

ABSTRACTS OF PATENT SPECIFICATIONS.

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

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AERODYNAMICS.

471,342. *Method and Devices for the Obtainment of Fluid Streamline Contours.* Huet, A., 48, Avenue du President Wilson, Paris, France. Convention date (France), Aug. 10th, 1935.

It is proposed to obtain a fluid streamline round a moving body by the formation of a fluid streamline body surrounding the movable body by placing in front of the movable body of a number of deflecting surfaces disposed to deflect the air from the movable body, the surfaces containing between them and the body diverging channels or orifices for admission through which passes part of the fluid. There is also a rear apparatus formed by convex surfaces which regulate the flow of the fluid streams, the front and rear apparatus being disposed so as to ensure the stability of the fluid streamline body.

AEROPLANES—CONSTRUCTION.

470,698. *Improved Method of Construction of Structural Work such as the Bodies of Motor Vehicles.* Park, Ward and Co., Ltd., 273, High Street, Willesden, London, and Roberts, A. T., 62, Devonshire Street, Piccadilly, London, W.1. Dated Nov. 19th, 1935. No. 32,066.

It is proposed to construct the bodies with pillars, cross-bracings and other members constituting skeleton framework of box section by assembling two or more lengths of light gauge metal with flanges adapted for inter-engagement so that when the section is formed the flanges are external to the structure, crumpling together and then wrapping or bending them together over on the adjacent side wall of the structure. The crumpled margins may be welded.

469,904. *Improvements relating to Aeroplanes.* Stieger, H. J., 54, Bathgate Road, London, S.W.19. Dated Feb. 4th, 1936. No. 3,346.

In order to vary the wing area of aeroplanes during flight, it is proposed to use an auxiliary wing which can be detached during flight, this wing may be the upper wing of a biplane. At the moment of release a small change of incidence is made

to the detachable wing. Other parts, such as the undercarriage, may also be jettisoned.

469,960. *Improvements in or relating to Hoods for Aircraft Cockpits or Cabins.* Bristol Aeroplane Co., Ltd., and Frise, G., both of Filton House, Bristol. Dated Feb. 5th, 1936. No. 3,538.

It is proposed to use a cockpit hood which is telescopically retractable into a cockpit. Preferably the hood is supported on a number of pillars slidable in guides and springs are arranged to extend it. It may also be operated by a rack and pinion. Locks are provided where necessary to retain the hood in a desired position.

474,065. *Improvements in or relating to Surfaces Adapted to be Displaced in a Fluid Medium.* Fauvel, C., and Coltel, H., Les Bengalis Cazaux (Gironde), France, and Boid de la Ste. Genevieve, Quai le Turleries, Paris, France, respectively. Convention date (Belgium), Jan. 17th, 1935. Specification not accepted.

In order that such surfaces as aeroplane wings may have the stresses in them reduced and so that these stresses do not vary materially under the effect of variations of the angle of incidence, it is proposed to use wings which can have their fore and aft sections varied in accordance with variations of incidence, etc., so as not to vary the position of the centre of pressure. Several ailerons may be used operating at different inclinations increasing towards the wing tips.

471,124. *Improvements in or relating to the Construction of Wings, Fuselages and other Aircraft Bodies.* Vickers (Aviation), Ltd., and Wallis, B. N., both of Weybridge Works, Weybridge, Brooklands Road, Weybridge, Surrey. Dated Feb. 27th, 1936. No. 5,886.

In the construction of aircraft bodies it is desirable to be able to vary the form of construction so that a body of one form of construction can be used for a body of another form of construction with a minimum of change. It is also desirable to be able to complete the attachment of fittings and equipment before the fuselage is completely assembled. To enable this to be done the body is built up of a number of component parts, including a series of spars or booms spaced apart from each other and surface components with fabric or plating and reinforcing members on the interior of the covering, the said parts being built up as units.

471,514. *Improvements relating to the Construction of Aircraft and the Like.* Stieger, H. L., 54, Bathgate Road, London, S.W.19. Dated Feb. 4th, 1936. No. 3,347.

