ENGINEERING

Magnetic Fluid Brakes

Principle developed for automobile clutches has been applied to new type of brakes operated by a push-button attached to steering gear.

➤ THE THUMB, not the foot, may operate the automobile brakes of the future. The magnetic fluid principle developed at the National Bureau of Standards for automobile clutches has been put to work at Rensselaer Polytechnic Institute in Troy, N. Y., in a braking device operated by the flow of an electric current.

The magnetic fluid developed by Jacob Rabinow some three years ago at the National Bureau of Standards uses an oil containing iron dust. When a magnetic field is applied to the mixture, the iron particles are magnetized. They then tend to stretch out lengthwise between the plates of the electromagnetic field and solidify the mixture.

Since the discovery of the magnetic fluid, several important uses for it have been developed. Among them is in so-called servomechanisms, automatic devices for control purposes, including in airplanes. Other uses are in shock absorbers and recoil mechanisms.

In the Rensselaer automobile brakes, a very light oil saturated with iron dust of a smooth grain type is used. It forms a liquid ribbon only one twenty-fifth of an inch thick between the brake rotor and the outside drum in which a magnetic coil is embedded. Current to activate the coil is controlled by a push button on the steering wheel. The brake takes hold smoothly and its power increases as the magnetizing current is stepped up.

Science News Letter, December 16, 1950

PLANT PATHOLOGY

Excess Acids Weaken

Amino acids linked to proteins in all living organisms, when they exist in excess in fungus-susceptible plants, have weakening effect.

➤ A CLUE has been uncovered to one of the unknown factors which make some plants more resistant to deadly fungus diseases than others.

With his study of black-rot diseases of tobacco, Dr. Robert A. Steinberg of the Department of Agriculture's plant research station believes that a poisoning process may be one key to this major biological mystery.

Certain amino acids, the physiologist found, seem to pave the way for the destroying fungus. Amino acids are vital substances linked to proteins in all living organisms. They play an important part in human nutrition, with more than 20 of them now known to science.

When some of these acids exist in excess in plants, Dr. Steinberg learned, they have a weakening effect on disease-susceptible plants, more so than on resistant varieties. One acid in particular is deadly. It was found to be lethal to tobacco seedlings at strengths as low as five parts per million.

In testing various of the amino acids with no disease organisms present, Dr. Steinberg discovered that they hit hardest at young tobacco plants which were known to be susceptible to black rot. Hardier strains of tobacco were affected least by the acids.

If it can now be shown that the fungus which causes a disease produces an excess of toxic acids in the plant system, a long step will have been taken toward better understanding of these diseases.

Sometimes completely ruining a farmer's crops in a short time, the fungus diseases can be fought by chemicals. But the only permanent defense is the work of plant breeders who cross and recross strains to produce plants with built-in resistance against disease.

Science News Letter, December 16, 1950

AERONAUTICS

Balsa Wood Dust Shows Air-Flow Pattern

See Front Cover

➤ FINE DUST from the lightweight wood known as balsa is being used in laboratories of the National Advisory Committee for Aeronautics to make movements of air visible in investigations concerning air-flow.

Its first use was in studying helicopters. The trend toward increasing the size and load capacity of helicopters has resulted in increased use of multiple-rotors. In order to study air patterns resulting from such rotors, this so-called NACA balsa-dust technique was developed.

The method, according to a recent report by the NACA, has provided a simple means of observing the flow distribution through model rotors and is suited for many other applications in which a pictorial representation of the air-flow pattern in a given plane is desired.

With this material still photographs and motion pictures of air-flow can be taken. One is shown on the cover of this week's SCIENCE NEWS LETTER. Other materials, including smoke, were tried. The finely divided balsa particles were found to provide the best combination of high reflectivity and low mass of any of the materials investigated.

The report, NACA Technical Note 2220, was prepared by Marion K. Taylor, Langley Aeronautical Laboratory, Langley Field, Va., where the method was developed. The balsa-dust method of air-flow visualization is simple to use, the report states, and requires only a supply of balsa wood, a camera and photograhpic lights.

Science News Letter, December 16, 1950

About 40% of the land area of the United States receives too little *rainfall* for safe general agriculture.