount of Post-Mortem Tattooing.

first anglicized by Captain Cook. The practice has been defined by Berchon as "that strange and very ancient custom which consists in the introduction under the cutaneous epidermis, at different depths, of coloring matter, in order to produce some design which will be of very long duration, though it is not absolutely indelible."

The significations of tattooing in different regions have become so varied that collectively they may be regarded as the visible expressions of certain racial motives and impulses. Love of ornamentation, substitution for clothing, a desire to show fortitude under physical suffering, the wish to perpetuate tribal symbolism, and among women the indication of marriage, are some of them. Others, again, believed that by engraving the image of a deity on their flesh, they furnished proof of their devotion.

In some countries only the men were tattooed, while in others women alone were thus adorned. In Samoa there is a curious legend that the goddesses of tattooing swam there from Fiji, for the purpose of introducing the custom, and had been ordered to sing all the way "Tattoo the women but not the men." Having to repeat these words so often, they became confused, and when they arrived at Samoa, they were singing just the reverse; and hence

by making cuts in the flesh so as to leave a cicatrized mark, but generally without the addition of any coloring matter; and by drawing a pattern on

tattooing can be here described. In the current SUPPLEMENT, however, will be found an account of the tattooing practices of various savage races.

In all Polynesia there is no place where tattooing is so widespread or varied in character as in the Marquesas Islands. Every part of the body is decorated, from the crown of the head to the fingers and toes. This applies principally to the men, the women generally having only a bracelet or two, or other small ornaments, tattooed on their arms. One writer states that women, even princesses, have no right to tattoo any parts but their hands and feet, although at Mukahiva "noble ladies" are permitted to wear more numerous tattoo marks than the women of the lower ranks. Old men have their bald heads covered with tattoo marks.



Tattooed Japanese.



Tattooed Marquesas Islander.



Japanese Tattooing.



Specimen of Tattooing Done by the Electric Needle.

The figures to be tattooed are chosen carefully and with appropriateness to the part to be decorated. Sometimes animals are depicted, while again other objects are employed which have special reference to the manners and customs of the people. Rows of punctures are separated by curved lines, diamonds and other designs. A man's head is completely covered, his breast is commonly ornamented with a

TATTOOING IN SAVAGE AND CIVILIZED LANDS.

shield, while stripes of various kinds adorn the arms and thighs. On the back is generally a large cross, beginning at the neck and ending at the end of the backbone. In the front are often seen figures representing the human face. On each side of the calf of the leg is an oval figure. The hands are profusely tattooed, and each finger has its own pattern. A peculiarity of the Marquesans is that they allow the finger nails to grow very long and pointed, this being esteemed, as among some of our own people, a mark of rank, since it furnishes evidence that the person thus ornamented is not accustomed to doing hard manual work.

Among the Marquesans this elaborate ornamentation answered the purpose of dress, nor indeed would it pay the poor victim to suffer all he has to endure during the long and painful operation, only to cover all his adornment with clothes. The men wear nothing but a small cloth around their waists, while the women of rank are similarly clad, with the addition perhaps of a large piece, which they can throw over their bodies to keep off the discomfort of the sun's rays. And, curiously enough, it is not the heat they mind, but the danger of spoiling their complexions by getting sunburnt.

A noteworthy feature of the practice on these islands is the tattooing of widows' tongues, as an expression of grief for their lost husbands. In this operation the operator's implement is first dipped into the coloring matter, then placed on the tongue. It is then given a smart stroke with a rod, whereby the skin is punctured and the dye injected. A woman who was undergoing this painful treatment was asked why she allowed it. She replied that, while the pain was great, her affection was still greater, and that particular mode of expressing it was chosen because it could never be obliterated.

In Samoa tattooing is applied to the whole body from the hips to the knees, covering the skin so completely with the pattern that (as on Easter Island or in Tahiti) at a little distance the person looks as though he were wearing ornamented tights. The operation, which as in the Marquesan Islands requires much time and many "sittings," is quite ceremonious. The tattooer, called the Matai, is, as elsewhere, a man of considerable influence, and his services are engaged by a prepayment of several mats, or perhaps a canoe. Here again "combs" are used and also a little mallet, but the combs are made of human bones, about an inch or less in width, resembling little bone adzes with the edges cut with a number of teeth. These blades are attached to handles about six inches long. The pigment is made from the ashes of the cocoa-nut.

The person to be tattooed lies on his face, resting his head in the lap of his sister or some other female relative, who with other young women assisting sing loudly to drown his groans, as it would injure his record for courage to be heard giving vent to expressions of pain. Instances have occurred, however, when young braves have lost all self-control, being entirely overcome with the agony of the operation, and have been despised as cowards for the rest of their lives. The operator, having traced out his pattern, commences to drive the toothed "comb" through the skin with his mallet by sharp and rapid taps. The assistants are ready with strips of white "masi" to clean off the blood as it flows from the wounds.

