

## ABSTRACTS OF PATENT SPECIFICATIONS.

(Specially abstracted for the Journal by W. O. Manning, F.R.Ae.S.)

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### AEROFOILS.

496,372. *Improvement in Aerofoils.* Craigon, A., 307, Garden Avenue, Toronto, Canada. Convention date (U.S.A.), May 17th, 1937.

The aerofoil consists of a basic wing with fixed chord span and camber and a number of spanwise slidable telescoping wing surfaces or covers of greater camber than the basic wing, but having nearly the same mean chord and superimposable only on the upper surface of the basic wing whereby more or less of the upper surface only of the basic wing may have surfaces of greater camber superimposed thereon, leaving the under surface unaffected and substantially without increasing the area of the aerofoil. One object of this arrangement is to produce a wing which is adjustable at the will of the pilot to suit best the take-off conditions, etc.

### AEROPLANES.

500,541. *Improvements in and relating to Aeroplanes.* Hamburger Flugzeugbau G.m.b.H., Hamburg, 1, Germany, and Vogt, R., 13, Oderfelderstrasse, Hamburg, 37, Germany. Dated Dec. 28th, 1937. No. 10,719.

This is an unsymmetrical aeroplane having the single engine nacelle and the fuselage side by side, placed respectively on each side of the centre line of the machine. In order to compensate for the unsymmetrical thrust, the airscrew may be at an angle to the longitudinal axis of the machine, or a rudder unit in the slipstream may be given an appropriate angle or the leading edge of the tail unit may be caused to form an acute angle with the axis of thrust of the airscrew. Any combination of these methods may be used.

### AIRCRAFT—CONSTRUCTION.

498,516. *Improvements relating to Combined Mechanical and Fluid Operated Controlling Means.* Dowty, G. H., Arle Court, Cheltenham, Gloucestershire. Dated June 8th, 1937. No. 15880.

The proposed control means for aircraft wings, flaps, etc., comprises a member capable of resisting tension, borne to resist loads transverse to its length and

guided for longitudinal movement. A fluid-operated jack is constructed thereto so that the member may be moved in either direction. The tension member is preferably connected to the flap by a number of short rigid links. The tension member may be made up of short lengths of rod, light tube inter-connected by joints permitting misalignment.

498,063. *Improvements in Aircraft Fuselage and Like Metallic Constructions.* Renault, L., 8, Avenue Emile-Zola, Billancourt (Seine), France. Convention date (France), Oct. 7th, 1936.

It is proposed to cover fuselage structures with thin metal plates which are first subjected to tension. The main structure is formed of frames to which the sheet metal covering is welded or riveted. The longitudinal members pass loosely through the frames, are secured to the end frames, but are not attached to the covering which latter is tensioned after assembly.

497,766. *Improvements in and relating to Light Structures.* Schmid, A., Finkenstrasse 13, Berlin-Dahlem, Germany. Convention date (Germany), July 9th, 1936.

It is proposed to construct structural members by using as the structural material, circular, polygonal, or other tubular elements made of a cellulose derivation and stuck together by means of a solvent. Metal wires or gauze can be embedded in the material. Apart from being stuck together in a bundle with their axes parallel, the components may be attached in an angle or by cross connecting pieces so as to form a composite structure. They may also be enveloped in sheeting of the same or other material.

497,969. *Improvements in or relating to Aircraft.* Handley Page, Ltd., 40, Claremont Road, Cricklewood, Middlesex, and Lachmann Balla, Commons Drive, Canon's Park, Middlesex. Dated July 2nd, 1937. No. 18,426.

This is a tailless aeroplane which has a front elevator in advance of the leading edge of the wing and of the centre of gravity. This aerofoil is freely pivoted so that it preserves a nearly constant angle of incidence, but is at the same time under the pilot's control. The front elevator may have a trimming tab and this tab may be interconnected with flaps on the wing so as to counteract the pitching moment caused by lowering the flaps.

498,010. *Improvements in Flying Machines.* Swingle, E. L., Sawyers Hall Cottages, Brentwood, Essex, England. Dated June 29th, 1937. No. 18,021.

The proposed flying machine has a tilting frame extending across over the oblong frame and carrying lifting airscrews between its edges, one at each side. There is one tilting wing in front of and another behind the tilting frame, two sets of control gear, one of which controls the wings and tilting frame, the other controls the steering.

497,500. *Improvements in or relating to Aeroplanes.* Rose, W. K., 250, Riverside Drive, City and State of New York, U.S.A. Convention date (U.S.A.), Nov. 10th, 1936.

This describes an aeroplane wing which has a number of vanes forming passage-ways between the upper and lower surfaces, the cross section of the passage-ways gradually diminishing from the inlet to the outlet, the passage-ways being curved with its mean line a segment of a flat spiral. The mean lines of the inlet and outlet posts of the passage-ways form an angle of about 90 degrees with each other. Means are provided for controlling the extent to which the passage-ways are open and for closing them,

497,623. *Improvements in or relating to Aircraft Wing Construction.* Deekay Aircraft Corporation and Hart-Still, S. C., both of 39-40, Albemarle Street, London, W.1. Dated June 21st, 1937. No. 29,528.

This is a stressed skin wing of plastic material of multi-cellular type with the cells extending spanwise. There are thin vertical sheet members with enlarged sections at top and bottom, these, with top and bottom horizontal members, complete the cells. The plastic used may be a synthetic resin combined with a cellulose fluff, or the resin may be of the phenol type. The vertical members are parallel and are of the full depth of the structure, while the horizontal members are of aerofoil shape.

500,076. *Aerofoil Structure.* Barkley, A. St. C., 318e, Grand Boulevard, Detroit, Michigan, U.S.A. Dated Jan. 12th, 1938. No. 1,030.

The wing structure proposed has longitudinally fluted sheet steel metal segments secured together and arranged to form a series of closed polygonal or circular passages extending lengthwise; reinforcing members are secured to the upper and lower stressed skins and to the segments. The segments have their opposite edges bent back towards each other forming a series of laterally spaced longitudinally extending triangular cells.

