

## Putting Industrial "Criminals" Behind the Bars

### How Science Solves the Mysteries of "Kidnaped" Power and How Iron Gets in Sugar-Cane.



Photos by Courtesy of General Electric

Testing a Radio Coil for the Number of Turns by Means of an Electrical Counting Device. The Coil Winding Count is Registered on a Galvanometer and is Correct With a Variation of One-Half of One Per Cent.

WHO put iron in the sugar cane? What makes power mysteriously disappear from generating machinery?

What causes insulation to become short-circuited? The answers to these questions are the solutions of mysteries in the industrial world which has its own class of "criminals." The detectives of industry are constantly at work running down these malefactors. These keen sleuths, working in great, darkened laboratories, almost every day are able to send out solutions of mysteries that would baffle the most expert investigator. Mr. Sherlock Holmes, for example, would have to saw many weary hours on his violin before he could determine the number of windings in a completed radio coil unless he took the coil apart.

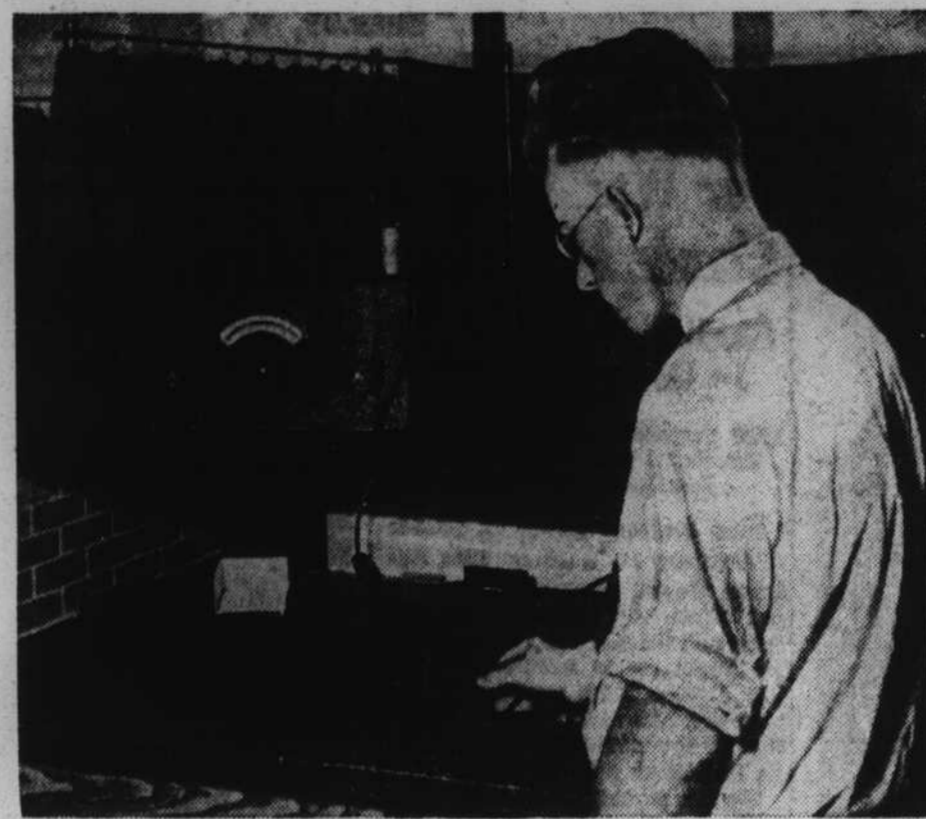
In these research laboratories there is headline news—giant x-ray tubes, electric eyes doing human tasks, high-frequency machines curing dread diseases and ten million volts of artificial light-

ning crashing through the darkness of a steel vault. Headquarters of one of these staffs of industrial detectives is found in the engineering laboratories of the General Electric Company, where the celebrated case of the kidnaping of power through magnetic losses keeps one detail of these detectives on duty day and night. The case is never placed in the file marked "closed." As new victories are chalked up they are made public to interested engineering groups, but the chase goes on.