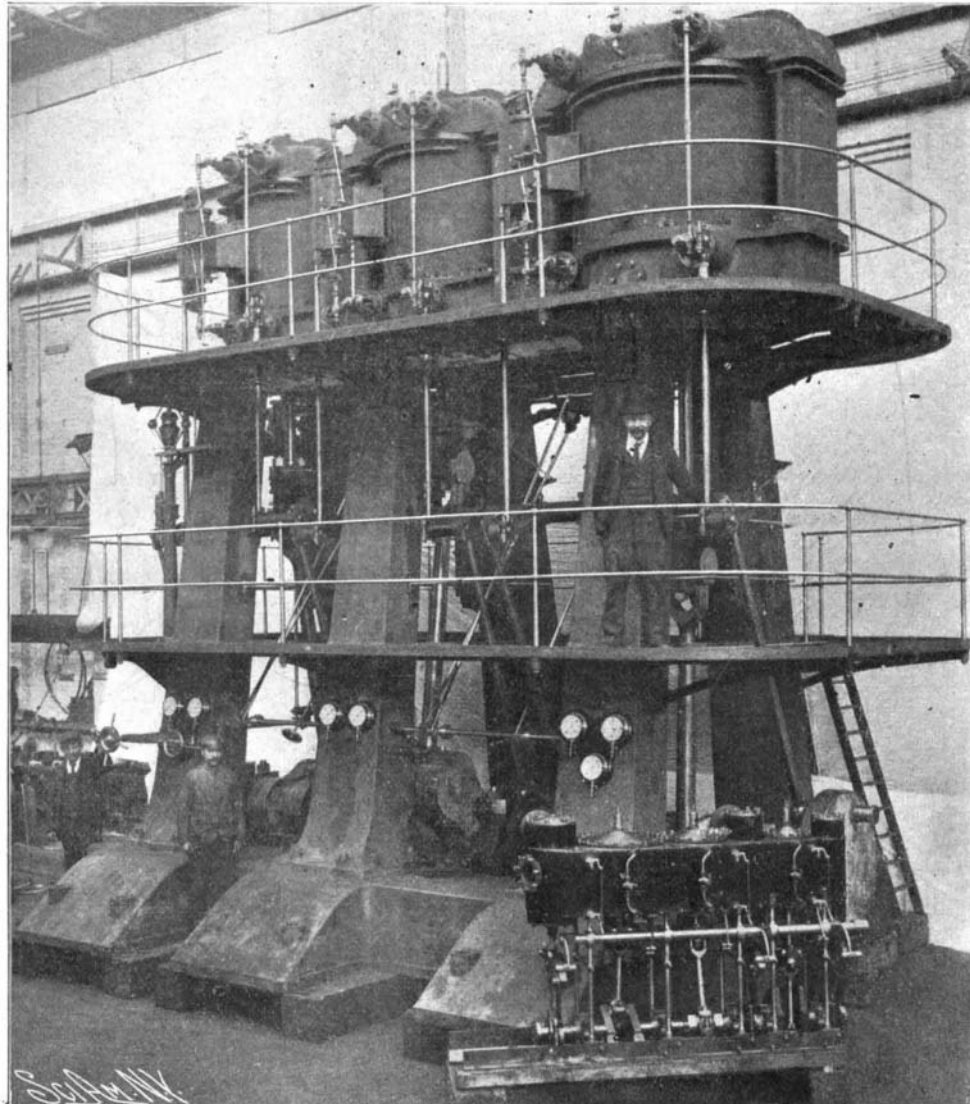
In general, the patterns used throughout the Samoan islands do not vary greatly, small variations denoting the particular island on which the man lives, the family of which he is a member, the slaying of human beings, etc., the form of an animal being usually the badge of honor in such cases. It takes ordinarily an hour to cover about three inches square, after which the "patient" gives place to another. After a week or so, his turn comes round again, and as a rule an operator can only attend to five "cases" a day. When the tattooing is about half done, the operator demands another payment, and if not satisfied, he refuses to complete the work, which puts the young chief in an embarrassing position, with the alternative of going through life "half dressed" or submitting to the Matai's demands. We may conjecture that he usually "pays up." While the operation is going on, the victim suffers terrific agonies, but when it is consummated, he glories in his admira-

tion to manhood, and gains the admiration of the female contingent.

The Burmese are fond of tattooing, and use coarse needles on a long reed with a metal image of some idol on the opposite end.

In Japan tattooing is chiefly confined to the lower classes, whose shoulders, arms, and thighs are decorated with such figures as are seen on porcelain. Cinabar and Indian ink are the pigments used. A thief who has stolen within a specified amount of property has a circle tattooed on his arm, and on the second offense he is beheaded. They use fine cambric needles, firmly bound to a piece of bamboo about seven inches long.

