ABSTRACTS FROM THE SCIENTIFIC AND TECHNICAL PRESS.

Issued by the
Directorates of Scientific Research and Technical Development, Air Ministry.
(Prepared by R.T.P.)

No. 88. March, 1941.

Notices and abstracts from the Scientific and Technical Press are prepared primarily for the information of Scientific and Technical Staffs. Particular attention is paid to the work carried out in foreign countries, on the assumption that the more accessible British work (for example that published by the Aeronautical Research Committee) is already known to these Staffs.

Requests from scientific and technical staffs for further information or translations should be addressed to R.T.P.3, Ministry of Aircraft Production.

Only a limited number of the articles quoted from foreign journals are translated and usually only the *original* can be supplied on loan. If, however, translation is required, application should be made in writing to R.T.P.3, the requests being considered in accordance with existing facilities.

Note.—As far as possible, the country of origin quoted in the items refers to the original source.

List of Abbreviations of Titles and Journals.

A.	Abstracts from the Scientific and Technical Press.
Aeron. Eng.	Aeronautical Engineering (U.S.S.R.)
Aer. Res. Inst. Tokyo	Aeronautical Research Institute of Tokyo.
A.C.I.C.	Air Corps Information Circular.
Ann. d. Phys.	Annalen der Physik
Army Ord.	Army Ordnance.
Autom. Eng.	Automobile Engineer
Autom. Ind.	Automotive Industries.
Autom. Tech. Zeit. ...	Automobile Technische Zeitschrift.
Bell Tele. Pubs. ...	Bell Telephone Publications.
Bur. Stan. J. Res. ...	Bureau of Standards (U.S.A.) Journal of Research.
Chem. Absts.	Chemical Abstracts.
Chem. and Ind. ...	Chemistry and Industry.
Comp. Rend.	Comptes Rendus de L'Académie des Sciences.
Eng. Absts.	Engineering Abstracts.
E.N.S.A.	Revenue Technique de l'Association des Ingénieurs de l'Ecole Nationale Supérieure de L'Aéronautique.
Forschung	Forschung auf dem Gebiete des Ingenieurwesens.
Fuel	Fuel in Science and Practice.
H.F. Technik.	Hochfrequenztechnik und Electroakustik.
Ind. and Eng. Chem. ...	Industrial and Engineering Chemistry.
Ing.-Arch.	Ingenieur-Archiv.
Inst. Autom. Eng. ...	Institute of Automobile Engineers (Research and Standardisation Committee).
J. Aeron. Sci.	Journal of the Aeronautical Sciences.

J. App. Mech.	Journal of Applied Mechanics.
J. Am. Soc. Nav. Engs.	Journal of American Society of Naval Engineers.
J. Roy. Aero. Soc.	Journal of Royal Aeronautical Society.
J. Frank. Inst.	Journal of Franklin Institute.
J. Inst. Civ. Engs.	Journal of Institute of Civil Engineers.
J. Inst. Elec. Engs.	Journal of Institute of Electrical Engineers.
J. Inst. Petrol.	Journal of the Institute of Petroleum.
J. Met. Soc.	Journal of Meteorological Society.
J. Sci. Inst.	Journal of Scientific Instruments.
J.S.A.E.	Journal of Society of Automotive Engineers.
J. Soc. Chem. Ind. (Abstracts B)	Journal of the Society of Chemical Industry (British Chemical Abstracts B)
L'Aéron.	L'Aéronautique.
L.F.F.	Luftfahrt-Forschung.
Luschau.	Luftfahrt-Schrifttum des Auslandes.
Met. Mag.	Meteorological Magazine.
Met. Prog.	Metal Progress.
N.A.C.A.	National Advisory Committee for Aeronautics (U.S.A.).
Phil. Mag.	Philosophical Magazine.
Phil. Trans. Roy. Soc.	Philosophical Transactions of the Royal Society.
Phys. Berichte.	Physikalische Berichte.
Phys. Zeit.	Physikalische Zeitschrift.
Proc. Camb. Phil. Soc.	Proceedings of Cambridge Philosophical Society.
Proc. Inst. Rad. Engs.	Proceedings of Institute of Radio Engineers.
Proc. Roy. Soc.	Proceedings of Royal Society.
Pub. Sci. et Tech.	Publications Scientifiques et Techniques du Ministère de l'Air.
Q.J. Roy. Met. Soc.	Quarterly Journal of the Royal Meteorological Society.
R. and M.	Reports and Memoranda of the Aeronautical Research Committee.
Rev. de l'Arm. de l'Air	Revue de l'Armée de l'Air.
Riv. Aeron.	Rivista Aeronautica.
Sci. Absts. (A. or B.)	Science Abstracts (A. or B.).
Sci. Am.	Scientific American.
Sci. Proc. Roy. Dublin Soc.	Scientific Proceedings of Royal Dublin Society.
Tech. Aéron.	La Technique Aéronautique.
Trans. A.S.M.E.	Transactions of the American Society of Mechanical Engineers.
Trans. C.A.H.I.	Transactions of the Central Aero-Hydrodynamical Institute, Moscow.
U.S. Nav. Inst. Proc.	U.S. Naval Institute Proceedings.
Verroffent (Siemens)	Vercffentlichungen aus dem Gebtete der Nachrichtentecgnik (Siemens).
W.R.H.	Werft Reederei Hafen.
W.T.M.	Wehrtechnische Monatschefte.
Z.A.M.M.	Zeitschrift für Angewandte Mathematik und Mechanik.
Z.G.S.S.	Zeitschrift für Das Gesamte Schiess und Sprengstoffwessen mit der Sonderabteilung Gasschutz.
Z. Instrum.	Zeitschrift für Instrumentenkunde.
Z. Mech.	Zentralblatt für Mechanik.
Z. Metallk.	Zeitschrift für Metallkunde.
Z.V.D.I.	Zeitschrift des Vereines Deutscher Ingenieure.

A History of External Ballistics. (F. Klemm, W.T.M., Vol. 45, No. 1, Jan., 1941, pp. 1-8.) (88/1 Germany.)

The author deals with the main points of development in flight path theory from the middle ages up to modern times. Galileo (1638) was the first to establish the parabolic nature of the path in the absence of air resistance. The effect of the latter could only be taken into account after the requisite mathematical tool (diffferential calculus) had become available (Newton and Leibniz). Bernoulli and Euler (1745) were the first to apply the new method to practical problems. A British gunnery officer, B. Robins in his "New Principles of Gunnery" (1742) pointed out the importance of projectile spin in ensuring stability. This rotation, however, also causes certain deviations in the path, the calculation of which presented considerable difficulties at first. We now know that the observed deviation is the resultant of three effects: The so-called cushion effect of Poisson (1839), the Magnus or Rotor effect (1852) and the gyroscopic effect (1852). Individually, these effects may work in opposite directions and the final result will depend on their relative magnitude. As its name implies, the cushion effect is due to the presence of a layer of compressed air in the immediate neighbourhood of the projectile. If the latter is cylindrical and slightly inclined to the path tangent, a clockwise spin (viewed from the rear) will tend to produce a right hand deviation (rolling action). This effect is generally small. The Magnus or rotor effect, on the other hand, will produce a much more pronounced left hand deviation if acting by itself under otherwise similar circumstances.

It will be noted that both these effects only become operative if for some reason the nose of the rotating bullet rises above the tangent to the flight path. As soon as this happens, however, the third effect mentioned above becomes operative. The projectile acts as a gyroscope and under the assumed conditions (clockwise spin viewed from the rear) it will precess towards the right, the axis describing the surface of a cone. If this precession is slow enough, the right hand deviation observed in practice is accounted for, since calculation shows that its magnitude is considerably greater than the left hand deviation due to the Magnus effect. (The cushion effect, which also leads to a right hand deviation, is generally very small.) More recently it has, however, been shown that the precession is relatively rapid (in the case of the German infantry bullet the cone is described in 0.11 seconds) and the simple explanation of the right hand deviation offered above thus breaks down. Closer examination has shown that the precessional cone is of the cycloidal type and remains predominantly on the right hand side of the vertical plane passing through the tangent to the path. In spite of the periodic nature of the oscillations, therefore, a right hand deflection predominates which increases with distance.

Other landmarks in external ballistics are provided by the well known air resistance formula of Siacci (1896) which covers experimental results for bullet velocities between 150 and 900 m./sec. and which led to the satisfactory integration of low angle trajectories.

An alternative graphical method has more recently been developed by Cranz and Rothe which can also be applied to high angle trajectories.

Fundamental Principles of Sound Locators. (O. Born, Flugwehr und-Technik, Vol. 2, No. 11-12, Nov.-Dec., 1940, pp. 251-255.) (88/2 Switzerland.)

Aircraft noises are due to the engine, propeller and complete structure. Exhaust noises are generally of low frequency, *e.g.*, a 12-cylinder four-stroke running at 2,100 r.p.m. has an exhaust frequency of 210/sec. Other engine noises are due to the supercharger which emits frequencies of the order of 4,000/sec. The fundamental propeller frequency is, on the other hand, generally less than 100/sec. The remaining structural noises are of various frequencies and generally of no great importance.

The summation of all these various sounds produces the characteristic aircraft noise (including possible beats in a case of twin engines) which must be located by the detector.

Generally speaking, the ear is most sensitive to low frequency sounds and therefore long range detection will depend primarily on exhaust and propeller noise. Sense of direction depends on differences in time of reception by the two ears. It appears that intervals as small as 1/34,000 seconds can be detected. In the sound locator full use is made of this by artificially increasing the base line from 30 cm. (average head distance) to 300 cm. Under these conditions a directional accuracy of the order of $\pm 2°$ should be obtainable.

At the same time it is important that the reception should show no deterioration of quality, as with trained personnel it is possible to determine the type of aircraft from its characteristic note, and thus estimate its probable speed. A knowledge of the speed of the target is of importance, since the locator, even should the sound waves travel in straight lines, cannot give the instantaneous direction of the aircraft but must lag behind it by an angle approximately given by V/a in circular measure (V=aircraft speed, a=velocity of sound). This correction can be incorporated automatically in a fairly simple manner. Much more difficult is a proper allowance for wind and temperature gradients, especially if discontinuities exist. The usual procedure is to neglect such effects entirely and to rely on a searchlight for the final spotting.

In conclusion, the author gives some indication of the method of training adopted by the Swiss army for their sound locating personnel. It appears that only 7 per cent. of the candidates possess initially the necessary acuteness of hearing to warrant further training. It is interesting to note that this talent is not limited to any special class and that men normally employed in factories where they are subject to a continual background of noise are just as likely to possess it as, for example, musicians and scientists.

Turbulence and Energy Dissipation. (A. A. Kalinske, Trans. A.S.M.E., Vol. 63, No. 1, Jan., 1941, pp. 41-8.) (88/3 U.S.A.)

The origin and dissipation of turbulence energy is studied with a view to understanding the mechanics of the energy losses produced by various flow-disturbing devices, such as expansions, bends, valves, etc. The important parameters characterising turbulence are the root-mean-square values of the fluctuating velocity components, the length factor proportional to the size of the small eddies responsible for the dissipation of energy and the length factor proportional to the average size of the eddies. The effect of variation of these parameters on the energy losses occurring in turbulent flow are discussed and also the change in these parameters in the decaying turbulence beyond turbulence-producing devices is indicated. Data are presented showing the variation in kinetic energy of mean flow and the turbulence energy in a 15° conical divergence. Visual studies of the start of turbulence at rounded entrances to smooth conduits seem to indicate that there is regular vortex formation at the boundary and the dispersion of these vortices into the main fluid stream gradually establishes normal turbulent flow.

Some Aspects of Non-Stationary Aerofoil Theory and its Practical Application. (W. R. Sears, J. Aeron. Sci., Vol. 8, No. 3, Jan., 1941, pp. 104-8.) (88/4 U.S.A.)

This paper consists of three notes on the theory of two-dimensional thin aerofoils in non-uniform motion :—

1. In the first note expressions for the lift and moment of an oscillating aerofoil are collected from an earlier paper and are presented in convenient forms for practical application.

2. In the second note the lift and moment are calculated for a rigid aerofoil passing through a vertical gust pattern having a sinusoidal distribution of intensity. The lift is determined as a function of the reduced frequency (which in this case is proportional to the ratio of the aerofoil chord and the wave length of the gust pattern) and is presented in the form of a vector diagram. It is shown that the lift acts at the quarter chord point of the aerofoil at all time.

3. In the third note the results of 1 and 2 are applied to the calculation of the amplitude of torsional oscillation of a fan blade operating in the wake of a set of pre-rotation vanes. In a numerical example the amplitude is found to be small even when the vanes are spaced so that the exciting frequency coincides with the natural frequency of the fan blade.

The Wind Tunnel with Open Working Section. (N. Simmons, Phil. Mag., Vol. 31, No. 205, Feb., 1941, pp. 89-102.) (88/5 Great Britain.)

The solution of the problem of a weak vortex in a two-dimensional jet issuing from a channel has previously been taken as a basis in calculating corrections for an aerofoil placed in a wind tunnel stream (N. Simmons, Quart. J. Math., Oxford, Dec., 1939). However, the true physical condition of a tunnel with open working section can be more closely approached by taking as a starting point a stream which, after having left the channel and met the vortex, passes into a collecting channel of similar form. The purpose of the present paper is to discover whether the introduction of such a collector leads to any modification of the formulæ given in the paper cited, and, if so, to determine them. The hydrodynamical problem is dealt with first, the assumption that the vortex is weak, which is valid in the practical application, being introduced at the outset in order to render the analysis tractable. The aerodynamical sequel is considered and the results discussed.

