



"Radio Tubes" With Power to Run a Railroad Train

How the Newly Perfected Mercury Arc Rectifier, a Giant Steel Hive, Handles Tremendous Electrical Force in Absolute Silence.

RADIO tubes capable of handling the tremendous power required to run a railroad train can be left only to the imagination when one tries to contrast with such huge and powerful devices the familiar radio tube which is the heart of the home receiving set. Had you been present, however, at a recent demonstration of the newly perfected mercury arc rectifier, which took place in the laboratories of the Westinghouse Electric and Manufacturing Company, you probably would have rubbed your eyes in wonder at one of science's newest and most amazing developments. You would have been astounded how almost unlimited quantities of power could be massed in such a machine. Despite the fact that it is 12,000,000 times as powerful as the ordinary radio tube, two of these great tanks handled enormous power in absolute silence. Since there are no moving parts to work loose or wear out, oiling and replacements would never be necessary.

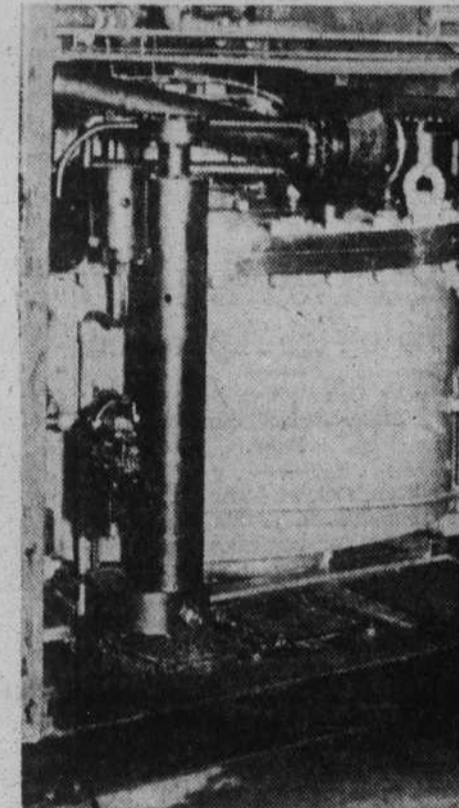
Electric power usually comes over transmission lines in the form of alternating current. For certain services it must be changed to direct current. In the new sectional form of the mercury arc rectifier, both the efficiency and economy of operation have been greatly increased for this necessary process.

This sectional feature has many advantages, according to the engineers. It is like the fuse plugs in the home. If one fails another can be substituted in its place or service can be continued without the faulty unit, just as seven cylinders will drive an automobile after a fouled spark plug has put one cylinder out of commission. The difference is that the "giant radio tubes" maintain an even flow of uninterrupted electrical power. Each of the remaining "tubes" assumes a portion of the load and carries on without a pause until a new "tube" takes the place of the one that failed.

Each section is a steel tank, surrounded by a water jacket. Every trace of air has been pumped from the inside of the tank and the mechanisms of the electric arc operate in an atmosphere of mercury steam.

Jets of mercury steam shoot upward from pools of liquid mercury in the bottoms of the tanks at the enormous speed of over five miles a second. These streams, which are composed of billions of billions of molecules, are thrown continuously upward and strike the water-cooled walls of the tanks where they condense and fall back to

