Determining the Frequency of Alternating Currents.

The frequency of an alternating current is usually determined by calculations based upon the number of poles and the special construction and speed of the generator; but since this speed is subject to sudden and inevitable changes, such calculations are only approximate, and cannot be relied upon as affording accurate information of the conditions that may exist at any given instant. Moreover, this means of determining frequencies is not available at transformer substations, or at any point remote from the generator, in which cases there is no practical means by which even approximately accurate calculations can be made. An apparatus has been invented by Hugh S. Carr, of Lawrence, Kans., by means of which the frequency of an alternating current is accurately determined at any time by means of the stroboscope.

The underlying principle of this improved apparatus is that of the stroboscopic effect of a revolving disk divided into alternate sectors having either reflecting or non-reflecting surfaces, or alternate translucent and opaque portions. Mr. Carr has found that, if such a disk be revolved in the light of an arc or incandescent lamp connected with an alternating-current circuit, the slight fluctuations in the intensity of the light due to the variation in the strength of the current will produce the illusion of a revolution of the sectors, whenever the alternations of the current and the revolutions of the disk are not in synchronism. If the number of revolutions per second of the disk be in excess of the number of alternations per second of the current, the apparent revolution of the sectors is clockwise; while if the number of alternations exceeds the number of revolutions the apparent movement of the sectors is counter-clockwise when the disk revolves clockwise. But if the number of revolutions of the disk and alternations of the current are the same, the sectors will appear stationary. This is also true if the number of revolutions of the disk is any exact multiple of one-half the number of revolutions.

A NEW SPRING BLOCK.

Our illustration shows a new spring block recently invented by P. J. Macdonald, of New London, Conn., which should prove of great value to yachtsmen. It differs from the ordinary block in having straps on each side of the sheave slidably fitted into the shell and held under the tension of a spiral spring coiled around a central guide-rod. The straps are joined at one end to form a becket, and at the other end are secured to a cross-piece against which the coil-spring bears. The play of the block is limited by the longitudinal slots in the straps, through which the sheave pin passes. The guide-rod, which is secured to the block proper, passes freely through the cross-piece and may, if desired, be connected with a shackle. The advantages of this block are evident. Its elasticity will prevent wear and tear of ropes and breaking of spars and rigging under the sudden strains to which they are subjected in a rough sea. When a ship is put about or jibed from one side to another the wind pressure is withdrawn, and if these spring blocks be applied to the gaff they will lift the sail and keep it from dragging across the taffrail. Aside from this, the spring gathers up the leach of the sail and greatly quickens the boat's action. This may permit a change in the construction of racing craft, which are at present made with almost too short a keel in order that they may come around quickly. The block should also be of particular advantage in a dying wind, for it will keep the sail flat and prevent the wind from being shaken out by a choppy sea.

A NEW SPRING BLOCK.

DOUBLE-MOLDBOARD HILLING-UP PLOW.

Our illustration shows a plow so constructed that it will throw up a large amount of loose soil against the stems of sugar-cane or other growing crops planted in rows. The plow can be economically made so that the working of the crops may be inexpensively conducted.

The heel of the beam is provided with a downwardly extending standard, while a second standard extends downward from the beam itself between its center and the heel. A runner is secured to the bottom portions of these standards, the forward portion of which runner is beveled downward and forward.

The moldboard may be termed a "double moldboard," for it consists of a V-shaped central portion formed of two vertical sections, and a marginal flange of a blunt V-shape. The beam passes through a recess at the forward pointed end of the upright section, and the handles are secured to the rear end of the same. The flanged portion rests, at the front, on the beveled end of the runner, and at the rear is supported by a cross-bar.

DOUBLE-MOLDBOARD HILLING-UP PLOW.

The upright sections may be made of wood or metal, as the occasion may demand. The flange portion may be made of wood, with a marginal strip of metal secured to its upper face, as shown in the illustration.

A patent for this plow has been recently granted to B. D. Baldwin, of Maui, Hawaii.

Giebeler Steel.

The publication of the tests made at Charlottenburg with the new steel invented by D. Giebeler, a Mecklenburg manufacturer, shows how exaggerated have been the reports circulated in the daily press both here and abroad. The tests have proved merely that Giebeler has invented a very dense steel which, however, is lacking in the most important property of ductility. It will be remembered that Giebeler steel was claimed to be far superior in hardness to Krupp, Böhler, and Harvey steel. It was furthermore claimed that in cost Giebeler steel was one-third to one-half cheaper than Krupp steel. But exactly what the price of Krupp steel is at the works no one but Krupp knows. For that reason it is difficult, indeed, to institute comparisons so far as cost is concerned. In the Charlottenburg tests the tensile strength fluctuated from 86.6 to 163 kilogrammes. Are these results so very remarkable? Holtzer nickel-steel has a breaking strain per square millimeter of 161 kilogrammes; nickel-steel made by the Société Anonyme de Commentry-Fouchambault et Decazeville, a breaking strain of 153.1 kilogrammes. Moreover these specimens of steel had a ductility of 15 to 16 per cent. Results equal, if not better than these, have been obtained with the best Krupp and Harvey steel.