On Turbulent Liquid Motion Outside a Circular Boundary. (M. Ray, Phil. Mag., Vol. 31, No. 205, Feb., 1941, pp. 144-55.) (88/6 Great Britain.)

In a previous paper (Phil. Mag., Vol. 28, 1939, p. 231) the problem of turbulent motion of an otherwise uniform stream in the neighbourhood of a circular boundary has been discussed from the point of view of "vorticity transport" theory of Taylor. The starting point was the Taylor-Goldstein equations, which were transformed into forms suitable for treatment of motion near a circular boundary. A solution was obtained in that paper by successive approximations, and it was also pointed out that the approximation must necessarily be restricted to regions very near the boundary. Since then it has been possible to reconstruct an almost correct solution numerically even of the complicated exact differential equation describing the motion. In the previous paper only an approximate form of the complicated equation was taken. The initial values required to start the numerical integration have been supplied by the approximation solutions very close to the boundary obtained in the previous paper. The construction of the velocity field and the stream lines near the circular boundary shows some important features of the motion. The motion in the neighbourhood of the boundary is retrograde, which gradually changes into direct motion at a distance from the circular wall equal to about a third of the radius of the circular boundary. On this circle the velocity is entirely radial. The velocity perpendicular to the wall near any part possesses a maximum which is attained within a distance not exceeding about a quarter of the radius of the circular boundary. The present investigation does not extend to the region where the wake is formed. The nature of the stream lines is shown in Fig. 4.

Section 2 is a recapitulation of the first part of the previous paper giving all the necessary equations of motion.

Wind Tunnel Correction for a Circular Open Jet Tunnel with a Reflexion Plate. (B. Davison and L. Rosenhead, Proc. Roy. Soc., Vol. 177, No. 970, 24/2/41, pp. 366-82.) (88/7 Great Britain.)

It is advantageous from many points of view to make test models as large as possible. One method of doing this is to measure the characteristics of half the model in existing wind tunnels. One half of the aerofoil is mounted horizontally on a vertical reflexion plate and the plate is placed in a suitable position in an open jet which, in the undisturbed state, is of circular section. The contour of the jet is distorted, especially with models of large semi-span, but this distortion is neglected in the analysis. The correcting factor associated with "uniform" distribution of lift is worked out exactly and that associated with "elliptic" distribution approximately. The effect of the induced downwash on the distribution of lift is ignored. The results are given in suitable tables and figures.

Throughout the working range of normal experiments the correcting factor is of the same order of magnitude as that obtaining when a full model is tested in a jet of circular section.

Cascade Theory and the Design of Fan Straighteners. (A. R. Collar, R. and M. No. 1,885, 22/1/40.) (88/8 Great Britain.)

It is usual to provide a set of straighteners for the fan of a wind tunnel, and often for ventilating and other fans. The function of straighteners is to remove the rotation from the fan slipstream. It is of particular importance to do this in a return flow wind tunnel, since otherwise there may be a rotation in the stream at the working section. Moreover, if the slipstream rotation is not removed, stalling of parts of the corner cascades is likely to occur, with a consequent loss of power and irregularity of velocity distribution.

Straighteners commonly consist of a bank of fixed radial vanes placed behind the fan; the dimensions and setting of the vanes are determined from the fan characteristics. In the present report the possibility is examined of designing a set of straighteners which will render the flow axial, irrespective of the sense or, within reasonable limits, of the magnitude of the slipstream rotation. An examination is made of the experimental and theoretical evidence available for the design of such straighteners. It is concluded that, provided stalling does not occur, a ring of straighteners of symmetrical aerofoil section, set radially with their chords parallel to the axis of the fan, and having a gap-chord ratio of approximately unity (so that the local chord is proportional to the radius), will remove rotation from the slipstream of a fan to a degree sufficient for most practical purposes.

The Combustion-Gas Turbine. (J. T. Rettaliata, Trans. A.S.M.E., Vol. 63, No. 2, Feb., 1941, pp. 115-23.) (88/9 U.S.A.)

At the present time the principal commercial application of the gas-turbine axial-compressor unit in the United States has been in oil refineries. Air discharged from the compressor is used in a process and the resulting high temperature gases are expanded in the turbine, producing power, the excess of which is supplied to a generator. In this arrangement, no combustion chamber is required as the process itself acts in this capacity.

Many gas-turbine axial-compressor units operate as superchargers in the Velox boiler, developed by Brown-Boveri, where the boiler exhaust gases drive the turbine.

A 4,000 kw. unit has been installed in an emergency stand-by power station in the city of Neuchatel, Switzerland. Its simplicity and independence of water facilities ideally adapt the gas turbine to this class of service. Recently published tests, conducted by Stodola indicate a coupling thermal efficiency, based on lower heating value of fuel, of 18.04 per cent. for this unit when operating on a non-regenerative cycle with a turbine inlet temperature of 1,000°F. This is the first unit built for the primary purpose of producing power.

A 2,200 h.p. gas turbine locomotive, with electrical transmission, is being built by Brown-Boveri for Swiss Federal Railways.

Numerous other natural and favourable applications of the gas-turbine axial-compressor unit will develop from time to time and probably include marine propulsion, blast furnace plants, wind tunnels, special power plants, and other special applications.

Technical Progress in Aviation. (J. C. Hunsaker, Mech. Eng., Vol. 63, No. 2, February, 1941, pp. 95-97.) (88/10 U.S.A.)

According to the author, the U.S. have the potential ability "to make obsolete all fighter aeroplanes in the world to-day, including our own." Two new types of air-cooled radial engines developing over 2,000 h.p. are already developed and in production and the N.A.C.A. have devised means of ducting and cowling these engines so that their drag is as low as that of the best liquid-cooled engine installations in use at the present time. Moreover, new wing sections have been devised which maintain laminar boundary layer flow over a greater area of wing surface and thus have smaller drag than standard types.

The interesting situation has arisen that a very large production programme for 1,200 h.p. fighter aeroplanes, based on European liquid-cooled engines, has been launched at the very time these new factors have arisen.

In the words of the author: " *When* we should take advantage of this recent technical progress is a delicate question involving a balance between strategic and tactical considerations. It is the old dilemma of quantity *now* versus quality *later* and can be decided wisely only when we know whether it really is later than we think."

Recent Progress in Aeronautics. (Progress Report of the A.S.M.E. Aeronautics Division.) (Mech. Eng., Vol. 63, No. 2, Feb., 1941, pp. 101-104 and 116.) (88/11 U.S.A.)

Some of the main conclusions are given below:—

Aerodynamics.—(1) The laminar flow aerofoil mentioned in the last year's report is still under development. One reason is the necessity of obtaining extreme surface smoothness before the advantages of this section can be realised. Also, other difficulties must be overcome. It is hoped that a practical solution will soon be found.

(2) Correlation between flight and wind tunnel tests requires further research so as to allow for more accurate performance predictions.

(3) Propeller cuffs designed primarily to improve cooling have led to increase in propeller efficiency.

(4) Flying characteristics (manœuvrability) are at last becoming amenable to quantitative treatment and improvements are anticipated. The quest for high speed has led to the introduction of wings with a higher taper ratio in order to reduce weight, and this in its turn has brought about difficulties due to tip stalling. Means of avoiding this without increasing drag are still being sought. The same applies to measures for stopping a fully developed spin.

Accessories.—(1) Injection carburettors have established themselves, with possible use of safety fuels in the near future.

(2) Remote reading instruments utilising either A.C. or D.C. are coming into greater use. Dual indication on one dial saves space and weight.

(3) An automatic radio magnetic compass has been perfected which enables the pilot to fly towards or away from a radio station regardless of cross winds.

Power Plants.—(1) Both the Wright Aeronautical Corporation and Pratt and Whitneys have produced 18-cylinder twin row air-cooled radial engines of 2,000 h.p. and over. The Wright engine has a capacity of 3,350 cu. in. and develops 2,200 h.p. The Pratt and Whitney produces 2,000 h.p. for a capacity of 2,800 cu. in.

It is interesting to note that the double row radials have practically the same specific weight as the earlier single row radials of approximately half the output (1.1 lb./take-off h.p.).)

(2) The liquid-cooled engines have the advantage over the radial that a more slender fuselage can be employed which should reduce drag. The Allison 12-cylinder liquid-cooled engine is now going into large scale production, which has necessitated an enormous expansion both of personnel and facilities. It is pointed out that relatively little service experience with this engine is available up to now and this necessitates " continual proof testing of parts and completed engines to provide the knowledge and experience that would in turn be correlated with actual normal and accelerated aeroplane flight tests."

(3) The total engine production (all classes) in the U.S.A. for Sept., 1940, was of the order of 2,400 units. It is expected that this monthly output will be doubled in a year's time.

(4) Variable reduction gears for propellers, if sufficiently simple, light and reliable, seem to offer outstanding advantages for high speed high altitude flight.

(5) Extension shaft drives are receiving considerable attention.

Since at the present moment most technical information is treated as confidential and not published, the above survey is necessarily incomplete. Thus very little can be said about possible progress in jet propulsion which is receiving attention in various quarters.

Aeroplane Performance Testing at Altitude. (A. C. Reed, J. Aeron. Sci., Vol. 8, No. 4, Feb., 1941, pp. 135-50.) (88/12 U.S.A.)

The method of obtaining, presenting, and reducing flight test performance data at altitude covered by this paper gives a means of checking the accuracy of each point against all of the other points. The data obtained at any given altitude are not considered as data separate and by themselves. They are considered in relation to all of the data obtained at all of the altitudes tested. By this means the inaccuracies of any individual point are reduced to a minimum. By checking the theory against the flight test and flight test against the theory, it is possible to obtain a rational shape to the curves that are faired to the data. Having obtained a reduction of the data that is consistent with theory, it is possible to interpolate very accurately for any condition of weight, power, altitude, and temperature and extrapolate with good accuracy and to within reasonable limits.

The methods presented in this paper have been developed only for the simple gear-driven supercharger. For some time development work has been progressing on exhaust-driven turbo superchargers. The factors that affect the power output of such an installation are more numerous and more involved than for the gear-driven supercharger. Some excellent testing has been done on the ground. Other testing has been done and is being done in the air. The evaluation of all of the factors involved has not yet been determined and will be the basis of extensive research in the future.

The constant trend toward increasing speeds has already brought aeroplane performance into the outer fringes of the effects of compressibility. The entire development of the methods presented in this paper has essentially neglected the effect of compressibility of the atmosphere, except in so far as minor corrections may account therefore. The complete answer to the question of how this effect will be handled in the interpretation and reduction of aeroplane performance does not appear immediately.

Shear Centre of a Multi-Cell Metal Wing. (H. W. Sibert, J. Aeron. Sci., Vol. 8, No. 4, Feb., 1941, pp. 162-6.) (88/13 U.S.A.)

The general principles for obtaining the shear centre of a multi-cell metal wing by means of the least work of shear have been given by Hatcher (J. Aeron. Sci., Vol. 4, No. 6, April, 1937, pp. 233-238). Due to the complexity of the analysis only single-cell beams, such as leading edge wing beams, have been treated so far. The purpose of this paper is to extend the methods developed to metal wings containing two or more cells. Since the effect of taper on shear centre is apparently small for modern metal wings, the analysis will be limited to a wing of uniform cross-section.

Simple formulas based on the least work of shear are given for the co-ordinates of the shear centre and the shear force per unit length of arc of a multi-cell wing beam. The terms involved in these formulas are ordinary summations or can be evaluated by Simpson's rule according as concentrated areas or skin effective in bending is concerned. A numerical example is worked out for the case of a two-cell wing beam with skin on the tension side effective in bending.

Constructional Principles of the Escher-Wyss Variable Pitch Propeller. (A. von der Mühll, Flugwehr und-Technik, Vol. 2, No. 11-12, Nov.-Dec., 1940, pp. 258-260.) (88/15 Switzerland.)

The propeller mechanism is operated by oil pressure and is normally of the constant speed type, the pressure being controlled by a centrifugal governor, which is set for the required speed by the pilot. Several novel features are incorporated in the design. Thus the feathering or breaking positions of the blades are brought about by the pilot putting a second oil pump into operation. This not only prevents these blade settings being assumed accidentally (since the first pump is insufficient to produce the necessary rotation), but also ensures that these positions are reached quickly when wanted, a point of great practical importance.

Under steady flight conditions, the blades are locked mechanically, thus preventing oil leakage. The same locking takes place automatically, should the oil pressure fail accidentally.

The design of the hub is symmetrical and lends itself to the installation of a cannon. The blades can be unscrewed without dismantling the hub. Alternately, the piston control mechanism for the blades can be withdrawn from the hub without dismantling the blades. Servicing is thus facilitated and it is stated that the propeller has been adopted by the Swiss Air Force.

No weights are given.

The C.U.E. Co-operative Universal Engine for Aviation Single-Cylinder Research. (A. W. Pope, J.S.A.E., Vol. 48, No. 1, Jan., 1941, Transactions, pp. 33-40.) (88/16 U.S.A.)