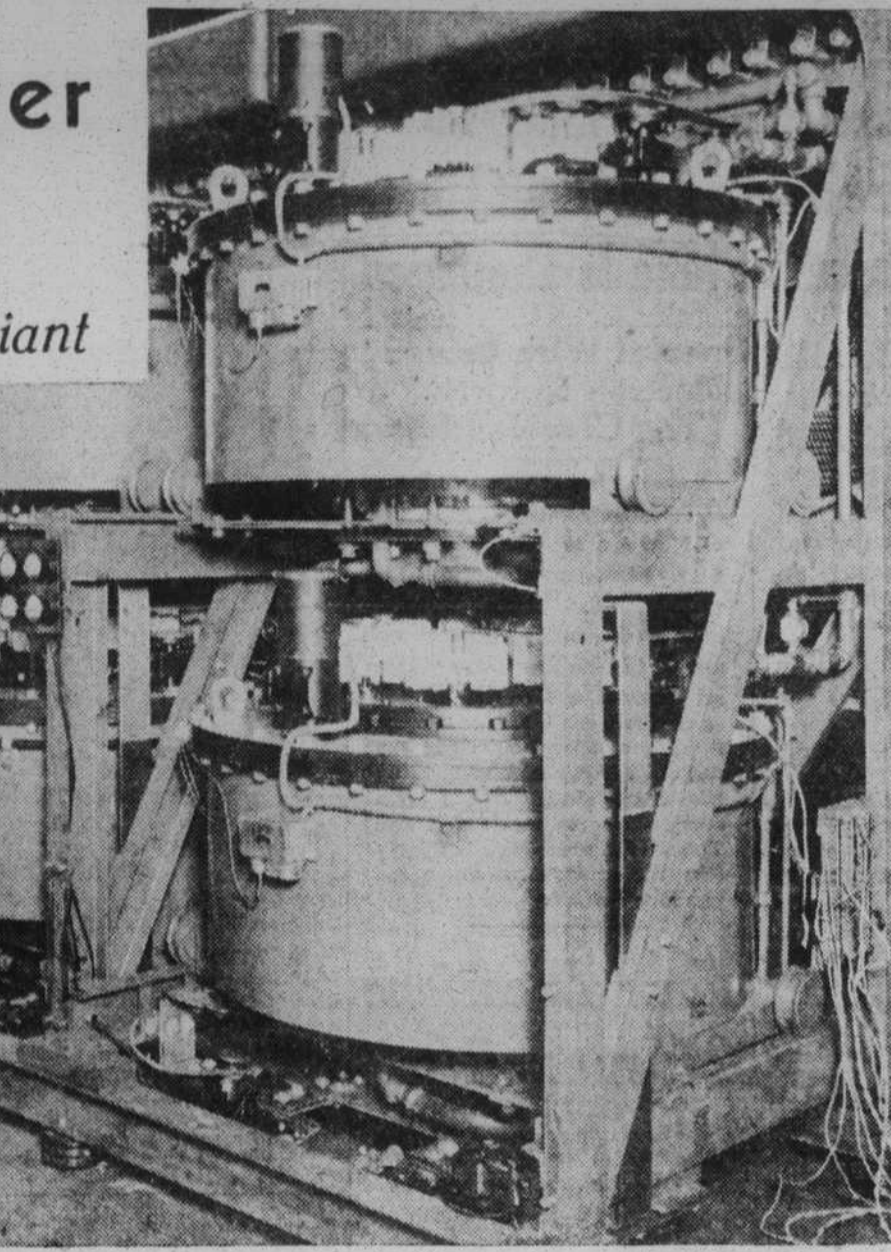
the pool below in drops. Over and over this mercury rain storm is repeated. No mercury is lost, so none needs to be added. As the tiny molecules fly upward they come under the influence of powerful electric fields which cause some of them to be broken into two parts. As soon as the molecule divides, the small portion becomes a very tiny electron and the remaining portion becomes the proton. The proton is more than 300,000 times as large as the electron, but it is the electron which is electricity because it carries the electric current.



The electrons, being so small, move easily and very fast among the large molecules, the protons and the drops of mercury, and carry the electric current through the tank like so many bees in a busy hive. The protons resemble the

Below: An Engineer Reading the Vacuum in a Mercury Arc Rectifier Which Converts Alternating Electrical Current Into Direct Current.

drones in the hive because they are sluggish. Before one has moved far from where it was born, an electron which has finished its work unites with it again to form a molecule. Billions upon billions of these small particles participate in the cycle within the steel hive. Commanded by the influence of the electric fields, the busy electrons carry the heavy electrical currents while the lazy protons hang around doing the odd jobs and taking



The Mercury Arc Rectifier Which Is Twelve Million Times as Powerful as an Ordinary Radio Tube. It Has No Moving Parts and Never Has to Be Lubricated.

the paths of least resistance. The molecules move under the action of the jets, are broken apart to form new workers or electrons and the condensed drops of mercury fall back to replenish the ever evaporating pool of mercury.

