NEWEST SCIENTIFIC DISCOVERIES & REMARKABLE FACTS

Twilight Sleep Is NOW USED in OPERATIONS of All NATURES

OLD-TIME anesthetics do not prevent pain, they merely render the patient unconscious of it. The pain is there and is just as destructive of the sufferer's strength as though he felt it. Pain is injurious, whether felt or not, so the object of modern surgery is to prevent or localize pain so that its destructiveness will be as limited as possible. So twilight sleep is coming into general use for all kinds of surgical operations. With the application of this new and wonderful anesthetic, the nerves that carry pain are blocked and the pain is localized.

Twilight sleep is a condition of semi-consciousness caused by the deadening of the nerves in the vicinity of the body to be operated on. With the old anesthetics the patient was put into such a sound slumber that the pain could not be felt, but it was present nevertheless, burning up the patient's strength and lowering his vitality. Pain acts something like high tension electricity, which burns out fuses.

Surgeons now find that recovery is hastened through the application of twilight sleep in any kind of a serious operation. The patient's strength is conserved. For this reason, twilight sleep is coming to be used in general practice.

Trinity hospital, New York, was one of the first institutions to generalize with twilight sleep, but many other institutions and eminent surgeons are now doing likewise. So successful have been the Trinity surgeons with twilight sleep that in the annual report recently issued several chapters are devoted to the successes crowning the general application of twilight sleep in surgical cases.

Calaveras Skull Open to Doubt

OF interest in connection with the Tertiary gold-bearing river gravels of California is the story of the Calaveras skull. For a time this skull attracted much attention not only from people in California, but from scientific men the world over. It was reported to have been found in 1866, near the town of Angels, Calaveras county, at a depth of 130 feet, in Tertiary gravels underlying Tertiary lava.

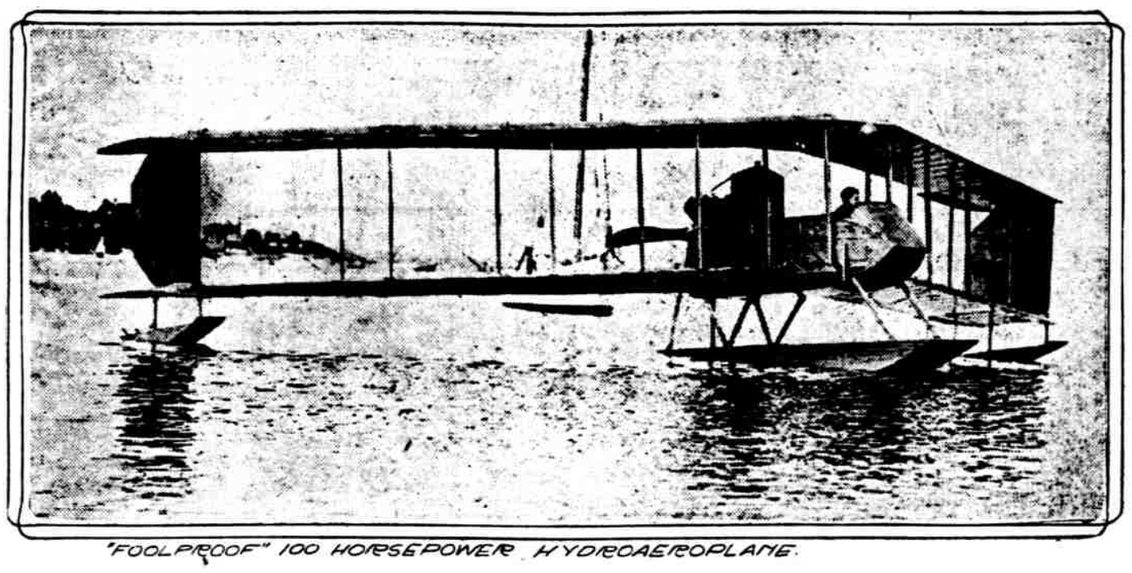
The finding of a human skull embedded in such deposits was for a time believed to indicate that man had been in existence in North America longer than had been supposed. Strange to say, the skull is of a higher type than skulls which, although known to antedate historic times, are known also to be much younger than the Tertiary.

