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Aircraft Design

Hodographs and Polars of Aircraft. (A. Magnan and A. Sainte-Laguë, Bull. Tech., No. 69, July, 1930, 67 pp.) (5.1/21001 France.)

When an aircraft is gliding steadily without power, for each inclination of the gliding path to the horizontal there is a corresponding air speed with horizontal and vertical components. Plotting the horizontal against the vertical component a curve is obtained which is defined as a *hodograph*. Certain useful quantities, such as the path of maximum horizontal velocity, path of longest glide, etc., can be found graphically. If there is a wind results are modified correspondingly. The method of measuring the speed of the aircraft from cinematograph records with a ruled framework of reference is illustrated by a reproduction of eight photographs from films.

Small Wind Tunnels and Aeroplane Design. (H. Glauert, J.R.Aer.Soc., Vol. XXXV, No. 243, March, 1931, pp. 207-230.) (5.102/21002 Great Britain.)

The corrections necessary for passing from a model to a full size aeroplane are discussed in detail. Elementary formulæ and graphical examples of corrections are given for the effect on tail-setting, down-wash, maximum lift, drag, thrust, choke velocity, etc. In the paper and in the discussion general agreement was expressed with what may be called " first order " corrections, but equally general doubt as to the residual errors. The discussion was specially valuable in eliciting the views of representative designers.

The Phenomenon of " Buffeting." (Airc. Eng., Vol. III, No. 24, February, 1931, pp. 31-34.) (5.11/21003 Great Britain.)

A new aeronautical term is introduced by the Accidents Investigation Sub-Committee in their report on the accident to the Junkers F.13 type aeroplane at Meopham, Kent. " Buffeting " is attributed to eddies given off by the wings at large angles of incidence and acting periodically on the tail.

Rationalisation of Aircraft Construction. (M. H. Bauer, Z.F.M., Vol. XXI, No. 24, 29/12/30, pp. 630-635.) (5.15/21004 Germany.)

The broad lines of the subject are laid down.

Aerodynamics for Engineers. (N. A. V. Piercy, Airc. Eng., Vol. III, No. 25, March, 1931, p. 67.) (5.15/21005 Great Britain.)

A series of six articles is concluded. They form a useful introduction to aeroplane theory.

Tests in Variable Density Tunnel to Investigate Scale and Turbulence Effects on Aerofoil Characteristics. (J. Stack, N.A.C.A. Tech. Note No. 364, February, 1931.) (5.2/21007 U.S.A.)

Artificial turbulence was introduced by a coarse screen of 5/16in. by 1/16in. steel strip, with 1½in. mesh, giving 1 3/16in. openings. Lift was measured against incidence for seven aerofoils at different Reynolds numbers, with and without the screen. The results are plotted and various conclusions are drawn.

The resistance of a sphere was measured as a standard of comparison.

Profile of Aerofoils, Effect of Small Variations. (K. E. Ward, N.A.C.A. Tech. Note No. 361, January, 1931, 18 pp.) (5.2/21008 U.S.A.)

Results are plotted for a pair of Göttingen and a pair of N.A.C.A. profiles, and show sensible differences in characteristics, greater than might be expected from the small geometrical differences in each pair.

Pressure Distribution Over Wings and Tail Surfaces. (R. V. Rhode, N.A.C.A. Rept., No. 364, January, 1931, 103 pp.) (5.25/21009 U.S.A.)

Photographs are given of the aeroplanes from various points of view, and of the installation of the test apparatus. The distribution of pressure orifices is given in dimensioned sketches and tables. Measurements were taken in (1) level flight, (2) pull-ups, (3) rolls, (4) spins, (5) inverted flight, (6) dives, (7) pull out of dive; and the results are tabulated and plotted graphically in several hundred diagrams.

Wing Flutter. (Air Corps Inf. Circular, Vol. VII, No. 653, 21 pp.) (5.26/21010 U.S.A.)

A general non-mathematical survey is made of the phenomena of forced vibrations in wings. The influence of natural periods, camber and dimensions is expressed in empirical formulæ. These are confirmed, it is stated, by German, Dutch and English results. The relations between frequency of vibration and air speed are given graphically for different incidences, positions of the elastic axis, mass distribution, and dimensions. The recommendations of Messrs. Fraser and Duncan are abstracted.

Pressure Distribution Over a Square Wing Tip on a Biplane in Flight. (R. V. Rhode and E. E. Lundquist, N.A.C.A. Tech. Note No. 360, January, 1931, 35 pp.) (5.2/21011 U.S.A.)

A specification is given of the Douglas M.3 biplane employed. Orifices in the wings were connected to measuring instruments maintained at constant temperature in an insulated compartment. The results are tabulated and plotted.

Load of Trailing Edge Flap. (R. M. Pinkerton, N.A.C.A. Tech. Note No. 353, October, 1930, 9 pp.) (5.22/21012 U.S.A.)

Author's Summary.—This report presents a theoretical analysis of the lift on a trailing edge flap. An analytical expression has been derived which enables the computation of the flap load coefficient. The theoretical results seem to show a fair agreement with the meagre experimental results which are available.

Aileron Effect on Wings, Theoretical Investigations. (C. Wieselberger, Aer. Res. Inst., Tokyo Impl. University, Rept. No. 30, December, 1927, 26 pp.) (5.31/21013 Japan.)

The circulation in a plane at right angles to the pitching axis at a given distance from the centre line is expressed as a Fourier series in terms of the eccentric angle of an ellipse with the span as major axis. The asymmetrical effect of the ailerons on circulation, lift resistance, pitching moment and yawing moment is expressed in a similar form. A number of coefficients is determined and the results are plotted graphically.

Interference and Drag of Struts on a Monoplane Wing. (H. E. Ward, N.A.C.A. Tech. Note No. 365, February, 1931, 17 pp.) (5.44/21014 U.S.A.)

A Göttingen No. 387 profile duralumin model was tested in the compressed air channel at Reynolds number 3,400,000 alone and with Navy No. 1 Section struts. The effects on the upper surface were more serious than on the lower surface in accordance with well-known experience, and in some cases doubled the profile drag. The results are given in numerical tables and graphically and are considered of sufficient importance to require further investigation.

International Wing Model. (Aer. Res. Inst. (Wind Tunnel Committee), Tokyo Imp. University, Rept. No. 66, December, 1930.) (5.2/21015 Japan.)

In accordance with the international comparison of test results R. and M. 954, a model wing of R.A.F. No. 15 profile was tested in six Japanese wind tunnels, of which dimensioned drawings are given. The velocity and pressure fields were explored and the lift-drag curves of the model were measured. The results are plotted and tabulated. No other international results are quoted, so that reference must be made to the reports of the other co-operating institutions for comparison.

Instrument for Conformal Transformation. (S. Gerschgorin, Z.F.M., Vol. XXI, No. 15, 18/8/30, pp. 391-393.) (5.2/21016 Germany.)

An elaboration of the elliptic compass gives a comparatively simple linkage by means of which Joukowski profiles can be drawn mechanically. The elementary geometrical theory is given.

Torsion in Box Wings. (N.A.C.A. Tech. Note No. 366, February, 1931, 46 pp.) (5.25/21017 U.S.A.)

Eight methods of design are summarised, and the results of calculation, compared in a table, show that the method which is stated to be in present use in U.S.A. gives a result roughly twice as much as the method of least work. The analysis arising in the various methods is given in some detail with numerical examples.

Testing Aeroplane Controls. (H. L. Stevens, J.R.Aer.Soc., Vol. XXXV, No. 242, February, 1931, pp. 96-120.) (5.35/21018 Great Britain.)

The author attempts to co-ordinate the sensations and muscular reactions of the pilot with the aerodynamics of control surfaces, with a view to removing from test reports descriptive adjectives and replacing them by quantitative numerical statements. The principal troubles arising during flying are discussed and methods of dealing with them are suggested. Both the paper and the discussion illustrate the tendency of the pilot to ascribe a personality to aircraft and the difficulty of regarding them in the cold light of mechanical reasoning.

Stresses in Wired Wheels. (A. J. Sutton Pippard and W. E. Francis, Phil. Mag., Vol. XI, No. 69, February, 1931, pp. 233-283.) (5.55/21019 Great Britain.)

A complete solution is obtained in terms of elementary functions and a number of values are tabulated for cases of a practical nature. Numerical examples are given with the pound weight as a unit of force. The complete formula being extremely laborious to compute, the approximate formulæ are developed which cover the more usual cases. A graphical comparison with experiment shows measured stresses somewhat exceeding calculated stresses.

Landing Gears, Rubber Cord and Oleo Rubber Disc; Tests. (W. C. Peck, N.A.C.A. Rept. No. 366, February, 1931, 19 pp.) (5.55/21020 U.S.A.)

The oleo gear was found slightly superior up to vertical drops of 16in. with maximum acceleration of 3.6 g. Rubber cord gear was increasingly superior from 16in. drop to 22in. drop, at which the stops prevented further travel. Beyond 22in. drop oleo gear withstood drops up to a total of 37in. Photographs are given of both types, and a sketch of the oleo gear. Graphical plotting yields faired curves, with considerable scattering of the observed points in some cases. The records of the oleo cylinder pressure show marked harmonic oscillations superposed on the whole pressure record.

Seventeen references are given.

Safety in Flying and Caterpillar Undercarriages. (Th. Chevalley, Aero. Rev., No. 2, 15/1/31, pp. 9-10.) (5.58/21021 Switzerland.)

The caterpillar landing wheel has an equivalent wheel diameter of 30ft., with small air resistance in flight. The specific loading is reduced, ground inequalities are easily surmounted, and nose dive on landing is practically impossible. Powerful brakes can be fitted without danger of capsizing. A French caterpillar developed during the last four years is described.

Seaplanes, Floats, Etc.