499,068. *Improvements in and relating to Wings, Control Surfaces, Rudders, and the Like of Aircraft.* Junkers Flugzeug-und-Motorenwerke Aktiengesellschaft, 39, Junkersstrasse, Dessau, Anhalt, Germany. Convention date (Germany), Feb. 8th, 1937.

The parts are formed by box type girder supports, the width of which occupies a considerable portion of the chord of the member and which are divided longitudinally. The two parts are detachable. The effect is to provide a stable rigid body. The upper and lower boundary walls of the box are formed by buckling and bending resistant upper and lower longitudinal walls over a considerable zone of the chord.

496,003. *Improvements in or relating to Folding Wing Aircraft.* The Fairey Aviation Co., Ltd., North Hyde Road, Hayes, Middlesex, and Trotter, J. C., 2, Manor Parade, Hillingdon, Middlesex. Dated Nov. 30th, 1937. No. 33,094.

In the case of low wing monoplanes where folding is carried out by means of a vertical hinge between the wing and the fuselage, an inner portion of the rear part of the wing is adapted to be folded over the wing itself. This inner portion is adapted to be swung about its hinge by means of a pair of links which are pivoted together and which are also pivoted respectively, the one to the main portion of the wing and the other to the inner portion. A screw jack may be mounted so as to act on these links, or they may be operated by a screw jack by hand.

496,161. *Improvements in or relating to Folding Wing Aircraft.* The Fairey Aviation Co., Ltd., North Hyde Road, Hayes, Middlesex, and Lobelle, M. J. O., Ludlow, 298, Langley Road, Langley, Bucks. Dated Nov. 30th, 1937. No. 33,095.

In the case of a monoplane wing hinged for folding by a vertical hinge, a part of the inner rear portion of the wing can fold over or under the wing itself, the rear portion of the wing can be raised or lowered by pushing action of the one or the other of two levers of the first order with one arm of which the flap is connected, said lever being pivotally mounted on said portion of the wing, and said rods being slidably mounted on the stub of the wing or a part carried thereby.

492,796. *Improvements in or relating to the Construction of Aircraft and Other Vehicle Bodies, Containers, or Other Light Hollow Bodies.* Klemm, H., Waldurgstrasse 29, Boblingen, Germany. Convention date (Germany), Nov. 5th, 1936.

It is proposed to make fuselages, etc., by making partial sections which are manufactured independently and then joined together. For manufacturing a partial shell, cut along one of the longitudinal sections of the body, stiffening members or cross frames are first inserted in a mould and the skin parts stretched over and secured on the stiffening members. The partial shell is then removed from the mould and joined to others by means of their stiffening members.

490,964. *Improvements in or relating to Folding Wing Aircraft.* The Fairey Aviation Co., Ltd., North Hyde Road, Hayes, Middlesex; Lobelle, J. O., Ludlow, 298, Langley Road, Langley, Bucks; and Trotter, J. C., 2, Manor Parade, Hillingdon, Middlesex. Dated May 22nd, 1937. No. 14,330.

The folding trailing marginal portions of an aircraft wing, including flaps, are supported by triangular brackets which are hinged at one corner or near one corner of the upper surface of the wing and are detachably secured at another corner or near the other surface of the wing, while a third corner forms a pivot about which the flap rotates. The operation of the flap may be effected by means of a hydraulic jack connected at one end with the rear of the flap and at the other end with the rear of the folding portion. Preferably the folding of the marginal portion is effected with the flap in its lowered position and means may be provided which straighten the flap during the folding operation.

494,177. *Improvements in Variable Camber Wings.* Grant, C. H., 166, Centre Avenue, New Rochelle, Westchester, New York, U.S.A. Convention date (U.S.A.), May 6th, 1936.

The proposed wing is rigid except for the trailing edge which has a number of separate sections pivotally inter-connected which are free to rotate the members curving downwards so as to act as a flap. The means for operating are situated below the pivotal connections of the members.

494,233. *Improvements in or connected with the Construction of Wings, Fuselages, or Other Aircraft Bodies.* Vickers (Aviation), Ltd., and Wallis, B. N., both of Weybridge Works, Brooklands Road, Weybridge, Surrey. Dated April 21st, 1937. No. 11,381.

This is a method of arranging the geodetic members so that it is no longer necessary to interrupt them on the longitudinal members. The geodetic members extend uninterruptedly past the places where the longitudinal members are placed, and the bracing members are apertured to allow the longitudinal members to be threaded through them, the parts being fixed together by means, say, of a pin. The longitudinal members are of greater depth than breadth.

#### AIRSCREWS.

499,622. *Improvements in or relating to Apparatus for Driving Co-axial Propellers in Opposite Directions.* Aeroplani Caproni Societa, Anonima, 76, Via Caio Clino Mecenate, Milan, Italy. Convention date (Italy), March 25th, 1937.

The propellers are driven by normal reduction gears, but in the drive to one of them there is interposed an arrangement of three mutually intermeshed bevel gears which reverse the direction of rotation. The lubricating oil, after passing through the oppositely rotating parts is collected in the form of a centrifugally produced annulus and means are provided for tapping oil from the annulus and returning it to the supply. This tapping is effected by means of a radial nozzle rotating in a direction opposite to that of the annulus.

496,278. *Improvement in the Propulsion of Aircraft.* Killen, J. W., Knockmore, Lawrence Hill, Londonderry, and Usher, H. A., 12, Heath Drive, West Wimbledon, London, S.W.20. Dated May 28th, 1937. No. 14,790.

This describes a propeller in which the blade or blades are arranged to be tilted at definite regions in their rotary path about the axis of the driving shaft, comprising a blade carrying shaft arranged at a right angle to the axis of the driving shaft so mounted on the end of the driving shaft that it is capable of limited longitudinal motion and is provided with a screw-threaded element which engages a relatively fixed nut element on the driving shaft, provision being made whereby the blade-carrying shaft has imparted to it an axial reciprocating motion whereby the nut and screw impart to it an oscillatory rotary movement during which the blades are tilted in the desired manner.

#### ARMAMENT.

497,938. *Aerial Forts.* Jones, T. B., Gwessin Villa, Tregoo, Llandyssul, Cardiganshire. Dated June 28th, 1937. No. 17,902.