The engineers explain the necessity and purpose of the mercury arc rectifier simply. Alternating current, as it comes from the power lines, is preferable for operating domestic appliances, street lights, etc. Other applications, such as street railways, require direct current. This need is met by passing the alternating current through the sectional mercury arc rectifier, otherwise

the "giant radio tubes." Here alternating current is changed into direct current exactly as the ordinary radio detector tube transforms the tiny alternating currents it receives from the air

Few Fat Men Are Criminals

A JAPANESE criminologist, Kinzo Saza, recently made the interesting statement that comparatively few stout men become criminals. Since Mr. Saza's statement is taken as authoritative by the faculty of his university, it is interesting to note the opinion of an American criminologist. Charles Shottland, a criminologist on the Prison Board of Illinois, says that he has noticed that most criminals involved in offenses against or in connection with insurance companies are fat men.

Prophecies in Fiction

THERE are many notable cases in which fiction has foretold facts and events of great importance and some prophecies made by novelists are world famous.

One of the most notable examples of prophecy in fiction is Jules Verne's description of the submarine in "Twenty Thousand Leagues Under the Sea," and his "Steam House," in which he forecasts the motor car.

In the first of these books the means of plunging under the sea, of maintaining proper balance, of lighting, etc., are all as now used. Not only that, but the diving suits, in which members of the crew left the ship, with their reservoirs of compressed air, purified by chemicals, are just what were patented many years later.

H. G. Wells published his short story, "The Land of Ironclads," years before the Great War, in it he gave a wonderful picture of tank warfare. It was Wells, too, whose "War in the Air" gave such an amazing forecast of the German Zeppelins.

In his "Iron Pirate" Sir Max Pemberton made his pirate cruise in a vessel of phosphor-bronze. It is interesting to know that later on two vessels, a torpedo boat and a launch, were actually constructed of this alloy.

In a novel called "Futility," by Morgan Robertson, which appeared in 1898, the author tells how a monster liner, the Titan, was built. She was the largest ship ever constructed; she carried 2,000 passengers, and was said to be unsinkable and indestructible. She was running full speed when—"Ice!" yelled the look-out.

"Forty-five thousand tons dead weight rushing through the water at fifty feet a second had hurled itself at an iceberg," wrote the author.

Fourteen years later the greatest of modern liners, the Titanic, also believed to be unsinkable, met her fate precisely as described by Mr. Robertson.

"It is difficult to say why this is so," says Mr. Shottland, and I can only base my statement on my personal observations, which may have been shadowed by coincidence.

"The gangster class in Chicago is in the main composed of thin men, not necessarily muscular or in good health. Without firearms they are no match for the police.

"Among women criminals, a fat woman is almost a rare avis, and I do not think I have seen a dozen fat women in prison during my career as a prison examiner. I have visited women's prisons in England, France and Germany, and I do not hesitate to say that in the United States we have a greater percentage of really beautiful girls who go to prison for various offenses.

"One of the reasons for the lack of criminal tendencies in stout men—if indeed this is so—may be that it is due to the inherent hatred of exercise in most fat people. Crime is, after all, a strenuous game, requiring in many of its branches physical endeavor."

How Veronica Was Named

THE VERONICA, which botanists have classified as a large genus of herbs or sometimes shrubs of the figwort, is a familiar plant, but just how it got its name is a fact little known, although it is cultivated



A Sprig of Veronica, Named After St. Veronica on Whose Kerchief, Tradition Tells, a Likeness of Christ Was Miraculously Imprinted.

throughout the land for its modest flowers of blue, purple, flesh color or white. How this flower serves to bring to mind a beautiful act of mercy performed by a pious, pious maiden of Jerusalem, is told in Nature Magazine by Albert A. Hansen.