Alighting of Seaplanes. (H. Wagner, Z.F.M., Vol. XXII, No. 1, 14/1/31, pp. 1-8.) (5.56/21022 Germany.)

A number of diagrammatic semi-empirical representations are given of the motion of water under the impact of the float or hull, the velocity field being partly determined by more or less plausible assumptions. Once the assumptions have been admitted the mathematical development of the consequences may be accepted. The results obtained in this way are exhibited graphically and applied to the working out of a numerical example.

Alighting Shocks of Seaplanes. (W. Pabst, Z.F.M., Vol. XXII, No. 1, 14/1/31, pp. 13-27, 202nd D.V.L. Report.) (5.56/21023 Germany.)

Two types of instrument are applied, one a pressure indicator let into the bottom of the float or hull, and the second a strain indicator attached to the struts of the landing carriage. The former is actuated by the bending of a flat circular plate under hydraulic pressure, while the latter acts on the usual extensometer principle and records the deflection by scratching a glass plate with a diamond. A semi-empirical theory of the mass of water displaced and its effect on impact pressures is developed. The tests as a whole are incomplete, but on developing the results with the aid of various assumptions and filling in the gaps from general experience a set of graphical representations is obtained which compares reasonably well with the assumptions made by D.V.L. The tabulated experimental results take up three pages of the report.

Dynamical Similitude Applied to the Starting of Seaplanes. (P. Schröder, Z.F.M., Vol. XXII, No. 1, 14/1/31, pp. 8-12.) (5.56/21024 Germany.)

In comparing starting tests on models and full-scale machines it is found that, in addition to maintaining geometrical similarity of surface, position of c.g., attitude and gliding angle, the square of the velocity must be proportional to the total load. This is tested experimentally and the results are exhibited graphically, the fulfilment of the above condition giving a universal experimental curve for a variety of loads. When this condition is not observed it is necessary to determine two functional conditions, one connecting the incidence with the gliding angle and the ratio velocity^2/total load; and another connecting the trimming moment with the same quantities. When these are determined it is possible to compare the whole range of starting conditions. Examples are given graphically.

Airscrews

Strength of Thin Metal Airscrews. (P. A. Ralli, J.R.Aer.Soc., Vol. XXXV. No. 242, February, 1931, pp. 121-166.) (5.654/21025 Great Britain.)

The author, who designed the airscrews for the high speed Schneider Cup machines, gives a complete method of designing thin blades in which the centrifugal forces partially balance the thrust forces. In the numerical working out nineteen pages of tabulated figures are given. These are represented in ten graphs. Dimensions of blade sections at twelve sections are given, with workshop instructions.

Design of Airscrews and Comparison with Tests. (R. Seiferth, Z.F.M., Vol. XXII. No. 3, 14/2/31, pp. 72-76.) (5.650/21026 Germany.)

A series of model airscrews was tested in the wind channel. Their characteristics were calculated from the simplified theory of Prandtl and von Kármán for airscrews of small pitch and the calculated thrust was larger than the experimental thrust by 5 to 15 per cent., according to the loading.

Controllable Pitch Airscrew. (W. Turnbull, J.R.Aer.Soc., Vol. XXXV, No. 243, March, 1931, pp. 231-244.) (5.658/21027 Great Britain.)

The advantages of a variable pitch airscrew are illustrated by graphical representations of improvement in performance. The disadvantages of weight and complication are considered.

The Benuzzi Variable Pitch Airscrew. (Z.F.M., Vol. XXI, No. 21, 14/11/30, p. 571.) (5.659/21028 Germany.)

Each blade consists of a series of segments threaded on two steel tubes and covered with duralumin sheet. Movement of the rear tube relative to the leading tube rotates the segments and alters the incidence.

Instruments

Present Status of Aircraft Instruments. (N.A.C.A. Rept. No. 371, December, 1930.) (6.0/21029 U.S.A.)

The report covers the whole range of instruments fitted to aeroplanes for every purpose. Twenty-two problems under investigation are listed and forty-six references are given.

A Portable Three-Component Vibration Meter. (J. Sci. Insts., Vol. VIII, No. 1, January, 1931, pp. 29-31.) (6.26/21030 Great Britain.)

A photograph with numbered parts illustrates a description of the mechanism. Three dead-beat lever arms record components of vibrations on locomotives and rolling stock. Two additional pens make time marks. The portable case measures 440 × 250 × 260 mm.

D.V.L. Torsiograph for Measuring Torsional Oscillations in High Speed Engines. (A. Stieglitz, Z.F.M., Vol. XXII, No. 2, 28/1/31, pp. 49-52.) (6.271/21031 Germany.)

The D.V.L. torsiograph is neat and easily attached to the crankshaft. A steel pointer records accurately on a celluloid strip time and rotation of the shaft, and the frequency of the oscillation can be obtained to the same order. The instrument appears to mark a noticeable advance.

A bibliography includes the R.A.E. torsiograph, which records optically.

New Optical Indicator for High Speed Engines. (J. Kluge (Abs. F. Nakanishi, Japan), F.G.I., Vol. II, No. 2, February, 1931, p. 82.) (6.44/21032 Japan.)

A new optical indicator by F. Nakanishi (J. Soc. Mech. Eng. (Japan), foreign edition, Vol. XXXIII, p. 86) is described. Vibration of the instrument as a whole does not affect the optical record, so that high magnification can be employed. The motion of the indicator piston is controlled by a beam spring. Two recording mirrors are attached to this beam so that a ray of light from the point source travels from one mirror to the other along the cantilever before it is reflected back on the recording drum. The frequency of the instrument is stated to be of the order of 10,000 per sec., and the motion of the piston 1,000th of a mil. per atmosphere.

No reference is made to calibration difficulties brought about by changes in temperature.

Development of the Distance Reading Compass and its Importance in Automatic Control. (W. Möller, Z.F.M., Vol. XXI, No. 24, 29/12/30, pp. 640-645.) (6.505/21033 Germany.)

The selenium compass, the earth inductor and pneumatic distant reading compass of the Askania Works are described. The selenium compass used in Germany during the latter part of the war is obsolete. The earth inductor as applied to aircraft is considered satisfactory. The best results have been obtained with a pneumatic compass fitted with a servo-motor and gyro-damping to operate the rudder automatically. The aileron control is inter-connected by a pendulum so as to compensate for departure from the horizontal. Pneumatic compasses have operated successfully for 300 working hours.

A Modification of the "Gerrish" Drive. (F. J. Hargreaves, J.B. Astr. Assoc., Vol. XLI, No. 3, January, 1931, pp. 112-115.) (6.3/21034 Great Britain.)

In the "Gerrish" chronograph drive the pendulum controls the current of a driven electro-motor on the principle of supplying alternately too much or too little current. The modification works on the principle of applying brake friction alternately in defect and in excess. It is stated that both arrangements give satisfactory accuracy.

Stability and Control

Behaviour of Conventional Aeroplanes in Engine Failure and in Stalled Landing. (F. E. Weick, N.A.C.A. Tech. Note No. 363, February, 1931.) (7.2/21035 U.S.A.)

Handling experiments were carried out with twelve aeroplanes. The velocity is plotted against time from cutting out of engine for all the different conditions. It is concluded that most accidents are due either to striking the ground while still in a turn or to development of a spin.

Investigation of Curved Flight. (H. Kruse, Z.F.M., Vol. XXII, No. 2, 28/1/31, pp. 37-44.) (7.2/21036 Germany.)

Expressions are obtained for the modified characteristics of an aeroplane. The results are exhibited in ten diagrams and fourteen tables. A number of curved flights were carried out on a full-sized aeroplane, and the time required for each manœuvre, with given control surface settings, was compared with the calculated times. The worst discrepancy was 25 per cent. The other observed figures agree very reasonably with the calculated figures.

Longitudinal Stability of Canard Type. (H. G. Kiel, Z.F.M., Vol. XXI, No. 23, 15/12/30, pp. 601-610.) (7.25/21037 Germany.)

The usual methods of aerodynamical stability are applied. A number of criteria are obtained, and the results are exhibited graphically in twenty-one diagrams.

Air Transport in Fog. (F. W. Meredith, J.R.Aer.Soc., Vol. XXV, No. 242, pp. 75-95.) (7.8/21038 Great Britain.)

The paper discussion covers nearly every aspect of the present position in regard to equipment for flying and landing in fog.

Engines—Fuels, Lubricants, Etc.

A New Method of Determining Heat Transmission Coefficients. (L. Kettenacker, T.M.T., Vol. I, No. 12, December, 1930, pp. 439-440.) (8.1/21039 Germany.)

Heat transfer coefficients have generally been determined by direct measurements of heat flow. This often requires rather elaborate apparatus, and the author suggests a new method of measuring the coefficient indirectly. A model of the apparatus for which the transfer coefficient is required is made in porous clay and filled with water. The heat transfer is estimated by the amount of water evaporated.

Thermal Conductivity of Gases: Christiansen Three-Plate Method of Determination. (H. Dierkes, Phys. Zeit., Vol. XXXII, No. 2, 15/1/31, pp. 84-91.) (8.1/21040 Germany.)

The guard ring method of Christiansen for air, hydrogen and carbon dioxide is subject to inherent errors and should no longer be quoted.

Compensated Thermopile. (J. Guild, J. Sci. Insts., Vol. VIII, No. 1, January, 1931, pp. 14-17.) (8.1/21041 Great Britain.)

Two " Moll " large surface thermopiles, each with eighty manganin-constantan junctions, are erected in opposition. One only is exposed to the radiation it is desired to measure, the other being protected by diaphragms. The resistance is doubled, but the compensation reduces the cooling and heating effects of disturbances in the surrounding air to one-fiftieth. Residual e.m.f., due to temperature changes in the laboratory, is eliminated. The compensated pile may be used without any further screening for determination of faint radiation requiring high sensitivity and precision.

