



PHYSICS

Artificial Lightning More Powerful Than Nature's

Electrical Current Amounting to 250,000 Amperes Makes Impressive Display for Visitors to Laboratory

MAN-MADE lightning rivaling nature's own thunderbolts with electrical current of 250,000 amperes was put on display at Pittsfield, Mass., recently in a crashing, flaming exhibition by engineers of the General Electric Company's high voltage laboratory.

Measurements of current surges in power lines have indicated that a direct hit by a natural stroke of lightning causes the current to mount to only 150,000 amperes. The current in the demonstration was discharged at 150,000 volts potential.

The electrical power expended during the eight one-millionths of a second of the flashing "bolt" was 30,000,000,000 watts. This is thirty times the electrical power developed by the hydro-electric plants at Niagara Falls and as much as the combined electrical output of all the electric plants in the United States.

Ordinary copper wires for handling heavy currents were blown apart and vaporized in a few millionths of a second during the demonstration. A section of reinforced concrete was shattered by the impact of the artificial lightning bolt just as a concrete structure is sometimes wrecked by natural lightning.

A metallic conductor large enough to

carry the tremendous current without fusing is subjected to powerful mechanical forces during its transmission of the current. A flat strip of copper shows the "pinch effect" which changes it from a ribbon to a nearly round cross section.

The new high current apparatus is a companion instrument for the 10,000,000 volt artificial lightning generator already in use at General Electric's high voltage laboratory. Both instruments are used in the research which the company is and has been making to study the effect of natural lightning on long distance power transmission lines.

Already many protectives have been devised to improve the service to distant places which formerly was interrupted by lightning strikes.

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MARINE ENGINEERING

Ship's Propeller Should Be In Bow As Is Seal's

IF MARINE engineers really wanted to increase the speed of great ocean liners they would put the ship's propeller in the bow and make it act as a "puller" instead of a "pusher" as now used. This is the verdict of the Ger-

ARE THEY SCARED ?

Visitors waiting for flash marking 250,000 ampere display of artificial lightning at Pittsfield, Mass., plant of General Electric Co. Thunderlike sound accompanied the discharge. Current in natural lightning seldom rises above 150,000 amperes. The high-current demonstration is part of research to find more effective ways of guarding power transmission lines from lightning shocks.

man scientist, Dr. Heinz Judis, after a study of the methods of movement in fast-swimming sea animals like the penguins, dolphins, seals and sharks.

All these animals, which gain remarkable speed in spite of comparatively small effort, have two sets of "propellers" which are the fins in front and rear. But in fast swimming only the forward fins are employed for straight-ahead motion. The tail fin serves mainly for steering.

A ship produces a bow wave, a resonance wave, and a system of stern waves. At high speeds these complicated wave systems constitute the major part of the total resistance, declared Dr. Judis.

Every propeller, and so also a penguin's wings, says Dr. Judis, produces a system of waves. But when a penguin is swimming fast, the waves produced by the wings cancel the bow waves so that the animal saves nearly the whole of this resistance.

Towing tests on a dead penguin made at the Berlin Institute of Shipbuilding Research showed that the resistance decreased the moment that the water began to flow over the shoulders of the animal, and the bow wave then almost disappeared.

Dr. Judis equipped a boat with fins and a mechanism by which the com-

bined flapping and feathering motion of a penguin's wings could be simulated. The wooden fins were of necessity stiff, whereas they should have been flexible. But despite this defect the results exceeded expectations. The boat propelled by two men made 2.8 to 3.7 miles per hour.

For comparison, the boat was also equipped with paddles, and was driven in each case at 6.2 miles per hour. Photographs showed that with the paddles strong bow waves were developed, but with the fins they were almost entirely absent.

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DENDROLOGY

200 Elms Killed Daily By Dutch Elm Disease in East

FINE old elm trees, of which the eastern states are so justly proud, are now succumbing to a renewed attack of the Dutch Elm disease at the staggering rate of 200 a day.

The ravages of this affliction have become so serious that Congress appropriated \$150,000 now being used for the work of checking the blight. Already death has reached 3,027 shade trees in the region around New York.

