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ENGINEERING ABSTRACTS

GERMAN RAIL CAR WITH A NOVEL DRIVE

A SERIES of tests have been made in Germany with a unique design of rail car which has a streamlined body and is powered with a 500-h.p. airplane engine installed at the rear, which drives a four-bladed propeller. The car, which is the result of fifteen years of development and research on the part of the designer, Herr Kruckenbergl, has attained a speed of 124 miles an hour over a straight piece of tracks, and has an estimated speed of 185 miles per hour.

The car weighs 20.6 tons, is built with a streamlined body, and is carried on two trucks spaced 65.62 feet, center to center. The body is made of steel tubing covered with sheet aluminum and balloon fabric.

The fuel consumption of the engine is estimated at about 14 gallons of gasoline per 62.2 miles. In addition to the four-blade airplane propeller, the engine drives an air compressor for the brake system and two electric generators which charge the storage batteries. The electrical control equipment and the batteries are installed in the front part of the car ahead of the elevated seat for the operator.

The storage batteries supply current for a motor which furnishes auxiliary power for propelling the car when the airplane engine is idle.

The car is equipped with two independent braking devices: an air brake similar to that used on highway vehicles and an emergency hand brake. The engine is started with the brakes applied, which are released as soon as the desired number of r.p.m. have been attained.

Tests are being made with the cooperation of the German State Railways, the first one being made with a capacity load of forty passengers.—*Railway Mechanical Engineer.*

SCIENCE AND THE VATICAN CITY

THE Vatican City, one of the most backward states in the world a few years ago, is now one of the world's greatest scientific centers. Up until 1928 this smallest of the world's states was centuries behind the times. Now, four years later, everything in the state is the last word in modernism.

An electric railroad, practically accident-proof, connects the Vatican City with the outside world. A super water-supply system supplies the 632 inhabitants with pure, fresh water. The telephone system is unique. There are 975 automatic dial telephones throughout the city. Thirty circuits provide service to Rome and six trunk lines connect with other countries. A series of radio, and land and submarine cables, totaling more than 4,700 miles, connects the Vatican City with the United States.

A powerful radio sending and receiving station, built by Marconi himself, can reach any part of the world.

One of the most scientifically up-to-date observatories is constantly searching the skies. The Vatican, palace of the Pope, has recently been equipped with elevators of the same type as those used in the Empire State Building.

This is the only state in the world to maintain a fleet of helicopters. It coins its own money and has in its mint a machine capable of coining 10,000 coins each of nine different sets, per day. It has a modern postal service, and letters received at the post-office are delivered in a few minutes by means of a great cable system.

In four years the Vatican City has been changed from an 1800 state to one that is thirty or forty years ahead. They say they will keep right on improving and by 1940 be as many years ahead of the times as they were behind.—*Popular Mechanics.*

A BATTERY A QUARTER MILE LONG

LARGE telephone companies are forced to supply the electricity to carry messages over the wires from storage batteries, because dynamos are too noisy. The bigger the exchange and the more traffic it handles, the larger must be the batteries. Next year the Farm Street, Mayfair, exchange in London will have thirty thousand automatically operated lines, and a battery of gigantic proportions is now being constructed for use there. One hundred and fifty men are employed in building it, and it is estimated that it will take six months to finish it.

Each cell will be nine feet long and the entire battery of 300 will be some 1,350 feet long. It will weigh more than 400 tons, and 4,000 gallons of dilute sulphuric acid will be needed to fill it. Its capacity will be 13,000 ampere hours, enough to supply current for a five-tube radio set from now until 1957, without recharging.—*Popular Mechanics.*

RADIO "FEELERS" FOR THE "AKRON"

WHEN the Navy's new monster dirigible, Akron, settles toward a landing field obscured by fog or cloud, she will not have to "go blind," but will drop a radio-equipped "feeler" that will signal back to an automatically registering apparatus the atmospheric conditions in the unseen air level below.

The instrument was invented by a Russian scientist, Professor Moltchanov. It was designed originally for use in an entirely opposite direction, namely for sending aloft attached to small drifting balloons, to obtain meteorological information at high altitudes.

It carries instruments to measure temperature, air pressure and atmospheric moisture, and an automatic radio-sending apparatus, whose signals are picked up and recorded on a revolving drum by the receiving apparatus.

The Navy has ordered two of Professor Moltchanov's sets, and expects to have them in use in a few months. In practice the sending set will be dropped from the

Akron on a long cable to "feel out" atmospheric conditions underneath, and inform the navigating officers whether there is clear air under a given cloud surface, or whether there is solid fog to the ground. Although there will always be a solid connection between the Akron and the sending set, the atmospheric data will still be transmitted by radio, because it is simpler to handle it that way than to make electrical connections and receive the data up the suspending wire.—*Literary Digest*, September, 1931.