Benzine-Air Explosions, Extinction by Carbon Tetrachloride. (A. H. Belinfante, Chem. Weekblad., 1931, 28, 2-19. Chem. and Industry Abstracts, p. 188, Vol. L, No. 9, 27/1/31.) (8.1/21042 Great Britain.)

The high boiling point of carbon tetrachloride requires a fairly high concentration to suppress explosions of benzine mixtures Generally, on passing a spark, a certain amount of hydrochloride acid is formed.

Heat Transmission to Water Flowing in pipes. (A. E. Lawrence and T. K. Sherwood, Ind. and Eng. Chem., Vol. XXIII, No. 3, 1/3/31, p. 301.) (8.1/21043 U.S.A.)

Experiments were carried out on heating water flowing through a copper tube .6 inch inside diameter by condensing steam on the outside, at speeds from $\frac{1}{2}$ to 22ft. per sec. Thermocouples determined the pipe surface temperature and the average deviation of the heat balance was less than 7 per cent. The film coefficients for condensing steam on the outside of a pipe were found to agree with Nusselt's formula, and were substantially independent of the effective pipe length.

Ignition Limits of Hydrogen-Air Mixtures. (Fr. Dieterlen, T.M.T., Vol. I, No. 12, December, 1930, pp. 429-434.) (8.11/21044 Germany.)

From optical indications and spark photographs of the flame front it appears that combustion of hydrogen air mixtures can be propagated, although the temperature of combustion is less than the ignition temperature. The intensity of the ignition spark is important. On repeated sparking at intervals of a few seconds, mixtures were finally ignited, in contrast with Coward's experiments. (J. Am. Chem. Soc.)

Combustion of Inflammable Gases by Electric Sparks. (J. D. Morgan, Phil. Mag., No. 68, January, 1931, pp. 158-163.) (8.13/21045 Great Britain.)

Under a succession of electric sparks in a gas mixture not ignited or inflamed by the sparks, the amount of combination of the constituents is proportional to the heat energy of the spark discharge with gap width constant, and over a wide range of the gap width with heat energy constant; from these and earlier experiments combustion, as well as ignition, depends on the heating of the gas by conduction.

Recording Gas Calorimeter. (Z.V.D.I., Vol. LXXV, No. 2, 10/1/31, p. 52.) (8.14/21046 Germany.)

Gas and air in constant proportions are burnt at a definite rate in a pyrometer. The temperature of the tube is estimated by its expansion, which is recorded on a rotating drum and gives consistent results under practical conditions. The temperature is a measure of the energy of combustion.

A New Electrical Indicator. (K. Schnauffer, Z.V.D.I., Vol. LXXIV, No. 30, 26/7/30, pp 1066-1067. See A. and N. 15/13155.) (8.22/21047 Germany.)

The pressure acting on one of the plates of a condenser alters the air gap and the electrical capacity. These changes are amplified and recorded on an oscillograph. Examples of indicator diagrams are given.

Difficulties due to thermal expansion in calibration and in fixing the zero point are not considered.

Piezo Electric Indicator for High Speed Combustion Engines. (J. Kluge and H. E. Linckh, Z.V.D.I., Vol. LXXIV, No. 25, 21/6/30, pp. 887-889.) (8.22/21048 Germany.)

A form of piezo electric indicator is described working with a valve amplifier and an electro-magnetic cinograph. From pressure diagrams on a time scale the work done per cycle is obtained by a harmonic analyser.

Heat Transfer in Sparking Plugs. (H. Rabezzana, Autom. Ind., Vol. LXIV, No. 4, 24/1/31, pp. 120-121.) (8.283/21049 U.S.A.)

It is necessary to keep the sparking plug insulator at a temperature high enough to burn off any carbon deposited, but not high enough for pre-ignition.

The plug should reach its normal temperature quickly, since a cool plug is liable to become covered with carbon during the start. These various requirements can be met by reducing the size of the plug and the weight of the insulator. Small plugs warm up more quickly than normal size plugs and their maximum temperature is less. Particulars are given of small plugs on the market.

Low Price Engine for Light Aircraft. (Autom. Ind., Vol. LXIV, No. 4, 24/1/31, p. 131.) (8.25/21050 U.S.A.)

Four-cylinder air-cooled horizontally opposed double twin, cubic displacement 155 c. inches, rated 35 h.p. at 2,500 r.p.m., weight 138lbs. complete. The L-head cylinders are cast in pairs. The crankcase is rigid and conforms to the nose of the aircraft. The carburettor is attached to the lowest part of the crankcase, both oil cooling and heating of the charge being obtained by passing the induction pipe through the oil sump.

Ganz-Jendrassik Diesel Engine. (Aut. Tech. Zeit., Vol. XXXIV, No. 4, 16/2/31, p. 103.) (8.25/21051 Germany.)

The two-stage principle is applied. The pre-ignition chamber is placed in the cylinder head and the fuel issues in the direction of the cylinder axis and meets a special atomiser plate fastened to the cylinder crown, the process combining the advantage of two-stage ignition and of direct injection. The engine is insensitive to nature of fuel, starts cold and has medium compression ratio. The design has been applied mainly to rail transport, but is being adapted to automobiles.

The Deeble Duplex Engine. (N. French, Aero Digest, Vol. XVIII, No. 1, January, 1931, p. 76.) (8.25/21052 U.S.A.)

This engine consists of two pistons, one working inside the other one. The inner piston is stationary, the outer one being reciprocated. Two combustion chambers are thus obtained, one above the other. A weight of under 1 kg./h.p. is claimed in the case of the air-cooled six-cylinder model rated at 300 h.p.

Range of Aircraft with Diesel Engines. (J. D. Coales, Airc. Eng., Vol. III, No. 25, March, 1931, pp. 61-62.) (8.265/21053 Great Britain.)

Approximate formulæ are developed of sufficient accuracy to determine the range within practical limits for specific weight, specific consumption, efficiency of engine, total weight of fuel carried, maximum lift-drag ratio of the complete aeroplane, and the total flying weight.

A numerical example is worked out taking representative weights and consumptions of a petrol engine and a compression ignition engine. The ranges become equal at 1,210 air miles, but the compression ignition engine has a slight advantage in mean speed, 94.2 m.p.h. compared with 91.5 m.p.h.

A table gives specifications and figures of equal range for seven standard types of aircraft fitted alternatively with petrol and compression ignition engines. It is remarkable that the compression ignition engine equals the performance of a petrol engine for an aircraft weighing 17,650lbs. only after flying 1,136 air miles in 15 hours; while for a water-cooled bomber of 9,486lbs. total weight, equality of range is only obtained at 2,060 air miles in 26 hours. These figures, closely based on experimental data, are less favourable to the compression ignition engine than previous estimates.

A Compressorless Diesel Engine. (F. Schmidt, Z.V.D.I., Vol. LXXIV, No. 33, 16/8/30, pp. 1151-1154.) (8.291/21054 Germany.)

The experimental 22 h.p. single-acting, four-stroke M.A.N. engine has a single cylinder of 210 mm. bore and 300 mm. stroke and a compression ratio

of 11. The inlet valve is masked so that the turbulence can be adjusted to the most complete combustion. The friction losses increase rapidly with speed. Below 300 r.p.m. cooling losses increase the specific fuel consumption.

Device for Observing Phenomena of Injection in Compressed Air. (M. Clerget, C.R., No. 9, 2/3/31, pp. 553-555.) (8.296/21055 France.)

In developing the Clerget oil injection engine, fuels injected into a closed vessel, effectively scavenged after each injection, were photographed stroboscopically with short exposures. At 1,040 r.p.m. the total injection time was 1/360 second. The mean speed of penetration was 130 m. per sec. with air at one atm. and 32 m. per sec. at 28 atm. The pump injection pressure throughout was 200 atm. The rate of growth of the jet sensibly follows the profile of the pump cam.

Life of High-Speed Engine Pistons. (Modersohn (Abst.), Z. fur Metallk., Vol. XXIII, No. 2, February, 1931, pp. 67-68.) (8.32/21056 Germany.)

The surface of the material should be as smooth as possible, since this largely determines the life of the piston. Cold working and so-called " press finish " should be applied to the parts.

Torsional Strength Measurement. (Autom. Ind., Vol. LXII, No. 22, 31/5/30, p. 828.) (8.36/21057 U.S.A.)

Prandtl has shown (Love's Elasticity, para. 224) that the contours, under internal pressure, of a soap film spread over the plane end of a thin pipe are identical with the lines of equal shear under torsion at corresponding points in a long solid cylinder of the same external contour as the pipe. The use of the method has been found economical by the U.S. Bureau of Standards.

Fractures of Crankshafts. (K. Matthaos, L.F.F., Vol. VIII, No. 4, 28/7/30, pp. 91-120.) (8.36/21058 Germany.)

Typical fractures are illustrated by nineteen photographs. Micro-photographs of etched surfaces indicate the grain of the materials. The mechanical qualities of the materials are discussed and numerical values are tabulated. The increased stresses due to bad shape of parts and to resonance oscillations are referred to.

Critical Speeds of Multiple Shafts. (J. J. Ryan, J. Franklin Inst., Vol. CCXI, No. 2, February, 1931, pp. 151-196.) (8.36/21059 Great Britain.)

A multiple shaft is defined as a continuous shaft formed by the alignment of the rotating elements of several machines in which the unit shafts are rigidly coupled. Differential equations are formed in the usual manner for rigid bearings with modifications for flexible bearings. Numerical examples are worked out, tabulated and graphed. Ten references are given.

Recent Developments in Engine Cooling. (A. Swan, J.R.Aer.Soc., Vol. XXXV, No. 243, March, 1931, pp. 179-206.) (8.44/21060 Great Britain.)