The engineer, who is the "inspector" in this particular branch of industrial crime, estimates that because of the improvement in magnetic materials in recent years the magnetic losses in machines have been cut to the extent of from one-half to two-thirds watta per pound, a statement that is unexciting at first glance until it is figured out in terms of the dollars saved in the immense poundage of such machinery used by all industry.

Aside from the design of these machines there are two factors that must be considered by the general engineering laboratory in this study, two clues upon which the whole case hinges. These are heat treatment and the composition of materials used, and so, at the very beginning of the study, the field of investigation is severely limited. The criminal in the case—magnetic loss—leaves a clear trail behind, but has a head start. The composition and heat treatment of various alloys have been thoroughly studied to the end of reducing losses. In addition to the result originally sought the studies have brought forth magnetic materials having a greatly increased response—that is, many times the response for the same amount of energy applied. For as a material becomes increasingly difficult to magnetize, it also holds that property much longer.

Companies today purchase steel for machines on the basis of a guarantee of so many watts per pound loss at a given flux density and frequency. The complicated researches of the engineering laboratory are boiled down to numbers and symbols which give this information. Among recent cases is that of the short-circuits in insulated wire, and how the wrong-doing element was caught in the crafty magnetic net. In one factory



Samples of Asbestos Are Placed in a Tube Which is Inserted in This Testing Device. The Indicator Immediately Registers the Percentage of Iron in the Material.

producing wire it was found that asbestos applied to copper for insulation occasionally contained metal. When the wire was tested, it would "short." The engineering laboratory men found the cause of these short-circuits and built a device which was added to the machine used in the insulating. This was so designed as to detect the presence of the metal and stop the machine within an inch of its location. A sugar manufacturer found that sugar-cane did not always melt in the mouth, principally because it became entangled with pieces of metal. A detector which used magnetism was devised to discover the foreign particles.

One of the strangest things these engineering detectives do is to tell with almost uncanny accuracy the number of turns in a radio coil when these windings are hidden by the outer covering. By using a device called a turn-counter the process of detection is made simple. A coil of a known number of turns is used as a standard, and the coil to be tested is merely slipped on a pin of the counter, which operates on the direct current reversal method. The coil winding count is immediately registered on

a galvanometer. These detectors will count a little more than 40,000 turns and will be correct with a variation of about one-half of one per cent. The amateur who has wound a coil for a home-made radio will stand somewhat in awe of this device.

## Making Paint Out of Milk

MILK is now being used as a raw material for making casein paint which has an advantage of high reflectivity, resulting in approximately the same effect under artificial illumination as in the daytime.

