ABSTRACTS.

Modern Aeronautic Engines.

The author has collected together information about a number of high-power engines, such as the Benz, Mercédès, Sturtevant, Thomas, Curtiss, Hispano-Suiza, and the Renault. The information given is: the power, stroke, number of cylinders, compression ratio, weight per B.H.P., and in some cases details of construction, carburettor, exhausts, and cooling system. Photographic illustrations of all the engines are given. (Herbert Chase, "The Journal of the Society of Automotive Engineers," August, 1918.)

Exhaust Headers and Mufflers for Aeroplane Engines.

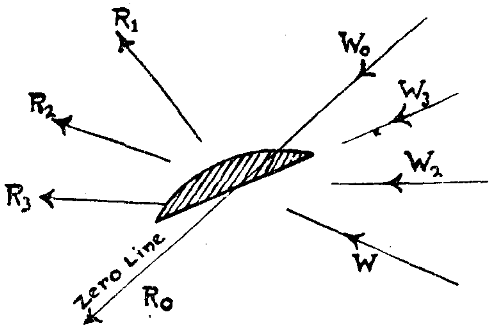
Some typical exhausts are described and illustrated. In the Curtiss type a manifold is illustrated which terminates in a tapering tube slotted longitudinally on both sides; the reduction of power is said to be very little and the noise is greatly reduced. There are some notes on the design of manifolds, and it is suggested that the results of blower practice should be of assistance. A chart is given showing the loss of velocity due to bends, from which it is seen that the loss diminishes rapidly at first with increase of radius, but remains constant when the radius of the bend is more than 2½ times the diameter of the pipe. Designs of various types of mufflers are shown, and a table is given showing the diameter of the exhaust for powers from 30 to 300 B.H.P.; it is suggested, however, that the best means of determining the exhaust diameter is by trial. Experiments made with the Curtiss muffler, previously referred to, indicated an increase of power in the engine, and it is suggested that this was due to the velocity of the gases, producing a partial vacuum. (Archibald Black, "The Journal of the Society of Automotive Engineers, August, 1918.)

Conventional Propeller Calculations.

The main purpose of this paper is to show how calculations are to be made to predict the strength, horse-power absorbed, and efficiency of a propeller. A graph is given, by means of which the propeller diameter can be ascertained, also the maximum speed and the horse-power, and a second graph enables propeller efficiency to be determined. Some remarks are made in respect of the materials to be used for the propellers and photographs of failures on test are given, including that of an all-steel propeller, welded together by means of oxy-acetylene process. There are some particulars of adjustable propellers and several numerical examples relating to climbing rates and the calculation of efficiency whilst climbing at various altitudes. (F. W. Caldwell, "The Journal of the Society of Automotive Engineers," August, 1918.)

Air Propulsion.

In Professor Morgan's paper it was shown that thrust was due in greater degree to velocity and less to blade disc area than is commonly supposed. There were several speakers, some of whom agreed and others disagreed, but considered that the paper contained ideas of some originality. Mr. G. De Bothezat agreed generally with the author, and argued that for every direction of attack of air striking the propeller blade there is a corresponding resistance, as shown in the figure. For some particular direction W_0 the resistance R_0 is in the same



direction—*i.e.*, there is no normal component. This he calls the zero line, and it is the "effective pitch" of the propeller. It is always greater than the "geometric pitch," and from measurements he had taken the angle between the two varied from 3° to 12°. He further shows that if slip is calculated on the "effective pitch," it is always positive, whereas if calculated on the "geometric pitch" it may be negative. In his view the use of "effective pitch" explains the difficulties arising out of the experiments of Professor Brooks. He further works out formula for calculating the velocity of the air before and after the propeller. (Professor Morgan Brooks, "The Journal of the American Society of Mechanical Engineers," August, 1918.)

To Ascertain the Speed and Direction of Aeroplanes Over the Water.

The practicability of flying over long stretches of water is handicapped by the difficulty of determining the direction and speed of flight. Admiral Fiske proposed a means of overcoming this difficulty based on the idea of making an aeroplane follow the same general procedure as a ship does.