Cooling by liquids of higher boiling point than water is briefly discussed, *e.g.* ethylene glycol, b.p. 197°C., and glycerine, b.p. 290°C. Graphical records are given of pumping tests at different temperatures for these two substances, their viscosity at low temperatures being 17 and 600 times that of water at 25°C., but less than that of water above 100°C.

Charts are given of temperature differences from air to cooling liquid over the range of working conditions.

Evaporative cooling is discussed at some length, with diagrams of a circulating system and a photograph of an aeroplane installation. Some figures of results are given.

A note is added on oil cooling. Experimental figures of heat transfer are given, and diagrammatic drawings of two coolers are reproduced.

The discussion and replies brought out a number of practical experiences and experimental data.

Resistance and Cooling Effect of an Aeroplane Body with Various Arrangements of Radiators. (H. Muttray, Z.F.M., Vol. XXII, No. 3, 14/2/31, pp. 65-73.) (8.422/21061 Germany.)

Model experiments were carried out on the efficiency of frontal, side and underbody radiators. Each design has relative advantages and selection depends on particular considerations. The underbody radiator can be retracted out of the slipstream where great variation in cooling is required, while blanking off other types by shutters increased the resistance.

In changing from climbing to horizontal flight a Junkers A.35 underbody radiator set up considerable buffeting by changing the type of air flow.

The Air Resistance of Air-Cooled Radial Engines. (F. N. Scheubel, Z.F.M., Vol. XXII, No. 3, 14/2/31, pp. 72-73.) (8.426/21062 Germany.)

The experiments were confined to a Jupiter cylinder with various forms of cowling. The resistance of a single cylinder was reduced to $\frac{1}{3}$rd, but the effect on heat transfer may be unfavourable and requires further experiment.

Foaming. (Autom. Ind., Vol. LXII, No. 22, 31/5/30, p. 836.) (8.54/21063 U.S.A.)

The cause of foaming of lubricating oil is the larger suction of the scavenging pump, which receives the oil delivery from the pressure pump. The rest of its capacity is made up by air, which becomes intimately mixed with the oil in minute bubbles. Additional bubbles may be formed by the splashing of the return oil into the oil in the tank. These bubbles reduce the oil pressure. Oil foaming will occur more readily under the following conditions: (1) hot oil, (2) small quantity in tank, (3) short oil return line, (4) engine having numerous scavenge pumps and a small sump, and (5) high oil tank.

The air bubbles are effectively separated by discharging the oil on to a sloping plate so that it runs down the sides into the oil in the tank.

Lubricating Oil. (J. Tausz and A. Staab, Petroleum, 1930, 26, 1117-1124, 1129-1140. Chem. and Ind. Abstracts, p. 187, Vol. L, No. 9, 27/2/31.) 8.54/21064 Great Britain.)

The molecular weights of a number of oils have been determined, using different solvents. Mineral oils generally show an increase of molecular weight with increased concentration. Vegetable oils show a decrease.

On mixing benzine with a mineral oil there is a marked increase in volume; with castor oil there is a small decrease.

Observations on the Testing of Lubricants. (E. Wooler, S.A.E., Vol. XXVIII, No. 1, January, 1931, pp. 53-65.) (8.54/21065 U.S.A.)

Gear tooth pressures and rubbing speeds beyond safe lubrication by petroleum distillates can be supported by a lead soap base, but fairly rapid wear cannot be prevented. If the fluid film is ruptured the high spots on the bearings which with a normal lubricant would lead to seizure, are worn away rapidly by a combination of chemical action and abrasion. Film lubrication over the full bearing area is thus restored.

Effect of Rubbing Speed on Lubricating Oil. S.A.E., Vol. XXVIII, No. 2, February, 1931, p. 258.) (8.54/21066 U.S.A.)

Lubricants that pass the ordinary journal bearing test at 100 r.p.m. often fail at lower speed. Possibly the higher temperature of the oil at the higher speed produces chemical action between journal pin and lubricant.

Lubricating Oil. The Effect of Oil Consumption and Temperature on Octane Numbers and Ratings. (H. R. Stacey, Annual Meeting of S.A.E., S.A.E. Jrnl., Vol. XXVIII, No. 2, February, 1931, p. 255.) (8.54/21067 U.S.A.)

The possible error arising from different rates of consumption and variations of temperature may reach one octane number. The type of oil does not materially affect the results. The oil consumption should be kept down to the minimum for safety, and the oil temperature should be kept constant at the lowest value consistent with good lubrication.

Production of Fuel and Lubricant Oils by Hydrogenation. (R. T. Haslam and W. C. Bauer, S.A.E., Vol. XXVIII, No. 3, March, 1931, pp. 307-314.) (8.5/21068 U.S.A.)

Three important effects are:

(1) Purification, by elimination of sulphur, nitrogen and oxygen as gaseous hydrides;
(2) Stabilisation; highly stable carbons are formed at the expense of less stable molecules;
(3) Decomposition of asphaltic, resinous and hydro-carbons, with formation of a more homogeneous oil.

Prevalence of paraffins determines a product suitable for lubrication, and prevalence of naphthenes a product suitable for combustion with anti-knock properties. Extensive tables and diagrams are given of the results of hydrogenation on a commercial scale.

Production of Motor Fuels containing Alcohol. (K. R. Dietrich, Chem. and Ind., Vol. L, No. 11, March, 1931, p. 232.) (8.604/21069 U.S.A.)

Directions are given for mixing fuels with alcohol so as to ensure stability. The most common mixture is 20 per cent. absolute alcohol, 30 per cent. benzol and 50 per cent. petrol, by weight. A table is given of the cc. water which can be added to 100 cc. motor fuel before the mixture becomes cloudy.

Oxidation of Fuels in Motors. (E. Berl, K. Heise and W. Winnaker, Chaleur et Ind., Vol. X, 1929, pp. 179-187, 241-246. Chem. Absts, Vol. XXV, 20/2/31, p. 806.) (8.64/21070 Germany.)

Hydro-carbons rich in H_2 decompose into H_2 and non-saturated hydro-carbons, which absorb O_2 forming H_2O_2, water and organic peroxides.

Present Position of Testing of Aero Engine Fuels. (A. v. Philoppovich, Z.F.M., Vol. XXII, No. 2, 28/1/31, pp. 47-49; and No. 3, 14/2/31, pp. 80-84, 203rd D.V.L. Rpt.) (8.640/21071 Germany.)

A fuel can be analysed into aromatics, naphthenes and paraffins and the toluene value calculated. This method gives rough results and is not applicable when metallic dopes are present. The determination of the self-ignition temperature of the fuel depends on the apparatus used, and the values are not generally applicable. The correlation of the self-ignition temperature with other physical properties has been proposed. Brown and Watkins take the pressure rise in a bomb divided by the self-ignition temperature as a figure of merit. Neither this

nor correlation of the self-ignition temperature with the rate of admission of oxygen to the ignition pot provided a satisfactory rating. The oxidation tendency of the fuel at temperatures below self-ignition has not given consistent results. The conclusion is that no laboratory tests can take the place of engine tests in determining the suitability of a given fuel. The cylinder temperature speed, and stroke volume of the test engine should approximate to the engine used in practice. Ricardo's method of determining absolutely the highest useful compression ratio has been replaced by matching fuels. Mild continuous detonation is obtained with the fuel under test, and with a mixture of two standard constituents possessing varying detonating characteristics, blended to give equal detonation, judged either by ear or by the bouncing pin. No satisfactory apparatus for use in flight has been devised. Detonation increases the thermal and mechanical loading of the engine. Valves and sparking plugs suffer especially under intense detonation, but no data are available on the effects of medium detonation over a short period, nor of continuous mild detonation over a long period.

Sixteen references are given.

Standardisation of Fuel. (Autom. Ind., Vol. LXII, No. 22, 31/5/30, p. 834.) (8.64/21072 U.S.A.)

The American Air Corps in future will specify a standard fuel and will rate engines by the power produced with specified maximum fuel consumption, at specified density of the carburettor air intake according to performance requirements. The purpose is that engines shall be designed to suit fuels rather than fuels selected to suit engines. Rating engines at a definite maximum allowable consumption will discourage the practice of cutting engine weight at the expense of fuel consumption.

On the Formation of Gums in Fuels. (R. Brunschwig and L. Jacqué, C.R., Vol. CXCI, No. 22, 1/12/30, pp. 1066-1068.) (8.64/21073 France.)

The effect of light on gum formation may be considerable under laboratory conditions, but in practice the fuel is usually stored in opaque tanks. Discoloration of a stored fuel is not a measure of gum formation.

Detonation. (N. A. Butkov, Trans. Thermo-Tech. Inst., Russia, 1930, No. 2, 41-44. Chem. Abst., Vol. XXV, No. 2, 20/1/31, p. 406.) (8.645/21074 Russia.)

The fuel under test was heated in a bomb with oxygen under pressure at 250° for 90 mins., under 5 atmospheres. Generally the fuels most resistant to oxidation had the highest anti-knock value in engine tests. The oxidation of mixtures differs considerably from the oxidation of the constituents separately.

Knock Testing with a Microphone. (Autom. Ind., Vol. LXIII, No. 26, 27/12/30, p. 946.) (8.645/21075 U.S.A.)

A microphone suspended on coiled springs near the test engine picks up all local noises, converting the sound pulsation into electric current. Pulsations corresponding to ordinary engine noises are then filtered out by what are technically known as " high-pass " filters, only the characteristic sound vibrations of knocking with a frequency of about 3,000 per second, passing on to the vacuum tubes. The electric current pulsations are magnified several hundred times and passed through a milli-ammeter, the readings of which are a measure of the intensity of the knock.