Although Professor J. D. Whitney, then state geologist, accepted the skull as a bit of genuine scientific evidence, it is generally believed by students of the antiquity of man that the Calaveras skull, while undoubtedly old, probably did not come from the auriferous gravels at all.

Same Each Year

A STUDY of the government weather tables shows that in spite of early or late spring just about the same amount of rain and snow comes each year and just about the same amount of summer sun baked days and nights.

At Last, Foolproof Hydroaeroplane Is Here



"FOOLPROOF" 100 HORSEPOWER HYDROAEROPLANE.

HERE is one of the new "Foolproof" hydroaeroplanes, said to have inherent stability from the peculiar construction of the planes. A similar machine, though considerably smaller, was recently built for Vincent Astor, with numerous de luxe accessories. The machine shown above has just been delivered to Harry Payne Whitney, at Roslyn, N. Y. It was constructed at Marblehead, Mass., and is a 100-horsepower Burgess-Dunne craft. It is the same kind of water and air craft that has been built at Marblehead for the United States and Russian governments.

Iona Magnetic ROTATION DISCOVERED by An Italian

THE conductivity of metals has long been attributed to electrons in the interior. These electrons act in some respect as if they were particles of a gas enclosed within a hollow body having the same surface as the actual conductor. According to Professor A. Righi in a remarkable paper, read at the Milan meeting of the Associazione Elettrocecnica Italiana, these electrons, therefore, will obey the same laws as ions and if a conductor be placed in a magnetic field, the electronic bombardment will produce a torque. That this is exactly the torque actually observed when a current-conveying conductor is placed in a magnetic field, is the conclusion of Professor Righi.

Professor Righi has discovered that if the residual gases in an exhausted glass vessel is ionised, the ions will by their bombardment set in rotation a delicately-mounted rotor, provided that a magnetic field be established along the axis of this rotor. This phenomenon has been named by its discoverer "iono-magnetic rotation."

The explanation given is that in a uniform magnetic field ions trace a helical path, the direction of motion depending on the sign of the particles. Hence, when an aoinised gas is traversed by a magnetic field, the ions, instead of moving in a straight line after each collision with the molecules or with each other, move along helical arcs.

The result is that when they ultimately collide with the lightly-mounted rotor, the negative ions produce a torque in one direction, and the positive ions in the other, and the actual rotation observed is due to the difference in the two opposite impulses. When the angular momentum of the positive ions is in excess, the rotation of the rotor is in the same sense as that of the current producing the magnetic field. Similarly, if the containing vessel is itself free to turn, it will do so, in virtue of the angular momentum destroyed at its walls in each collision of a moving ion.

In a modification of the above experiment, Professor Righi electrified his rotor to a potential sufficient to ionise the surrounding gas without extraneous aid. Rotation was again produced, but was more rapid than in the original experiment, the reason being that owing to its charge the rotor received few collisions save from ions of opposite sign to its charge, ions of the same sign being repelled.

In still another modification of the experiment, the electrodes are concentric cylinders, the rotor being mounted between them. Under these conditions, both positive and negative ions produce torques in the same direction, and the motion of the rotor is still further accelerated. In a final experiment, rotation was produced by the impact of ions inside the rotor, which took the form of a closed box.

Waterproof VEIL to Protect Woman's Hat

MILADY now has the opportunity to protect her hat from damage by rain or snow. A New York man has secured a patent on a veil and waterproof base fabric head covering. This it is proposed to slip on over the hat at any desired time or to be taken off and rolled up in a little wad to be carried in the vanity bag.

A doctor points out that nearly all the soldiers who suffer from battle shock are young men of twenty-one and twenty-two. We should not, he says, send out men too young.

GIANT Plane to Carry 20 MEN for Uncle Sam

DESPITE the secrecy that was thrown around the United States government's experiments with the huge biplane near Alexandria, Va., last summer, details of the construction of the craft have leaked out. While the Curtiss plant has been turning out military biplanes for the British government designed to carry a dozen to twenty men, Uncle Sam has not been dozing. He has been doing a little experimenting himself with a plane equally as large.

The Alexandria machine, as it is now known, was developed by a Massachusetts man and offered first to the American government, which conducted the experiments. These, by the way, while nothing official was forthcoming during the flights, are said to have been fairly satisfactory, only details of construction and design needing improvement.