The standardised single-cylinder aviation research engine originally designed in 1937 proved suitable for investigation of spark plugs but was not adequate for fuel and oil tests. Since then a volunteer group, organised by the S.A.E., has studied and co-ordinated the requirements of such an engine and from five complete designs a combination has been developed which appears to be completely satisfactory. The single-cylinder crankcase design was dimensioned to take the Wright Cyclone air-cooled cylinder $6\frac{1}{8} \times 6\frac{7}{8}$ in. bore and stroke, the largest in use at the time. The C.U.E. engine is described in detail, including the following features:—The balancing system; main roller bearings; smooth-walled crank chamber; lubrication; crankcase construction; temperature control; crankcase seal; accessory drives; crankshaft; connecting rod; spark indicator; flywheel; reverse rotation; dynamometer coupling; and fuel injection system.

Fifteen C.U.E. engines have already been built and 15 more are under construction.

"Averaging" Ignition Lag Meter for Compression Ignition Engines (Digest). (A. E. Traver and W. S. Mount, Autom. Ind., Vol. 84, No. 3, 1/2/41, pp. 122-123.) (88/17 U.S.A.)

The meter is essentially an electronic switch which is turned "on" by the voltage impulse from the first closure of the injection contact points, and is turned "off" by the first closure of the combustion pressure contact points. It can be applied to any Diesel engine where the injector can be fitted with some sort of mechanical pick-up or contactor and where there is an outlet in the combustion chamber for the pressure contactor.

The current flowing through the circuit during the "on" period of approximately 13° of crank angle rotation is stored in a large condenser which discharges continuously throughout the whole cycle through a micro-ammeter. Most cycle to cycle variations are thus damped out and only changes in ignition lag, due to changes in fuel quality, are recorded. A wiring diagram is given.

Comparison of Automatic Types of Exhaust Gas Analysers (Digest). (J. L. Dilworth, Autom. Ind., Vol. 84, No. 3, 1/2/41, pp. 123-124.) (88/18 U.S.A.)

Four commercial type analysers were attached to the exhaust manifold of a single-cylinder variable compression engine and simultaneous readings taken whilst both air and fuel supply were measured independently over an extended range of operation. Two of the instruments were of the thermal conductivity type, whilst the others worked on the hot wire (catalytic) and relative density principle respectively. Comparison of true and indicated air fuel ratios showed fair agreement over the mixture strength range 10/1 to 14/1. Further weakening of the mixture scarcely affected the readings of the analysers which continued to indicate ratios of the order of 13 or 14/1, whilst the true mixture was as weak as 17/1.

Quite apart from this serious defect, readings are far from consistent on the rich side and even under most favourable conditions variations of the order of $\pm 1/2$ air fuel ratio must be expected over the range 10/1 to 14/1. The instruments working either on the hot wire (catalytic) or thermal conductivity principle are lighter and more compact than those of the relative density type.

Propulsive Effects of Radiator and Exhaust Ducting. (M. Rauscher and W. H. Phillips, J. Aeron. Sci., Vol. 8, No. 4, Feb., 1941, pp. 167-74.) (88/19 U.S.A.)

It is shown how the thrust and the thermal efficiency of a ducted radiator vary with the design of the duct, the amount of radiator heating and the aeroplane speed. The type of duct commonly used for drag reduction is found to serve well for thrust recovery. Nevertheless, the thermal efficiency of the arrangement is so low that the thrust obtainable is unlikely to offset more than about one-third of the drag of the radiator and duct.

A study is made of the thrust given by a jet of fluid released in a duct. Conditions are found to exist under which the thrust of the ducted jet is greater than that of the jet unducted. If the jet consists of cool fluid, the thrust augmentation is secured by a venturi-shaped duct. With a hot jet, an expanding-contracting duct is required, as for a propulsive radiator. The analysis suggests that the potential benefits of exhaust ducting are of the same order as those of radiator ducting, but presumes steady flow conditions and applies therefore only to exhaust streams fed by numerous cylinders. Such collected streams are generally much slower than the free blasts from cylinders with individual stacks. This means that exhaust collection reduces the net impulse $\int F dt$ on the discharged gases, and hence the work $\int F ds = \int F v_1 dt = v_1 \int F dt$ done by the net exhaust reaction F on the engine moving at the velocity of v_1. If the noise and glare of unmuffled exhaust flashes could be tolerated, or could be blanketed from view and hearing, it would thus be advantageous to use individual stacks, preferably shaped into expanding nozzles.

The Significance of Diesel Exhaust Gas Analysis. (J. C. Holtz and M. A. Elliott, Trans. A.S.M.E., Vol. 63, No. 2, Feb., 1941, pp. 97-105.) (88/20 U.S.A.)

Data on exhaust gas composition, obtained in a study of the hazards that might attend the use of Diesel engines underground, are discussed in relation to combustion in the Diesel engine. Two engines were tested throughout a wide range of fuel-air ratios, and the results indicated that combustion was essentially complete in the normal operating range, although even under these conditions low but significant concentrations of carbon monoxide, aldehydes, and free carbon were present in the exhaust gases. The concentration of carbon monoxide, determined by precise analytical methods, was a minimum at a fuel-air ratio of approximately 0.03 lb. per lb. and was affected by engine design and to a slight extent by factors that varied with speed. The co-existence of aldehydes and free carbon indicated that direct oxidation and destructive combustion of the fuel were occurring simultaneously. The calculation of combustion efficiency from data on the products of incomplete combustion is illustrated.

Lateral Stiffness and Vibration in Engine Structures. (R. Pyles, Trans. A.S.M.E., Vol. 63, No. 2, Feb., 1941, pp. 107-14.) (88/21 U.S.A.)

The forces tending to produce horizontal vibration in engine frames may be obtained from the bearing-load diagrams. For an eight-cylinder nine-bearing engine, the dominant forces occur at the centre main bearing and bearings Nos. 3 and 7. The first major horizontal critical speed is the eighth order, which will come into resonance when the engine speed is one eighth the natural horizontal frequency of frame.

In view of the difficulty of predicting the horizontal frequency of the complicated frame structure, a simplified empirical method of comparing stiffness of frames is given.

The Influence of the 24-Cylinder (2,000 h.p.) Engine on the Development of the Fighter Bomber. (C. Rougeron, Inter. Avia., No. 751,20/2/41, pp. 1-3.) (88/22 France.)

In any aircraft, not only the weight but also the question of disposable space plays an important rôle. In the case of a fighter, both bombs and extra fuel could be carried if only space could be found. This difficulty has existed for years and is due to the fact that whilst engine power has increased very considerably, frontal area has not. Since the smallest possible fuselage is built round the engine, there is besides the cockpit no new disposable space. Similarly, any new wing space which might become available has so far been taken up by machine guns and the retractable undercarriage.

These matters are likely to change, now the 24-cylinder 2,000 h.p. H or X engine is becoming available. During the period 1936-1940 engine weight was practically constant, the increase in power being obtained mainly by boost and speed.

The new 24-cylinder engines will, however, weigh at least twice as much as the old 12-cylinder arrangement, and with the increase in armament necessitated by the higher speed, it is likely that the new fighters will weigh round about 10,000 lb. against a former weight of 5,000 lb. The wing area will have to be approximately doubled and the fuselage volume will be more than doubled in order to house the larger power plant.

Extra space now becomes available for either fuel or bombs and the long range fighter or really high speed bomber becomes a possibility.

An Instrument for Continuous Measurement of Piston Temperatures. (A. F. Underwood and A. A. Catlin, J.S.A.E., Vol. 48, No. 1, Jan., 1941, Transactions, pp. 20-7.) (88/23 U.S.A.)

The thermocouple method for measurement of piston temperatures involves problems relating to the measuring instrument or instruments required, installation of the thermocouples in the piston and the electrical connections connecting the two. In the present work the regular galvanometer supplied with the commercial potentiometer selected for use was replaced by a standard light beam galvanometer, whose sensitivity could be controlled by means of a variable resistance connected across its terminals. The contact device described enables continuous measurement of one temperature or intermittent measurement of several temperatures. Test data obtained with this instrument and discussed in the paper include temperature gradients of both aluminium and cast iron pistons, the effect of load variation on piston temperature and the effect of spark advance on piston temperature. A production engine fitted with the final design of the instrument has been run for 25,000 miles at 60 m.p.h. on a dynamometer without attention or adjustments. A test car installation has shown that measurements can be made continuously on the road.

Quantity Production of Gyro Instruments. (P. R. Bassett, Mech. Eng., Vol. 63, No. 2, Feb., 1941, pp. 98-100 and 124.) (88/24 U.S.A.)

Irrespective of the rate of increase in demand for a particular instrument, its production history usually exhibits three phases: (1) Lots of 10; (2) lots of 100; (3) lots of 1,000. The first is the engineer's phase, every instrument being checked for proper functioning. In the next stage (lots of 100) the foreman checks for uniformity of product, but experts are still necessary for individual performance of each instrument. Production proper is not reached till lots of 1,000 are reached. No single person checks every instrument, but control of materials and workmanship are the main concern. The paper deals particularly with the methods adopted by the Sperry Company for the large scale production of gyro horizons and directional gyros. Already in 1937, orders for certain parts were placed with sub-contractors working in the vicinity, experts being also supplied by the parent firm to assist in fitting the work to the machine, helping to train the men, when necessary modifying the original jigs and fixtures to suit the new conditions. Gradually the number of sub-contractors was extended, unsuitable firms being discarded at an early stage. After two years, 25,000 machine hours per month had become available, distributed over 21 sub-contractors. Sub-contracted machine hours had risen to 140,000 by April, 1940 (32 firms) and the figure of 200,000 was aimed at by the end of that year. At the same time the output of the parent firm expanded so that the ratio of the machine hours worked bore a reasonably constant ratio to the sub-contracted hours. Certain critical parts of the gyro instruments are never subcontracted. Also all the assembly work, calibration and testing is done by the parent firm. It is claimed that by their method of sub-contracting, the Sperry Instrument Company were able to increase rate of production eight-fold and satisfy all emergency demands of the future.

The " Plug " Method for Obtaining the Compressive Elastic Properties of Thin-Walled Sections. (H. W. Barlow, H. S. Stillwell and Ho-Shen Lu, J. Aeron. Sciences, Vol. 8, No. 3, Jan., 1941, pp. 109-114.) (88/25 U.S.A.)

A new method is proposed for use in determining the compressive elastic properties of thin-walled sections. The method consists essentially in supporting the section with a cement plug which restrains the flat sides of the specimens from early secondary failure. The method of preparing specimens is simple and inexpensive. Results are given for a large number of compressive stress-strain tests, plotted, using a modification of Osgood's non-dimensional system of co-ordinates. The method is believed to be preferable to the " pack " or " coil " method in that it permits the direct testing of the fabricated section and thus gives the true compressive property of the section itself. If the test specimen is properly prepared, as described, the possibility of the plug causing appreciable shearing forces between the walls and the plug is so small as to be negligible, and any possible compression of the plug when the specimen has been shortened under load is eliminated.

The plug method is applicable to both closed and open sections.

Spot Welding Development at the Arado Works. (E. Reichel, Jahrbuch der deutschen Luftfahrtforschung, Vol. 1, 1938, pp. 538-48; Translated in Airc. Eng., Vol. 13, No. 144, Feb., 1941, pp. 49-54.) (88/26 Germany.)

Tests made with the A.E.G. electric welding machine, based on the principle of grid control and providing exact regulation of the current, have proved that welding can be substituted for riveting for joining parts of hydronalium sheet. An important increase in fatigue strength of the welded parts can be obtained by subsequent annealing at 330°C. for 60 mins. The fatigue strength then exceeds that of similar riveted parts. A large stressed component, in the form of the fuselage of a single-seat fighter, has been welded and tested in flight. Welding can also be used conveniently for aluminium components and for elektron so long as the sheet thickness does not exceed 0.8 mm. For thicker elektron sheet it proved advisable to anneal, shortly before welding, at 300°C. for 5-10 minutes. Duralumin material has presented greatest difficulties in electrical spot and seam welding, and further research is required. By comparison with riveting, production may be increased two or three times by seam welding, while obtaining a considerable reduction in production costs.

Fire-Extinguishing Effectiveness of Chemicals in Water Solution. (H. D. Tyner, Ind. and Eng. Chem. (Ind. Ed.), Vol. 33, No. 1, Jan., 1941, pp. 60-5.) (88/27 U.S.A.)

Results are presented of over eight hundred tests on wood cribs to measure the fire extinction effectiveness of water solutions of thirty-three chemical compounds in various concentrations, and the results of similar tests with water alone.

The study indicates the advantages that may be obtained by adding chemicals to the water used. Results of several other investigators are reviewed.

The experimental results obtained at the Forest Products Laboratory, using water solutions of chemicals to extinguish standard test fires indicate the following:—

1. The superiority of a given concentration of a given chemical compound in water, over water alone, varies with both the rate of application of the liquid and the wind velocity.

2. As extinguisher solution application rates approach the minimum rate at which extinction can be accomplished with water, the amount of water required increases greatly, whereas the amount of a 10 per cent. monoammonium phosphate solution required remains approximately constant.

3. The superiority of a 10 per cent. monoammonium phosphate solution over water is greater with moderate wind velocities (up to 15 miles per hour) than at zero wind velocity.

4. Several of the most effective agents in concentrations of about 2 per cent. possess a large part of the extinction effectiveness attained with much higher concentrations.