Anti-Knock Fuels. (L. Edeleanu and W. Grote, Brennstoff Chem., 11, 212-4, 1930. Chem. Abst., 20/1/31, p. 407.) (8.645/21077 Germany.)

By refining and blending, mixtures having high anti-knock value can be obtained. The results obtained by mixing fractions below 175° with higher boiling fractions from liquid sulphur-dioxide are similar to those obtained by adding a metallic dope.

Wheeler-Schebler Carburettor with New Metering Principle. (Autom. Ind., Vol. LXIII, No. 26, 27/12/30, p. 938.) (8.701/21078 U.S.A.)

The metering of the fuel delivered by the main jet is regulated by a pin operated by a suction controlled piston.

The advantage claimed over metering under direct throttle control is the possible use of a leaner "economy" mixture, with better part-throttle performance and freedom from low-speed lean spots.

Fuel Measuring Pump Pressures and their Effects on Performance. (J. Canoose, J.Am.Soc.N.Eng., Vol. XLV, No. 1, February, 1931, pp. 1-31.) (8.741/21079 U.S.A.)

Indicator cards of the pressure in pump cylinder, suction receiver, and suction line give useful information on the relative merits of the float chamber, the suction standpipe and the suction system without surge control. They show the superiority of the float chamber for surge control. The pumps should be rigid, the fuel leads should have the same flow resistance, and the discharge valve springs the same initial compression.

Anti-aircraft Ranging, Etc.

American Anti-Aircraft Guns. (E. C. Nichols, Sci. Am., Vol. CXLIV, No. 2, February, 1931, pp. 81-84.) (9.12/21080 U.S.A.)

A descriptive account with five photographs and a diagram, is given of the anti-aircraft equipment of the U.S. army, and of some of the results obtained in practice. Photographs are also given of a small mortar and a medium tank.

Photographic Method of Controlling Air Bombing Practice. (Capt. Billard, Rev.F.Aer., No. 17, December, 1930, pp. 1449-1474.) (9.33/21081 France.)

Aircraft are photographed from the ground on a recording theodolite. No bombs are dropped but readings on the bomb sights and the instant of release are signalled to the ground. The position of the aircraft on the photographic record and the readings on the bomb sight are correlated, and the probable accuracy is estimated.

Materials

Strength of Rectangular Flat Plates under Edge Compression. (L. Schuman and G. Back, N.A.C.A. Rept. No. 356, January, 1931, 24 pp.) (10.1/21082 U.S.A.)

Plates of duralumin, stainless iron, monel metal (65 per cent. Ni., 32 per cent. cu., plus Fe. Mn. Si. Zn.), and nickel (99 per cent.) were tested for buckling under edge loading. Sketches and photographs exhibit the testing machine and the corrugations of the specimens buckling under end loads. The stress-strain curves are exhibited graphically, as also the observed corrugations on the various test specimens. The departure from the observed maximum load did not exceed 50 per cent. for duralumin and 20 per cent. for monel metal.

Influence of High Frequency Oscillation on Metallurgical Treatment. (G. Mahoux, Rev.S.G.A., February, 1931, p. 8.) (10.12/21083 France.)

Subjection of a steel to high frequency mechanical oscillations, during nitration in a stream of ammonia, produced more rapid and intense hardening.

Some Properties of Protective Films on Metals. (E. S. Hedges, Chem. and Ind., Vol. L, No. 2, 9/1/31, pp. 21-25.) (10.125/21084 Great Britain.)

Anodic or potassium chromate treatment of iron forms a protective film of iron oxide which under certain conditions can be isolated.

Fourteen references are given.

Initial Corrosion Rate of Steels. (H. O. Forrest, B. E. Roetheli and R. H. Brown, Ind. Eng. Chem., Vol. XXII, No. 12, December, 1930, pp. 1197-1199.) (10.125/21085 U.S.A.)

The initial rate of corrosion of stainless steel is the same as that of other steels, but the rate of corrosion falls off rapidly and ceases in a few minutes with the formation of a protective film.

Protective Coatings of Aluminium Foil. (Z. fur Metallk., Vol. XXIII, No. 2, February, 1931, pp. 66-67.) (10.125/21086 Germany.)

A method of cementing 0.003in. aluminium foil on steel plates has been developed in America with some success as a protection against corrosion. The process has been used mainly in protecting the inner and outer surfaces of fuel tanks in the oil industry. The composition of the cement is not stated.

Outdoor Corrosion of Zinc and Cadmium Coatings on Iron and Steel. (C. L. Hippensteel and C. W. Borgmann, Bell Tele. Lb., No. B.516, November, 1930.) (10.262/21087 U.S.A.)

A description is given of the methods of applying natural and artificial atmospheric conditions. Specifications are given of the method of plating, and the rate of corrosion measured by loss of weight is exhibited in four graphs. The most resistant coating was a zinc alloy with 5 per cent. cadium.

Fatigue Strength of Welded Steel Joints. (W. Hoffmann, Z.V.D.I., Vol. LXXIV, No. 46, 15/11/30, pp. 1561-1564.) (10.14/21088 Germany.)

Specifications are given of seven steels which were investigated, in tabular form with the usual test figures. The variation of strength of the welded steel tubes, Nos. 1 and 3, is given graphically, and the mean values of twenty tests are tabulated for all seven materials. Micro-photographs are given of seven specimens, and two photographs of fractures near the weld.

Report of Conference on Wire Cable Research. (Z.V.D.I., Vol. LXXV, No. 7, 14/2/31, pp. 206-209.) (10.162/21089 Germany.)

The experiments deal mainly with the strength of joints under fatigue. Corrosion has an ultimate effect on life and depends largely on the composition of the steel. Government regulations limit phosphorous and sulphur content to 5 per cent. in cable for lifting machinery, but from the experiments it appears that this is no criterion for the stability of the wire cable.

Cast Aluminium in Compression Ignition Engine Construction. (W. Hartl, Aut. Tech. Zeit., Vol. XXXIV, No. 4, 16/2/31, pp. 94-98.) (10.231/21090 Germany.)

Ample ribbing is required to give rigidity to light alloy castings. Sharp regressive corners must be avoided. Silicon alloy castings are suitable under

fatigue stresses. As a rough guide a light alloy casting should weigh at least half the cast iron article it replaces, and any further reduction in weight is accompanied by risk of failure. These figures are based on experience, the light alloy casting having a suitable section for its purpose.

Aircraft Timber. (L. J. Markwardt, N.A.C.A. Rept. No. 354, January, 1931, 33 pp.) (10.4/21091 U.S.A.)

Two hundred and eighteen hard woods and 48 soft woods are tabulated with specific gravity dried, bending and compressive strength, hardness, shock resistance, stiffness, average figure of merit, and comparative figure of merit. The relation between specific gravity and bending strength is plotted and free curves drawn through the points representing fairly the average value, the points lying in well defined belts. The same remark applies to modulus of rupture plotted against specific gravity. Other mechanical properties are discussed fully. It is concluded that the data put the selection of aircraft material on a reliable basis. Twenty-one references are given.

Polarisation Optical Stress Measurements of the Corners of Bent Rods. New Device by H. Cardinal. (Mat. Pruf., No. 9, 1931, p. 129.) (10.406/21092 Germany.)

Experiments on flint glass, free from initial tension, show that the maximum tension at the inner edge does not lie in the axis of symmetry but on either side of it, increasing at the inner edge up to 84 per cent., according to the ratio of the bend to the depth; at the same time considerable radial tensions may exist.

Wind Tunnels

Tests with a Model Wind Channel. (M. Schilhansl, Z.F.M., Vol. XXII, No. 4, 28/2/31, pp. 107-117, 208th D.V.L. Report.) (11.1/21093 Germany.)

Details are given of the model channel, illustrated by five photographs and five diagrams. The powers required at different angular velocities of the impeller are plotted and a fair curve is drawn through the points, some of which show considerable scattering according to the day on which the observations were made. The distribution of velocity across the stream is exhibited by means of contour lines. By experimenting with different types of diffuser a saving of 10 per cent. in the power required was obtained. Seven references are given.

Design of Wind Tunnels. (E. F. Relf, Airc. Eng., Vol. III, No. 24, pp. 27-28.) (11.1/21094 Great Britain.)

The advantage of return flow wind tunnels in compactness and economy of power are discussed in view of the decision to instal a 24-foot tunnel of this type at the R.A.E. The disadvantages of increased turbulence in the stream are discussed. The advantage of an open jet for airscrew tests is also considered.

A Simple Six-Component Balance for the Kiffhauser Technical School Wind Channel. (E. v. Lossl, Z.F.M., Vol. XXI, No. 15, 18/8/30, pp. 393-396.) (11.16/21095 Germany.)

A diagram and photograph of the linkage are given. The forces in the linkage arms are transmitted through membranes to six manometer gauges, which may be calibrated to give readings in suitable units. Lift and resistance are simple sums and differences of the readings. The cross force involves a non-dimensional factor. The component couples are sums and differences of the readings multiplied by fixed lengths.

Airships

Metal Airship Construction. (W. Bleistein, Z.F.M., Vol. XXI, No. 24, 29/12/30, pp. 626-630.) (12.1/21096 Germany.)

A descriptive account is given of the methods of construction of metal airships and is illustrated by photographs and sketches.

Metal-Clad Airships. (U.S. Air Services, Vol. XVI, No. 2, February, 1931, p. 32.) (12.1/21097 U.S.A.)

Some technical details are given of a proposed metal-clad airship for the United States army, which will be slightly larger than the Graf Zeppelin, and will cost $4,500,000 to construct.

Airships. (U.S. Air Services, Vol. XVI, No. 2, February, 1931, p. 57.) (12.3/21098 U.S.A.)

Some account is given of progress on the Akron airships and power plant. Trial flights are expected by the summer of 1931.