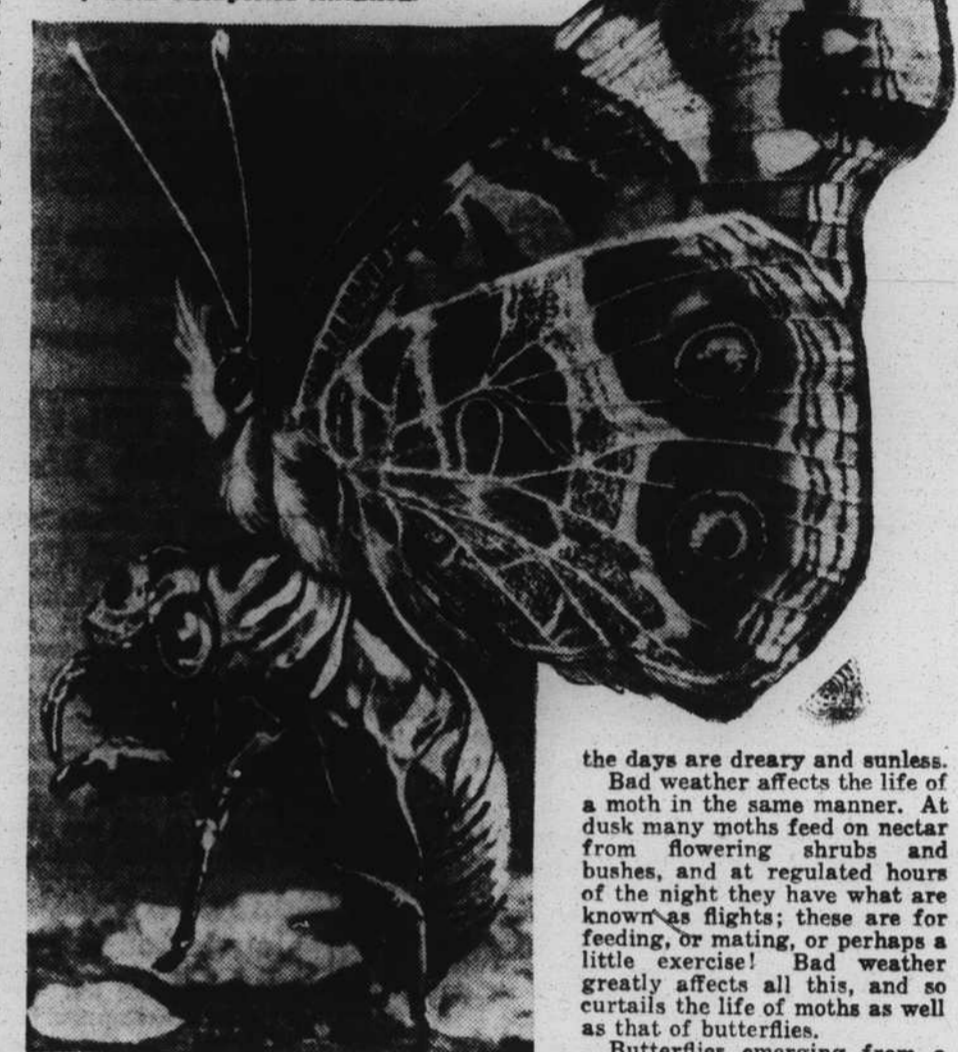
Casein paints, as the Industrial Bulletin of Arthur D. Little, Inc., points out, are not to be thought of as highly competitive with oil paints. The latter are best on smooth woodwork, and especially outdoors. Casein paints fill the great need of a decorative and light-reflecting paint which can be applied very easily by brush or spray and over even the roughest of materials. While not glossy, its surface is smooth and absolutely free from tackiness. It is singularly resistant to the accumulation and retention of dirt and grime, making this type of coating particularly suitable for use in cellars, warehouses, and factories, as well as for all temporary constructions.

Because of the porosity of its films, casein paint is not recommended for the long-time protection of wood or metal outdoors. This very porosity to water vapor is not always a disadvantage, however; for it permits casein paints to be applied to plaster while it is still wet, and does not interfere with the proper drying out of the plaster thereafter. Casein paints also have high lime-resistance, a rare quality in paints, so that they may be used over cement or lime mortar, even while these are still wet.

Casein paint is now made in the form of paste, so that mixing for use is much quicker and easier than when the old fashioned powder was used.

## The Life of the Butterfly

A Vivid Contrast in Beauty and Ugliness is Shown by the Gorgeously-Colored Butterfly as It Condenses to Alight Upon the Back of the Ugly Bug, Which, No Doubt, is Greatly Flattered by Such Unexpected Attention.



the days are dreary and sunless. Bad weather affects the life of a moth in the same manner. At dusk many moths feed on nectar from flowering shrubs and bushes, and at regulated hours of the night they have what are known as flights; these are for feeding, or mating, or perhaps a little exercise! Bad weather greatly affects all this, and so curtails the life of moths as well as that of butterflies.

Butterflies emerging from a chrysalis during cold, wet weather stand less chance of living.

Another difficulty in the way of determining the average length of the life of butterflies is the fact that many varieties of these insects spend the winter in hibernation, and are therefore alive for nine or ten months, whereas the usual life of a butterfly varies from one to two, or perhaps three, weeks, according to L. Hugh Newman, writing in Chamber's Journal.