5. Chemicals vary in their capacity to knock down flames quickly and in prevention of glowing and rekindling. Potassium acetate, potassium bicarbonate, and potassium carbonate have pronounced flame-extinguishing capacity. Phosphoric acid, di- and monoammonium phosphates, and boric acid have pronounced glow-extinguishing and total extinguishing capacity.

6. A survey of the results and theories of other investigators indicates that the fire-retarding action of chemicals is related to both physical and chemical properties. For the effective agents studied, possession of one or both of the following capabilities seems to be important: (*a*) Reduction of the volume of combustible gas formed (by increasing the proportion of charcoal formed); (*b*) formation of a fused inactive surface-protective layer upon the combustible surface. Cooling the seat of the fire, the smothering action of liberated, inert gas, and catalytic action may be contributing factors, but their importance seems very limited.

Identification of Light Scrap. (Engineer, Vol. 171, No. 4,442, 28/2/41, p. 145.) (88/28 Great Britain.)

Three solutions are recommended as sufficient to identify the light metal alloys when in scrap form: No. 1, 30 per cent. nitric acid solution in water; No. 2, 20 per cent. caustic soda solution; and No. 3, 5 per cent. hydrochloric acid solution in water. Solution No. 1 produces a positive reaction only with magnesium base alloys of the elektron type. A drop of this solution placed on a perfectly clean surface of such alloy will produce a pronounced white colouration after a few minutes. This test is quite suitable for the identification of magnesium base alloy scrap. The alloys aluminium-silicon and aluminium-magnesium-silicon are indicated by a greyish-brown colouration with No. 2 solution. Pure aluminium is indicated when no etching reaction is obtained with Nos. 1 and 3 solutions. If a drop of No. 2 solution produces a black stain, the alloys containing copper (aluminium-copper and aluminium-copper-zinc) are indicated. If on wiping off the remaining caustic soda solution a drop of No. 3 solution removes the black stain, the scrap tested belongs to the group aluminium-copper-zinc.

Statistical Control of Materials and Manufactured Products. (J. Geschelin, Autom. Ind., Vol. 84, No. 3, 1/2/41, pp. 128-129 and 139-140.) (88/32 U.S.A.)

Statistical inspection is essentially a sampling control applied to materials or manufactured articles which are themselves produced under controlled conditions. Once standard conditions have been established, any variation outside some determined limits indicates that some change has taken place which in a large majority of cases can be readily traced.

When introducing the method, it may be safer to restrict it to materials or products which have relatively wide limits of acceptance. As experience is gained, sampling control can eventually be applied to processes in which a 100 per cent. inspection was the traditional procedure. As an example, the surface finish of crankpins and journals is given. Originally this required inspection of every crank with the profilometer, together with a continuous record of the finishing process so that the latter could be checked and corrected. Eventually the method of finishing would be under control and instead of inspecting every sample, the examination of small batches at hourly or daily intervals will suffice.

The aim throughout is to produce a better article at a less cost and speed up production.

A useful bibliography of 12 recent publications on the subject of statistical control is given.

Iron-Base Hard-Facing Metals. (V. E. Alden, Mech. Eng., Vol. 63, No. 2, Feb.,1941, pp. 149-51.) (88/33 U.S.A.)

An outstanding development of the last four years in the field of hard facing has been the development of iron-base alloys, containing chiefly the relatively less costly constituents iron, chromium, nickel, molybdenum, and carbon. The wearing qualities of these alloys in the presence of temperatures up to at least 1,350°F. are equal or superior to those of the cobalt-chromium-tungsten alloys, made up of more expensive constituents. This family of iron base alloys goes under the name of "Coast Metals."

Excellent control can be exercised over these iron base alloys to give all sorts of interesting properties. Various coefficients of expansion are obtainable by slight modifications of the basic analysis and thus hard surfacing of cylindrical sections of all types of steels and irons can be guaranteed free from checks or cracks.

One respect in which the experience with these iron-base hard-facing alloys differs from the experience outlined for the cobalt-chromium-tungsten alloys is that a majority of the applications have been made by arc welding. There are, however, a limited number of applications, such as the hard facing of the cutting edges of shears and dies where Coast Metals can usually be best applied by gas.

Preparation of Automobile Bodies for Painting. (V. M. Darsey, Ind. and Eng. Chem. (Ind. Ed.), Vol. 33, No. 2, Feb., 1941, pp. 222-4.) (88/34 U.S.A.)

Successful application of paint to steel parts depends upon thorough cleaning and suitable chemical pre-treatment. Methods used for preparing automobile bodies for painting are:—Phosphating, phosphoric acid cleaning and solvent cleaning. Of these the phosphating (Bonderizing) process is now most widely employed and consists in spraying the Bonderite solution by means of a completely mechanised equipment on to the bodies as they are carried by conveyor through an enclosed tunnel which combines cleaning, phosphating, rinsing and drying in one continuous operation. A solution commonly used for rust proofing is prepared by dissolving zinc or manganese dihydrogen phosphate in water.

Frequent testing of finished bodies by an accelerated humidity test serves as a check on all chemical pre-treatments prior to painting. Salt spray tests also prove that increased protection is obtained from paint applied over phosphated surfaces compared with that afforded by the same paint finish over solvent cleaned metal without phosphating.

The Column Strength of Closed, Thin-Walled Sections of 18-8 *Stainless Steel.* (H. W. Barlow, J. Aeron. Sci., Vol. 8, No. 4, Feb., 1941, pp. 151-61.) (88/35 U.S.A.)

Thin-walled members having closed cross-sectional shapes are used as columns in aircraft construction. The purpose of this investigation was to determine and evaluate the factors influencing the behaviour of such columns fabricated from 18-8 corrosion-resistant steel. Approximately 300 specimens comprising two different cross-sectional shapes in nominal thicknesses of 0.006 in., 0.008 in., 0.010 in., 0.012 in., 0.014 in., were tested as columns under flat-end and under pin-end conditions.

The fact that the physical properties of the material are subject to change with cold working makes it necessary to determine the basic strength characteristics of the material after all processing has been completed.

The compressive elastic properties of the completed sections were determined by the use of the " Plug " method. This method is fully described in a previous article by the author (J. Aeron. Sci., Vol. 8, No. 3, Jan., 1941, pp. 109-114) and consists essentially in supporting the section with a cement plug which restrains the flat sides from early secondary failure.

The column tests were analysed on the basis of the compressive elastic properties of the material. For the sections investigated it was established that in the equation for primary failure by translation, the tangent modulus in compression represents the effective modulus.

The coefficient of end-fixity for flat-end column tests was found to be 4.0.

It was established that the critical unit stress for secondary failure is directly proportional to R and is inversely proportional to the square of the flat-pitch ratio. R is defined as a section constant for any given shape. The value of R does not vary with the thickness of the material and may be determined for each section by compression tests of a few short specimens.

Experience with Metals at High Temperatures for Power Plants. (A. E. White and C. L. Clark, Trans. A.S.M.E., Vol. 63, No. 2, Feb., 1941, pp. 137-41.) (88/36 U.S.A.)

From wide experience with various metals and applications of different types, in high pressure, high temperature power plant service, the authors have selected piping and bolting materials for detailed discussion. In this field, carbon-molybdenum steel is receiving the greatest amount of attention, and so the properties, control of grain size, heat-treating practice, creep rates, and kindred matters for this material are dealt with in the paper. Based on two specifications for bolting material, issued by the American Society for Testing Materials, the authors discuss the selection of properties, heat-treatment practice, and causes of failure in this type of material. The conclusion is reached that in so far as suitable alloys for pipes and bolts for high temperature are concerned, the art is yet in its developmental stage.

Recent Fog Investigations. (S. Petterssen, J. Aeron. Sciences, Vol. 8, No. 3, Jan., 1941, pp. 91-102.) (88/37 U.S.A.)

Fogs may be classified according to the identity of the process constituting the principal cause of their formation. A classification based on this principle is given in the following table:—

Fog Producing Processes.	Fog Dissipating Processes.
1. Evaporation from:—	1. Sublimation or condensation on:—
1. Rain which is warmer than the air (rain area fog, or frontal fog).	1. Snow with air temperature below 0°C. (excepting ice crystal fogs).
2. Water surface which is warmer than the air (steam fog).	2. Snow with air temperature above 0°C. (melting snow).
2. Cooling due to:—	2. Heating due to:—
3. Adiabatic upslope motion (upslope fog).	3. Adiabatic downslope motion.
4. Flux of air across the isobars toward lower pressure (isobaric fog; effect negligible).	4. Flux of air across the isobars toward higher pressure (effect negligible).
5. Falling pressure (isallobaric fog; unimportant).	5. Rising pressure (unimportant).
6. Radiation from the underlying surface (radiation fog).	6. Radiation absorbed by the fog or by the underlying surface.
7. Advection of warmer air over a colder surface (advection fog).	7. Advection of colder air over a warmer surface.
3. Mixing:—	3. Mixing:—
8. Horizontal mixing (unimportant by itself and strongly counteracted by vertical mixing).	8. Vertical mixing (important in dissipating of fogs and producing stratus).

The main remaining problem associated with fog investigation is that of fog forecasting. Experience has shown that formation of fog depends on many local factors, such as local sources of pollution and water, obstacles influencing air currents, local temperature effects and the local properties of the ground. It is therefore desirable that studies of local fog conditions should be organised for all the principal airports and adequately co-ordinated with theoretical fog research.

Detection of Super-cooled Fog Droplets. (R. L. Ives, J. Aeron. Sciences, Vol. 8, No. 3, Jan., 1941, pp. 120-2.) (88/38 U.S.A.)

Super-cooled fog droplets may be detected in many instances by means of a modified polariscope used in conjunction with a source of sonic disturbances. From various observations made it is concluded that any violent mechanical disturbance in a fog containing super-cooled droplets will cause them to "flash" into ice, and that an ice crystal passing through a polarised beam will cause a rotation of that beam, giving rise to the chromatic effects observed with the equipment described. It appears possible that a combination of a polariscope and a noise-maker can be used to detect the presence of super-cooled droplets with a high degree of consistency and that such a device could also be used to warn of incipient wing-icing conditions. When visual observation methods are used the mechanism is light in weight and mounted on an aircraft need not appreciably increase air drag. A photo-electric cell can be substituted for the eye and the device be made to operate a suitable alarm system.

The Distribution of Electricity in Thunderclouds (II). (G. Simpson and G. D. Robinson, Proc. Roy. Soc., Vol. 177, No. 970, 24/2/41, pp. 281-329.) (88/39 Great Britain.)

The investigation of the distribution of electricity in thunderclouds described by Simpson and Scrase in 1937 has been continued at Kew Observatory. Alti-electrographs, which record the sign of the potential gradient, are sent up on small free balloons. Additional observations made during eight thunderstorms in the years 1937, 1938 and 1939, are discussed and the conclusions reached by Simpson and Scrase are confirmed. Each thundercloud has positive electricity in the upper half of the cloud, negative electricity in the lower half, and in most storms, if not in all, there is a concentrated positive charge below the main negative charge. The generation of the positive and negative charges in the main body of the cloud is ascribed to the impact of ice crystals and that of the positive electricity in the base of the cloud to the breaking of rain drops in an ascending current of air.

Latent Energy and Dissociation in Flame Gases. (W. T. David, A. S. Leah and B. Pugh, Phil. Mag., Vol. 31, No. 205, Feb., 1941, pp. 156-68.) (88/40 Great Britain.)

The gases remaining after flame has spread through an inflammable gaseous mixture are not just hot normal gases. The view has been put forward that they contain a considerable latent energy which, in the absence of surface, persists for a long time and which varies in amount with the initial conditions of the mixture before combustion. The latent energy probably resides in a proportion of the tri-atomic molecules formed during combustion as an excess of intra-molecular energy which cannot be handed on to the translational degrees of freedom. The experimental evidence, collected over a period of years, is briefly reviewed in Part I of this paper—attention being confined to mixtures of carbon monoxide and air, since the authors' experiments have for the most part been made with these mixtures.

In Part II experiments are described which show that there is a much larger dissociation in flame gases than in normal gases of the same composition under similar conditions of temperature and pressure. This would appear to result from the excess of intra-molecular energy in the tri-atomic molecules, and, indeed, the experiments indicate that the extent of the abnormal dissociation varies with the latent energy.

The New Specific Heats of Air and Certain Combustion Gases (Addenda and Discussion). (R. C. H. Heck, Mech. Eng., Vol. 63, No. 2, Feb., 1941, pp. 126-135.) (88/41 U.S.A.)

According to the classical kinetic theory, the body of a gas at any temperature contains molecules at different energy levels, the number of such levels approaching infinity. With the advent of the quantum theory it became possible to reduce these energy levels to a definite number. Moreover, the proportional number of molecules at any particular energy level can be determined from spectroscopic data. Making use of Plank's so-called " sum of state " theorem, it is then possible to calculate the variation of specific heats with temperature. This represents a great advance, since direct calorimetric measurements of specific heat are difficult and liable to considerable sources of error, especially at high temperatures. For this reason specific heat values obtained by the new method are designated " new specific heats " and extensive tables covering the more common gases were given by the author in a previous paper, published in the January, 1940, issue of "Mechanical Engineering." The present paper gives some extensions, but its main interest lies in the discussion.

It appears that although the theoretical basis of the new method dates back to 1907 when Einstein published his equations of the heat of oscillation of harmonic oscillators, reliable numerical calculations were first carried out by Hicks and Mitchell in 1926. During the last five years the new method has received considerable attention. The theoretical treatment of most diatomic gases appears to be completely satisfactory, and satisfactory checks have been carried out at room and ordinary temperatures by alternative methods.