Commercial Airship Progress. (S.A.E., Vol. XXVIII, No. 1, January, 1931, pp. 5-7.) (12.3/21099 U.S.A.)

The National Advisory Committee for Aeronautics (U.S.A.) recommends that lines be established forming a United States airship merchant service. Dr. Karl Arnstein, formerly chief engineer to the Zeppelin Co., discusses new lines of airship development.

The latest type of hull construction has main frames of triangular section and flexible bulkheads between individual gas cells to reduce stresses if one of the gas cells becomes deflated.

Cotton cloth covered with gold beater's skin makes satisfactory gas bags, but the skins are expensive and difficult to manufacture. Research has developed a rubberised fabric cell and a gelatine latex cell, both satisfactory. The rubberised cells are heavy, but are inexpensive and stand rough handling. The gelatine latex cells have characteristics similar to those of gold beater's skin, but are less expensive.

Wireless

Utilisation of Photo-Electric Cells with Glass Cover for Investigations on Radiation of Very Short Waves. (J. and J. F. Thovert, C.R., Vol. CXCI, No. 22, 1/12/30, pp. 1058-1059.) (13.3/21100 France.)

The photo-electric cell is rendered sensitive to the short waves by treating the glass surface of the cover with a thin layer of a substance which will fluoresce under the action of the short wave, *e.g.*, a thin layer of vaseline.

Application of Oscillogram to Transient Phenomena. (H. M. Turner, Proc. Inst. Rad. Eng., Vol. XIX, No. 2, February, 1931, pp. 269-281.) (13.2/21101 U.S.A.)

In recording transient phenomena by oscillogram the movement of the spot of light once along the path is insufficient to form an image on the retina. In the present apparatus the transient phenomenon is repeated periodically, and by suitable mechanical adjustments which are fully described the time-intensity curves, due to successive transients are superposed.

A number of diagrams are reproduced and illustrate the important information obtainable by this method.

Graphical Determination of Electric Field near Antennæ. (J. S. Petrie, J.I.E.E., Vol. LXIX, No. 410, February, 1931, pp. 290-298.) (13.31/21102 Great Britain).

From Author's Summary.—The mathematical calculation of the electric field in the immediate neighbourhood of a transmitting aerial is somewhat laborious, and the paper describes a graphical method by means of which calculations may be made for any desired arrangements of a transmitting aerial.

Investigations on Behaviour of Quartz Controlled Transmitters. (P. v. Handel, L.F.F., Vol. VIII, No. 5, 18/10/31, pp. 121-140.) (13.31/21103 Germany.)

Various forms of oscillation of the Piezo electric circuit are investigated. The magnitude of the grid current has great influence on the oscillation and successful working of the circuit. Special valves using very small grid current are required.

Impedence Correction of Wave Filters. (E. B. Payne, Bell Tele., B.531, December, 1930.) (13.5/21104 U.S.A.)

From Author's Summary.—The development of appropriate filter terminating sections has passed through a number of stages. The earliest filters gave reflection coefficients as great as 50 to 60 per cent. in the useful transmission band. The invention of " m-derived " and " π-terminated " filters, plus a number of more or less empirical schemes, made it possible to obtain reflection coefficients ranging from 10 to 15 per cent. in the useful band. Recent progress has resulted chiefly from the development of a series of sections, the simplest of which is equivalent to the m-derived type, while the others, of progressively increasing complexity, give progressively better approximations to the ideal characteristic. The use of the more complicated sections has made it possible to reduce filter reflection coefficients to the order of 2 per cent. or even less. At present the chief limitation appears to be the difficulty of manufacturing filters with sufficient precision to allow the theoretical characteristics to be realised. The paper is illustrated by figures showing the various stages of this progress as they are exemplified in actual designs.

Method of Impedence Correction. (H. W. Bode, Bell Tele., B.552, December, 1930, 42 pp.) (13.5/21105 U.S.A.)

A theoretical treatment is given of some recently developed wave filter terminating sections whose application is discussed in the accompanying paper on " Impedence Correction of Wave Filters." The sections consist primarily of non-recurrent ladder networks which operate, over the transmission bands of the associated filters, as transformers whose ratio varies with frequency. The transformation ratio of the network is specified, as a function of frequency, by a power series containing a limited number of terms and the design procedure therefore depends upon the construction of power series approximations to the ratio between the resistance of the filter proper and the desired resistance. A separate network is added to secure control of the reactance component. An increased number of terms in the power series and therefore an improved approximation to the desired transformation ratio, can be obtained by increasing the number of branches in the network. The method thus leads to a series of sections of progressively increasing complexity and with progressively improving impedence characteristics. By an inversion of the analysis a second series of sections can also be obtained. The paper is chiefly devoted to a discussion of these two series of filter sections, but other possible applications of the method are also described briefly.

The Selenium Rectifier. (J. Noack, Z.V.D.I., Vol. LXXV, No. 2, 10/1/31, p. 48.) (13.5/21106 Germany.)

The rectifier is built up of elements in series, each element consisting of a layer of metallic selenium welded to a copper plate and covered with a thin foil of copper, and is capable of dealing with about 24 volts. The back current is stated to be less than 1/10th of one per cent. of the transmitted current. Advantages are claimed over copper oxide rectifier.

Beam Arrays and Transmission Lines. (T. Walmsley, J.I.E.E., Vol. LXIX, No. 410, February, 1931, pp. 299-323.) (13.6/21107 Great Britain.)

Seven types of array are shown diagrammatically, and curves of directional intensity are given in certain cases. The question of losses in transmission lines is discussed, and an arrangement for reducing losses in open transmission lines leads to the conclusion that these losses may be reduced to a figure which competes with the concentric metallic tube transmission usually regarded as essential. Sixteen references are given.

The Present Position of Television. (F. Schröter and H. Lux, Z.V.D.I., Vol. LXXV, No. 8, 21/3/31, pp. 237-239.) (13.7/21108 Germany.)

Attempts are being made to reduce the wave band to reasonable width by concentrating on the light portions of the picture for transmission, and by causing the light spots at the receiving end to remain longer on the brighter areas, which show more detail. The difficulties are considerable.

Acoustics

Propagation of Sound Waves in a Long Cylindrical Tube. (Th. Vautier, Ann. d. Phys., Vol. XIV, Nov., 1930, pp. 263-625.) (15.2/21109 France.)

The experiments were carried out in a nearly straight iron pipe 3 feet dia. and one mile long, laid at Lyons. The sounds were produced by firing small charges and the passage of the sound wave was recorded by interference fringes.

The speed of propagation and the type of wave front are closely dependent, and show satisfactory agreement with the theoretical conclusions of Hugoniot.

Accuracy of Measurements with Behm Air Height Ranging Device at Low Altitudes. (E. Schreiber, Z.F.M., Vol. XXII, No. 3, 14/2/31, pp. 77-79.) (15.25/21110 Germany.)

The source of sound for these experiments was a special pistol constructed by the Haenel-Suhl munition works. The experiments were carried out for heights between 4 and 18 metres, with a mean error of ± 1.3 metres. Between 19 and 100 metres an error of ± 3.5 metres had been determined previously on another instrument.

Aircraft Sound Locator; Acoustical Properties of Some Sound Collectors. (J. Obata and Y. Yosida, Aer. Res. Inst., Tokyo Imp. University Rept., No. 62, July, 1930.) (15.25/21111 Japan.)

Four types of sound collectors were used, two parabolic reflectors and two horns. Dimensioned sketches of the latter are given. Technical details are given of the sources of sound and the sound receiver, with sketches and diagrams of connections of the microphone circuits. The directional intensity is plotted on polar diagrams, and shows a fairly definite maximum in certain cases but a poorly defined maximum in others.

In the case of the horns there may be as many as seven maxima, of which the greatest is not necessarily in the direction of the sound source. Photographs are given of the various installations.

Analysis of Sounds Emitted by Aircraft. (J. Obata and Y. Yosida, Aer. Res. Inst., Tokyo Imp. University Rept., No. 59, March, 1930.) (15.3/21112 Japan.)

The apparatus consisted of a combined microphone seven-stage amplifier and oscillograph, of which a diagram of connections is given. Oscillograms are reproduced and a Fourier analysis is given of the principal frequencies. The sounds are so complex that it is not always possible to interpret the oscillograms, but an attempt is made to analyse the large mass of records reproduced. The results include the recognition of ground echo and fluctuation of intensity due to the wind.

Experiments were carried out with an airship, Benz engine, 130 h.p.; a bomber, Napier Lyon, 450 h.p.; a chaser, Hispano-Suiza, 300 h.p.; and a reconnaissance machine, Hispano-Suiza, 300 h.p.

Survey of Room Noise in Telephone Locations. (W. J. Williams and R. G. McCurdy, Bell Tele. Lab., B.526.) (15.38/21113 U.S.A.)

The noise meter described with illustrations, is designed on the principle of weighting the frequencies to stimulate the sensitivity of the ear so as to avoid the more elaborate apparatus required to analyse a number of narrow frequency bands. The accuracy of the instrument was compared with other methods and shows discrepancies of less than half a decibel over the entire range of observation. Four examples of measurements are given graphically.

Miscellaneous

Parachute Cloth, Physical Characteristics. (Air Corps Information Circular, Vol. VII, No. 651, 23/6/30, 11 pp.) (16.2/21114 U.S.A.)

A description is given of the test apparatus used and the method of procedure. Figures of tensile strength along warp and filling and Mullen burst values are tabulated. The results are also given graphically.

Photographs are given of pendulum impact tester, porosity meter, and Scott textile tester.

Italian Ascanio Helicopter. (Flugsport, Vol. XXIII, No. 5, 4/3/31, p. 78.) (17/21115 Germany.)