Jesus, heavily laden with the cross, passed along the road to Golgotha. He passed the home of a certain pious maiden of Jerusalem. Her heart filled with compassion at the sight of the sorrowing and agonized face, she ran to the Master and gave Him her kerchief. Jesus wiped His suffering brow and gratefully returned the linen cloth to the maiden.

A miracle had happened! On the surface of the kerchief an image of His sacred features had been miraculously imprinted!

Ever since, the likeness has been known as "Vera iconica," that is, the "true image."

The linen cloth was religiously preserved, and, according to tradition, it is the identical kerchief which now rests in St. Peter's at Rome.

Desiring to canonize the merciful Jewess, the church named her St. Veronica, a gentle tribute to the "Vera iconica."

Because a pretty little plant, which grows in abundance in many parts of the world, has an irregular and streaked flower, a fancied resemblance to the flower to the image on the kerchief so inspired the imagination of the ancient monks that they named the plant after St. Veronica.

Measuring One-Millionth of an Inch

AN electrical measuring instrument which is quite "fussy" over tiny errors to a superhuman degree utilizes vacuum tubes, including the photo-tube or electric eye, which never before has been called upon to do such precise work.

The most minute quantities are measured and permanently recorded on a moving chart. Infinitesimal inaccuracies loom as tremendous, glaring errors to the supersensitive "eyes" of this new engineering tool. Errors of one-millionth of an inch are detected. If an ordinary sheet of paper could be split edgewise a thousand times, the instrument could measure the thickness of one of these delicate tissues. The device insures utter precision of

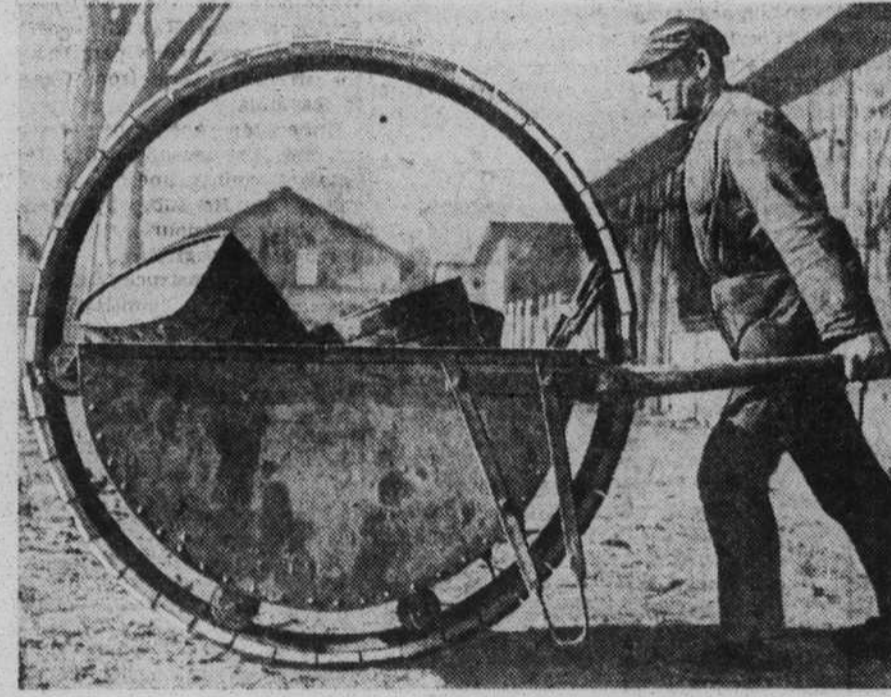
The Tomb of Egypt's First Queen

THE great pyramid recently discovered at Gizeh, by Professor Selim Hassan is believed to be the tomb of Queen Khentkawes, who was possibly the wife of King Neferekerka, the third king of the Fifth Dynasty. This ancient monument lies near the Great Pyramid of Cheops, and is the tomb of the first Egyptian lady to bear the title of "Queen." It is built against the solid rock, which forms one side, and its base measures about 150 feet. The superficial area of the pyramid is about 3,300 square yards, which shows that it is somewhat smaller than the third pyramid. It is also slightly different in formation.