The treatment of the simpler polyatomic molecules, including even some of the simpler hydrocarbons is less complete, but adequate. Thus the calculated values for CO_2 are in good agreement with those deduced from recent sound velocity measurements up to 1,000°C. The water molecule presents difficulties since the spectra are complicated and corrections have to be applied for rotational distortion of the molecule at high temperatures. Here again, however, satisfactory agreement with experimental equilibrium constants gives indirect evidence of the reliability of the new method. Speaking generally, the specific heat values deduced by the new method are 5-10 per cent. higher than those previously accepted. (Abstractor's Note: Report of Empire Motor Fuels Committee, I.A.E., 1924.)

A study of the basis of the method indicates the possibility of some additional quantum states existing which are as yet undiscovered. This may lead to a further (small) increase in the final true values. It appears quite certain that no future discovery can lead to a decrease in the values given by the author.

In conclusion, it must be emphasised that the "new" specific heat values as tabulated apply only to the ideal state (infinitely dilute).

Conversion to higher pressures requires a knowledge of the equation of state of the substance. The correction in the specific heat due to "imperfections" is, however, generally small for the common gases with the exception of H_2O. In the case of air it amounts to about 1 per cent. at temperatures above 0°C. and pressures below 150 lb. per sq. in.

LIST OF SELECTED TRANSLATIONS.

NOTE.—Applications for the loan of copies of translations mentioned below should be addressed to the Secretary (R.T.P.), Ministry of Aircraft Production, and copies will be loaned as far as availability of stocks permits. Suggestions concerning new translations will be considered in relation to general interest and facilities available.

Lists of selected translations have appeared in this publication since September, 1938.

AIRCRAFT AND ACCESSORIES.

TRANSLATION NUMBER AND AUTHOR.		TITLE AND REFERENCE.
1153-4	Kimmerle, O. ...	*Twenty Years of Regular Air Services and Problems of Commercial Flight II. The Influence of Altitude and Direction of Flight on Safety and Efficiency in Commercial Aviation (Parts 1 and 2).* (Forschungsergebnisse des Verkehrswissenschaftlichen Instituts für Luftfahrt an der Technischen Hochschule Stuttgart, No. 14, 1940, pp. 43-87 and 87-111.)
1155	Vladimirov, A. N.	*Standards of Transverse Stability for Flying Boats.* (Aeron. Eng., U.S.S.R., Vol. 14, No. 4-5, April-May, 1940, pp. 62-70.)

MATERIALS.

1156-61	Portier, H. ...	*The Riveting of Thin Metal Plates in Aircraft Construction (Parts 1-10).* (Pub. Sci. et Tech., B.S.T., No. 87, 1939, pp. 1-50, 51-85, 86-99, 100-139, 140-164 and 165-192.)
1163	Englisch, C. ...	*The Modulus of Elasticity of Piston Ring Materials. Determination and Significance.* (A.T.Z., Vol. 40, No. 17, 10/9/37, pp. 431-4.) (Translated by the Bristol Aeroplane Co., Ltd.)
1166	Müller, J.	*The Cause of Welding Cracks in Steels Used for Aircraft Construction.* (L.F.F., Vol. 17, No. 4, 20/4/40, pp. 97-105.)

MISCELLANEOUS.

1162	Kuhlenkamp, A. ...	*Co-ordinate Systems in Anti-Aircraft Defence.* (Z.V.D.I., Vol. 84, No. 51, 21/12/40, pp. 1005-9.)
1164	Wedemeyer, E. A.	*Some Cases of Unusual Tyre Wear.* (A.T.Z., Vol. 42, No. 6, 25/3/39, pp. 157-61.)
1165	Poggi, L.	*The Velocity Field in a Two-Dimensional Flow of Compressible Fluid. Part II. Case of Profiles Obtained by Conformal Transformation from the Circle and, in particular, of Joukowski Profiles.* (L'Aerotecnica, Vol. 14, No. 5, May, 1934, pp. 532-50.)
1167	Berg, H. H. ...	*A Method of Measuring Blade Temperatures in Gas Turbines.* (Z.V.D.I., Vol. 84, No. 19, 11/5/40, pp. 329-30.)

https://doi.org/10.1017/S0368393100140131 Published online by Cambridge University Press

TITLES AND REFERENCES OF ARTICLES AND PAPERS SELECTED FROM PUBLICATIONS RECEIVED IN R.T.P.3 DURING DECEMBER, 1940.

THEORY AND PRACTICE OF WARFARE.

ITEM NO.		TITLE AND JOURNAL.
72/1	Great Britain	*Hawker Hurricane Single-Seat Fighter.* (Flight, Vol. 38, No. 1,662, 31/10/40, pp. 369/h and 371-373.)
72/2	Great Britain	*Vickers-Armstrong Wellington Bomber.* (Aeroplane, Vol. 59, No. 1,537, 18/11/40, pp. 510-521 and 523-524.)
72/3	U.S.A. ...	*Aeroplanes from the U.S.A. Some Notes on Design.* (Aeroplane, Vol. 59, No. 1,537, 8/11/40, pp. 527-528.)
72/4	Germany ...	*Ju. 88 Twin Engine Dive Bomber (Photograph).* (Aeroplane, Vol. 59, No. 1,536, 1/11/40, p. 481.)
72/5	Great Britain	*Some Notes on the Art of Baling Out.* (G. Johns, Aeroplane, Vol. 59, No. 1,536, 1/11/40, pp. 493-494.)
72/6	Great Britain	*Air Raid Damage and Munitions Production.* (Engineering, Vol. 150, No. 3,905, 15/11/40, p. 392.)
72/7	Germany ...	*Air Force Targets in Germany XI. Politz Hydrogenation Works near Stettin.* (Engineer, Vol. 170, No. 4,427, 15/11/40, pp. 312-3.)
72/8	U.S.A. ...	*Boeing B.17 and Douglas Big Bombers.* (Engineer, Vol. 170, No. 4,427, 15/11/40, p. 320.)
72/9	Germany ...	*Heinkel He 111K Night Bomber.* (Flight, Vol. 38, No. 1,665, 21/10/40, pp. a-c.)
72/10	Germany ...	*F.W. 187 "Destroyer" (Photographs).* (Aeroplane, Vol. 59, No. 1,538, 15/11/40, p. 543.)
72/11	Great Britain	*The Cazeau Effect.* (W. T. D. Allan, Aeroplane, Vol. 59, No. 1,538, 15/11/40, p. 549.)
72/12	Great Britain	*Glider Trains for Troop Transport.* (O. L. L. Fitzwilliams, Aeroplane, Vol. 59, No. 1,538, 15/11/40, pp. 552-555.)
72/13	Great Britain	*Aircraft Identification by Sound.* (C. Campbell, Flight, Vol. 38, No. 1,664, 14/11/40, p. 412.)
72/14	Germany ...	*Notes on the Armament of Enemy Aircraft (Armour Plate, Guns and Bombs).* (Flight, Vol. 38, No. 1,664, 14/11/40, pp. a-f.)
72/15	Italy ...	*Fiat B.R. 20 Two-Motor Bomber.* (Aeroplane, Vol. 59, No. 1,539, 22/11/40, p. 570.)
72/16	U.S.A. ...	*Treated Plywood Bomb-Bay Door (G. L. Martin Co.).* (American Aviation, Vol. 4, No. 10, 15/10/40, p. 3.)
72/17	Great Britain	*Progress of Camouflage.* (Nature, Vol. 146, No. 3,702, 12/10/40, p. 482.)
72/18	Great Britain	*A New Apparatus for the Detection of Mustard Gas.* (F. C. Hymas, Chem. and Ind., Vol. 59, No. 29, 20/7/40, pp. 779-780.)
72/19	Great Britain	*Camouflage in Modern Warfare.* (Nature, Vol. 146, No. 3,706, 9/11/40, pp. 597-8.)
72/20	Great Britain	*Douglas B.19 Giant Bomber.* (Airc. Prod., Vol. 11, No. 12, Dec., 1940, pp. 395-398.)

ITEM NO.		TITLE AND JOURNAL.
72/21	Germany ...	*Air Force Targets in Germany. XIII. Duisburg, Ruhrort Harbour.* (Engineer, Vol. 170, No. 4,429, 29/11/40, pp. 342-4.)
72/22	U.S.A. ...	*Air Power for Defence, Strategic Requirements of Aircraft in all Services.* (J. L. H. Peck, Sci. Amer., Vol. 163, No. 6, Dec., 1940, pp. 311-4.)
72/23	U.S.A. ...	*Curtiss Wright Dive Bomber XSB2C-1.* Sci. Amer., Vol. 163, No. 6, Dec., 1940, p. 314.)
72/24	U.S.A. ...	*Puncture-Proof Inner Tubes for Combat Vehicles.* (Sci. Am., Vol. 163, No. 5, Nov., 1940, pp. 255-6.)
72/25	Switzerland...	*Some General Considerations on the Possible Errors of A.A. Fire.* (H. Brandli, Flugwehr und-Technik, Vol. 2, No. 1, Jan., 1940, pp. 9-12.) (Abstract available.)
72/26	Germany ...	*Ju 88 Bomb Racks.* (Inter. Avia., No. 732, 21/10/40, p. 7.)
72/27	Germany ...	*Arado 96 B Fighter.* (Inter. Avia., No. 732, 21/10/40, p. 8.)
72/28	U.S.A. ...	*Martin Twin-Engine Patrol Bomber, Type XPBM.* (Inter. Avia., No. 730, 4/10/40, p. 7.)
72/29	Germany ...	*Ju 88 Twin-Engined Bomber.* (Inter. Avia., No. 729, 25/9/40, pp. 2-3.)
72/30	U.S.A. ...	*Republic Dive Bomber.* (Inter. Avia., No. 729, 25/9/40, p. 4.)
72/31	U.S.A. ...	*Douglas B.19 Four-Engined Heavy Bomber.* (Inter. Avia., Nos. 726-7, 10/9/40, pp. 10-11.)
72/32	U.S.A. ...	*Lockheed P-38 Twin-Engined Interceptor.* (Inter. Avia., Nos. 726-7, 10/9/40, pp. 11-12.)
72/33	Great Britain	*Short "Stirling" Heavy Bomber.* (Inter. Avia., Nos. 724-5, 3/9/40, pp. 8-9.)
72/34	U.S.A. ...	*Northrop N.3-PB Patrol Bomber.* Inter. Avia., Nos. 724-5, 3/9/40, p. 13.)
72/35	U.S.A. ...	*Vought Sikorsky XF4U-1 Navy Fighter.* (Inter. Avia., Nos. 724-5, 3/9/40, p. 13.)
72/36	Italy ...	*A.R.P. in Italy.* (Inter. Avia., Nos. 724-5, 3/9/40, p. 17.)
72/37	Great Britain	*High Altitude Bombers.* (N. Pemberton-Billing, Vol. 38, No. 1,668, 12/12/40, pp. 502-4.)
72/38	Great Britain	*Ventilation of Air Raid Shelters.* (J. S. Weiner, Nature, Vol. 146, No. 3,710, 7/12/40, pp. 733-737.)
72/39	Great Britain	*Night Bombing: An Imperative Research.* (Engineer, Vol. 170, No. 4,431, 13/12/40, pp. 378-9.)
72/40	Great Britain	*Reinforced Concrete Air Raid Shelters.* (Engineer, Vol. 170, No. 4,431, 13/12/40, p. 382.)
72/41	U.S.A. ...	*American Four-Engined Bombers—Consolidated B.24 and Boeing B-17B.* (Aeroplane, Vol. 59, No. 1,540, 29/11/40, p. 591.)
72/42	Italy ...	*Fiat CR. 42 Single-Seat Fighter.* (Aeroplane, Vol. 59, No. 1,540, 29/11/40, p. 598.)
72/43	Great Britain	*Fairey "Fulmar" Two-Seat Fleet Fighter.* (Aeroplane, Vol. 59, No. 1,540, 29/11/40, pp. 608-9.)
72/44	Germany ...	*Ju 88 Dive Bombers (Details of Armaments, Wing De-icing, Automatic "Pull-out," Anti-flutter Devices, etc.).* (Flight, Vol. 38, No. 1,667, 5/12/40, pp. b-f.)
72/45	Great Britain	*A Survey of Aircraft Orders Placed in the United States.* (L. Engel, Vol. 38, No. 1,667, 5/12/40, pp. 472-4.)

ITEM NO.		TITLE AND JOURNAL.
72/46	Germany ...	*Ju 88 Twin-Engined Bomber.* (Inter. Avia., No. 728, 19/9/40, p. 3.)
72/47	Italy ...	*The Italian Air Force.* (Inter. Avia., No. 733, 28/10/40, p. 1-4.)
72/48	Great Britain	*Air Force Targets in Germany: Cologne and its Environments.* (Engineer, Vol. 170, No. 4,432, 20/12/40, pp. 391-3.)

Aero. and Hydrodynamics.