WELL POINTS DRAIN WATER UNDER BRIDGE APPROACH STRUCTURE

IN building a street-car right of way near the Hudson River bridge, it was found that the road bed must cross a swamp. First it was planned to drive piles through the twenty-five feet of muck to bed rock, but it soon became apparent that the muck offered insufficient lateral support. Finally it was decided to dry up the immediate area and then excavate to bed rock. It would then be possible to fill in with good material to provide a firm foundation. The water was removed by means of two header pipes placed sixty-five feet apart and extending for six hundred feet. Well points were driven every three feet along the headers and connected directly to the pipes. Five centrifugal pumping units were used. After the ground was dry enough, the excavating was soon completed and the new material filled in. This was a very ingenious method of completely solving a difficult problem.—*Engineering News-Record*, October 22, 1931.

CATAPULTING ON A LARGE SCALE

ALTHOUGH it has been the practice for some time to catapult small planes from the decks of ships, it is only recently that any progress has been made toward putting large planes into the air by this method. The Royal Air Force has been experimenting on a seven-ton Vickers Virginia bomber. The apparatus used consisted mainly of a cable and a motor-driven windlass. The cable runs under the plane tail to nose, through a pulley anchored near the end of the runway, and back to the plane where it is fastened to the nose by a special hook. The other end of the cable is wound on a drum which is motivated by two compressed-air engines. The two engines together develop 4000 horsepower. Before taking off the motors on the plane are worked up to full speed and then the compressed air engines started. When the plane reaches the pulley, the cable disengages and the plane takes off. A special carriage is used to support the tail in flying position. In the tests the plane attained a speed of sixty m.p.h. in 100 feet, in three seconds.—*Aviation*, October, 1931.

X-RAYS

X-RAYS at 900,000 volts, over four times as high a voltage as is being used in today's most powerful therapy tubes, have been attained by Dr. W. D. Coolidge, associate director of the General Electric research laboratory at Schenectady. Such a decided increase in voltage,

and hence increase in the penetrating power of the rays, was made possible by a system of "cascading" in the tube, an arrangement devised by Dr. Coolidge. This system of cascading is merely that of building the tube in two sections. By use of the cascade there appears to be no limit to the voltage that can be used.

The highest voltage X-ray tubes used commercially at the present time are of 200,000 volts peak capacity, and are of two types—water-cooled and air-cooled. The air-cooled type is used considerably in industrial applications, since the high voltage gives the necessary penetrating power required for examining the heavier metal objects. The introduction of the new 900,000-volt tube would permit the radiography of thicker objects and shorten the time of exposure.—*Scientific American*.

BRIDGING THE HUDSON AT FORT LEE

ON November 4, 1927, contracts were let for the building of the superstructure of the Fort Lee Bridge, since named the George Washington Bridge.

The dimensions are: "main span 3500 feet, suspended side spans 650 feet each, the two steel towers 588 feet from mean water level to the L of the cables. They support four 36-inch cables. The present upper deck is 106 feet wide, designed to carry eight lanes of traffic."

The towers were originally designed for a steel and concrete construction, but when they were built they were made entirely of steel with provisions for covering with concrete later. The bridge was designed to have a lower deck which will carry four lines of rapid-transit tracks. When this lower deck is built, the channel clearance will be 213 feet at mid span.—*Engineering News-Record*, October 22, 1931.

AMMONIA-CHLORINE TREATMENT OF WATER

THE ammonia and chlorine treatment of water is a recent development, having a great value to those interested in city or industrial water plant projects. In these projects this treatment has several important uses; it is very effective in sterilizing drinking and swimming waters; it eliminates bad odors and tastes which accompany other water treatments; it destroys irritant action of chlorine in swimming waters; it prevents algal and slime growths in swimming pools, city water mains, and industrial water systems; it proves a better method of cleaning food containers; and, it helps in the production of a whiter newsprint paper.

Chloramines, formed by the action of a dilute solution of ammonia with chlorine, produce the excellent sterilizing quality of the treatment. The chemical and physical properties of chloramines adapt these compounds to their excessive use in water treatment. Chloramines, highly soluble in water, are stable compounds making them weak oxidizing agents, an important consideration in water systems. The stability of these compounds promotes an action in the water opposite to that of chlorine, in that chlorine is a great oxidizing agent, loses effect in sunlight, and forms

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bad odors and tastes. With ammonia present much less chlorine is needed, which is an economical factor.

Although a new development the ammonia-chlorine method of treating water is not a new process. It was discovered in 1904, but was not used until 1915 when Ottawa, Ontario, Canada, applied it to the water system as a sterilizer. However, it was not used as a preventative of bad taste and odor until 1927 when it was applied to the Greenville, Tennessee, water system. Installations of the process in the United States in the past year have increased from 5 to 145.—*The Canadian Engineer*, September, 1931.

MECHANICS DEPARTMENT

When told that the "Akron" was passing over the city, Professor Boyd of the Mechanics department won a handicap race from his 607 Mechanics class, using as his slogan, "I'm gonna get out where I can stretch my blinkers."

A room in the southwest tower of the Armory has recently been rearranged and made the office of Lieutenant Kidwell, instructor in the Signal Corps.

Freshman: "I hear that the legislature is going to abolish convict labor at this University and I can't understand their reason for doing this."

Experienced Upperclassman: "That's simple. The convicts are in danger."