ENGINEERING

Prevent Pipe-Corrosion

Connecting zinc cylinders to steel underground gives corrosion protection. This method is especially effective for remote areas too far away from electrical power.

➤ THE corrosion of steel underground, such as in pipes was adequately prevented over test periods ranging from three to six years by connecting zinc cylinders to the steel, the National Bureau of Standards has found in tests conducted by I. A. Denison and Melvin Romanoff of its staff.

Underground pipe lines have been widely and effectively protected from the corrosive action of the soil by the use of electricity for some time. If an electrical supply is handy, protection can be easily applied. But pipelines transmitting oil, gasoline and natural gas over vast distances are often too far away from electrical power to permit its economical use. It is for protection in these remote areas that the Bureau has sought improved methods.

Corrosion of steel in the soil is caused largely by electric currents set up by chemical action. Technically, it is often caused by differences in electrical potential of local areas on the corroding surface. Those areas whose potentials with respect to conventional reference electrodes are relatively high are designated as anodes, while areas of lower potential are known as cathodes. The electric current associated with corrosion flows toward, rather than from, the cathode areas. The cathode areas are not, therefore, subject to corrosion, but the anode areas are.

However, if sufficient current from an external source is caused to flow toward the corroding surface, the potential difference between the local anodic and cathodic areas is eliminated, and consequently the cause of corrosion.

A source of electrical energy for corrosion protection, in areas where underground pipe is removed from other electric power, can be provided by the galvanic corrosion of bars of the electronegative metals, zinc, magnesium or aluminum, buried at suitable intervals along the right of way and connected to the pipe line.

The Bureau's recent investigations were relative to the behavior of zinc anodes for cathodic protection in various types of soil. Experimental zinc-steel couples were installed at eight sites. The cathode of the couple was a small steel ring, to which was connected either one, two or three zinc anodes. Unconnected steel rings and zinc cylinders were also buried at each test site. Data obtained, among other information, indicate the proper amount of current to give just the protection necessary.

Science News Letter, June 19, 1948

PHYSICS

Thundercloud Registers Highest Electrical Charge

➤ IN planes that were three times hit by lightning during the course of their researches, scientists of a joint Army-Navy team gathered data during the war on the electrical charges in various types of clouds.

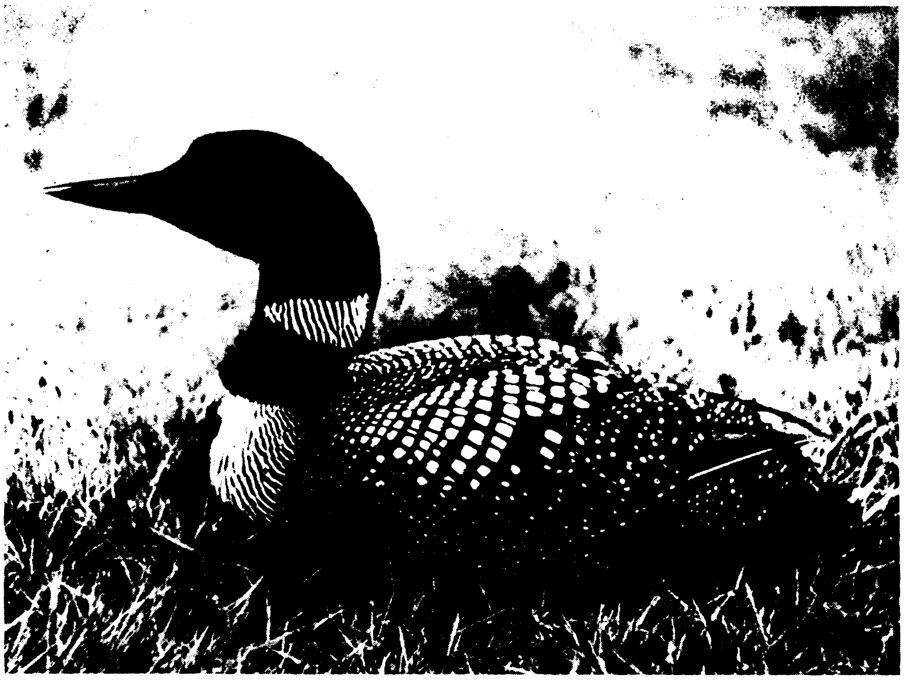
These modern Ben Franklins carried their instruments into the clouds to measure the electrical charges which Franklin is credited with first discovering in his famous kite experiment. A summary of the latest results is reported by Dr. Ross Gunn, now of the U. S. Weather Bureau, in the *Journal of Applied Physics* (May).

Most significant data were obtained by mounting one measuring instrument on the belly of a plane and one on its back, and expressing the differences in electrical potential between them in terms of volts per centimeter of distance.

Highest reading obtained was 3,400 volts per centimeter, registered while the plane was flying through an August thunderstorm. An instant later, a lightning-bolt hit the right wing-tip and tore out through the plane's nose. There were two other readings made in thunderclouds that were higher than 2,000 volts per centimeter.

By contrast, charges in ordinary, quiet clouds gave readings lower than 40 volts per centimeter when steady rain was falling, and lower than 10 volts per centimeter in clouds yielding no rain.

Science News Letter, June 19, 1948



TROUBLE ON THE TAKE-OFF—The loon is a capable flier, but it sometimes has flight trouble because of its massive weight and short wings. Once in the air, the bird flies at great speed with rapid wing beats. But its flight may be grounded by bad weather. When this happens, the loon does not crash. Results, however, may be just as disastrous to the bird. If forced down on land, the loon, a web-footed water bird, can only crawl along with the aid of its bill and wings. This makes the grounded loon easy prey of predatory animals.