72/49	Great Britain	*Model Experiments in the Wave Tank on Beach Formation of Waves.* (R. A. Bagnold, J. Inst. Civ. Engs., Vol. 15, No. 1, Nov., 1940, pp. 27-52.)
72/50	U.S.A. ...	*Thickness of a Liquid Film adhering to a Surface Slowly Withdrawn from the Liquid.* (F. C. Morey, Bur. Stan. J. Res., Vol. 25, No. 3, Sept., 1940, pp. 385-93.) (Abstract available.)
72/51	U.S.A. ...	*Curved Flow in Conduits of Constant Cross Section.* (C. N. Nordell, Oil and Gas Journal, Vol. 39, No. 5, 1940, pp. 5, 50, 53, 55.) (Chem. Absts., Vol. 34, No. 19, 10/10/40, p. 6,491.)
72/52	Germany ...	*Flow of Viscous Oils Through Pipes.* O. Wirth, Oel und Kohle, Vol. 36, pp. 58-60.) (Chem. Absts., Vol. 34, No. 19, 10/10/40, p. 6,491.)
72/53	Great Britain	*Calculation of Terminal Speeds (Maximum Speed Falling Freely Through Viscous Fluid).* (Engineering, Vol. 150, No. 3,908, 5/12/40, pp. 441-444.)
72/55	Switzerland...	*The Effect of Compressibility in Air Flow.* (J. Ackeret, Flugwehr und-Technik, Vol. 2, No. 1, Jan., 1940, pp. 18-20.) (Abstract available.)
72/56	U.S.A. ...	*Private Wind Tunnels in the U.S.A.* (Inter. Avia., Nos. 726-7, 10/9/40, p. 12.)
72/57	Japan ...	*On the Subsonic Flow of a Compressible Fluid Past an Elliptic Cylinder.* (I. Imai and T. Aihara, Aer. Res. Inst., Tokyo, Vol. 15, No. 194, Aug., 1940.) (Abstract available.)
72/63	Great Britain	*Generalisation of Cunningham's Extension of Stoke's Law for the Force on a Sphere.* (G. Young, Math Biophysics Bull., Vol. 2, Sept., 1940, pp. 105-8.) (Sci. Absts., A, Vol. 43, No. 515, 25/11/40, p. 731.)
72/64	Great Britain	*Forces on Two Parallel Infinitely Long Plane Plates Placed in a Uniform Flow.* (Y. Nomura, Tohoku Univ. Sci. Reports, Vol. 19, June, 1940, pp. 22-35.) (Sci. Absts., A, Vol. 43, No. 515, 25/11/40, p. 731.)
72/65	Japan ...	*Flow of a Compressible Liquid Past a Sphere.* (K. Tamada, Proc. Phys. Math. Soc., Japan, Vol. 22, July, 1940, pp. 519-525.) (Sci. Absts., A, Vol. 43, No. 515, 25/11/40, p. 732.)
72/66	Japan ...	*Non-Permanent Movement of Viscous Fluids in Tubes of Very Small Diameter.* (K. Kitagawa, Proc. Phys. Math. Soc., Japan, Vol. 22, June, 1940, pp. 442-7.) (Sci. Absts., A, Vol. 43, No. 515, 15/11/40, p. 732.)
72/67	Great Britain	*Flow of Suspensions Through Narrow Tubes.* (F. J. Dix and G. W. S. Blair, J. Applied Physics, Vol. 11, Sept., 1940, pp. 574-81.)

Aircraft and Airscrews.

ITEM NO.		TITLE AND JOURNAL.
72/68	Great Britain	*Douglas DC-6 Civil Transport.* (Flight, Vol. 38, No. 1,662, 31/10/40, p. 381.)
72/69	U.S.A. ...	*Pitcairn P.A.-36 Autogiro.* (Aeroplane, Vol. 59, No. 1,536, 1/11/40, pp. 491-492.)
72/70	Great Britain	*Airscrew Spinners.* (F. G. Marshall and P. Burton, Flight, Vol. 38, No. 1,665, 21/11/40, pp. e-f.)
72/71	Great Britain	*Rotol Airscrew De-Icing Equipment.* (Flight, Vol. 38, No. 1,665, 21/11/40, p. f.)
72/72	Great Britain	*Comparison of Methods of Assisted Take-off.* (N. Pemberton-Billing, Flight, Vol. 38, No. 1,665, 21/11/40, pp. 429-432.)
72/73	Great Britain	*Hydraulic Servo Mechanisms.* (L. Pomeroy, Jr., Aeroplane, Vol. 59, No. 1,539, 22/11/40, pp. 577-580.)
72/74	Great Britain	*The "Owlet" Tricycle Trainer.* (Flight, Vol. 38, No. 1,666, 28/11/40, pp. a-g.)
72/75	U.S.A. ...	*Protecting Gasoline Tanks, Principles and Practice in Development of Bullet-Proof Tanks for Aircraft.* (A. Klemin, Sci. Amer., Vol. 163, No. 6, Dec., 1940, p. 322.)
72/76	U.S.A. ...	*Hydraulic Method for Strength Testing of Aircraft Parts.* (Sci. Amer., Vol. 163, No. 6, Dec., 1940, pp. 322-3.)
72/81	U.S.A. ...	*Blind Landing of Aircraft (International Telephone Co. System).* (Sci. Am., Vol. 163, No. 5, Nov. 1940, p. 260.)
72/82	U.S.A. ...	*Pitcairn Autogiro P.A.-36.* Inter. Avia., Nos. 724-5, 3/9/40, pp. 12-13.)
72/83	Great Britain	*Review of British Aircraft.* (Flight, Vol. 38, No. 1,668, 12/12/40, pp. 498-499.)
72/84	Great Britain	*Runways and Assisted Take-off.* (Flight, Vol. 38, No. 1,668, 12/12/40, p. 500.)
72/85	U.S.S.R. ...	*Russian Giant Airliner L-760.* (Flight, Vol. 38, No. 1,668, 12/12/40, p. 512.)
72/86	U.S.A. ...	*Production of Aircraft Stampings.* (H. Chase, Metal Industry, Vol. 57, No. 23, 6/12/40, pp. 446-448.)
72/87	U.S.A. ...	*Douglas DC-6 Transport.* (Inter. Avia., No. 730, 4/10/40, pp. 4-6.)
72/88	Great Britain	*General Aircraft "Owlet" (Trainer for Night Flying).* (Aeroplane, Vol. 59, No. 1,540, 29/11/40, pp. 603-6 and 613.)
72/89	Great Britain	*Rotol Four-Bladed Airscrew.* (Flight, Vol. 38, No. 1,667, 5/12/40, p. 471.)
72/90	U.S.A. ...	*Plastics Trainer.* (Inter. Avia., No. 720, 25/9/40, p. 6.)
72/91	Great Britain	*Airscrew Spinners—II. The Development of Spoked, Cooling and Bullet Proof Types.* (F. G. Marshall and P. Burton, Flight, Vol. 38, No. 1,667, 5/12/40, pp. 467-8.)
72/92	Germany ...	*Universal Compass Checking Bench.* (Inter. Avia., No. 728, 19/9/40, pp. 3-4.) (Abstract available.)
72/93	U.S.A. ...	*Windshield Wipers.* (Inter. Avia., No. 733, 28/10/40, p. 8.) (Abstract available.)

ITEM NO.		TITLE AND JOURNAL.
72/94	Germany ...	*Diving Brakes on Ju* 87. (Inter. Avia., No. 731, 12/10/40, p. 9.) (Abstract available.)
72/95	Germany ...	*Locking of Control Surfaces for Testing Aeroplanes.* (From Fuftfahrtforschung, No. 8, 1940.) (Inter. Avia., No. 731, 12/10/40, p. 10.)
72/96	Great Britain	*Tyre Wear on Runways* (*B. Pt., No.* 516, 738). (Inter. Avia., No. 731, 12/10/40, p. 11.) (Abstract available.)
72/97	Japan ...	*Measurement of the Period of Natural Vibration of an Airscrew Blade.* (J. Obata and Y. Yosida, Aer. Res. Inst., Tokyo, Vol. 15, No. 191, July, 1940.) (Abstract available.)
72/106	U.S.A. ...	*Plastic Trim Tabs for Aircraft—Developed by Glenn L. Martin Co.* ((Autom. Ind., Vol. 85, No. 8, 15/10/40, pp. 434-5.)
72/107	U.S.A. ...	*Synthetic Rubber Flexible Nozzle for Gasoline Hose (Able to Discharge Static Electricity).* (Autom. Ind., Vol. 83, No. 8, 15/10/40, p. 436.)
72/108	U.S.A. ...	*Shock Absorbers, Testing and Measuring the Resistance of the Hydraulic Type.* (P. Douglas, Autom. Eng., Vol. 30, No. 405, December, 1940, pp. 411-2.)
72/109	Great Britain	*Vibration Patterns of Propeller Blades.* (G. S. Baker, Engineering, Vol. 150, No. 3,910, 20/12/40, pp. 484-486.) (Abstract available.)

ENGINES AND ACCESSORIES.

72/110	Germany ...	*Mercedes-Benz DB-601 A Aero Motor.* (Aeroplane, Vol. 59, No. 1,536, 1/11/40, pp. 490-491.)
72/111	Great Britain	*The Development of the Kaplan Turbine.* (J. R. Finniecome, Engineering, Vol. 150, No. 3,905, 15/11/40, pp. 381-383.)
72/112	U.S.A. ...	*Polonium Alloy for Spark-Plug Electrodes.* (R. D. Evans, J. Applied Phys., Vol. 11, 1940, pp. 561-2.) (Chem. Absts., Vol. 34, No. 19, 10/10/40, p. 6,531.)
72/113	U.S.A. ...	*Current Investigation at the I.A.E. Laboratories (Mobile Gas Producer, Aeration of Oil, Gear Testing, Bearing Temperatures, Crankshaft Fatigue).* (Autom. Eng., Vol. 30, No. 403 (Extra Number), 14/11/40, pp. 333-7.)
72/114	Great Britain	*Specific Speeds of Pumps and Turbines.* (J. Jennings, Engineering, Vol. 150, No. 3,908, 5/12/40, p. 454.)
72/115	Great Britain	*Steam Turbine Efficiency and the Reynolds Number.* (Engineer, Vol. 170, No. 4,430, 6/12/40, pp. 363-4.)
72/116	Great Britain	*Dimensionless Characteristics of Turbines and Pumps.* (H. Addison, Engineer, Vol. 170, No. 4,430, 6/12/40, p. 365.)
72/117	U.S.A. ...	*Design of High-Speed Two-Stroke Engines.* (S. Treves, Autom. Ind., Vol. 83, No. 7, 1/10/40, pp. 483-5.)
72/118	U.S.A. ...	*Performance of Modern Aircraft Diesels (with Discussion).* (P. H. Wilkinson, J.S.A.E., Vol. 47, No. 5, 1940, pp. 474-81.) (Abstract available.)
72/119	U.S.A. ...	*Comparison of 1940 and 1941 Car Engines (Cylinders and Valves, Piston RinCgs, Crankshaft and Ventilation, Lubrication, Cooling Systems, Fuel System).* (T. A. Bissel, J.S.A.E., Vol. 47, No. 5, Nov., 1940, pp. 447-452.)

ITEM NO.		TITLE AND JOURNAL.
72/122	U.S.A. ...	*Steam Turbine Blading (with Discussion).* (R. C. Allen, Trans. A.S.M.E., Vol. 62, No. 8, Nov., 1940, pp. 689-710.) (Abstract available.)
72/123	U.S.A. ...	*Water Pump Employing Helicoidal Rotor in Rubber Casing.* (Sci. Am., Vol. 163, No. 5, Nov., 1940, p. 256.)
72/124	U.S.A. ...	*Pratt and Whitney R-2,800 Engine (Double Wasp).* (Inter. Avia., No. 729, 25/9/40, pp. 3-4.)
72/125	Great Britain	*British Aero Engines.* (Flight, Vol. 38, No. 1,668, 12/12/40, pp. 506-9.)
72/126	U.S.A. ...	*Aircraft Diesels; Pitman Publishing Co., 1940 (Review).* P. H. Wilkinson, American Aviation, Vol. 4, No. 12, 15/11/40, p. 3.)
72/127	Italy ...	*Italian Experiments on Jet Propulsion.* (Inter. Avia., No. 733, 28/10/40, p. 6.) (Abstract available.)
72/132	U.S.A. ...	*Zerex Anti-Freeze Liquid (Ethylene Glycol Base, made by E. I. du Pont de Nemours).* (Autom. Ind., Vol. 83, No. 8, 15/10/40, p. 436.)
72/133	U.S.A. ...	*Fuel Injection. A Summary of Tests made with Spark-Ignition Engines (from paper to S.A.E.).* (O. W. Schey, Autom. Eng., Vol. 30, No. 405, Dec., 1940, p. 384.)
72/134	U.S.A. ...	*Diesel Engines. Experiments showing the Possibilities of Oxygen for Power Boosting (paper to A.S.M.E.).* (P. H. Schweitzer, Autom. Ind., Vol. 30, No. 405, Dec., 1940, pp. 395-7.)
72/135	Great Britain	*Some Fallacies Concerning the Petrol Engine.* (W. T. David, Engineer, Vol. 170, No. 4,432, 20/12/40, pp. 388-9.)

Fuels and Lubricants.

