HALF PINT OF SKILL

This little pile contains 80 cents' worth of steel but 8,000 hours of precision work. To make each pinion required 24 operations, using 11 different machines. They are accurate to .0001 inch.

GEOLOGY

Submarine Canyons May Be Caused by Artesian Springs

Mudflows and Submarine Landslides Following Cave-Ins Might Account for Unexplained Breaks in Cables

A NEW theory to account for the creation of the tremendous submarine canyons that gash the sea bottom off all continental shores of the world is advanced by Prof. Douglas Johnson of Columbia University. These enormous submerged gullies, some of them rivalling the Grand Canyon of Arizona in width and depth, may have been caused by undermining and collapse of the layered rocks of the ocean bottom by long-continued action of submarine artesian springs, Prof. Johnson suggests.

Existence of these submarine canyons is one of the most recent of major geological discoveries. New ones are still being turned up, and further exploration of old ones constantly yields new wonders—and new puzzles for the scientists.

At first, it was thought that the canyons owed their existence to deep erosion during a time when ocean levels were lower than they are now. This view is still widely accepted. However, serious difficulties have arisen through the discovery of canyons more than two miles below present-day sea level, which of course demands a tremendous amount of change in relatively short geologic time.

Prof. Johnson points out that his theory, of undercutting of the sea bottom by waters working under pressure beneath it, could account for canyons at any depth, and that it has the further advantage of allowing plenty of time. Instead of being confined to the mere million years or so of the Pleistocene ice age, the work of canyon formation could have gone on ever since the Cretaceous period, more than a hundred million years ago, when great saurians still wallowed in the swamps and swam in the seas.

According to the theory, submarine canyons could be formed wherever the layered formation of rocks under the sea, and a sufficient supply of water under pressure from heights somewhere back inland, combined under favoring circumstances. This could be connected with existing river valleys, as is known to be the case in such places as the famous canyon off the mouth of the Hudson river. However, canyon formation could also take place unassociated with any existing river; and such submarine canyons are known.

Of course, when bottom cave-ins occurred, they would be followed by mudflows, submarine landslides and other adjustments of unsolidified bottom sediments, which would modify their outlines considerably. Prof. Johnson thinks that such flows and slides account for some of the breaks in trans-oceanic cables that have occurred without any accompanying earthquakes to take the blame.

Prof. Johnson has also invoked a theory of artesian spring action to account for the famous "bays" of the Carolina coastal plain. These are great, shallow, saucer-like elliptical depressions in the land, which another theory holds were created by the impact and explosion of a shower of enormous meteor fragments many thousands of years ago.

Science News Letter, January 20, 1940

AERONAUTICS

New Airplane Design Will Increase Safety at Take-off

BY PROPER design the giant four-motored airliners of the future should be able to clear a 50-foot obstacle 3,000 feet from the start of take-off, even if one motor fails, Clarence L. Johnson, chief research engineer, Lockheed Aircraft Corporation, told the meeting of the Society of Automotive Engineers at Detroit.

Take-off time is perhaps the most hazardous period because, during those few brief seconds, engine failure may make a forced landing necessary.

Increasing the size of the vertical tail surfaces of the new four-motored transport planes would be the most effective way to increase control of the plane needed if one of the four motors failed, Mr. Johnson said.

Some automatic control over the power of the engines, if one of them dies, is needed, the research engineer indicated, for "the pilot should not be expected to juggle throttles, trimming controls, landing gears, flaps and airspeeds during the critical 10 seconds after take-off."

Mr. Johnson described the characteristics of the four-motored plane of the near future which would give it increased safety at take-off. The projected plane could land and take off in smaller landing fields than is now possible.

One striking finding of Mr. Johnson's analysis of take-off safety is that when one of the four motors fails it is best that the power in the corresponding motor on the other side of the plane be reduced to 50% of its rated take-off value. The idea that if one motor failed the other three would need to deliver still greater power is refuted by Mr. Johnson's study.

Science News Letter, January 20, 1940

Improved Spark Plug

A NEW and superior type of spark plug for high-powered airplane engines has been developed in England, it was disclosed by A. L. Beall, Wright Aeronautical Corporation.

The new type plug uses ceramic materials for its electrical insulation instead of thin sheets of mica compressed and piled one atop the other. Ceramic spark plugs are not themselves new, but the new British type are outstanding because they can be used under the severe conditions of high-powered aviation motors.

Ceramic spark plugs are smaller and lighter than mica spark plugs, a big advantage for multi-cylindered engines.

Science News Letter, January 20, 1940

CHEMISTRY

"Father" of Nylon Receives Prized Medal of Chemists

His Research in Making Big Molecules From Small Ones Is Important Part of Rise of Organic Chemical Industry

THE chemist who initiated the research of making big molecules out of little ones that led to the discovery of nylon, remarkable organic material out of which chemistry can make anything from sheer silk-like stockings to toothbrush bristles and fishline leaders, was awarded one of science's highest honors: the Perkin Medal of the American Section of the Society of Chemical Industry.

The man is Dr. C. M. A. Stine, vice-president in charge of research, of E. I. du Pont de Nemours & Company of Wilmington, Del. In his address following the medal presentation Dr. Stine traced the rise of America's great organic chemical industry of today from its virtual birth at the time of the World War in 1914.

Directly or indirectly from the results of intensive research in organic chemicals have come the following advances: Modern plastics, motion picture film using synthetic camphor, medicinal chemicals like sulfanilamide and sulfapyridine, superior dyes, improved cheap and safe refrigerant fluids like Freon, a vast improvement in the wear of automobile tires, the development of synthetic rubber, safety glass, tougher and more oily oils and lubricants for motor cars, superior gasolines and fuels, better and safer explosives, synthetic urea for fertilizer for agriculture, and the new plant hormones and vitamins.

Contrary to popular belief, American chemical industry was large prior to the World War, but mainly in the inorganic chemical field, Dr. Stine said. As early as 1865 its products had a valuation of some $60,000,000. In 1910 the United States produced three times as much sulfuric acid as Germany and twice the amount of alkalies made in England.

In organic chemicals, however, the United States was sadly lacking at the start of the war. The great industry which has been created since that time, in this field, represents an enormous investment of American money and American brains in research, Dr. Stine continued. He revealed that in the case of the du Pont concern alone, $40,000,000 was invested in research before a cent of profit was realized.

Dr. Stine challenged those who maintain that present national and international ills are the result of too much scientific development.

These people overlook, he said, "the horrible wars that have been waged all down the years when there was no science as we know it today. They overlook or wilfully ignore the well recognized fact that the lust for power by one man, or a small group of men, leads all too frequently to that great social and economic disaster called war. Until indoctrinated race antipathies and hatreds, envy, and greed for power are eliminated from human nature through spiritual regeneration, we shall have no solution of this fatal disease which afflicts humanity. Science, though it is able to confer the richest blessings upon mankind, is not able to change the heart of man and insure that the great increases in scientific knowledge will be beneficiently applied. But while this is unquestionably true, I nevertheless hold that the great contribution which the development of the organic chemical industry has made to the self-sufficiency of this country is a definite contribution toward the maintenance of peace."

Science News Letter, January 20, 1940

A "howling machine" developed by the Forest Service howls when the exploring coil of the detecting device comes near metal embedded in logs.