AERONAUTICS

Suction Slots for Wings

This new type of wing for airplanes was proposed to draw away a part of the boundary layer of air. It is still in the experimental stage.

➤ A PROPOSED new type of wing for airplanes with a slot through which part of the boundary layer of air is drawn away was described in the annual Wright Brothers Lecture by Dr. Sydney Goldstein of the University of Manchester, England, who is also the chairman of the British Aeronautical Research Council. The lecture was under the sponsorship of the American Institute of the Aeronautical Sciences.

The wing is designated as a suction airfoil. It is in an experimental stage but is promising. Pulling away part of the air in the so-called boundary layer next to the surface of the wing is a method to control the flow of this layer and delay the drag and other harmful effects when the smooth or laminar flow breaks into a turbulent flow. This breaking means a boundary layer separation from the surface of the wing; it is desirable to prevent the separation until the flow of air reaches the trailing edge of the wing.

"The story I am about to tell in this lecture is still incomplete," Dr. Goldstein said. "It is largely the story of researches carried out in Great Britain arising from an idea due to Dr. A. A. Griffith. The idea is at once very general and very simple." When a fluid flows along an immersed solid surface at sufficient speed, a boundary layer is formed. If the flow of the boundary layer can not be controlled, harmful results may follow. Removing part of the boundary layer by suction is an attempt to avoid these harmful effects.

To use the suction principle, the wing must be especially designed. How much of the boundary layer air needs to be removed is as yet undetermined. When the method of design was satisfactory, the English scientist stated, the separation was avoided by sucking away less than half. The suction may be effected by use of a ducted fan, or the air may be taken through wing slots to the intake of the turbo-jet engine. The amount of air removed in the latter case would depend upon the amount needed by the engine.

"In assessing the probable performance of a suction wing, the state of the boundary layer (turbulent or laminar) at the slot through which part of it is sucked away is of great importance," he explained.

"In considering the principles of the design of low-drag aerofoils, we saw that we should like the velocity outside the boundary layer to rise to a position as far back along the wing as possible; but that we are hindered by the danger of turbulent separation if the rate of velocity decrease at the back of the aerofoil is too great. The danger increases, roughly, when the thickness of the aerofoil increases and when the position of maximum suction is moved further back."

"If, however, the whole of the pressure recovery, or velocity decrease, is concentrated over a very narrow interval along the chord, over which the boundary layer, or as much of it as necessary, is sucked away to stop separation, all danger of separation is avoided, and we can have a favorable velocity gradient over the whole of the rest of the chord."

"In spite of the work which has been done, it is clear that much is yet unknown about suction wings," he declared. The greatest gains will be obtained by application to the flying wing type of aircraft, and "it becomes feasible to design a much smaller flying wing than otherwise would be the case."

Science News Letter, January 31, 1948

PHYSICS

Popular Radio Program Features Dots, Dashes

➤ A RADIO program that consists essentially of ticks, dots, dashes and a musical note is faithfully followed by tens of thousands of enthusiastic listeners.

Jewelers and navigators, school teachers and musicians, radio hams and power companies all get vital information from these coded broadcasts, issued continuously night and day.

You can get the correct time by listening to these signals. Time announcements are given at five-minute intervals in International Morse Code. These signals are being advanced one minute so that in the future the audio frequencies will be interrupted for a minute precisely on the 59th minute, on four minutes past the hour, nine minutes past and so on.

A faint tick heard at intervals of precisely one second over station WWV of the National Bureau of Standards provides a useful standard time interval.

Musicians use the broadcast to tune their instruments. The standard of musical pitch, A above middle C, is broadcast for four minutes and interrupted for one minute.

The National Bureau of Standards' station provides six important technical broadcast services to the nation and five to the world. They are: 1. standard radio frequencies, 2. time announcements, 3. standard time intervals, 4. standard audio frequencies, 5. standard musical pitch, and 6. radio propagation disturbance warning notices. The bureau's broadcast offers the only such service being provided by any country.

Station WWV can be heard on the following frequencies: 2.5, 5, 10, 15, 20, 25, 30 and 35 megacycles.

Science News Letter, January 31, 1948

CHEMISTRY

Test Developed To Detect Minute Traces of Arsenic

➤ HERE'S one for the whodunit fans: University of Pennsylvania chemists have developed a simple, quick test for "microscopic traces" of arsenic in foods. As little as one thirty-thousandth of a pound of the poisonous metal can be detected, even in the presence of lead, tin and some other metals that interfere with conventional tests.

The test was reported by James H. Freeman and Prof. Wallace M. McNabb at the meeting of the American Chemical Society in Philadelphia.

It is said also to have industrial applications, since a fraction of one percent of arsenic impurity, for example, seriously impairs the electrical conductivity of copper wire, and traces of arsenic can poison and destroy the effectiveness of platinum catalysts used to stimulate many vital chemical reactions.

The test can be completed within 45 to 50 minutes. It involves acidifying the suspected material, heating it with sodium hypophosphite, dissolving in a solution of potassium bromide and bromate, and finally adding potassium iodide. The amount of iodine freed by this procedure gives an accurate indication of the arsenic content of the sample.

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