72/136	Great Britain	*Recent Developments in the Production of High-Speed Diesel Fuels.* (M. E. Kelly, Fuel, Vol. 19, No. 10, Nov., 1940, p. 219.)
72/137	U.S.A. ...	*Factors Involved in Lead Susceptibility of Gasolines.* (A. W. Trusty, Refiner, 1940, Vol. 19, pp. 93-6.) (J. Soc. Chem. Ind., Vol. 59, No. 10, Oct., 1940, p. 719.)
72/138	Germany ...	*Ignition Values and Chemical Structure of Liquid Fuels.* (H. Winter and H. Mönnig, Glückauf, 1939, Vol. 75, pp. 907-9.) (J. Soc. Chem. Ind., Vol. 59, No. 10, Oct., 1940, p. 720.)
72/139	U.S.A. ...	*Deterioration Factors in Diesel Lubricants.* (C. G. A. Rosen, Nat. Petrol. News, Vol. 32, No. 18, 1940, pp. R.152 and 545.) (J. Soc. Chem. Ind., Vol. 59, No. 10, Oct., 1940, p. 720.)
72/140	Germany ...	*Relation Between Cetane Number and Starting Characteristics of Diesel Fuels.* (P. Weber, Oel und Kohle, Vol. 36, 1940, pp. 78-89.) (Chem. Absts., Vol. 34, No. 19, 10/10/40, p. 6,791.)
72/141	Great Britain	*Power and Combustion.* (A. C. G. Egerton, Engineer, Vol. 170, No. 4,428, 22/11/40, pp. 326-328.)
72/142	Great Britain	*Power and Combustion.* (A. C. G. Egerton, Engineering, Vol. 150, No. 3,908, 5/12/40, pp. 454-456.)
72/143	Great Britain	*Gas Traction Development.* (Engineering, Vol. 150, No. 3,907, 5/12/40, pp. 456-7.)

ITEM NO.		TITLE AND JOURNAL.
72/144	Great Britain	*Piston Deposits, Ring Sticking, Varnishing and Ring Clogging (Condensed from J. Inst. Petrol.).* (W. A. Gruse and C. J. Livingstone, Engineer, Vol. 170, No. 4,429, 29/11/40, pp. 352-3.) (Abstract available.)
72/145	Italy ...	*Liquefied Methane and Other Gases as Substitutes for Gasoline.* (Grossi, Riv. Ital. Petrolio, Vol. 8, No. 81, 1940, pp. 9, 11, 13, 15, 17, 19.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,573.)
72/146	Great Britain	*On the Ignition of Inflammable Gases by Hot Moving Particles.* (S. Paterson, Phil. Mag., Vol. 30, No. 203, Dec., 1940, pp. 437-457.)
72/147	Great Britain	*Lubrication and Wear.* (D. Clayton, Engineer, Vol. 170, No. 4,431, 13/12/40, pp. 383-5.)
72/148	Germany ...	*Comparison of the Behaviour in the Cold of Lubricating Oils from Petroleum and Synthetic Oils.* (R. Heinze and M. Marder, Oel Kohle Erdoel Teer, Vol. 15, 1939, pp. 611-6.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,590.)
72/149	Japan ...	*Viscosity Characteristics of Lubricating Oils as Related to their Chemical Structure.* (B. Yamaguchi, Aer. Res. Inst., Tokyo, Vol. 15, No. 192, Aug., 1940.) (Abstract available.)

INSTRUMENTS.

72/152	Germany ...	*Meters with Equipment for Continuous Measurement of Quantity.* (W. Brauer, Feinmech. und Präzision, Vol. 46, 1938, pp. 267-8.) (Chem. Absts., Vol. 34, No. 19, 10/10/40, p. 6,491.)
72/153	Great Britain	*High Precision Gauging.* (Engineer, Vol. 170, No. 4,428, 22/11/40, pp. 324-326.)
72/154	U.S.A. ...	*Method for Measuring the Thickness of Non-Magnetic Films (to 10^{-5} of an inch).* (Sci. Amer., Vol. 163, No. 6, Dec., 1940, p. 330.)
72/155	U.S.A. ...	*Contour Finder, developed by Abrams Aerial Survey Corporation (Measures Elevations directly from a Set of Two Aerial Photographs).* (Sci. Amer., Vol. 163, No. 6, Dec., 1940, p. 336.)
72/156	Germany ...	*Measurements of Hardness and Sources of Error.* (H. von Weingraber, Metallwirtschaft, Vol. 19, 1940, pp. 255-60.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,232.)
72/157	U.S.A. ...	*Metal-Electric Strain Gauge.* (Sci. Am., Vol. 163, No. 5, Nov., 1940, p. 265.) (Abstract available.)
72/158	Switzerland...	*Simultaneous Recorder for Engine r.p.m. and Boost Pressure (Peravia RD. 239).* (Flugwehr und-Technik, Vol. 2, No. 1, Jan., 1940, pp. 20-21.) (Abstract available.)
72/159	Great Britain	*Plating Wire Tips for Electrical Instruments.* (Downie, Electrical Engineer, 29/11/40, pp. 88-9.) (Abstract available.)
72/160	Great Britain	*High Precision Gauging (VI).* (Engineer, Vol. 170, No. 4,431, 13/12/40, pp. 374-5.)
72/161	U.S.A. ...	*Tensor Gauge.* (Inter. Avia., No. 731, 12/10/40, p. 12.) (Abstract available.)

ITEM NO.		TITLE AND JOURNAL.
72/163	U.S.A. ...	*American Instruments (Length, Time, Temperature Measurements, Electronic, Optical and Mechanica Devices, etc.).* R. H. Miller, Ind. and Eng. Chem. (An. Ed.), Vol. 12, No. 10, 10/10/40, pp. 571-630.)

MATERIALS.

72/164	Great Britain	*Surface Treatment of Steel Prior to Painting.* (Engineering, Vol. 150, No. 3,905, 15/11/40, p. 390.)
72/165	Great Britain	*Mechanical and Physical Properties of High Duty and Alloy Cast Irons.* (J. W. Donaldson, Metal Treatment, Summer, 1940, pp. 51-57, 61.) (Abstract available.)
72/166	Great Britain	*The Machining of Aluminium Alloys.* (Metal Treatment, Summer, 1940, pp. 58-61.)
72/167	Germany ...	*Synthetic Rubber from Acetylene.* (British Plastics, Vol. 12, No. 137, Oct., 1940, p. 160.)
72/168	Germany ...	*New Type of Safety Glass.* (British Plastics, Vol. 12, No. 137, Oct., 1940, p. 163,) (Abstract available.)
72/169	Germany ...	*Pendulum Hardness Testing Machine (Reprinted from Iron Age).* (Engineer, Vol. 170, No. 4,427, 15/11/40, pp. 319-320.)
72/170	U.S.A. ...	*Permeability of Elastic Polymers to Hydrogen.* (T. P. Sager, Bur. Stan. J. Res., Vol. 25, No. 3, Sept., 1940, pp. 309-13.)
72/171	U.S.A. ...	*Electrode Potential Measurements as a Means of Studying the Corrosion Characteristics of Wrought Aluminium Alloys of the Duralumin Type.* (H. L. Logan, Bur. Stan. J. Res., Vol. 25, No. 3, Sept., 1940, pp. 315-25.)
72/172	Great Britain	*Improvements in Cutting Oils.* (A. G. Arend, Chem. and Ind., Vol. 59, No. 46, 16/11/40, pp. 771-772.) (Abstract available.)
72/173	Great Britain	*Plastic Mouldings Used in the Construction of Ear Plugs.* (Plastics Vol. 4, No. 40, Sept., 1940, pp. 247-250.)
72/174	Great Britain	*Aircraft Developments in Plastics.* (Plastics, Vol. 4, No. 40, Sept., 1940, pp. 248-250.)
72/175	Great Britain	*Fillers in Plastic (Theory and Practice).* P. Grodzinski, Plastics, Vol. 4, No. 40, Sept., 1940, pp. 253-257.)
72/176	U.S.A. ...	*Effects of Temperature of Pre-treatment on Creep Characteristics of 18-8 Stainless Steel at 600-800.* (C. R. Austin and C. H. Samans, Amer. Inst. Min. Met. Eng., 1940, Tech. Publ. 1,181, 15 pp.) (J. Soc. Chem. Ind., Vol. 59, No. 10, Oct., 1940, p. 741.)
72/177	Germany ...	*German Manganese Case-Hardening Steels Low in Imported Alloying Elements, with Additions of Chromium, Silicon or Vanadium.* (H. Schrader and F. Brühl, Tech. Mitt. Krupp. Forschungsber, 1939, Vol. 2, pp. 207-15.) (J. Soc. Chem. Ind., Vol. 59, No. 10, Oct., 1940, p. 741.)
72/178	U.S.A. ...	*Electrical Furnaces for the Melting of Metals.* (G. R. Bashforth, Iron and Steel, Vol. 13, 1940, pp. 148-50, 191-4.) (Chem. Absts., Vol. 34, No. 19, 10/10/40, p. 6,527.)

ITEM NO.		TITLE AND JOURNAL.
72/179	Germany ...	*Destructive Conditions of Strain in Castings and the Difficulty of Recognising Them.* (H. Reininger, Ergeb. Tech. Röntgenkunde, Vol. 6, 1938, pp. 122-40.) (Chem. Absts., Vol. 34, No. 19, 10/10/40, p. 6,552.)
72/180	Germany ...	*Investigations of the Static Strength, Notch-Impact Toughness and Fatigue Strength of Welded Structural Steel S.T. 52 after Different Heat Treatments and after Welding with Pre-heating.* K. L. Zeyen, Tech. Mitt. Krupp. Forschber, Vol. 3, 1940, pp. 87-98.) (Chem. Absts., Vol. 34, No. 19, 10/10/40, p. 6,556.)
72/181	U.S.S.R. ...	*Casting Properties of Magnesium Alloys Containing Beryllium and Calcium.* (A. S. Lugaskov, Aviapromyshlennost, 1938, No. 2, pp. 43-6.) (Chem. Absts., Vol. 34, No. 19, 10/10/40, p. 6,558.)
72/182	U.S.S.R. ...	*Resistance of Cast Magnesium Alloys to Dynamic Loads.* (A. S. Lugaskov, Aviapromyshlennost, 1938, No. 5, pp. 20-4.) (Chem. Absts., Vol. 34, No. 19, 10/10/40, p. 6,558.)
72/183	U.S.A. ...	*Protection of Iron and Steel Against Corrosion.* (J. C. Hudson, Iron and Steel, 1940, Vol. 13, pp. 111-3, 158-9.) (Chem. Absts., Vol. 34, No. 19, 10/10/40, p. 6,559.)
72/184	U.S.A. ...	*Solutions for Metal Cleaning.* (T. K. Cleveland, Monthly Rev. Amer. Electroplaters Soc., Vol. 27, 1940, pp. 432-442.) (Chem. Absts., Vol. 34, No. 19, 10/10/40, p. 6,731.)
72/185	Great Britain	*The Tinning of Piston Rings.* (Engineering, Vol. 150, No. 3,906, 22/11/40, p. 410.) (Abstract available.)
72/186	U.S.A. ...	*Synthetic Rubbers.* (L. A. Wood, Engineering, Vol. 150, No. 3,906, 22/11/40, pp. 419-420.)
72/187	Great Britain	*The Science of Rheology (Deformation and Flow of Matter).* (Nature, Vol. 146, No. 3,705, 2/11/40, pp. 580-582.)
72/188	Great Britain	*Transformer Insulating Oils.* (Nature, Vol. 146, No. 3,705, 2/11/40, p. 594.)
72/189	Great Britain	*Use of Cork in Aircraft.* (Airc. Prod., Vol. 11, No. 12, Dec., 1940, pp. 379-381.)
72/190	Great Britain	*Protection of Magnesium Alloys.* (Airc. Prod., Vol. 11, No. 12, Dec., 1940, pp. 408-411.)
72/191	U.S.A. ...	*Trimming Tabs Made of Plastic Material.* (Autom. Ind., Vol. 34, No. 21, 15/10/40, pp. 434-5.)
72/192	U.S.A. ...	*Electroplating Aluminium and its Alloys.* (Autom. Ind., Vol. 34, No. 21, 15/10/40, pp. 435-6.)
72/193	Great Britain	*The Tocco Process for Hardening Steel.* (Engineering, Vol. 150, No. 3,907, 29/11/40, pp. 426-7.)
72/194	Great Britain	*The Influence of Some Special Elements upon the Strain-Ageing and Yield Point Characteristics of Low-Carbon Steels.* (C. A. Edwards, D. L. Phillips and H. N. Jones, Paper to Iron and Steel Inst., 12/9/1940.) (Engineering, Vol. 150, No. 3,907, 29/11/40, p. 434.)
72/195	Great Britain	*Fatigue of Helical Springs.* (Tatnall, Mech. World, 22/11/40, pp. 373-5.) (Met. Vick. Tech. News Bull., No. 739, 29/11/40, p. 5.)