The aerial fort is intended to be elevated over cities for anti-aircraft protection, and it consists of two frames, one of which is connected to the ground by a cable and the other frame is hinged to the first and carries electric motors driving lifting airscrews. The first frame is hinged to the other at a point above its centre of gravity so that a horizontal component of the thrust is automatically introduced to counteract drift. The second frame may carry personnel and equipment.

494,256. *Improvements in or relating to Aeroplanes.* Redgrave, K., and Scottish Aircraft and Engineering Co., Ltd., both of Scotia Works, Hythe Road, Willesden, London, N.W.10. Dated April 23rd, 1937, No. 11,701, and April 23rd, 1937, No. 11,702.

In the case of aircraft having bodies with external contours designed to augment the lift of the machine, it is proposed to arm such machine with guns approximating to 37 mm. bore, and to mount these guns in retractable turrets at the stem corners of the main framework. The turrets are rotatable in housings and the guns may protrude above or below the machine. Alternatively, a single gun may be disposed centrally.

494,222. *Improvements in or relating to the Armament of Aeroplanes.* Cook, F., 51, Pickering Road, Hull, Yorks. Dated May 30th, 1938. No. 16,066.

It is proposed to mount guns to fire laterally, the guns being operated by such means as Bowden cables, there being provided a sighting device by means of which the gunner can follow the field of view traversed by the guns as a result of manœuvring the aeroplane so that the gun can be trained on a target. The guns are to be mounted horizontally sideways on each wing, usually at the wing tip, though in certain cases they may be within the fuselage. The sighting device may be a form of periscope.

#### CONTROL OF AIRCRAFT.

497,953. *Improvements in Gyroscopes.* Societe Civile d'Etudes de Constructions Aeronautiques (E.C.A.), 3, rue Saint Georges, Paris, France. Convention date (France), June 30th, 1936.

This is a device for the automatic stabilisation of vehicles, especially aeroplanes, and also for indicating the velocity of a movement caused by a disturbance. The apparatus is utilised for angularly moving the frame of a precession gyroscope, this movement being used for control.

497,509. *Improvements in or relating to Aircraft Landing Flaps and Control Surfaces.* Dornier-Werke G.m.b.H. and Dr. Ing. C. Dornier, both of Friedrichshafen, Lake Constance, Germany. Convention date (Germany), Dec. 5th, 1936.

This is an apparatus for controlling aircraft flaps and control surfaces so that each member, when at rest, forms a continuous profile with the wing. Each flap or control comprises two or more members rotatable about a common axis which, when they are operated, is controlled in such a manner that the member lying in the direction of flight is always within the wing. The gear used is self-locking.

499,503. *Improved Hinge Mechanism for the Moving or Control Surfaces of Aircraft.* Tampier, R., 1, rue de Bellevue, Boulogne-sur-Seine, France. Dated July 29th, 1937. No. 21,015.

It is proposed to provide a casing, a lever, or hinge arm secured on a shaft rotatably mounted on bearings at one end of the casing. A control lever is fixed to a shaft at right angles to the first shaft mounted on bearings at the opposite end of the casing. Cranks extend from each shaft within the casing and their ends are connected by, for example, ball joints attached to a third member.

499,632. *Improvements in Aircraft Designed to Facilitate Take-off and Landing.* Hammond, E. V., 88, Louisville Road, Balham. Dated April 14th, 1938. No. 11,470.

A normal aeroplane is provided with a retracting rotor for giving additional lift while the normal stabilising parts of the aircraft are modified so as to confer the stability necessary. These modified or additional means of stability coming into action when the rotor is extended from its housing and going out of action when the rotor is retracted. The retraction or extension of the undercarriage may also be operated in conjunction with similar operations to the rotor. The rotor may have only one blade.

499,833. *Improved Means for Controlling the Moving Surfaces of Aircraft.* René Tampier, 1, rue de Bellevue, Boulogne-sur-Seine, France. Dated July 29th, 1937. No. 21,016.

This specification refers to variable contour aerofoils or control surfaces which it is proposed to make in several parts and to hinge them together in tandem relative movement of the parts being effected by axially slidable members which move along the hinge axes. The transmitting means between each pair of hinges consists of the axially slidable member and a mechanical transmission consisting of bell-crank levers operatively connecting the displaceable members.

495,876. *Improvements in or relating to Means for Controlling and Trimming Aircraft.* Brown, D. B. W., Dobbs Ferry, Westchester County, New York, U.S.A. Convention date (U.S.A.), July 25th, 1936.

In order to overcome the propeller torque of aircraft use may be made of the horizontal tail control surfaces by operating them differentially or in unison. When operated differentially a rolling moment is produced; they are operated in unison for control. These control means have been devised specially for use with two co-axial airscrews carried by concentric shafts rotating in opposite directions and are brought into operation when one engine stops or is working at lower power than the other. They may, however, be used with any type of engine arrangement where an engine torque acts on the aeroplane.

496,054. *Improvements in Controls for Aircraft.* Andrews, W. R., and Scottish Aircraft and Engineering Co., Ltd., both of Scotia Works, Hythe Road, Willesden, London, N.W.10. Dated May 26th, 1937. No. 14,635.

This arrangement relates to controls having a large pivoted surface operated by the pilot and a smaller auxiliary movable surface mounted on the large surface and operated with it. The main control surface has a portion of its chord projecting in front of its hinge so that it is inherently unstable, the smaller surface is hinged to the main surface at a point behind the hinge of the latter. The main surface is controlled by the pilot through a device which allows automatic movement of the main surface owing to its inherent instability and additional to the hand control a mechanism for operating the auxiliary surface independence on the movements of the operating member and main control surface so as to control the automatic movement.

494,257. *Improvements in Control Devices for Aircraft.* Andrews, W. R., and Scottish Aircraft and Engineering Co., Ltd., both of Scotia Works, Hythe Road, Willesden, London, N.W.10. Dated April 23rd, 1937. No. 11,706.

This specification describes an irreversible control. A gearbox is interposed between the pilot and the control which contains multiplying gearing having a driving wheel operated manually and a driven wheel engaging by means of a screw with an axially movable shaft. The movements of this are communicated by means of a link to a rocking lever on the gearbox, this lever being coupled to the control to be operated.