Another First Invention of the Telephone.

Every country would like to claim for one of its citizens the honor of having invented the telephone. Most of us are familiar with the claims made for Reiss, but no one ever suspected that an Italian would be put forth as the first inventor. Such was the interesting feat performed by Prof. Banti at a recent meeting of the Italian Electro-Technical Association. Mucci is the name of the man to whom Prof. Banti would ascribe the invention of the telephone. Of course the Bell Telephone Company is accused of having gotten possession of Mucci's secret, and of course the drawing and description of Mucci's "acoustic telegraph" are as like those of the Bell telephone as one pea is to another. The Italian Electro-Technical Association was so thoroughly convinced of the truth of Prof. Banti's assertions that they unanimously requested the president to appoint a committee to continue such official researches as would enable them to render posthumous honor to the memory of their inventive countryman.

The Latest Sensation-Machine.

The blasé New Yorker of the East Side, who desires to experience a new sensation, has but to go to Coney Island. There he will find most ingenious apparatus, all warranted to tingle his nerves. On a centrifugal railway he is vertically whirled around in the air at a terrific speed; in a barrel of peculiar construction he may also experience all the bliss to be derived from an ingenious application of the laws governing centrifugal force; and on a "scenic railway" he is shot in and out of tunnels and up and down sharp inclines. All these hair-raising devices must pale into insignificance before an invention which has recently been patented in the United States.

The invention in question is an open submarine boat which is shot down a steep incline and through a tank of water at such velocity that its occupants, although completely submerged, will leave the water just as dry as when they entered it. Obviously this exciter is based on the principle that the velocity of the boat is greater than that of the velocity of falling water, so that the boat is swept through the tank before the water has had time to enter. A short upward incline raises the boat out of the water at the end of the journey.

The Constant Need of New Inventions.

Every home and workshop teems with profitable suggestions to the man with open eyes and mind. In a recent number of Everybody's Magazine, the possibility of inventing new processes and new machines, as the result of such observation is clearly brought out.

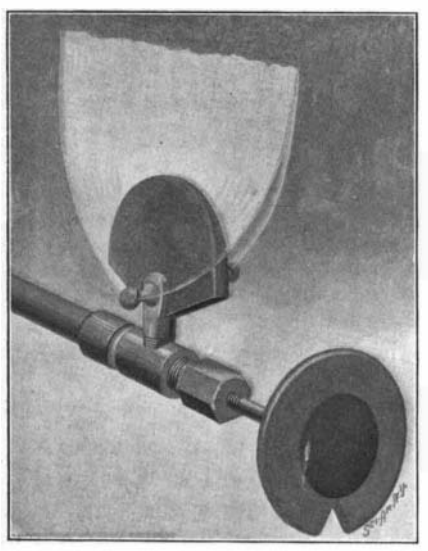
The cost of refining kerosene oil is paid to-day from the despised sludge acid which formerly fouled our rivers and harbors. The waste of the slaughter-house brings in almost as much as the flesh of the animals killed.

Nature has waste products still waiting for use. Prairie wire grass was once one of these. Nowadays it is used in the manufacture of furniture and furnishings. Corn-stalk pith is made into fillings for warships' hulls to close holes made by an enemy's shells.

Somebody should come along and invent a substitute for elastic Para rubber. Celluloid and oxidized linseed oil are fair substitutes for some purposes, but nothing has apparently yet been found that possesses the true elastic properties of India rubber. There is still nothing like leather for shoes; but an inventor may find a substitute to his profit.

HYDROCARBON BURNER.

The hydrocarbon burner here illustrated aims to perfectly vaporize the liquid fuel and attain a complete combustion and a steady bright light without the use of a mantle or chimney. The burner is the invention of G. A. Bonelli, of Kingman, Ariz. A combined generator and spreader is employed, which is comparatively flat and semicircular in shape, its sides tapering to form a blunt edge along the periphery. A hollow shank is formed on the lower portion of the generator and spreader, which is threaded into the burner-casing. Liquid fuel enters the casing through a supply pipe and passes out through the hollow shank into a peripheral passage in the generator. The upper end of this passage opens into a central passage connecting at the bottom with two burners. The burners are disposed on opposite sides of the generator and spreader and, when in use, direct the burning fuel against its inclined faces, so as to heat the generator and thoroughly vaporize the liquid. When the flames strike the spreader they spread over its opposite faces, and unite at the periphery in a single bright and steady flame. The amount of liquid fuel passing into the casing is controlled by a needle-valve, and impurities are prevented from entering the burners by screens placed in the casing and at the mouth of the generator shank.



HYDROCARBON BURNER.