PHYSICS

Solve 60-Year-Old Puzzle

Question of whether fluids flowing at uniform rate become turbulent without outside influence settled by electronic calculator. Better jets ultimately foreseen.

➤ A PROBLEM puzzling the minds of scientists for over 60 years has been solved by a mechanical "brain," Columbia University scientists have reported.

Its solution is expected to make it easier in the future for engineers to design better aircraft, steam turbines, hydro-electric power generating machinery and other devices involving fluid flow.

The 60-year-old controversy was about whether a stream of fluid flowing at uniform speed between two parallel plates became turbulent. The scientists have now calculated that fluids of low viscosity when moving rapidly become unstable without any outside influence.

"It was a brute force computation," stated Dr. L. H. Thomas, physicist at the Watson Scientific Computing Laboratory at Columbia, under whose direction the work was done. "The problem took about 150 hours of operating time, equivalent to about 100 years of hand computing."

The mathematical solution on the International Business Machines' Selective Sequence Electronic Calculator, Dr. Thomas explained, is for the "simple, ideal case." A hypothetical example of the problem would be a curtain of water falling between parallel sheets of glass at constant speed. Flow of fluids in a circular pipe, such as water mains, is known to be stable and was so explained by the 19th century English scientist William Thomson Kelvin.

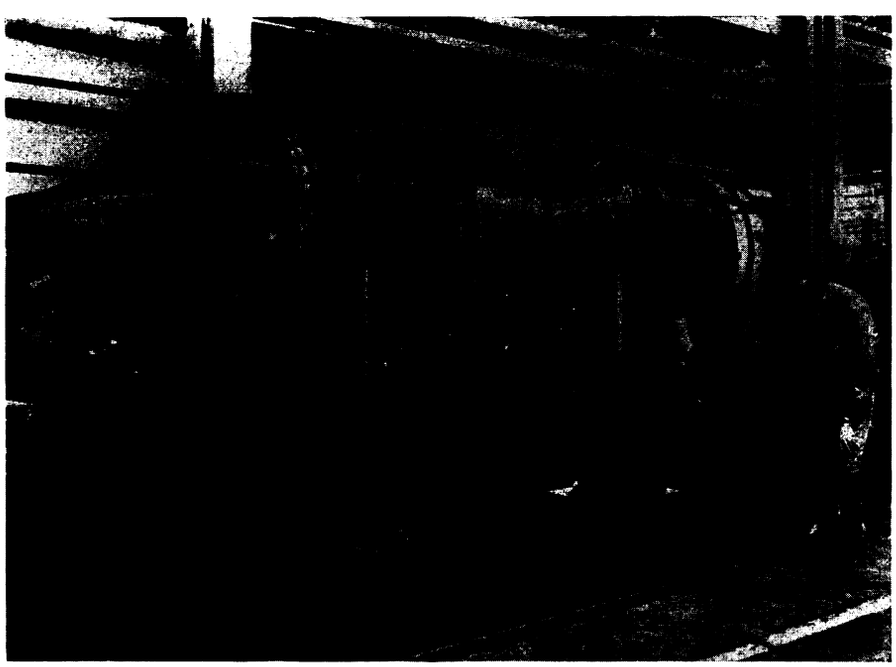
Since 1888, however, physicists and engineers have speculated on fluid flow between two parallel plates, such as those found in a heat exchanger. A numerical try at the solution was suggested four years ago by Dr. John von Neumann of the Institute for Advanced Study at Princeton, N. J., and a limited number of cases were solved at that time. These were not enough, however, to settle the controversy.

Dr. Thomas worked out a slightly different numerical attack and the equations were then adapted to the giant calculator by Phyllis K. Brown and Donald A. Quarles, Jr., of IBM. The solution was announced in New York by Dr. Wallace J. Eckert, director of the Computing Laboratory.

"Our results have fortunately settled some current arguments in hydrodynamics," Dr. Thomas stated. "Specifically they support the work of Dr. C. C. Lin of Massachusetts Institute of Technology who was able to arrive at some similar results by using asymptotic formulas. We hope results of this kind will help in the task of obtaining a good theory of turbulent motion," he added.

Dr. Thomas reported this study in the *Physical Review* (June 15).

Science News Letter, July 26, 1952



"OLYMPUS" JET ENGINE—The new British turbo-jet engine that delivers 9,750 pounds of thrust is shown here. It uses two compressors in series to get a high compression ratio.

VETERINARY MEDICINE

Map Battle Lines on New Hog Virus Disease

➤ A RARE virus disease that hits hogs, causing symptoms similar to but not quite so serious as those of foot and mouth disease of cattle, was discussed by veterinarians from 10 states at a meeting in Washington.

They pinpointed spots where attacks have occurred and just how many hogs have come down with the virus. Immediate slaughter and disinfection of contaminated premises was recommended. Known as vesicular exanthema of hogs, the virus has so far been most troublesome in Nebraska.

No serious financial damage has yet been suffered by farmers, since the hogs usually do not die, although they cannot be sent to market until they recover, a matter of a few weeks. The virus, which does not affect cattle or sheep, has been spread recently by feeding raw garbage, so the veterinarians advised that pigs be fed only garbage that has been cooked.

Symptoms of the disease include blisters above the hoof and between the toes, and on the snout and nostrils. The virus has been known in California for about 20 years.

Science News Letter, July 26, 1952

AERONAUTICS

New British Jet Engine Is World's Most Powerful

➤ A NEW type of jet engine for airplanes, developed in England and just removed from the secret list, is claimed to be the most powerful jet engine in the world, delivering nearly 10,000 pounds of thrust.

It is the first of what is known as the "two-spool" type and has been named the Olympus. It is a product of the Bristol Aeroplane Company, Ltd. The engine has a published rating of 9,750-pound thrust.

This is about the equivalent of 17,000 horsepower at speeds of 600 miles an hour. With turbines, as with piston engines, the key to high power and economical fuel consumption is the use of a high compression ratio.

High compression ratio from axial compressors is obtained in the Olympus by the use of two compressors in series. One is a low pressure unit and the other a high pressure unit. Each has an entirely independent axial compressor and turbine. The low pressure unit acts as a supercharger to the high pressure unit, and each is driven through concentric shafts by its own separate turbine.

Science News Letter, July 26, 1952