496,153. *Improved Arrangement of and Locking Devices for Aircraft Control Levers.* Tampier, René, 1, rue de Bellevue, Boulogne-sur-Seine, France, Dated Aug. 28th, 1937. No. 23,605.

The arrangement consists of mounting an assemblage of pivoted levers loosely on a shaft, and providing each lever with a friction surface adapted to co-operate with a friction surface on a fixed member. The assembly can be compressed axially so as to regulate the frictional resistance and there are further means for so increasing the friction as to lock the levers. The means for compressing the assembly may consist of a screwed hand wheel, and the assembly may be locked by means of a hand lever fixed on a nut which is arranged to engage the thrust transmitting member.

496,522. *Improvements in or relating to the Control Surfaces of Aircraft.* The Fairey Aviation Co., Ltd., North Hyde Road, Hayes, Middlesex, and Trotter, J. C., 2, Manor Parade, Hillingdon, Uxbridge, Middlesex. Dated Oct. 2nd, 1937. No. 26,733.

The wing has a flap which is provided with a spoiler which is brought into action automatically when the flap is lowered beyond the position corresponding with maximum lift. The spoiler then closes the gap between the undersurface of the wing and the leading edge of the flap. The spoiler is connected to the trailing edge of the wing and is connected with link and lever mechanisms so disposed that when the flap has been lowered to the position of maximum lift the spoiler acts as desired.

496,526. *Improved Mechanism for Actuating the Control Surfaces of Aircraft.* The Fairey Aviation Co., Ltd., North Hyde Road, Hayes, Middlesex, and Trotter, J. C., 2, Manor Parade, Hillingdon, Middlesex. Dated Dec. 1st, 1938. No. 33,988.

In order that a wing flap may be lowered from its normal retracted position to a position below the wing and at the same time rotated to the desired angle about a point near the centre of pressure, the flap is carried by pivoting to the rear ends a pair of beams carried in turn by the wing through a pair of links

pivotaly connected with the wing and with the beams at an intermediate point and through the medium of a jack mounted on the wing and connected with the front ends of the beams. Operating the jack provides the desired action of the flap.

496,609. *Aeroplane Flight Control*. The Glenn L. Martin Co., Middle River, Baltimore, Maryland, U.S.A. Convention date (U.S.A.), Dec. 16th, 1936.

The proposed flap is spaced from the wing by a slot, which latter can be obstructed by a shutter mechanism, including differentially operable mechanism for positioning the shutter to open the slot upon the adjustment of the flap from a high speed position. The shutter closes the slot so long as the two elements are in a substantially aligned position and in the train of elements for opening the flap there are a number which continue to move with the adjustment of the flap while the adjustment of the shutter is being completed.

496,875. *Improvements in Means for Controlling the Movements of Ailerons, Rudders and Elevators of Aircraft*. Tampier, René, 1, rue de Bellevue, Boulogne-sur-Seine, France. Dated May 6th, 1937. No. 12,947.

Control movements are effected by means of a screwgear comprising a screw and a nut. The axial travel of the nut along the screw is converted into a rotary movement which is then applied to the control surface. The proposed arrangement of this type is a device arranged so that it can be used as a hinge. A frictional arrangement is provided for the purpose of damping out vibrations and the arrangement generally is irreversible.

497,074. *Improvements in or relating to Lift-Increasing Devices for Aeroplane Wings*. United Aircraft Corporation, 400, South Main Street, East Hartford, Connecticut, U.S.A. Convention dates (U.S.A.), June 12th, 1936, and Aug. 4th, 1936.

Between the wing and the flap a slot is provided in which a deflector plate is located near the exit so that its leading edge projects into the slot. This deflector plate moves with the flap so as to extend and curve the wing slot so as to cause it to discharge air over the upper surface of the flap. The deflector plate may be so arranged so as to divide the slot into two portions, one of which always discharges the air in a fixed position with regard to the flap. A door may be used for closing the wing flap.

490,850. *Improvements in Aircraft Flaps*. Marenday, D. M. K., Barton Airport, Barton, Bedfordshire. Dated Feb. 13th, 1937. No. 4,321.

The combination of an aircraft wing with a flap or set of flaps normally housed within the wing and movable either into a position to increase the drag or into a position to increase the lift. There is an auxiliary aerofoil beneath the main wing at a point other than the trailing edge, adjustable from the folded position into a position where it is below and distant from the wing. The flap may be hinged to one of the wing spars and may be of true aerofoil section.

495,711. *Improvements in Distributing Apparatus for the Control of Two or More Distinct and Concomitant Devices*. Mercier, J., 131, Boulevard de la Seine, Neuilly-sur-Seine, Seine, France. Dated May 13th, 1937. No. 13,525.

This is a device for the simultaneous control by means of a fluid of distinct devices, such as flaps, split flaps, ailerons, brakes, etc. There is a cylinder with lateral openings for the inlet, the outlet, and the distribution of the fluid, and a slide valve member, balanced in the lateral and longitudinal directions, the valve being connected to the control member of the aircraft and arranged to follow the



movements thereof, provided in the case where a disturbance occurs in the symmetrical motion of distinct devices for the correction of this result by separating or connecting the inlet or outlet with the conduit controlling one of the aforesaid distinct devices.

494,110. *Improvements in or relating to Controls for Aircraft.* Andrews, W. R., and Scottish Aircraft and Engineering Co., Ltd., Scotia Works, Hythe Road, Willesden, London, N.W.10. Dated April 23rd, 1937. No. 11,704.

This is a dual control mechanism and two control members of the type consisting of a shaft slidably but non-rotatably mounted in a member rotatable, but prevented from endwise movement are directly coupled to the elevator, and are inter-connected so that the sliding movement operates the elevator. The rotatable members are also inter-connected and coupled to the ailerons so that turning movements can be controlled by either of the two shafts.

494,146. *Improvements in or relating to Actuating Systems for Controls on Aircraft.* Siemens Apparate und Maschinen Gesellschaft mit Beschränkter Haftung, Askanischer, Platz 4, Berlin, S.W.11, Germany. Convention date (Germany), Jan. 16th, 1936.