The lifting airscrews of the Ascanio helicopter are driven direct by a 94 h.p. Fiat engine. The blade tips are fitted with small elevator planes automatically varying the incidence. The inclination to the vertical is produced by subsidiary airscrews operated by the main engine. The following flights are recorded:—distance 1,000 metres in 5 min. 12½ secs., climb 16½ metres in 1 min. 40 secs.; time of longest flight 8 min. 45 secs. Hovering flight was maintained for several minutes in a balloon shed in spite of the disturbance of the air.

The Rotor Aeroplane. (Flugsport, Vol. XXIII, No. 5, 4/3/31, p. 79.) (17.1/21116 Germany.)

Experiments have been carried out in U.S.A. with a float seaplane fitted with rotor wing 2½ ft. in diameter, driven by a 90 h.p. engine. A three-bladed airscrew is driven by an independent engine.

It is stated that the seaplane left the water, but was subsequently wrecked.

Jet Propulsion. (E. G. Richardson, J.R.Aer.Soc., Vol. XXXV, No. 241, January, 1931, pp. 29-36.) (17.2/21117 Great Britain.)

The chemical and mechanical elements of the problem are treated somewhat discursively. From the main results it appears that it is just within the limits

of technical possibility to project a rocket with sufficient velocity to escape the earth's gravitational influence. It would, however, continue to move round the sun unless directed towards the moon, in which case it might end its career on the moon's surface. For starting purposes the efficiency of rocket propulsion is low in comparison with various forms of catapult. *A fortiori* it is unsuitable for ordinary flight.

The Future of the Rocket. (D. Lasser, Sc. Am., Vol. CXLIV, No. 3, March, 1931, pp. 164-166.) (17.2/21118 U.S.A.)

Drawings are reproduced from the U.S.A. patent specification of Prof. Goddard's duplex rocket. Reference is made to Scherschevsky's and Esnault-Pelterie's papers on the possibility of rocket flight.

The only practical application appears to be the exploration of the upper atmosphere to heights of the order of a hundred miles by recording instruments returning to the earth by parachute.

Ornithopter Problem; "Flapping Wing" Flight of Birds. (Capt. Guillaume, Rev. f. Aer., No. 16, November, 1930, 1340-1363.) (17.3/21119 France.)

Research on flapping flight is reviewed. Even if mechanical difficulties could be overcome an ornithopter would be less efficient aerodynamically than existing aeroplanes.

Catches for Holding Gliders. (Aero. Rev., No. 2, 15/1/31, pp. 16-17.) (17.4/21120 Switzerland.)

The glider is held on the ground by a cable and the starting rubber bands are stretched by assistants to the requisite tension. The pilot then releases a catch and the glider is launced. The method has become standardized in Switzerland.

American Naval Flying. (Lieut. L. D. Webb, U.S. Air Services, Vol. XVI, No. 2, February, 1931, pp. 19-24.) (18.01/21121 U.S.A.)

An account is given of the manœuvres of fleet carriers and aircraft. A photograph is given of the Lexington, which maintained over 32 knots for 24 hours, developing over 210,000 h.p. Over ten thousand launches from catapults have been carried out in ten years without a fatality; and eighteen thousand landings on carrier decks have been made in $2\frac{1}{2}$ years without serious injury.

Measurement of Height of Clouds. (Z.F.M., Vol. XXI, No. 21, 14/11/30, p. 571.) (19.1/21122 Germany.)

The height of the cloud is measured by the angle of elevation of beam from a searchlight placed at a known distance from the observer. Types of searchlight for this work are described. The firm of Pintsch manufacture a projector of three million heffner candles, the image thrown on a cloud being visible in moonlight.

Ice Formation on Aircraft in Flight. (O. Heitmanek, Aer. Rev., Vol. VI, No. 6, 15/3/31, pp. 72-75.) (19.15/21123 Switzerland.)

A description is given of loss of controllability during a winter flight in Switzerland, ending in a spin which was attributed to ice formation, although on landing no ice remained. Quotations are given from American work, with illustrations of typical ice formation on struts and round stream-lined wires.

Matters Affecting Pilots

Cinematograph Study of Dilation of the Heart by Deficiency of Oxygen. (H. Strugold, Z.F.M., Vol. XXI, No. 24, 29/12/30, pp. 645-648.) (19.2/21124 Germany.)

The physiological effects of lack of oxygen are discussed and the heart of a hound under narcotics was exposed and cinematographed to exhibit the dilation. Records of the results are given in tables and charts and a strip of the film is reproduced. Fifteen references are given.

Aerial Acrobatics. (R. Greim, Flugsport, Vol. XXIII, No. 6, 18/3/31, pp. 104-116.) (19.29/21125 Germany.)

Various manœuvres are described with the concomitant movements of the controls. Many of the manœuvres cause physical discomfort and may lead to temporary unconsciousness, especially the outside loop. Details are given of the examination undergone by a pilot before giving paid public exhibitions.

Variation of Power with Height. (W. G. Jennings, Airc. Eng., Vol. III, No. 25, March, 1931, pp. 55-56.) (19.3/21126 Great Britain.)

In the first part of the paper the usual empirical equations are given showing brake horse-power as a function of air pressure and density with fractional indices.

In the second part the indicated horse-power is taken as the fundamental physical variable. The losses are divided into approximately constant losses and losses varying with the density. Numerous factors of indeterminate importance require further investigation, but the basis of a truly physical theory is formulated. (Cf. A. R. Low, Aeronautics, 1920, p. 223). Reference is made to supercharging and to the need for further research.

High Altitude Aeroplane. (Flugsport, Vol. XXII, No. 5, 4/3/31, p. 80.) (19.3/21127 Germany.)

A high altitude aircraft ordered by the French Air Ministry from Messrs. Farman, has a 400 h.p. engine, and a variable pitch metal airscrew. Three supercharge ratios come into operation successively at 6,000, 10,000 and 15,000 metres. The cylindrical aluminium cabin is kept at ground level pressure by the supercharger. A designed ceiling of 20,000 metres is mentioned.

Seat and Safety Belt in an Aircraft. (E. Gilbert, Z.F.M., Vol. XXI, No. 24, 29/12/30, pp. 648-652.) (19.37/21128 Germany.)

The correct methods of setting and applying the safety belts are considered in their medical aspects and illustrated by four X-ray photographs.

Aerodynamics and Hydrodynamics

Stability of Motion of Rectilinear Vortices in Ring Formation. (T. H. Havelock, Phil. Mag., Vol. XI, No. 70, February, 1931, pp. 617-633.) (22.1/21129 Great Britain.)

The case of a single ring of vortices is examined and reference is made to Kelvin's solution for three vortices, to J. J. Thomson's result that the configuration is stable for six or fewer vortices, and to the analogy with Mayer's experiments on stability with floating magnets. The author applies methods analogous to those of Lamb and von Kármán and confirms J. J. Thomson's result for a single ring. A solution is also obtained for a double ring with alternate arrangements, and it is found that there is stability excepting for a particular limiting case.

By increasing the radius of the double ring indefinitely von Kármán's solution for the stability of a linear double row of vortices is obtained as a limiting case.

Stability of Kármán Vortex Street in a Channel of Finite Breadth. (Susumu Tomotika, Aer. Res. Inst., Tokyo Imp. University Repts., No. 48 (August, 1929), and No. 55 (January, 1930.) (22.1/21130 Japan).

The complex velocity potential due to the double row of vortices and their images is expressed by a doubly periodic function corresponding to the double periodicity of the vortices and their images in the whole plane. The form selected is the logarithm of quotients of sigma functions. On differentiating, the conjugate of the complex velocity is obtained in terms of sums and differences of zeta functions of distances from the poles. Using the addition theorem for the zeta function the real and imaginary parts are separated, and the components of the velocity are obtained in terms of zeta and Weirstrass functions and their first derivatives. To examine the stability, small displacements are imposed on the vortices, and the conditions for the increase or decrease of the displacements are examined. These conditions are expressed in terms of Weirstrass functions and computed numerically and tabulated. Certain ranges of stability are found for ratios of breadth of street to breadth of channel lying between 5/16 and $\frac{3}{8}$ for the von Kármán type of disturbance. For a more general type of disturbance it appears that there are at most two essentially stable configurations. (Compare with Rosenhead's treatment of the problem. Abstract No. 11/11300 & 1).

Some Experiments on the Motion of Fluids. (T. Terada and K. Hatori, Aer. Res. Inst., Tokyo Imp. University Reports, No. 16, May, 1926, and 26, August, 1927.) (22.1/21131 Japan.)

Part I. Nineteen photographs are reproduced of motions of convection currents with a variety of boundary conditions. These are all of an irregular nature as compared with Benard's experimental work, in which great geometrical regularity was obtained.

Part II. Motions of fluids set up by rotation of discs, spheres and cylinders are considered. Seventy-eight photographs of fluid motion are given. Taylor's type of instability between rotating cylinders is reproduced, and the experiment is further modified by setting the cylinders eccentrically and by introducing obstructions between the cylinders. It is not clear what advantage is gained by thus complicating the phenomena under consideration, and in general the authors seem rather to lose sight of the desirability of isolating phenomena, for observation and solution,especially in so intractable a subject as viscous fluid motion.

The Possible Steady Motions of a Heavy Fluid. (H. Poncin, C.R., Vol. CXCII, No. 9, 2/3/31, pp. 543-546.) (22.1/21132 France.)

The methods of conformal representation are extended to represent steady flow along a two-dimensional channel with curved walls. A solution is given for a channel with decreasing section down stream in the form of an integral equation involving elliptic functions.

Resistance of a Cylinder in a Channel of Finite Breadth. (S. Tomotika, Aer. Res. Inst., Tokyo Imp. University Rept., No. 58, March, 1930.) (22.1/21133 Japan.)

