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THE NEW ELECTRONIC DIFFERENTIAL ANALYZER

THE mathematics that the engineers of the future are likely to use is expected to come out of the research to be done with the new electronic differential analyzer of the Massachusetts Institute of Technology which has just been released from war to peacetime work.

This new mathematical robot, with 2,000 electronic tubes, several thousand relays, 150 motors and nearly 200 miles of wire in its mechanical "brain," has worked on the development of radar theory, computing range tables for the U. S. Navy guns and other war tasks.

Now it is to be used on an equally important job. It is free to turn to the task for which it was designed—creating the groundwork for the mathematics of the future.

The mathematics currently used in physics and engineering applications has been devoted to the solution of what mathematicians call "linear" problems, but it has become increasingly evident that the usefulness of these methods has been almost exhausted. They will still constitute the major body of information in handling routine problems.

But the new problems in physics, electrical engineering, aerodynamics, and similar fields seem to be primarily non-linear. Leading mathematicians admit that their principal handicap in handling such problems is that they just don't know enough about the nature of solutions to these problems to make intelligent guesses as to what they are like. From the mathematician's point of view, the major contribution of the differential analyzer and similar computing machines will be to provide the "horse-work" to build up an immense number of detailed numerical solutions to non-linear problems so that the form or shape of the general solutions will become intuitively familiar.

To solve new problems, a mathematician must develop a feel for what the solution will be like. The computing machines of the future must provide a skeleton outline of the new mathematics as a framework for the mathematician to construct theories which the physicist and the engineer require.

Scientific announcement of the differential analyzer has just been made in the Journal of the Franklin Institute in a joint paper by Dr. Vannevar Bush, formerly vice-president of the Massachusetts Institute of Technology, and now president of the Carnegie Institution of Washington and director of the Office of Scientific Research and Development, and Dr. Samuel H. Caldwell, director of the Institute's Center of Analysis.

ITEMS

A NEW oil exploration and production research center, to be devoted to studying new methods of finding oil and getting it out of the ground, will soon be built in Houston, according to officials of the Shell Oil Company. The million-dollar research center is expected to be completed by spring. It will house the company's recently organized division of exploration and production research, an independent entity within the Shell organization. The research program of the new laboratory will focus attention on augmenting America's petroleum resources by developing new and more efficient methods for discovering oil and for recovering it in quantities from the underground reservoirs in which it is found. The discovery of new reservoirs is becoming increasingly difficult and large quantities of oil in present reservoirs are not being brought to the surface by present production methods, oil experts agree. Research in physics, chemistry and geology, as they relate to petroleum exploration and production, will be carried on at the laboratory. It will also serve as an instruction center for training exploration and production field men in new techniques and methods. Director of the new division is Dr. Harold Gershinowitz, who for the last few years has been research director of the company's manufacturing department in New York.

THE shell of the average hen's egg has about 8,000 pores or tiny holes in it. However, there is a great variation in the number and size of these pores. The best egg shells are the ones with a large number of small pores—so small that the escape of gases is difficult and evaporation is slow. Poor shells have fewer pores, but several large ones that make evaporation more rapid. Investigators at several experiment stations have demonstrated that these differences in shell quality are inherited. Dr. A. L. Romanoff of the poultry department at Cornell University has made a detailed study of porosity in eggs and points out that eggs with poor quality shells lose quality much more rapidly than do those with good shells. This, he says, is particularly important at this time since greater attention is being paid to egg quality. Workers in the U. S. Bureau of Animal Industry at Beltsville found that more broken eggs occur among those with poor shell quality. However, by using the progeny test method of breeding, they were able to improve egg shell quality considerably. Hens were selected as breeders whose eggs showed the least egg weight loss during the first 14 days of incubation.

CAFFEINE, that causes the stimulating effect in coffee, tea, soft drinks and certain medicines, will soon be in production synthetically in St. Louis in a vast plant to be constructed by the Monsanto Chemical Company. Domestic production of this synthetic caffeine will free the United States from dependency on foreign-produced natural sources. Although scientists have long known how to duplicate the natural product's complicated molecular structure in the laboratory, caffeine until now has been derived almost exclusively from such sources as tea waste and surplus coffee, or indirectly from cocoa cake, a byproduct of chocolate manufacture. The new plant will use a new process, details of which are not revealed, except that the synthetic material, simulating the process of nature, will be derived from nitrogen from the air and hydrogen from water.