The control system has a hand control and an auxiliary power actuator, both being attached to the control to be operated, the control surface having a regulating member disposed in or connected with the transmission from the hand control to the member to be actuated. The regulating member is so adjusted that the displacing force applied by the auxiliary power is related to the manual force. The adjustment can be effected by means of the hand control member in the event of the failure of the operating medium. A further auxiliary power actuator is fitted so as to nullify the effect upon the hand control of friction landing flap actuations or the like.

494,148. *Improvements in or relating to Liquid Pressure Control Systems.* Automotive Products Co., Ltd., Brock House, Langham Street, London, W.1, and Parker, S. M., of the same address. Dated Dec. 18th, 1937. No. 2,816.

This control system is intended for the operation of controlled units on aircraft which are assisted in one direction by gravity. The pump operates a double acting slave cylinder, and the valve controlling the fluid flow limits the rate of flow of the liquid as the controlled unit moves under gravity. At the same time it allows unrestricted flow of liquid into the same end of the slave cylinder to move the controlled unit in the opposite direction, by means of a by-pass valve opened to by-pass the flow limiting valve so that in the event of an increase in the resistance to movement of the controlled unit by the resulting rise in pressure in the liquid flowing to the slave cylinder.

492,669. *Improvements relating to Means for Equalising or Balancing the Operation of Aircraft Flaps, Retractable Undercarriages, or other Adjustable Aircraft Elements.* Dowty, G. H., Arle Court, Cheltenham, Gloucestershire. Dated March 23rd, 1937. No. 8,530.

In order to ensure equality of movement of two separate components such as wing flaps or undercarriages, they are interconnected by a double acting hydraulic piston and cylinder and cross connections between the opposite sides of the pistons thereof so that fluid displaced by the movement of the piston operating with one part is accommodated by the equal movement of the piston operating with the other part. The pistons and cylinders may be arranged in tandem fashion as double acting jacks.

## DE-ICING.

495,570. *Improvements connected with the Prevention of Ice Formation on the Wings and Other Parts of Aircraft.* Bullock, B. C., 28, Victoria Street, London, S.W.1. Dated April 14th, 1937, No. 10,644, and Sept. 25th, 1937, No. 26,032.

The method proposed consists of a closely woven fabric formed partly of wire and partly of fabric, secured along the leading edges of the wing or other parts of the aircraft, and to be supplied along the inner or outer side with an anti-freezing fluid so that the fluid may seep through the fabric. The warp may be of wire and the weft of yarn or vice-versa.

495,635. *Improvements Connected with the Prevention of Ice Formation on the Wings and Other Parts of Aircraft.* Bullock, B. C., 28, Victoria Street, London, S.W.1. Dated April 14th, 1937, No. 21,896; June 10th, 1937, No. 21,897; and Sept. 25th, 1937, No. 21,898.

There is secured along the leading edges of the wing or other parts a covering of a closely woven cloth consisting partly of wire and partly of yarn and an anti-freezing fluid is allowed to seep through the cloth. The cloth may be held by clamps in recesses within the leading edges of the wing and the anti-freezing fluid may be supplied to a looped portion held in the clamp, the cloth being turned back and secured along the leading edge at each side of the recess. The cloth may be in separate sections and each held in its own clamp and each supplied with anti-freezing mixture by a separate pipe.

## ENGINES.

498,224. *Improvements in Elastic Mountings for Engines and the Like.* d'Aubarede, P.C.A.M., Saint Genis-Laval, Rhone, France. Convention dates (France), June 9th, 1936, and Dec. 16th, 1936.

It is proposed to insert a universal transmission joint between an engine and its propeller. The joint may be made of elastic material and the propeller shaft may be connected to the engine by an intermediate shaft. The engine is mounted on its frame through elastic joints and by a spring system.

500,247. *Improvements in and relating to the Elastic Mounting of Prime Movers.* Voight, 13, Woyrochstrasse, Berlin, W.35, Germany. Convention date (Austria), June 25th, 1937.

The motor is to be elastically mounted and a measuring device is provided which gives a continuous indication of its change of position due to deflection of the mountings. These mountings are highly elastic with wide clearances and the deflections may be used for continuously measuring the torque of the motor in flight. Further, the thrust of the airscrew may also be measured under the various conditions of flight. The readings can be shown on an instrument so that the pilot is acquainted with the work the engine and airscrew are giving.

500,252. *Improvements in Elastic Mountings for Engines Carrying Airscrew Propellers.* d'Aubarede, P.C.A.M., Saint Genis-Laval, Rhone, France. Convention date (France), June 9th, 1936.

This is a flexible mounting for a V engine and airscrew, which has a flexible member near the propeller so as to form the centre of oscillation of the engine, while a second flexible member is at the opposite end of the engine, so arranged as to permit limited horizontal movements while suppressing vertical ones. The flexible member near the airscrew may have a rubber sleeve and may be designed to deal with the torque, the rear flexible member may consist of vertical leaf

springs or may be formed of rubber blocks, and the freedom may be limited by abutments.

500,538. *Improvements in Elastic Mountings for Engines Carrying Airscrew Propellers.* d'Aubarede, P.C.A.M., Saint Genis-Laval, Rhone, France. Convention date (France), June 9th, 1936.

This is an elastic mounting for a radial engine, having two unequal systems of elastic members, one forming the centre of oscillation while the other one forms the spring means. The mounting has a rigid longitudinal extension rigidly fixed to the rear of the engine, one elastic system being disposed at the extremity of the said extension beyond the corresponding end of the engine, and at a distance from the plane of the cylinders which is materially greater than the distance from the other elastic system to the said plane.

499,004. *Arrangements of Aircraft Engines and Propellers.* Armstrong-Siddeley Motors, Ltd., and Fell, L. F. R., both of Armstrong-Siddeley Works, Park Side, Coventry, and Lloyd, J., Sir Armstrong Whitworth Aircraft, Ltd., Whitley, Coventry. Dated June 24th, 1938. No. 18,750.

The engine is disposed within the wing, being of such a shape and size that this can be done without thickening the wing. Air for cooling is taken in through the leading edge of the wing and is ejected near the trailing edge, the propeller being a pusher. This rear opening for ejection is of the form of a slot situated centrally behind the propeller and approximately equal in length to the propeller diameter. The inlet is of lesser length.