The work of H. Villat and L. Rosenhead (see 9/10477 & 8, 11/11300 and 1, 15/13115, 16/13520) is discussed in somewhat different but equivalent form. The leading results are identical with Rosenhead's and where the form is very different the equivalence is formally demonstrated. Villat's apparent paradox that

Kármán's formula is not approached in the limit when the walls of the channel are removed to an infinite distance is resolved and v. Kármán's result is obtained as a limiting case. Sigma functions, zeta functions and Weirstrass functions are used throughout.

Measurement of Flow through Orifices. (K. Jaroschek, T.M.T., Vol. I, No. 12, December, 1930, pp. 423-428.) (22.2/21134 Germany.)

Following Witter's experiments with orifices in tubes the paper deals with coefficients of free discharge from a tank. The coefficient increases with Reynolds number and with the height of the free surface above the orifice. V.D.I. and I.G. nozzles (1930), with coefficients previously determined, were inserted in tubes; expressions obtained for the effect of the tube diameter, and, by extrapolation, for free discharge. The calculated results were 2 per cent. lower than experiment. The flow coefficient of a sharp edged orifice decreases with increasing Reynolds number.

A bibliography is given.

Resistance in Curved Pipes. (H. Richter, Z.V.D.I., Vol. LXXIV, No. 22, 27/12/30, pp. 1757-1758.) (22.5/21135 Germany.)

Experimental values are plotted graphically against Reynolds number and compared graphically with the results for straight pipes. The losses are in every case higher both in the laminar range and in the turbulent range of flow, but the difference is less in the latter case than in the former. For a complete representation the ratio of the curvature to the radius of the tube requires to be taken into account.

A General Equation for Heat Transmission of Fluid Flow in Pipes. (T. Bosch, Z.V.D.I., Vol. LXXV, No. 2, 10/1/31, pp. 40-42.) (22.2/21136 Germany.)

Prandtl has given an expression for the heat transfer, depending among other factors on the Reynolds number and the ratio of mean velocity to velocity at the boundary of the laminar flow estimated from other experiments. By substituting this ratio in Prandtl's expression the author has computed tables for the heat transfer for various sizes of tubes and rates of flow of water.

Temperature and Velocity Field near a Warm Vertical Plate. (E. Schmidt and W. Beckmann, Z.V.D.I., Vol. LXXV, No. 8, 21/2/31, p. 227.) (22.1/21137 Germany.)

The formula is based on Pohlhausen's investigation. Experimental values of the temperature and velocity fields are plotted graphically.

Loss of Pressure in Smooth Bent Tubes. (H. Richter, Z.V.D.I., Vol. LIV, No. 52, 27/1/30, p. 1757-1758.) (22.2/21138 Germany.)

In a straight tube the change from laminar to turbulent flow produces a region of instability in the resistance coefficient; in a curved tube the change progresses uniformly from laminar to turbulent flow. For low Reynolds numbers there is considerable differences in the resistance coefficients of bent and straight tubes. At high values of R the difference becomes small.

Experimental Hydrodynamical Study of Currents of Air by Methods of Optical Interference. (R. Tremblot, C.R., Vol. XCII, No. 8, 23/2/31, pp. 480-482.) (22.4/21139 France.)

Reference is made to Prandtl's work in 1907 on measurement of velocities above that of sound. In the present paper Cranz's method of photographing waves of condensation and rarefaction in the air round projectiles is employed

and is applicable to speeds below that of sound. The stream of air passes through a channel with curved surfaces and bounded at the sides by flat glass plate. The section parallel to the plates first converges and then diverges. Photographs are taken by electric spark, and a numerical example indicates the method of calculating intensity from the interference displacements. A sketch illustrates the nature of the photographs obtained, and the densities are plotted against axial position in the channel with an error stated to be 1 per cent. Certain interesting concomitant phenomena are mentioned.

Distribution of Pressure Round a Sphere in an Air Stream. (O. Krell, Z.F.M., Vol. XXII, No. 4, 28/2/31, pp. 97-105.) (22.4/21140 Germany.)

Photographs and dimensioned diagrams give the details of the mounting of a sphere of 8 cm. diameter in the wind channel. Nine polar diagrams show the distribution of pressure graphically. A projecting ring is fitted round a small circle, corresponding to latitude 43°, and is of rectangular section 2 mm. high by 1 mm. wide. Photographs exhibit the region of turbulence behind the sphere with and without the ring.

Six photographs are also given of two-dimensional flow of water past a cylinder with parallel rods lying along generators at $\pm 67\frac{1}{2}°$ and $\pm 43°$ from the plane of symmetry with respect to the current.

Ship Wave Resistance. (W. C. S. Wigley, N.E.C. Inst. Eng. Trans., Vol. XLVII, Part 4, March, 1931, pp. 153-180.) (22.1/21141 Great Britain.)

A mathematical theory of wave formation is worked out in terms of Bessel functions, and numerical values are plotted graphically. Substantial agreement between the theory and measured results is claimed for two very different cases.

Miscellaneous—Unclassified

Tables for Use in Astronomical Aero Navigation. (P. F. Everitt, J.R.Aer.Soc., Vol. XXXV, No. 242, February, 1931, pp. 167-172.) (0/21142 Great Britain.)

A list of useful tables is given, and their application is illustrated by a number of worked out examples.

American Guggenheim Safety Competition. (W. Pleines, Z.F.M., Vol. XXI, No. 15, 18/8/30, pp. 381-391.) (0/21143 Germany.)

An account of the technical measurements and decisions is given, which follows closely the official report.

Air Safety Services. (R. Benkendorff, Z.F.M., Vol. XXI, No. 24, 29/12/30, pp. 623-626.) (0/21144 Germany.)

The summarised lecture discusses the problems of wireless signals, weather reports, and supply of light beacons for night flying. At present eighteen German air ports have wireless apparatus installed, and twenty-four are inter-connected by 3,500 km. of cable. For the weather service five stations are installed at Berlin, Hamburg, Darmstadt, Munich, Konigsberg. By means of regular daily ascents to 6 km. atmospheric conditions are given up to this height. Weather prediction along a selected route is considered more valuable than synoptic charts for a fixed time over a wide area.

Summarised Report of the 19th Meeting of W.G.L., 11/9/31. (Z.F.M., Vol. XXI, No. 24, 29/12/30, p. 621.) (0/21145 Germany.)

In addition to administrative reports reference is made to the work of the committees on gliding, navigation, medical questions, air law, inventions, units and symbols, technical terms, etc.

American Naval Aviation. (Rear-Admiral W. H. Moffett, U.S. Air Services, Vol. XVI, No. 2, February, 1931, pp. 43-45.) (o/21146 U.S.A.)

The relation of aviation to fleet work is the subject of a statement by Admiral Moffett, Chief of the Bureau of Aeronautics, covering every aspect of naval air operations.

Airships. (U.S. Air Services, Vol. XVI, No. 2, February, 1931, p. 32.) (o/21147 U.S.A.)

It is sought to make airships eligible for United States mail subsidies.

Civil Aviation: Subsidies. (J. P. van Zandt, U.S. Air Services, Vol. XVI, No. 2, February, 1931, pp. 15-18.) (o/21148 U.S.A.)

An international comparison is made from which it appears that the United States paid the highest effective subsidy of any nation. Technical superiority is claimed in speed, comfort, and freedom from noise.

Value of Scientific Research. (Aviation, Vol. XXX, No. 1, January, 1931, pp 3-4.) (o/21149 U.S.A.)

The value of scientific research is defended against certain criticisms, with examples of general research work which has improved design as a whole, and particular applications which have improved individual flying qualities.

Airport Construction. Gliding. (Aviation, Vol. XXX, No. 1, January, 1931, pp. 31-33.) (o/21150 U.S.A.)

Statistical, financial and some technical data are given for air port construction in the United States and Canada. The position of gliding is discussed. At the Elmira meeting a height of 2,409 feet was reached, and a duration flight of seven hours forty-three minutes was carried out.

Airscrew-Driven Rail Coach. (Z.F.M., Vol. XXI, No. 23, 15/12/30, pp. 615-616.) (o/21152 Germany.)

A streamlined coach of 19 tons tare attained a speed of 110 miles an hour with a two-bladed airscrew at the rear driven by a 12 cylinder B.M.W. Mk. VI engine. At 90 m.p.h. in still air 200 engine h.p. is absorbed. Acceleration to 60 m.p.h. from rest takes one minute.

Theory of Deposition of Dust from a Stream of Air; with Application to Dust Filters. (F. Albrecht, Phys. Zeit., Vol. XXXII, No. 1, 1/1/31, pp. 48-56.) (o/21153 Germany.)

Assuming potential flow, the path of a dust particle moving in the neighbourhood of a cylinder is calculated by the step by step method. The results obtained are correlated with the form of deposits of hoar-frosts obtained under certain conditions. References are given to work by von Kármán and Albrecht with applications to meteorology.

Removing Carbon Deposits from Cylinders such as those of Internal Combustion Engines. (T. Midgley, jun., and C. A. Hochwalt; to General Motors Research Corp., U.S.1, 1,786,860, December 30. Chem. Absts., Vol. XXV, No. 4, February. 1931, p. 802.) (o/21154 U.S.A.)

After heating the metal to 65°, a mixture of high and low b.p. organic compounds is applied to the deposit.

A specified mixture is aniline 25 per cent., alcohol 25 per cent., benzine 25 per cent., naphthalene 25 per cent.

(W. G. Lovell and T. A. Boyd; to General Motors Research Corp., U.S. 1,787,789, January 6. (Ref. as above.)

The metal is heated and the coated parts are treated with an aliphatic amine boiling above 64°, such as hydroxyethylamine, to facilitate removal of the deposit. Alcohol, C_6H_6, aniline, furfural, etc., may also be used.