A wing of an aeroplane built up of previously constructed members, namely, an upper and lower member, each of which forms part of the skin and has structure projecting internally for attachment together. Additional skin members may be used to close openings in the assembled component. Fuselages, floats, etc., may be constructed in a similar manner.

471,123. *Improvements in or connected with Aircraft Frame Structures.* Vickers (Aviation), Ltd., and Wallis, B. N., both of Weybridge Works, Brooklands Road, Weybridge, Surrey. Dated Feb. 27th, 1936, No. 5,885, and Jan. 22nd, 1937, No. 1,920.

This specification refers to the construction of wings, fuselages, etc., in which tubular booms are employed. The booms are formed of tubes of uniform size arranged in spanwise sections of multiple side-by-side tubes in the root and a decreasing number of tubes beyond the root. The tubes may be varied in wall thickness. The booms are serrated to engage with fishplates having faces curved to interlock.

472,839. *Improvements in or connected with the Construction of Wings for Aircraft.* Supermarine Aviation Works (Vickers), Ltd., and Mitchell, R. I., both of the Company's Works, Woolston, Southampton, Hampshire. Dated March 31st, 1936. No. 9,517.

It is proposed to combine the fuel tanks with the wing structure. The wing may be constructed with upper and lower booms with a shaped tank attached to them having a part of the tank extending between the booms and acting as the spar web. The tanks may form the nose portion or a more rearward portion of the aerofoil. It is claimed that the arrangement effects a considerable weight saving.

472,366. *Improvements in Removable Roof for the Cockpit of Aircraft.* Saulnier, R., 5, Rue de Monceau, Paris, France. Convention date (France), Dec. 27th, 1935.

The roof proposed is intended to be opened normally by sliding and is also capable of being immediately detachable from the machine, a provision in case of accident. Further, if the roof cannot be detached as when the machine is upside down on the ground, there are doors in the side which are arranged to open in the case of such an accident. The roof movements can be operated from inside the cockpit.

475,433. *Improvements in or relating to Aircraft having Folding Wings.* The Fairey Aviation Co., Ltd., North Hyde Road, Hayes, Middlesex, and Bolton, F., 22, Shanklin Road, Southampton, Hants. Dated July 8th, —. No. 18,953.

An object of this specification is to enable the overall width of an aircraft when the wings are folded to be reduced. The ailerons or flaps are permitted to drop automatically when the wings are folded and are raised automatically when the wings are spread.

475,493. *Aeroplane Construction.* Barnhart, G. E., 407, Waldo Avenue, Pasadena, California, U.S.A. Dated April 16th, 1936. No. 10,980.

It is proposed to use in combination an aerofoil with a vane member formed of two hinged portions pivotably secured at the end of one section of the aerofoil and a pilot flap arranged in advance of the vane member for controlling the amount of air impinging thereon. The aerofoil may have a single vane member in the rear of the first vane member, the single vane being hinged to the aerofoil at a location such that the air stream modified by the first vane member strikes the single vane member.

474,003. *Aircraft Wings.* Sir W. G. Armstrong Whitworth Aircraft, Ltd., and Lloyd, J., both of Whitley, Coventry, Warwickshire. Dated July 7th, 1936. No. 18,821.

It is proposed that the wings of a monoplane may be folded by dividing each wing transversely into at least three sections which are hinged together in such a way that the outer sections of the wing can be folded to lie substantially horizontally alongside one another adjacent the inner section, detachable joints being provided for holding the sections extended.

476,133. *Improvements in Streamlined Tie Rods for Aircraft and like Members and Method of Making the Same.* Flynt, L. W. G., 24, South 6th Street, Newark, New Jersey, U.S.A. Dated Sept. 29th, 1936. No. 26,402.

The proposed tie rod has circular ends and a middle portion of streamline shape, one section merging into the other without appreciable variation in sectional area. It is proposed that they shall be manufactured from blanks of symmetrical form and a section formed by the combination of a circle and a streamline shape.

474,241. *Improvements in Aeroplanes.* De Jong, A., Vlaardingen, Holland, and Volpert, 4, Schiedam, Holland. Dated April 27th, 1936. No. 11,976.