"The importance of locality," says Mr. Newman, "will be understood when it is explained that the life of a butterfly is regulated greatly by the amount of nourishment it obtains from flowers, in the form of nectar."

HOW long does a butterfly live? The question does not refer to the human variety such as "futter in the pageant of a monarch," as Lord Byron described them, but the beautiful, winged creature that emerges from a chrysalis.

Entomologists have found it very difficult to state an average age for the butterfly, for so much depends on circumstances and the locality in which the insects are born.

Weather also has a very great effect on butterflies, curtailing their lives. The insects cannot obtain the nourishment they need to live their full span of life if

## The Correct Method of Hiking

WALKING strengthens the bones, hardens the muscles, loosens the joints, benefits the heart, enriches the blood, speeds up a lazy liver, promotes deep breathing. It improves the figure, maintains normal weight, tones the nerves, sharpens the wits, improves the complexion.

Watch the good walker with his even strides and how he elevates himself on the balls of the toes. Notice, too, that he swings forward the shoulder opposite the advancing steps as he makes every step. There is a simple knack.

The perfect countryside gait is one adapted to the character of the terrain, the season, and the prevailing weather. On a cold winter's day the bracing air will accelerate the hiker's gait during the first two miles. He has now acquired a comfortable body warmth, and will automatically reduce his speed. The other extreme is a hot summer's day, conducive to leisurely movements.

If the novice is anxious to learn from the veteran, the following tips which Ernest A. Dench gives in Nature Magazine, will prove helpful:

Try to arrange the trip so that the hardest stretch occurs in the morning, when one's energy is undiminished. The hiker who delays his start until late morning or early afternoon loses some of the health benefits attributed to the sunlight's violet rays. They exist in northern climes between 9 and 3 o'clock

in summer, and from 11 to 1 o'clock in winter.

It is best to take a steep hill or mountain at a slow but even pace. Pretend you are stepping out to music—a slow waltz in preference to a fast fox-trot—and you will soon acquire a sense of rhythm, and then the all-essential measured tread. If unaccustomed to climbing, a two-minute rest every 10 minutes will prove desirable. Two short steps are preferable to one long step. This likewise applies to the later descent.

## Fingerprinting Disease

FINGERPRINTS are now expected to play as important a part in the detection of disease as in the detection of crime. Doctor Heinrich Poll, a noted German scientist, after 25 years of ceaseless research, during which time he studied 200,000 fingerprints, announces that he has found that these marks not only contain concealed evidence of the racial or ancestral group into which a person is born, but also hidden signs of inherited tendencies, both mental and physical.

During an outbreak of infantile paralysis, Doctor Heinrich also discovered that the finger-prints of all the victims showed common characteristics which, apparently, were marks that indicated this particular malady.