495,469. *An Improved Method of and Means for Propelling Aircraft.* Prof. Dr. H. Wagner, Cunostrasse 67b, Schmargendorf, Berlin, Germany. Convention dates (Germany), Feb. 8th, 1936, and Feb. 8th, 1936.

This describes a gas turbine consisting of a compressor, a combustion chamber and a turbine, and the exhaust gases may be discharged to the rear. The output of such a turbine may be maintained at high altitudes by increasing the circumferential velocity of the turbine giving a higher compression ratio and improved efficiency. The gearbox between the turbine and the propeller is arranged with a variable gear so as to keep the propeller revolutions constant and the propeller may have a variable pitch.

493,120. *Improvements in the Suspension and Mounting of Internal Combustion Engines or Other Engine Units.* Julien, M. F. A., Avenue Theophile Gautier No. 58, Paris, France, and Paulsen, J. F., 6, rue Francois Gaillard, Viroflay, Seine et Oise, France. Convention date (France), March 28th, 1936.

This is a mounting for a radial engine with resilient supports, each support having metallic rings or tubes with rubber connecting them together by adhesion. The rings are arranged concentrically to the axis of the crankshaft passing through the C. of G. of the engine. One support is situated at the opposite end of the engine to the propeller and a second support is attached to the propeller end of the engine. These supports are preferably connected by links.

493,107. *Improvements in the Suspension and Mounting of Internal Combustion Engines or Other Engine Units.* Julien, M. F. A., Avenue Theophile Gautier No. 58, Paris, France, and Paulsen, J. F., 6, rue Francois Gaillard, Viroflay, Seine et Oise, France. Convention dates (France), March 28th, 1936, and Feb. 24th, 1937.

Engine mountings comprising resilient suspensions longitudinally arranged in groups of resilient supports on either side of the engine, each support being

formed of elastic material adhering to a part rigid with the engine and to a part rigid to the body, the surface of the adhered parts being normal to a plane which includes an axis passing through the centre of gravity of the engine and parallel to the crankshaft. The resultant of the resilient reactions passes through the centre of gravity of the engine.

492,904. *Improvements in and relating to Engine Cooling Systems for Vehicles and Aircraft.* Boulet, G., 1, rue des Erables, Plessis-Robinson (Seine), France. Convention date (France), April 2nd, 1936.

It is proposed to recuperate the heat in the cooling air of an internal combustion engine by means which includes at least one stationary set of blades through which the cooling air flows; the blades are streamlined and arranged like the blades of a low pressure steam turbine, so as to convert a part of the heat carried away into a thrust on the blades which are disposed so that this thrust is propulsive. The blades may be hollow so as to form circulating conduits for the cooling liquid of a liquid-cooled engine.

#### FLYING BOATS.

497,780. *Improvements in or relating to Controlling Flying Boats During Take-off, Flight and Alighting.* Waller G., 2, Wartling Road, Eastbourne, Sussex. Dated Feb. 26th, 1938. No. 6,124.

It is proposed to provide flying boats with hydrovanes and to arrange that the angle of incidence of these hydrovanes, the angle of incidence of the wings and the line of thrust of the airscrews may be simultaneously adjusted.

499,069. *Improvements in or relating to Flying Boats.* Dornier-Werke G.m.b.H. and Dr. Ing. N. C. Claude Dornier, both of Friedrichshafen, Lake Constance, Germany. Convention date (Germany), March 31st, 1937.

The proposed flying boat has a wing which, in front elevation, is shaped like a laterally extended W, the lower angles of which form buoyant supports taking the place of wing-tip floats, while the upward angle in the centre terminates in the hull. The boat may carry retractable undercarriages at the lowest points of the wing.

#### MISCELLANEOUS.

496,387. *Improvements in the Suspension of Vibrating Machines.* Julien M. F. A., 58, Avenue Theophile Gautier, Paris, France. Convention date (France), Sept. 19th, 1936.

The suspension has a number of link members of the same length unstressed, articulated by ball and socket or other universal joints to the body and its support and maintaining the body and support parallel or in substantially parallel relationship, and permitting combined translational movement of the body in a direction normal to its longitudinal axis and rotational movement about that axis, the said movements being opposed by resilient means.

#### PARACHUTES.

499,850. *Improvements in or relating to Parachutes.* Popelakova, M., Hladkor 701, Prague, XVIII, Czecho-Slovakia. Convention date (Czecho-Slovakia), April 25th, 1936.

This is an attaching device for parachutes consisting of fastening parts secured to the pack and engaging parts attached to the harness arranged so that the engaging parts are held on to the body of the parachutist at a constant distance from each other which corresponds to the distance between the fastening parts secured to the pack, whereby the fastening parts on the bag may be simultaneously connected to the engaging parts.

499,409. *Improvements in or relating to Parachutes.* Hart, R. P., 29, Southend Avenue, Darlington, Co. Durham. Dated July 29th, 1937. No. 20,950.

It is proposed to provide a parachute having a device which is automatically inflated during descent, forming a raft which is capable of floating on water. The inflatable compartment is contained in the canopy and it is inflated by the air under the parachute.

492,777. *Device for Automatically Opening Parachutes.* Clark, D. R., Main and Brampton Road, Amherst, Erie, New York, U.S.A., and Bird, W., 234, Barton Street, Buffalo, Erie, New York, U.S.A. Dated May 25th, 1937. No. 14,463.

In mechanism for opening parachutes there is incorporated dashpot mechanism having a valved piston rod, having the piston rod connected externally to the setting element and retained in an energised state at the end of its movement in one direction by the releasable locking device and connected by an intermediate member to a detent actuating member which controls displacement of the detent through eccentric action, so that on release of the setting element from its strained position it is automatically moved by the piston in its other direction and transmits movement through said actuating member, so releasing the detent.

#### PARACHUTES.

493,958. *Parachutes, Parachute Harness and the Release Mechanism Relating Thereto.* Taylor, E. H., Brookside, Combs, Derbyshire, nr. Stockport, Cheshire. Dated May 5th, 1937. No. 12,806.

The parachute is connected to the harness by detachable means in which the operation of connecting the two also connects the parachute release mechanism to actuating means located on the harness. The detachably connecting means proposed consist of one or more D rings associated with one of the parts and one or more snaphooks associated with the other part, either being associated with the mechanism for releasing the parachute from the pack.