The new craft, one of the largest heavier-than-air machines ever built in this country, rests on two long, sled-like pontoons, which are also used as auxiliary oil carriers, having a capacity of several barrels. Two horizontal, six-cylinder motors develop 136 horsepower each. Four gasoline tanks above the engines carry fifty gallons of oil.

The machine is driven by propellers fore and aft. Carrying a load of twenty men, it is expected the craft will be able to develop a speed of sixty miles an hour. Beside the fore and aft propellers, the novel feature of the Alexandria machine is the shape of the wings, which have the appearance of tandem biplanes faced head-on, but in reality are four sets of planes. Elevating planes and rudders are carried on outriggers extending fore and aft of the boat.

Many OBSTACLES in Way of DEVELOPMENT of American Domestic DYE INDUSTRY

IN the past year notable progress has been made in the building up of a domestic supply of dyes and colors, but as the desirability and practicability of making the United States self-dependent in its supply has not been demonstrated, the measures taken are more in the way of a temporary expedient pending the reopening of the German markets than the establishment of a permanent industry.

On the face of it, it seems more than desirable that this country should supply all its own dyes and colors, as the supply of bituminous coal, the primary material from which they are derived, is practically unlimited. It IS possible to supply all our own dyes and colors, but, according to the Oil, Paint and Drug Reporter, which made an exhaustive study of the situation after a year of closed importations, it is not desirable and, under present conditions, not practical to invest huge sums of money in domestic dye and color manufacturing plants.

The reason is that owing to the cheaper methods of production, in which cheap labor is a large factor, the dyes can be made abroad cheaper than at home, even when the basic material is imported from America. A high protective tariff wall would have to be thrown around the baby American industry. Otherwise, foreign colors would sell in America for less than the home product.

If present market prices for dyes were to hold good there is no doubt about financial success which might be achieved, but to establish a permanent industry it is necessary to figure on normal prices and normal conditions. In the first place some idea of the extent to which our production of dyes might be extended can be obtained from the import figures of the country. These figures show imports of dyes, colors, etc., at a value of about $12,000,000.

There are about one thousand different products included in this total and in order to make home production complete in supplying domestic consumers it would be necessary to produce all of these various colors. This at once presents a difficulty which would make a thorough output of dyes in this country a matter remote in time and it serves to check the ardor of investors.

Considerable progress has been made in recent months in the manufacture of dyes and intermediates in this country. This expansion no doubt would be still more pronounced had the explosives trades been less insistent in their demands for benzol, toluol and kindred products. The precedent thus established is encouraging, and certain colors in general use will be produced here in comparatively large amounts during the year to come.

While it is premature to say that any specific dye will be produced in the future by domestic plants, yet it is true that constructive steps have been taken to relieve the shortage of foreign-made goods, and with the experience gained it may be possible for the branches thus started to carry on indefinitely. To narrow domestic production to the materials in greatest demand and which are most adaptable to home production seems to offer the most practical way for entering in earnest on the manufacture of dyes in this country.

Invisible Troops

INVISIBILITY may become the sixth arm of the French land service if Major Kopenhagen's invention for making troops invisible to the enemy observed before and above them is adopted by the general staff. The invention has been submitted, after trials beginning in April, 1913, at St. Cyr. L'Information states that on trial the new method made twenty-five French soldiers on an open field so invisible that an aviator circling over the field at a height of 1,000 feet had to report, at the end of twenty-four minutes' search, that he could not locate them.

The average farm family in Kansas uses twelve loads of corncobs a year for heating and cooking.

Pellagra DUE to RAYS of Sun

CORN has pretty well been acquitted of responsibility for pellagra, but just what does cause the disease is still a puzzle to medical science. The two chief theories that now hold the field are, first, that which regards the malady as the result of an infection by a protozoal parasite transmitted by some insect; and secondly, that which classes pellagra among the deficiency diseases and as being due to the absence or insufficiency of some essential element in the patient's dietary.