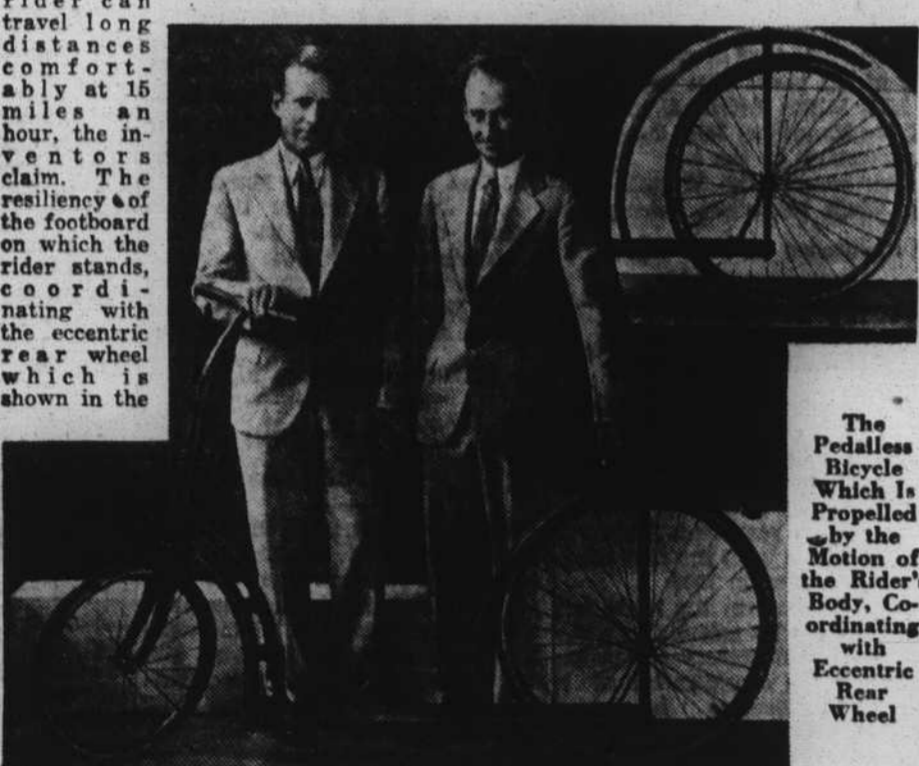
## The New Pedalless Bicycle

MOTION of the body alone propels a new type of bicycle, the rear wheel of which is eccentric. No pedals are required for the "x-cyclette," as it is called, shown here with its designers, two Chicago brothers.

After acquiring the proper swing a rider can travel long distances comfortably at 15 miles an hour, the inventor claims. The resiliency of the footboard on which the rider stands, coordinating with the eccentric rear wheel which is shown in the

upper right-hand corner, keeps the vehicle in motion.

This odd bicycle is equally as useful as an exercising device as it is a vehicle, for, the inventors point out, practically every muscle of the rider's body is brought into play in imparting motion to the two-wheeled machine.



The Pedalless Bicycle Which is Propelled by the Motion of the Rider's Body, Coordinating with Eccentric Rear Wheel

## Freak Foods That Tempt Men's Appetites

SUPPOSE you entered a restaurant and picked up the bill of fare on which were listed such strange dishes as birds' nest soup, bummalo, sea-cucumbers, sharks' fins, sea-weed, bou-targue, financier and poppadums, would your appetite be tempted? Maybe you would not care to taste such freak foods without which no dinners in different parts of the world are complete.

Bummalo, for instance, is a tiny transparent fish used for flavoring curry. Not unlike a smelt in size and appearance, the fish is found on the seashore in most parts of Southern Asia. It has a powerful aroma when warmed, and with most people in this hemisphere is decidedly an "acquired taste."

Another odd dish is beche-de-mer, the name given by the Portuguese to the sea cucumber. The substance is used in making soup, and costs as much as two dollars a pound.

Edible seaweed, vanilla pods and bou-targue, the roe of a species of mullet preserved in beeswax, are other items that tempt many appetites.

Sharks' fins are used for soup, a plate of which, flavored with this delicacy, would cost as much as a dollar and a quarter or more. The fins are obtained from a small species of shark found off the coasts of Australia and New Zealand.

Pickled cocks' combs are sold under the name of financier which is an expensive delicacy.

Poppadums are an equally unknown dish which is very palatable. They consist of a mixture of finely-ground split peas mixed with a special kind of butter.

Edible birds' nest is popular with millions of people. It consists of thin, gelatine-like sections of the nest, made of the saliva of the swift, which makes its home in caves on the coast in the East Indies, Japan and China. So highly esteemed is this strange substance, which is eaten with soup, that a considerable industry is devoted to collecting the nests, preparing them for export, and distributing them to all parts of the world. The price is about forty dollars a pound.

## The Cost of Color in Illumination

COLORS not only play an important part in decorative effects in the home, but also in the electric light bills. That last fact is too often overlooked. Just what colored walls and ceilings, as well as colored lights, cost in light absorption, is disclosed in the following tables compiled by illuminating engineers.