It is proposed to construct an aeroplane with a deep sectioned wing extending across the top of the fuselage so that the leading edge and the upper surface is continuous. There is a large air inlet opening forwards in the nose of the fuselage which is connected to the suction side of an air pump, the air being discharged to transverse slots in the leading edge of the wing above the fuselage, or near to it. Various arrangements of the pump and slots are described.

AEROPLANES—GENERAL.

470,650. *Improvements in or relating to Aircraft.* Airspeed (1934), Ltd., and Tiltman, A. H., The Airport, Portsmouth. Dated Feb. 25th, 1936. No. 5,618.

It is proposed to produce an aeroplane in which the tailplane is carried by booms from the wings and in which the pilot and crew are contained in a nacelle arranged to act as a fin. This nacelle is carried on the rear fin.

469,557. *Improvements in or relating to Composite Aircraft.* Mayo, R. H., 55, Pall Mall, London, S.W.1, Short Bros. (Rochester and Bedford), Ltd., and Clark, A., both of Seaplane Works, Rochester, Kent. Dated Jan. 27th, 1936. No. 2,488.

The locking means between the two aircraft may comprise a hook pivoted to the lower component, a latch pivoted to the upper so that the hook exercises a progressively increasing turning movement on the latch as the separating force increases. The safety device is released when the separating force reaches a predetermined limit. The locking means may include release levers connected to override the pilot's controls and the locking means may also provide a member arranged to displace progressively as the separating forces increase and this may be arranged to give a visual indication to the pilot's by electrical means.

469,739. *Improvements in or relating to Flying Machines.* Pouit, R. J., 1, Rue Edouard Branly, Issydes, Moulmeaux (Seine), Paris. Convention date (France), Jan. 28th, 1935.

In an aeroplane fitted with brakes on the landing gear, arrangements are made so that when the aeroplane lands in the flying position the lift of the aerofoils is destroyed or diminished so as to prevent capsizing so that much higher breaking torques can be used. The brakes are inter-connected with wing flaps which are raised so as to destroy lift.

469,094. *Improvements in Flying Machines.* Société des Moteurs Salmson, 68, Rue Pierre Charron, Paris, Seine. Convention date (France), Nov. 23rd, 1934.

It is proposed to pivot wing flaps on an axle situated below the lower part of the wing. It is claimed that with this arrangement the controls are simple, that the trailing edge remains nearly in the vertical plane of the wing trailing edge and that the hinge moment is reduced.

469,149. *Improvements relating to Wing Flaps for Aircraft and Their Control.* Phillips and Powis Aircraft Co., Ltd., of Reading Aerodrome, Woodley, Reading, Berkshire, and Miles, F. G., of the same address. Dated April 14th, 1936. No. 10,754.

The proposed arrangement consists of wing flaps in two sections interconnected for movement in opposite directions so that one area will act as a servo to operate or help to operate the other, the servo area and interconnection being

chosen so that it only becomes effective at a chosen phase of the operation of the remainder. The operating means has two operating positions corresponding to a partially operative and wholly operative position of the flap.

470,923. *Supporting Surface for Flying Machines.* Kooll, J., 22, Enderstrasse, Breslau 10, Germany. Dated Feb. 24th, 1936. No. 5,518.

The wing proposed has a rear flap attached on the underside of which is a secondary flap of the split type. For high speed flight the flaps are arranged to give the standard wing profile. For starting, the main flap is displaced to the rear and pulled down. For landing, the main flap is displaced to the rear and the auxiliary flap is pulled down and also displaced rearwards. Several alternative forms of a wing having these characteristics are described and details of the proposed construction are given.

470,528 *Improvements in Aircraft.* Budig, F., 37, Quais des Grandes, Augustins, Paris VI, France. Dated June 25th, 1936. No. 17,633.

It is stated that, in an aeroplane wing, the airstream meeting the leading edge and thereby split into two streams be not deflected away from the surface of the plane by eddies. Accordingly, it is proposed to fit a step under the wing close to the leading edge tapering away into the leading edge. This step is adjustable and may be of the form of a flap hinged at the leading edge itself.