A remarkable case of tattooing came to light in Prof. Hebra's lecture-room in a hospital in Vienna some thirty years ago. The man was the subject of a lecture, and one of the spectators at first mistook him for a bronze statue. He was tattooed from head to foot, and not a quarter of a square inch of his entire person was intact. The skin presented an appearance resembling the elegant tracery of an exceedingly rich cashmere shawl; only that the coloring was done with indigo principally, with enough red inserted here and there to give it effect. His name was George Constantine, a Greek by birth, who with a band of robbers entered Chinese Tartary to commit depredations. The gang was captured, and this man, with



A TORPEDO BOAT ENGINE AND A PUMPING ENGINE, BOTH OF THE SAME HORSE POWER.

others, was ordered by the ruler to be branded in this manner. On the palms of his hands letters were tattooed, which explained that "he was the greatest rascal and thief in the world." It took three months to tattoo him, the indigo being pricked into the skin. The designs represented elephants, lions, tigers, birds, etc., with letters worked in between. A couple of dragons ornamented his forehead. He said that his body swelled up very much at the time and had ever since been sensitive to changes in the weather.

Among criminals secret hieroglyphics often form the tattoo marking, and the following specimen was observed in Portugal by Dr. Peixotto—which he believed to be some magical formula used in early Roman times to drive away fevers. It read

S A T O R
A R E P O
T E N E T
O P E R A
R O T A S

These letters read the same vertically or horizontally, forward and backward, and the reader will have the opportunity of deciphering its meaning for himself.

It has been decided that the telephone line between Rome and Paris is to be opened very shortly, and at all events in time for Victor Emanuel's visit to France.

Return of the Brooks Periodic Comet.

The Brooks periodic comet has just returned to visibility. This comet was discovered by Dr. William R. Brooks, professor of astronomy at Hobart College, at the Smith Observatory, Geneva, N. Y., on July 7, 1889, in the constellation Cetus. Computations soon indicated that the comet was moving in an elliptical orbit, with a period of revolution around the sun of about seven years.

True to the prediction, it returned in 1896, and now for the third time the comet makes its appearance exactly in its computed place in the heavens.

It is now in Capricornus and moving slowly westward. It is a telescopic comet and is not likely to become visible to the naked eye.

Soon after its discovery in 1889 the comet was found to be attended by four small companion comets, and hence is sometimes called the Brooks multiple comet.

In this respect it stands unique, and this, in connection with its short periodic character, renders this comet one of the most interesting in astronomical annals.

A Striking Comparison.

No more striking example of the immense power of the compact engines used in the modern torpedo boat can be offered than by the accompanying illustration.

Our picture represents a large set of engines for the East London Water Company, and the engines of a second-class Yarrow torpedo boat. Both engines are of the same horse power. Unfortunately we have no data giving the steam pressure and revolutions of both installations. No doubt it would have been interesting to give a comparison of the cost of each engine, the space occupied, with the probable loss in each system for maintenance, repairs, and depreciation.

Shop Fires from Spontaneous Combustion.

Damp lampblack will ignite from the sun's rays. The same can be said of cotton waste moist with lard or other animal oil. Lampblack and a little oil or water will, under certain conditions, ignite spontaneously. Nitric acid and charcoal create spontaneous combustion. New printers' ink on paper, when in contact with a hot steam pipe, will ignite quickly. Boiled linseed oil and turpentine in equal parts on cotton waste will ignite in a few hours under a mild heat, and will in time create enough heat to ignite spontaneously. Bituminous coal should not be stored where it will come in contact with wooden partitions or columns or against warm boiler settings or steam pipes. This coal should not be very deep if it is to be kept on storage for a long period. If piled in the basement of a building it should be shallow and free from moisture, and under good ventilation. That liable to absorb moisture should be burned first. If on fire, a small quantity of

water showered on this kind of coal cokes it upon the top and retards any great supply of water reaching the fire, thus necessitating the overhauling of the pile. Iron chips, filings, or turnings should not be stored in a shop in wooden boxes. The oily waste which is not infrequently thrown among them adds to the danger of fire from this source. The sweepings from the machine shop, if kept on hand, should never be placed over iron shavings. This mass of disintegrated iron is enough to incite heat and combustion. Iron and steel filings and turnings when mixed with oil will ignite spontaneously after becoming damp. A steam pipe against wood will cause the latter to ignite spontaneously after being carbonized, particularly if superheated steam enters the pipe, thus increasing the heat temperature.—J. H. L. Coon in Cassier's Magazine.

The Russian naval department has decided to increase the strength of the navy by the construction of twenty-three additional vessels of the lighter type—twenty gunboats and three torpedo-boat destroyers. The former are intended for the reinforcement of the Russian flotilla on the Amoor, while the latter are for service in the Black Sea. The whole of the gunboats are to be built at the government dock yards, will be of light draft, and will all be fitted with turbines.