White and white ivory average 20 per cent light absorption, according to these authorities, while black, at the other extreme, rates 99 per cent, with the various colors and shades in between rating the following percentages of light absorption:

Color	Per cent
Ivory	29
Primrose Yellow	22
Gray (depending on tint)	30-80
Buff	36
Pink	46
Azure Blue	60
Sky Blue	63
Tan	65
Olive Green	79
Forest Green	80
Cardinal Red	80
Brown	81
Dark Green	95
Dark Blue	96

## Why Fastings More Harmful to Women

FASTING is much more injurious to women than to men, according to Professor H. J. Denel, of the University of Southern California Medical School.

When women refrain from taking food and starve themselves to gain a slender figure they incur far greater risks to their health than do men who undergo similar deprivations.

"Women develop a much more pronounced acidosis during a week's fasting than do men," says Professor Denel. "This condition is associated with the inability of females to oxidize fat during starvation as completely as the male subjects are able to do. For this reason an accumulation of incompletely oxidized products, which are organic acids, occurs in the female, and typical symptoms of acidosis ensue."

"Although none of the ordinary laboratory animals develop an acidosis during fasting, comparable with man, nevertheless it was shown that fasting male rats are able to oxidize one of these organic acids—diacetic acid—much more completely than female rats can." Professor Denel found that experiments on animals may indicate that certain operations might reverse this comparative ability to endure starvation as between the sexes.

## Feeling the Earth's Pulse

RECORDS of earthquakes obtained by the large seismograph installed in an underground vault at the Seismological Laboratory at Pasadena, California, yield new facts about earthquakes which may cause scientists to develop new theories about the interior of the earth.

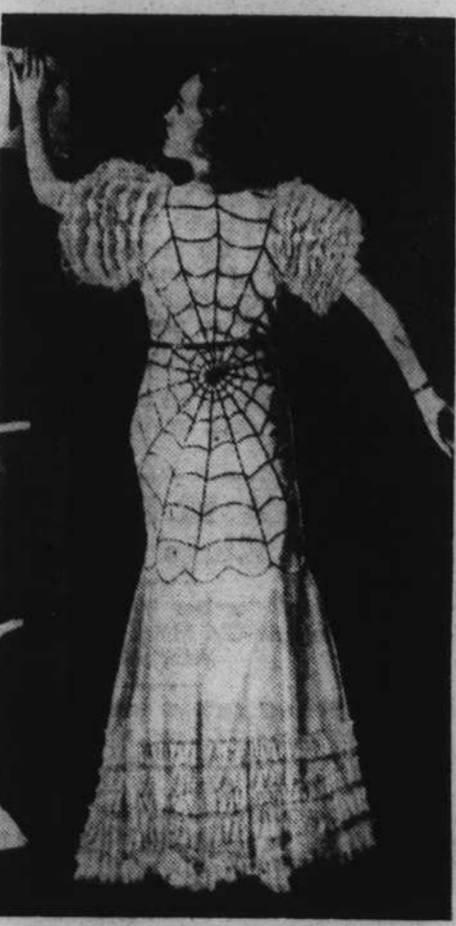
Most seismographs indicate only the vibratory motions of the earth at a given point, but the Pasadena instrument also takes the earth's pulse by measuring the relative movements of two different points. It responds only to stretches or compressions and indirectly to vibratory movements.

## Spider Dress

SPIDERS are such abhorrent creatures to look upon that, as every-one naturally would expect, these cunning insects could never become an accessory to dress.

A case in point is seen in the spider gown pictured in the accompanying illustration which was among the new autumn and winter creations displayed at a recent exhibition of women's wear in London.

This costume is described as a charming evening gown of white net, with frilled hem and sleeves. Its fascinating feature, however, upon which the interest of the spectators centered, is the design of a spider's web, carried out in detail in black sequins artistically arranged on the back of the gown.



The Spider Web Design Which is Carried Out in Black Sequins of This Evening Gown of White Net Forms the Gown's Most Unusual Feature.