The existence of a fourth pyramid has been suspected for a considerable time. The pyramid now discovered probably disappeared from view more than twenty centuries ago.

The location and history of the fourth pyramid has for ages been a mystery. Professor Hassan recently unearthed a brick temple not far from the third pyramid, and as every pyramid had its temple he was convinced that his discovery was the key to the whereabouts of the fourth pyramid.

A Wheelbarrow in a Wheel



The Container of the Wheelbarrow Is Mounted on Wheels Which Run on a Track Extending Around the Inside of the Large Exterior Wheel, the Latter Making Contact With the Ground.

THE principle of a giant motorized hoop which an English inventor recently developed as one of the strangest of all vehicles, a huge unicycle known as the "dynamosphere," has been applied by a German genius to the perfection of the odd-looking wheelbarrow pictured in the accompanying illustration.

The queer vehicle is called a "hoop-barrow," from the fact that it is the familiar wheelbarrow built within one large hoop whose diameter is equal to the height of a man of average size. The container part of the hoop-barrow is fitted with rollers which run on a track that extends completely around the inside of the hoop. A pair of handles extend from the barrow proper to a convenient point beyond the hoop, so the vehicle is easily pushed by hand like the ordinary wheelbarrow.

The length of the container part of the barrow, including the four sets of wheels on which it is mounted, is made equal to the inside width of the hoop to hold the wheels on their track. The large hoop is the sole contact with the ground when the barrow is being pushed along. The container part remains stationary at the bottom of the hoop, as the latter makes complete revolutions around the barrow.

When the hoop-barrow is stationary the container part is held in a horizontal position by two legs attached to

the barrow at a point near the handles and just inside of the hoop.

The hoop-barrow thus works more on the principle of a rolling drum, rather than on that of a lever. Its inventor claims that it is superior to the familiar type of wheelbarrow, as much heavier loads can be carried in it with the greatest of ease over rough ground.

A Computing Pencil For Bridge Players

AN automatic computing pencil has been invented as an aid to contract bridge players in eliminating errors, avoiding disputes and saving time in scoring.

Merely by turning the movable barrel the desired number of over tricks or under tricks is shown in the center column marked "Tricks," and the answer instantly appears. Totals are shown for vulnerable, not vulnerable, doubled, not doubled, or redoubled, as the case may be. Under tricks are indicated in red; over tricks, in black.

This pencil can be used for contract bridge and for any other purpose. It propels, repels and expels the lead. It also has an eraser and a chamber for reserve lead.

How Crabs Gather Coconuts

COCONUTS form the favorite food of the giant crab of the coral islands of the Pacific. Many of these nuts are blown down by winds, but if the food on the ground becomes scarce the crabs climb trees and dislodge the nuts. First they strip the outer fibre, then they attack the shell. It is sometimes not easy to break the shell with a hammer, but these giant crabs are able to get to the food inside in a clever manner, which makes it appear that at one period their ancestors were able to think out and solve a difficult problem.

When the crab has a nut upon the ground and has removed a sufficient quantity of the fibre covering, it attacks the shell. Starting at the end which has three small holes, with a powerful hammer-like claw it strikes one until pierced, then inserts a smaller claw to extract the white flesh of the nut. Travelers have declared that the crab can actually break open the nut with its claws.

The coconut is said to be an acquired food in these coral islands, for the tree was introduced from Mexico.



The Giant Climbing Crab of the Pacific Coral Islands.