For long flights over water the machine should be made to fly quite close to the water and steer a straight course, not only laterally, but vertically, thus enabling the pilot to obtain information concerning the direction and speed of flight from the water itself by means of what may be called "an aeroplane log."

The direction can be ascertained by towing through the water a small object by means of a long and light steel wire. The wire will always be in the vertical plane containing the flight path, and the direction may be found by attaching the log line to the end of a pointer moving under the compass or to a "dumb compass" kept in agreement with the compass.

To find the speed it would be necessary merely to tow a "Massey's log"—a simple contrivance towed by a ship and consisting of a sort of box fitted with a propeller that actuates dials on the surface of the box when it turns. The dials indicate the distance the box has been towed, and knowing the time, the speed can be determined. The error that might be made in calculating the speed is estimated at 2 per cent. ("Aerial Age Weekly," July 22, 1918.)

Notes on Glue.

Ideal glue brings in possibilities of high-speed construction, labour economy, and appreciable saving of wood. The current production of ply wood is of high excellence, but the aim should be for still higher quality. The gap to be bridged is illustrated in the elaborate process of sewing mahogany boat and seaplane hulls with copper wire. Further, in connection with wing spars, the H-type girder involves a waste of 30 per cent of the wood in shavings and chips as at present constructed. The ultimate end of glueing is to produce a correct representation of a continuous piece across the joint. Uniformity cannot be expected unless the glue be prepared in accordance with a rigidly enforced recipe. It must consist of a definite mechanical mixture having a definite chemical composition and susceptible of accurate reproduction.

Perhaps the greatest bar to progress is the difficulty of knowing the result desired. Some tensile strength is needed which should remain when the glue is set, and the glue should have the power of permeating through the surface of a piece of wood. It is also necessary to measure this permeating quality, and to ascertain whether it falls off with dilution or concentration.

Assuming that the ideal glue has been found, it is probable that it should be applied at some standard fluidity and temperature, and that the make-up water should not be tap water, since it is hardly likely that the well-known deposit of chalk can add either to the adhesiveness or tensile strength of the glue.

Further, it must be determined how far dampness or dryness of the wood at the time of glueing affects the glue; the relation, if there be one, between the strengths in compression, tension, and shear of the glue itself should be found, in addition to the ability of the glue to form a good entry into the pores of the wood.

More information is needed on the problem of treating the glue after application for rendering it insoluble in water without detracting from its hold on the wood or its tensile or other properties.

Investigations are in progress to discover how to prevent glue becoming a culture ground for micro-organisms that breed and turn it into water.

Glue is by no means the only possible adhesive; all gums, gelatines, and colloids are open to use; shellac has its possibilities, and is water-resisting.

The fact that linen is fastened to the framework of an aeroplane by means of tacks testifies to the need of scientific inquiry into the matter of adhesives. (Lieutenant-Colonel M. O'Gorman, "Aerial Age Weekly," July 22, 1918.)

Notes on Glue.

The article is a sequel to a discussion opened by Lieutenant-Colonel O'Gorman in "Aerial Age Weekly" of July 22. It deals mainly with the qualities that glue used for constructing aeroplanes (particularly three-ply wood) should possess. It should have adhesiveness to a high degree, and should not deteriorate through bacterial action or vibration when in use. Moreover, for aircraft work it should be water resistant. In order that a ply wood may be classed as water resistant, it should not merely fail to fall apart when saturated with water, but the glue should be of such a quality that it retains a high percentage of its adhesiveness when the ply wood is saturated, and a shearing test should be applied to ascertain if the glue is really entitled to be called waterproof.

In view of the severe conditions which aerial work must meet, it is suggested that glues ought to be classified as non-water resistant, semi-water resistant, and water resistant, with specifications drawn to distinguish the three grades, and thus stimulate investigation which will improve each grade. (Dr. W. R. Drushel, "Aerial Age Weekly," August 26, 1918.)

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