Many workers are engaged at the present time in trying to solve the difficult problem of the etiology of pellagra, but so far none of them have been definitely successful. Recently Dr. H. E. Bond, of Jamaica, has summarized the work of various authorities on the subject and has drawn attention to a theory that pellagra may be due to a gastro-intestinal auto-infection (or alimentary toxemia), and that the actinic rays of the sun may assist in the development of the disease.

Dr. Bond declares the actinic rays of the sun irritate the uncovered surface of the human body and so cause intense hyperemia, especially in subjects whose vitality has been already lowered from defective innervation. As a result of his studies he arrived at certain conclusions:

Pellagra is an affection akin to Addison's disease. The casual bacterium is in the intestines, as indicated by the amounts of indol and skatol present; and it primarily affects the sympathetic and secondarily the central nervous system. There are factors in the actinic rays of the sun which can irritate the exposed areas of the human skin and intensify the condition.

The disease should respond to treatment by gastro-intestinal antiseptics, such as calomel, beta-naphthol or acetozone, administered internally; also by treatment externally with the usual protective ointments, one, for instance, consisting of beta-naphthol, balsam of Peru and zinc ointment. As regards diet, Dr. Bond recommends the daily administration of ripe bananas, but salt fish is to be avoided. The patient must as far as possible be kept in the shade.

Production of Platinum Grows

PLACER miners of California and Oregon saved 570 ounces of crude platinum in 1914, as compared with 483 ounces in 1913, according to United States geological survey statistics. Oregon's increase was greatest, a gain of 85 ounces.

From this crude platinum 525 ounces of metallic platinum was extracted, valued at $23,625 figured at the average market price, $45 an ounce.

Besides the platinum obtained from sands and platinum ore 2,906 ounces of this metal was obtained from new material, of both domestic and foreign origin, by smelters and refiners of gold and copper bullion and mattes.

The secondary platinum industry handled 40,826 ounces of platinum, which was obtained from refining scrap metals and sweepings of the jewelry and dental trades.

Even if the imports of foreign platinum were greatly reduced, there are apparently sufficient stocks of this metal in the United States to meet domestic requirements.

Breakdowns in ELECTRIC Plants Due to SURGES

SURGES are responsible for many of the breakdowns in large electric power systems generally attributed to defects in generators and transformers. It has been impossible to trace the causes of many breakdowns, and when formerly the generator or transformer was blamed, it is now realized that the little known and less understood surges are really the cause.

Electric systems are never at rest. Surges of some dimension or other are continually passing to and fro along the mains, but it is only occasionally they attain a magnitude sufficient to make themselves noticed by the operation of the overload relays or by the breakdown of the plant.

Electrical voltage surges occurring in alternating current systems are due to four principal causes: (a) resonance, (b) switching, (c) arcs and sparks, (d) lightning effects.

Originally devised to cope with lightning effects, protective devices against voltage surges have been influenced in their development by the rapid increase in size of electrical power systems which has necessitated the installation of apparatus for preventing damage to the plant due to the above mentioned causes.

The condenser is the principal piece of apparatus for preventing such damage. The main advantages of the condenser are: (1) It is connected direct to the line, so there is no dielectric spark lag; (2) it is the only arrester not containing an air-gap, the setting of which may become vitiated by reason of deposits of dust, changes in the atmospheric conditions and variations in other factors; (3) it is the only arrester discriminating adequately between the low frequency of the line and the high frequency of a surge; (4) it is the only arrester which can be installed without a series resistance; (5) it does not require any charging or daily attention like the aluminum arrester; (6) the condenser is the only arrester which does not permit line current to flow during the time it is discharging the surge, beyond the charging current which has a very low power factor and flows continuously; (7) the condenser is the only surge protective device which modifies the wave form of steep-fronted waves.

The condensers usually installed are capable of effecting a reduction in the surge pressure of a 100,000-cycle surge to 0.067 of its value and of a 1,000,000-cycle per second surge to 0.007 of its value.

Condenser protective gear for the protection of power systems, both large and small, against surges of all voltages and frequencies has been in operation for a considerable number of years with every success. Large numbers of instances are on record where surges which have been the cause of repeated breakdowns and interruptions to the supply have been rendered inocuous by condenser protective gear.