494,022. *Improvements in Detachable Connectors for Parachute Harness.* Quilter, J. R., Stadium Works, Woking, Surrey. Dated April 23rd, 1937. No. 11,672.

This is a detachable connector for a parachute harness adapted to maintain the harness conveniently in position, but enabling the wearer to free himself when desired. It has two parts with a yielding engagement with each other one of the parts being secured to a lift strap and the other fastened to the wearer, the connection being firm enough to resist a moderate tension, but adapted to yield to a releasing movement of the wearer or to the greater tension exerted by the lift strap or the like when the parachute comes into operation. The connector has parallel flanges and a pin from one to the other, spring jaws engaging between the flanges. The extremities of the jaws diverging at an angle to allow them to be forced apart as the pin enters between them and the inner parts of the jaw, being shaped so as to engage around the pin at the limit of its inward or entering movement.

#### PILOTS AND PILOTING.

498,940. *Apparatus for Instructing Aircraft Pilots in Instrument Flying Methods.* C. Lorenz Aktiengesellschaft, Lorenzweg, 1, Berlin-Tempelhof, Germany. Convention date (Germany), Oct. 15th, 1936.

A visual representation of the landing space is provided on a reduced scale, and on this a visual representation of an aircraft is arranged to be shifted in all directions. The signals of a radio beacon are imitated and they vary with the displacement of the aeroplane.

## ROTORCRAFT.

498,363. *Improvements relating to Rotors for Rotating-Wing Aircraft.* Prof. H. Focke, 30, Strassburger Strasse, Bremen, Germany. Convention date (Germany), Aug. 16th, 1937.

The blades of the rotors are mounted articulately, and each blade is fitted with projection arms with spring connections between the arms, in order that the incidence of the blade may be automatically varied as it lags or overtakes. The arms are attached to blade spars in the manner of cranks and are preferably streamlined. There is also an opposed spring device operative on the pivot mounting of the blades which acts so as to preserve a given blade incidence.

500,192. *Improvements in or relating to Captive Flight Devices.* Chupp, C. B., 218, Jericho Road, Abington, Pennsylvania, U.S.A. Convention date (U.S.A.), Aug. 1st, 1936.

The device proposed has a body, fixed stabilising surfaces and a sustaining rotor; is in fact somewhat like a man-lifting kite sustained by a rotor. The rotor axis is constructed for automatic adjustment to different angles in the longitudinal vertical plane under the influence of varying pull of the tow rope. The angle of incidence of the rotor blades may be controlled, there is a stabilising plane in the rear, dihedral stabilising surfaces may be fitted and the rotor axis may be bodily moved.

499,073. *Improvements relating to the Control of Helicopter or Rotating Wing Aircraft.* Focke, H., 30, Strassburger Strasse, Bremen, Germany. Convention dates (Germany), Oct. 4th, 1937, and May 30th, 1938.

In rotating wing aircraft or helicopters with side-by-side rotor arrangement where elevation is effected by fore-and-aft tilting of the rotors, lateral control is effected by means producing tilting movements of the rotor axes and connected to the lateral control of the aircraft so that operation of this control causes differential forward and backward tilting of the two rotors. This arrangement may be operated by a rudder bar.

495,502. *Improvements in Helicopters.* Hammond, E. V., 88, Louisville Road, Balham, London. Dated June 23rd, 1937. No. 17,488.

The improvement described is a pitch-changing device for helicopters either free flying or anchored to the ground in a similar manner to a kite. The rotor support has a hub and a driving member for the hub mounted on said support, the hub has pivotal connections for the blades which are capable of limited rotation. They are connected to the driving member by links. Rotational movement can take place between the hub and its driving member, which relative rotational movement is utilised to effect a change in blade pitch angle.

492,816. *Improvements in and relating to Aircraft with Sustaining Rotors.* The Cierva Autogiro Co., Ltd., Bush House, Aldwych, London, W.C.2, and Bennet, J. A. J., 67, Grove Way, Esher, Surrey. Dated April 6th, 1937. No. 9,799.

A sustaining rotor for a jump take-off having an articular mounting for a rotor blade, comprising pivot means displacement about which is constituted by a leading and lagging displacement of the blade compounded with a variation of pitch angle and other pivot means permitting leading and lagging displacement of the blade independently of the displacement on the first named pivot means and stops limiting the displacements about each of the pivot means in one directing at least wherein the mentioned parts are so relatively disposed or wherein additional means are provided which are so operative that when the rotor is rotating, but not driven, the action of centrifugal force is used to lock the first named pivot means, the second pivot means being free.

492,911. *Improvements in and relating to Sustaining Rotors for Aircraft.* The Cierva Autogiro Co., Ltd., Bush House, Aldwych, London, W.C.2, and Bennet, J. A. J., 67, Grove Way, Esher, Surrey. Dated April 6th, 1937. No. 9,801.

The compound flapping pivot mechanism has two independent pivot axes together with physical constraints interconnecting the articular mechanisms of the several blades in such a way as to prevent the fundamental component of at least the non-differential flapping from taking place about one of the axes, or to prevent coning or differential flapping taking place about both axes, being inclined at different angles to the radial axes of the rotor blades so that a given angular flapping displacement is accompanied by a different change of pitch angle according as it takes place about the two axes.

#### SEAPLANES.

499,883. *An Improved Form of Seaplane.* Cox, H. R., 119, Cromwell Road, London, S.W.7, and Coombes, L. P., Wynchlea House, Church Avenue, Farnborough, Hampshire. Dated Aug. 3rd, 1937. No. 21,325.

It is proposed to construct a seaplane in the form of a flying wing, there being no hull, the wing being used for sustentation, accommodation of load, and support on the water. The wing is so formed as to have an extended bow, and while the section everywhere is of normal aerofoil type the underside has a planing bottom similar to that of a normal flying boat. The trailing edge of the centre section forms a flap which is so arranged that by moving it upwards a transverse step is formed on the underside of the wing.

#### UNDERCARRIAGES.

498,540. *Improvements relating to Aircraft Undercarriages and Wheel Brakes.* Dowty, G. H., Arle Court, Cheltenham, Gloucestershire. Dated October 13th, 1937. No. 27,869.