ITEM NO.		TITLE AND JOURNAL.
72/196	Great Britain	*Determining Hardness and Wear Resistance in Light Alloys.* (Light Metals, Vol. 3, No. 35, Dec., 1940, pp. 299-305.)
72/197	Great Britain	*Age-Hardening Magnesium Alloys.* (W. F. Chubb, Light Metals, Vol. 3, No. 35, Dec., 1940, pp. 306-8.)
72/198	U.S.A. ...	*Rubber Die: Pad Used with Single Forming Die (Guerin Process).* (Sci. Amer., Vol. 163, No. 6, Dec., 1940, p. 314.)
72/199	U.S.A. ...	*Cold Setting Resin Adhesive (Weldwood Plastic Resin Waterproof Glue).* (Sci. Amer., Vol. 163, No. 6, Dec., 1940, p. 329.)
72/200	U.S.A. ...	*Indium as a Constituent of Bearing Alloys.* (Sci. Amer., Vol. 163, No. 6, Dec., 1940, p. 331.)
72/201	U.S.A. ...	*"Vicalloy" Magnetic Alloy (Co-Va-Fe).* (Sci. Amer., Vol. 163, No. 6, Dec., 1940, p. 340.)
72/202	U.S.A. ...	*Inter-relation between Stress and Strain in the Tensile Test.* (E. J. Janitzky and M. Boeyertz, Trans. Am. Soc. Metals, 1940, Vol. 28, pp. 714-23.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,234.)
72/203	U.S.A. ...	*The Possibilities of Employing Measurements of Electrical Conductivity at Increasing Temperatures in Consttutional Investigations and in Practical Testing.* (H. Borchers and H. Egler, Aluminium Archiv., No. 19, 1939, 23 pp.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,234.)
72/204	U.S.A. ...	*Fatigue with Reference to Wrought Aluminium Alloys.* (G. Forrest, Metallurgia, Vol. 22, No. 128, 1940, pp. 51-3.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,235.)
72/205	Japan ...	*On the Relation Between Fatigue Strength and Elastic Limit, I for Cold-Drawn Materials of Various Reduction Percentages.* (I. Igarasi and S. Hukai, Trans. Soc., Mech. Eng., Japan, Vol. 5, No. 20, 1939, pp. 3-15.) (In English.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,235.)
72/206	Japan ...	*Further Experiments in the Pitting of Metals (Duralumin).* (T. Nishihari and T. Kori, Trans. Soc. Mech. Eng., Japan, Vol. 5, No. 21, 1939, pp. 89-97.) (In English 90-1.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,235.)
72/207	U.S.A. ...	*Processing Trends in Powder Metallurgy.* (P. Schwarzkopf and C. G. Goetzel, Iron Age, Vol. 146, No. 12, 1940, pp. 39, 45.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,236.)
72/208	U.S.A. ...	*Study of Lattice Distortion in Plastically Deformed Alpha Iron (X-Ray Technique for Studying Plastically Deformed Metals).* (N. P. Goss, Am. Inst. Min. Metal. Eng. Tech. Publ., No. 1,218, 1940, 15 pp.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,239.)
72/209	U.S.S.R. ...	*Anti-Friction Alloys with an Aluminium Base.* (O. E. Kestner, Aviapromyshlennost, No. 7, 1939, pp. 39-44.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,257.)
72/210	U.S.A. ...	*Brazing Aluminium Alloys.* (A. H. McGraw, Prod. Eng., Vol. 11, 1940, pp. 176-9.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,257.)

ITEM NO.		TITLE AND JOURNAL.
72/211	Italy ...	*On the Correct Interpretation of Certain Phenomena whch may Occur During the Heat Treatment of Aluminium Alloys.* (C. Panseri and M. Monticelli, Alluminio, Vol. 8, 1939, pp. 183-91.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,257.)
72/212	U.S.A. ...	*A Comparison of Single Heat Treatment and Double Heat Treatment Aluminium Alloys.* (O. R. Smith, Metallurgia, Vol. 22, No. 127, 1940, pp. 25-7.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,257.)
72/213	U.S.S.R. ...	*The Phenomenon of " Growth " of the Aluminium Alloy Y.* (V. V. Chichagov and E. I. Demicheva, Aviapromyshlennost, 1938, No. 9, pp. 33-7.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,258.)
72/214	U.S.A. ...	*Lead Bearing Aluminium-Magnesium Alloys (Free-Cutting Alloys).* H. Bauer, Aluminium Arch., No. 24, 1939, 30 pp.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,258.)
72/215	U.S.S.R. ...	*Cutting of Aluminium and Magnesium Alloys.* (A. T. Bundin, Aviapromyshlennost, No. 7, 1940, pp. 4-16.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,260.)
72/216	Germany ...	*New Lead Base and Aluminium Base Babbitts.* (M. von Schwarz, Giesserei, Vol. 27, 1940, pp. 137-44.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,261.)
72/217	Japan ...	*Diagram of Endurance Limit of Duralumin for Repeated Tension and Compression.* (T. Nishihara and K. Kozima, Trans. Soc. Mech. Eng., Japan, Vol. 5, No. 20, 1939, pp. 1-2 inEnglish.) (Chem. Absts., Vol 34, No. 21, 10/11/40, p. 7,263.)
72/218	U.S.S.R. ...	*Technology of the Casting of Magnesium Alloys.* (A. S. Lugaskov, Aviapromyshlennost, No. 7, 1940, pp. 28-38.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,264.)
72/219	U.S.S.R. ...	*Alloys of Magnesium with Cadmium (Increased Corrosion Resistance).* (K. V. Peredelsky, Aviapromyshlennost, No. 7, 1940, pp. 40-2.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,265.)
72/220	U.S.A. ...	*Corrosion of Aluminium Alloys in Salt Spray.* (W. Nitzsche, Aluminium Arch., No. 22, 1939, 44 pp.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,271.)
72/221	U.S.A. ...	*Atomic Hydrogen for Welding.* (R. M. Fenton and E. W. Dougherty, Iron Age, Vol. 146, No. 3, 1940, pp. 40-2.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,272.)
72/222	U.S.A. ...	*Fluxes for Welding Aluminium.* (E. G. West, Inst. Welding, Quart. Trans., Vol. 3, No. 2, 1940, pp. 93-105.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,273.)
72/223	U.S.S.R. ...	*Preparation of Flux Containing Welding Material for Welding Aluminium Alloys.* (A. A. Abinder and I. M. Gryaznov, Aviapromyshlennost, No. 5, 1939, pp. 61-2.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,273.)
72/224	U.S.A. ...	*Laboratory Tensile Tests Shed Light on " Fish-Eye " Fractures in Weld Metal.* (M. Ferguson, Welding Engr., Vol. 25, No. 4, 1940, pp. 22-3.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,274.)

ITEM NO.		TITLE AND JOURNAL.
72/225	Germany ...	*Tension Measurements on Synthetic Resin Press Materials.* (J. Schmitz, Kunststofftech. und Kunststoffanwend, Vol. 10, 1940, pp. 25-8.) (Chem. Absts., Vol. 34, No. 21, 10/11/40, p. 7,478.)
72/226	U.S.A. ...	*Modern Aircraft Materials and Their Testing.* (K. R. Jackman, J.S.A.E., Vol. 47, No. 5, Nov., 1940, pp. 461-73, 496.) (Abstract available.)
72/227	U.S.A. ...	*Plastic Metals.* (S. J. French, Sci. Am., Vol. 163, No. 5, Nov., 1940, pp. 262-4.)
72/228	Switzerland...	*Hot Strength of Various Aluminium Alloys.* (A. von Zeerleder, Inter. Avia., No. 732, 21/10/40, pp. 1-4.) (Abstract available.)
72/229	Great Britain	*"Tocco" Process for Hardening Steel Surfaces.* (Engineering, 29/11/40, pp. 426-7.) (Abstract available.)
72/230	Great Britain	*A Survey of the British Patents on the Anodic Oxidation of Aluminium.* (Metal Industry, Vol. 57, No. 23, 6/12/40, pp. 453-456.)
72/231	Japan ...	*Dynamical Stability of a Column Under Periodic Longitudinal Forces.* (I. Utida and K. Sezawa, Aer. Res. Inst., Tokyo, Vol. 15, No. 193, August, 1940.) (Abstract available.)
72/232	Japan ...	*Some Experiments on the Forced Vibration of Varying Period.* (K. Sezawa and W. Watanabe, Aer. Res. Inst., Tokyo, Vol. 15, No. 195, Aug., 1940.) (Abstract available.)
72/235	Great Britain	*Theory of Large Elastic Deformation.* (M. Mooney, J. Applied Physics, Vol. 11, September, 1940, pp. 582-92.) (Sci. Absts., A, Vol. 43, No. 515, 25/11/40, pp. 730-1.)
72/236	U.S.A. ...	*Flame and Induction Hardening (Shorter and Tocco Processes).* (Autom. Eng., Vol. 30, No. 405, Dec., 1940, pp. 398-400.)
72/237	U.S.A. ...	*Rubber in Compression. A Study of Load Deformation (Paper to S.A.E.).* (R. Brown, Autom. Eng., Vol. 30, No. 405, Dec., 1940, pp. 408-9.)

METEOROLOGY AND PHYSIOLOGY.

72/238	U.S.A. ...	*An Improved Radio Sonde and its Performance.* (H. Diamond, W. S. Hinman, F. W. Dunmore and E. G. Lapham, Bur. Stan. J. Res., Vol. 25, No. 3, Sept., 1940, pp. 327-67.) (Abstract available.)
72/239	Great Britain	*Atmospheric Pollution.* (Engineering, Vol. 150, No. 3,906, 22/11/40, p. 415.)
72/240	Switzerland...	*Psycho-Medical Investigation on Flying Accidents.* (H. Meier-Muller, Flugwehr und-Technik, Vol. 2, No. 1, Jan., 1940, pp. 12-14.) (Abstract available.)
72/241	Italy ...	*Improved Type of Radio Sonde.* (Inter. Avia., No. 728, 19/9/40, p. 4.) (Abstract available.)

MISCELLANEOUS.

72/242	Great Britain	*The Design of High Pressure Plant and the Properties of Fluids at High Pressures.* (O.U.P. 35/-.) D. M. Newitt, Engineering, Vol. 150, No. 3,905, 15/11/40, pp. 383-384.)

ITEM NO.		TITLE AND JOURNAL.
72/243	Great Britain	*The Production of O.M.T. Optical Flats for Test Purposes.* (Engineering, Vol. 150, No. 3,905, 15/11/40, pp. 385-386.)
72/244	Great Britain	*Foundations of the Electrical and Mechanical Transmission of Energy.* (W. M. Thornton, Engineer, Vol. 170, No. 4,426, 8/11/40, pp. 302-303.)
72/245	Great Britain	*Foundations of the Electrical and Mechanical Transmission of Energy (cont. from p. 303).* (W. M. Thornton, Engineer, Vol. 170, No. 4,427, 15/11/40, pp. 318-9.)
72/246	Great Britain	*The Air-Driven Ultracentrifuge.* (F. R. Eirich and E. K. Rideal, Nature, Vol. 146, No. 3,704, 26/10/40, pp. 541-2, 551-2.)
72/247	Great Britain	*Directional Stability of Ships.* (Nature, Vol. 146, No. 3,704, 26/10/40, p. 563.)
72/248	Great Britain	*Searching the Literature of Science.* (E. L. Jones, J. Sci. Inst., Vol. 17, No. 11, Nov., 1940, pp. 253-257.)
72/249	Great Britain	*Molecular Fields of Force—Retrospect and Suggestions.* (S. Chapman, Nature, Vol. 146, No. 3,706, 9/11/40, pp. 607-609.)
72/250	U.S.A. ..	*Mathematics from the Engineers' Viewpoint. (Paper to Amer. Inst. Mech. Engs.).* (T. von Karman, Engineer, Vol. 170, No. 4,427, 15/11/40, pp. 310-2.)
72/251	Great Britain	*Report of the Fuel Research Board.* (Engineering, Vol. 150, No. 3,908, 5/12/40, p. 445.)
72/252	U.S.A. ...	*Car Riding Comfort and Cushions.* (W. E. Lay and L. C. Fisher, J.S.A.E., Vol. 47, No. 5, Nov., 1940, pp. 482-96.) (Abstract available.)
72/253	U.S.A. ...	*Wearless Tap Washer.* (Sci. Am., Vol. 163, No. 5, November, 1940, pp. 279-80.)
72/254	Great Britain	*Statistical Methods in Engineering Practice.* (H. Rissik, Engineer, Vol. 170, No. 4,432, 20/12/40, pp. 389-90.)
		PHOTOGRAPHY.
72/255	Great Britain	*The Chemistry of Photo-Copying Processes (Part II—The Diazotype Process).* (H. D. Murray, Chem. and Ind., Vol. 59, No. 46, 16/11/40, pp. 769-770.)
72/256	Great Britain	*Air Photography Applied to Surveying (Longmans, Green and Co., Ltd.,* 1940, 25/-). (C. A. Hart, Nature, Vol. 146, No. 3,705, 2/11/40, pp. 572-3.)
72/257	U.S.A. ...	*Examples of Night Aerial Photography.* (American Aviation, No. 10, 15/10/40, p. 26.)
		SOUND, LIGHT AND HEAT.
72/258	Great Britain	*On Maintained Convective Motion in a Fluid Heated from Below.* (A. Pellew and R. V. Southwell, Proc. Roy. Soc., Vol. 176, No. 966, 1/11/40, pp. 312-343.)
		WIRELESS AND ELECTRICITY.
72/259	Germany ...	*German Radio Equipment.* (Flight, Vol. 38, No. 1,664, 14/11/40, pp. g-h.)
72/260	Germany ...	*Electricity Problems in Germany.* (Nature, Vol. 146, No. 3,704, 26/10/40, p. 565.)
72/261	U.S.A. ...	*Ultra-Short Wave Transmission over a 39-Mile "Optical" Path.* (C. R. Englund, A. B. Crawford and W. W. Mumford, Proc. Inst. Rad. Engs., Vol. 28, No. 8, Aug., 1940, pp. 360-9.) (Abstract available.)