The greatest loss has been suffered by New Jersey where the mortality of elms to date is 2,456. And each day new cases of the disease are discovered. The only check which has been found by scientists working against this plague is to chop down and burn the trees the moment tests have shown them to be infected.

The Dutch Elm disease first appeared in 1920 in Holland. It waged a destructive war against European elms and then proceeded to cross the ocean in the holds of ships carrying elm logs for the furniture industry.

It made its first appearance in a flank attack in Ohio three years ago, but not seriously as only nine elms were felled and immediate action checked further damage.

Carried By Beetle

In the last few months, however, it has stabbed the heart of the elm region around the port of New York. A small bark beetle, *Scolytus*, carries the infection in the form of a fungus known as *Graphium ulmi* which attacks the smaller twigs and withers whole branches of the tree.

None of our native elms seems to be immune, although an oriental variety is not infected. This tree, imported from Asia, can nevertheless be a harbinger of the disease and should also be destroyed if it is found to be bearing the fungus.

When queried as to whether this epidemic will have the terrible effects of the blight which years ago stilled the whistles of so many chestnut venders, U. S. Department of Agriculture scientists declared it equally serious from its present aspect. Whether a wholesale slaughter of elms will take place in the future can not yet be foretold.

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RADIO

Radio Device Blocks Out Parts of Programs

A DEVICE which automatically tunes out any part, or the whole, of a radio program has been patented by Floyd G. Caskey, Washington inventor.

If the listener wishes to turn off his radio for one minute intervals every fifteen minutes it is only necessary to push a button in an attachment on the radio set and the instrument goes "dead" for the desired interval and then turns itself back on. The new radio appliance is not necessarily attached directly to the set but can be operated by remote control while the listener sits on the other side of the room in an easy chair.

Numerous devices for eliminating undesired parts of radio program, either advertising talks or any type of speech, have been invented before. At the 1933 meeting of the American Association for the Advancement of Science Prof. G. W. Kenrick of Tufts College described a mechanism which automatically shuts off a radio set for fifteen seconds every time there is silence on the program for a quarter of a second. Thus if an announcer pauses, as he must, for breath, the set will be silent for fifteen seconds. If he is still talking at the end of that time it will stop again. Only

when a continuous flow of music comes in will the device operate steadily.

In the new device of Mr. Caskey, the radio listener looks at the radio program before it starts, and pushes one or more buttons to block out the program at intervals when silence is desired. This act brings the sought-after result, but what happens in the mechanism is essentially the following:

Pressing down each button switches off the radio receiver and at the same time starts a small electric motor of the synchronous type used in electric clocks. This motor, turning at constant speed, operates a train of gears which restores the switch key to its "on" position after the desired interruption in the program.

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GENERAL SCIENCE

Sweden's Crown Prince To Take Part in Expedition

WHILE Dr. Sven Hedin, one of Sweden's best known scientific adventurers, has been having adventures with Chinese bandits, other Swedish scientists have been making ready for expeditions to distant fields.

Crown Prince Adolf, who ranks as one of Sweden's leading archaeologists, will set out for Baghdad in the autumn to take part in excavations in Mesopotamia.

An ethnologist of the Swedish National Museum, Henry Wassen, is making ready to sail for South America, to continue studying the Chaco Indians of Colombia, a work begun by the late Swedish scientist Erland Nordenskiöld.

The geologist Prof. Hans Ahlmann will join with the Norwegian Prof. Sverdrup to observe glaciers in the interior of Spitzbergen. And four Swedish zoologists are setting out for Brittany, to continue experiments with the eggs of sea-urchins, in research expected to throw valuable light on phases of evolution.

Among Sweden's scientific representatives already abroad, is Dr. Carl T. W. Hammarlund who is studying potato plants in the mountains of Chile and Peru, in the hope of discovering a potato more resistant to frost and insects than potatoes now grown in Sweden. In India, Dr. Walter Kaudern is making biological studies and seeking rare orchids, with the mission of bringing back their seeds for the King of England.

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