In this arrangement it is proposed that where a wheel and brake are mounted on an undercarriage leg and where the brake consists of a drum rotating with the wheel on an axle integral with the leg, it is proposed to use an anchorage between the non-rotating shoe and the leg, consisting of a link extending between the two. The object is to obviate the necessity of transmitting brake torque through the axle.

498,361. *Improvements in Tail Skids or Tail Wheels for Aircraft.* Saulnier, R., 5, rue de Menceau, Paris, France. Convention date (Germany), Jan. 22nd, 1937.

In the case of a skid or tail wheel made under Patent 462,963 the skid or wheel can be withdrawn into or drawn out of the inside of the body of the aircraft by varying the effective length of a mechanism which includes the shock absorber and connects a suitable point of one of the arms that bears the supporting tube of the skid with a stationary part of the aircraft.

497,559. *Knee-Shaped Spring Leg for Aircraft.* Arado Flugzeugwerke Gesellschaft mit beschränkter Haftung, Brandenburg (Havel), Germany. Convention date (Germany), July 30th, 1937.

This knee-shaped leg is arranged so that landing and other loads are transmitted from the lower limb to the upper, which carries a spring by either hydraulic or mechanical means. The spring leg may be formed as a cylinder carrying a piston under the action of a spring, while the shocks are transmitted to the fluid through a piston in the lower limb.

500,574. *Improvements in or relating to Shock Absorber Struts for Aircraft.* Onions, J. H., 18, Telford Avenue, Leamington Spa, Warwickshire, and the Ribbesford Co., Ltd., Brock House, Langham Street, London, W.1. Dated Aug. 12th, 1937. No. 22,209.

The shock absorber has a locking valve controlling the flow of liquid into or out of the cylinder of the strut, the locking valve being automatically urged to take up a position preventing such flow of fluid, and being movable from that position only by the pressure of fluid supplied to effect a change of length in the strut. The locking valve comprises a piston normally biased to take up a position in which it seals the cylinder of the strut, and is moved from that position by pressure fluid supplied to change the length of the strut, to connect the cylinder to a source of pressure, or an exhaust reservoir.

499,500. *Improvements relating to Locking and Operation of Retractable Parts of Aircraft.* Aircraft Components, Ltd., Arle Court, Cheltenham, Gloucestershire, and Bound, R. H., of the same address. Dated July 24th, 1937, No. 20,546, and Nov. 17th, 1937, No. 31,621.

In the case of retracting gears moving during retraction about a fixed pivot axis, the retracting jack travels in continuation of the operating stroke and in doing so operates a locking device. The travel for unlocking caused an abutment to register with a fixed guide shaped as a circular arc, which prevents locking or unlocking except before the start of or after the completion of an operating stroke.

500,477. *Improvements relating to the Control of Fluid-Operated Systems Particularly for Aircraft.* Dowty, G. H., Arle Court, Cheltenham, Gloucestershire. Dated Aug. 5th, 1937. No. 21,634.

It is proposed to add to the hydraulic control system described in Patent No. 480,674, which consists of the provision of a pressure accumulator to the pressure delivery system between the pressure source and the selector valve unit so as to receive pressure liquid against resilient resistance and thus to relieve pressure in the event of pressure delivery becoming excessive. The accumulator may contain an idle piston separating the pressure fluid from trapped air.

496,067. *Improvements in Aeroplane Landing Gear.* Robertson, J. H., 1, Albemarle Street, Piccadilly, London, W.1. Dated June 15th, 1937. No. 16,600.

The gear consists of an endless track bearing on a wheel and with tracking rollers, the track is such that it wraps round the wheel for a considerable length. Contact with the ground takes place under the wheel. A spring control may be incorporated so as to vary the disposition of the load between the wheel and the track.

496,080. *Improvements in or relating to Retractable Undercarriages for Aircraft.* Automotive Products Co., Ltd., Brock House, Langham Street, London, W.1, and Thornhill, P. W., of the same address. Dated Aug. 19th, 1937. No. 22,782.

This folding strut has two articulated parts, a lever connected to one articulated part and connected by a link to the other articulated part. Operating means act on the lever to turn it about its pivot on the strut and to cause a thrust on the link when the strut is being folded. The pivots of the lever and link on the strut parts are both spaced from the point of articulation of the strut and the link is shorter than the lever, the arrangement being such that the link approaches a position substantially at right angles to the second part of the strut as the folding operation approaches completion.



492,545. *Improvements in or relating to Aircraft Landing Gear.* The Fairey Aviation Co., Ltd., North Hyde Road, Hayes, Middlesex, and Lobelle, M. J., "Ludlow," 298, Langley Road, Langley, Bucks, and Trotter, J. C., 2, Manor Parade, Hillingdon, Middlesex. Dated June 8th, 1937. No. 15,871.

The tail wheel or tail skid is retractable from a landing position to a position nearer the tail of the aircraft, but so that it still projects so that the aircraft can take-off from a smooth surface. The tail wheel is extended automatically and concurrently with the undercarriage.

491,094. *Improvements in and relating to Jointed Mechanisms for Aircraft.* Mercier, J., 131, Boulevard de la Seine, Neuilly sur Seine, Seine, France. Dated March 4th, 1937. No. 6,492.

A jointed mechanism for aircraft for the purpose of lowering or lifting the retractable undercarriage when the aircraft is landing or starting, comprising a folding strut and jack which is mounted on the jointed mechanism and controls the deformations thereof. The strut consists of three or more pivoted elements, the jack being the sole controlling means and producing the relative displacement by direct action.

495,759. *Improvements in Operating Mechanism for Retractable Members on Board Aircraft.* Air Equipment, 64, Avenue Edouard Vaillant, Billancourt (Seine). Convention dates (France), Feb. 18th, 1935, and Aug. 12th, 1936

This is an operating mechanism for retracting members such as landing gears, turrets, etc., comprising a folding strut attached at one end to the aircraft and at the other end to the retractable member, a motor and a speed reduction device located at the articulated joint and so connected that rotation of the motor causes folding of the strut. A reversible motor may be used to fold and unfold the strut. A clutch may be interposed between the motor and the speed reduction device.