It must be borne in mind, however, that no single device, be it a condenser, aluminum arrester, multigap arrester, Giles valve, or any other, will of itself completely protect a system. One device will protect against high voltage, another will protect against high frequency, but no single one will protect against all. While the condenser is the only one which protects against excess pressures of high frequency and against steep wave front, with it must be installed a complementary device to protect against surges of low frequency but high voltage.

New Way to Make Sulphuric Acid

A NEW method of manufacturing sulphuric acid, for which advantages are claimed, is suggested in a United States department of agriculture bulletin. The essential difference of the method is that the gases employed are drawn downward through a spiral flue in place of being drawn through lead chambers or intermediate towers.

It is asserted that the resistance of gases to the downward pull and the constant change in their course through the spiral tend to mix them very intimately. The fact that the gases constantly impinge on the walls of the spiral flue, which can be cooled either by air or water, makes it practicable to maintain the gases at a temperature most favorable for the efficient yield of sulphuric acid.

In laboratory tests in which the spiral was utilized, practically all the sulphur dioxid was oxidized to sulphuric acid, only traces being lost through escape or in the system. The lead spiral, however, is not intended to replace the Glover tower, nor to do away with the Gay-Lussac tower.

It is believed that while the lead spiral will take considerable lead, the great reduction it will effect in the chamber space will make it possible to construct a plant with considerably less lead than is required in the ordinary chamber system.

The new type of plant requires no other device to accelerate the reactions, occupies much less ground space, and would not need as large buildings, and therefore should decrease the initial cost of construction. The method, however, has been tried only on a laboratory scale, and the bulletin refuses to predict just how efficient the commercial plant would be, but states that all indications are that this method offers promise of being economically successful.

New X-Ray Tube IS HARMLESS

THE danger to the operator from X-ray burns is almost entirely eliminated in a tube invented by a German, Professor Zehmder. The ordinary X-ray tube emits in all directions and must be surrounded by screens of metal, except in the direction in which their action is expected.

In the German professor's tube, the cathode of magnesia, covered by tungsten, is insulated by a large block of porcelain from the metal wall of the tube, which serves as anode and anticathode. The pencil of X-ray escapes through a small window of glass aluminum.

Even at the highest vacua this tube produces very strong X-rays of any desired hardness. The tube is free from the risk of breakage, and it is very safe to operate. When it is connected to earth it can be handled freely.

Edison at Work on Miracle Battery

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MR. THOMAS EDISON AND HIS LARGEST BATTERY

AFTER 55,000 experiments and five years of work, Thomas A. Edison believes that he has perfected a battery that will revolutionize submarine construction and increase the efficiency of the under-sea craft at least forty percent. The electrical wizard is shown at work on the battery, which is to be tested in the new American E-2.

The battery has been completed some time, but the inventor has insisted on the most thorough-going tests. The battery has been hammered, rattled, shaken, jerked and tossed about in a manner no over-or-under-sea going craft could possibly duplicate. The battery is smaller, lighter and stronger than the ones now in use. Besides, it eliminates the dangers from chlorine and other dangerous gases. With it installed, a submarine can dive at an angle of sixty degrees, while a fifteen-degree dive now is attended with danger.

If the new Edison storage battery is one-half the success the inventor claims for it, the United States should immediately leap to first rank in the construction of efficient and safe submarines

PET Chinese Drug Is FRAUD

AN analysis of "jintan," a nostrum extensively advertised and widely sold throughout China, has demonstrated the almost total worthlessness of the pellet for medicinal purposes. "Jintan" is the most extensively advertised article in China, the whole country being literally covered with the advertisements. It is said to be manufactured by a Japanese.

The only medicinal qualities found were sugars. The pill is highly aromatized, so that it has a certain value as a breath perfumer, but that is about all. A small quantity of some unknown Asiatic drug was also discovered by the chemist.

Potent alkaloids, iron and other heavy metals, saline laxative salts and emodin-bearing cathartics are conspicuously absent in "jintan," thus exposing the worthlessness of the Chinese nostrum and exposing the huge fraud being perpetrated on the Chinese people.

Metals in Alaska

The annual statement on gold, silver, and copper in Alaska for 1914 has just been issued by the United States geological survey. The value of the total output of these three precious metals for the year aggregated $18,535,520.