471,946. *Improvements in or relating to Aircraft.* Delanne, M. H., 17, Rue Servandoni, Paris, France. Convention date (France), July 4th, 1935.

An aeroplane having a rear supporting plane in staggered relation with the front plane has the tailplane provided with a drift plane on each side of the fuselage fixed perpendicularly to the rear plane and parallel to the axis of the fuselage control surfaces being hinged to the drift plane for steering. The rear supporting plane co-operates with the front plane to increase support and mobility.

471,656. *Improvement in Aeroplanes.* Lindstrom, G. E., Bergsgatan 19, Stockholm, Sweden. Dated Jan. 29th, 1937. No. 2,631.

The proposed aeroplane has a wing or wings arranged so as to be immersed in the slipstream from the propellers. The wings have a small fixed portion, the rest being flexible and can be bent down sufficiently to allow the slipstream to lift the machine vertically.

472,642. *Improvements in or relating to Aeroplanes Convertible from Monoplanes to Biplanes or Vice-versa.* Tommeo, F., 78, Via XX Settembre, Turin, Italy. Dated March 26th, 1936. No. 8,981.

The arrangement proposed consists of a monoplane with planes which can be split so as to form two planes, by means of, say, a screw gear. Several differing methods of bracing the machine, both as a monoplane and a biplane are described.

472,546. *Improvements in or relating to Aircraft.* Mayo, R. H., 55, Pall Mall, London, S.W.1. Dated March 24th, 1936. No. 8,758.

A composite aircraft is proposed, comprising two aircraft mounted one on top of the other, locking means to secure them together which are releasable to enable detachment to be carried out in flight, and a flexible connecting link between them which continues to connect them after detachment has taken place. This link may be a tube through which fuel can be pumped.

473,682. *Improvements in or relating to Aircraft.* Mainguet, H., 10, Rue Garanciere, Paris, France. Convention dates (France), Jan. 13th, 1935, and June 22nd, 1935.

It is proposed to arrange the wings of aircraft so that the air before being attacked is deviated upwards so that the reactions on the wings are deviated and the wings become hyper-sustaining and even propelling. The machine has wings of decreasing depths arranged one in front of the other, the wing of least depth being in front with a negative angle of incidence.

475,218. *Improvements in or relating to Aircraft having Folding Wings.* The Fairey Aviation Co., Ltd., North Hyde Road, Hayes, Middlesex, and Flt. Lieut. L. M. Hilton, Ravelston, Pinner Hill, Middlesex. Dated Nov. 6th, 1936. No. 30,281.

The wings of an aircraft are locked in flying position by locking pins inserted through registering apertures in overlapping eyes or the like on the relatively fixed and foldable portions of the wing, the pins being movable oppositely in pairs by screw action. It is proposed to move these pins by jointed rods connected with an intermediately disposed pair of members arranged to be rotated concurrently by a common ratchet and pawl device.

474,659. *Improvements in or relating to Aeroplanes.* Huley, P., Bear Creek, Dawson, Yukon Territory, Canada. Dated March 16th, 1937. No. 7,745.

The apparatus described is called a glider, but is shown in the illustration to be fitted with an airscrew and pedalling gear. The machine is described as having an elongated rectangular frame, a wing across the top thereof, two main posts depending from the wind carrying the landing gear, and a cabin constructed about the posts.

AIRSHIPS.

475,587. *Improvements in and relating to Flying Machines.* Glaser, M. A., 24, Rue de la Sabliere, Asnières (Seine), France. Convention date (France), Oct. 24th, 1935.

The arrangement claimed consists of a dirigible and a nacelle, the latter having an airscrew mounted so that its axis can be included in any direction from the normal to the vertical, the airscrew being underneath the nacelle. The mounting may be so designed so that the engine and the airscrew may be inclined together.

AIRSCREWS.

472,318. *Improvements in or relating to Aircraft Propulsion.* Maina, J., 35, Maybury Mansions, Marylebone Street, London, W.1. Dated March 18th, 1936. No. 8,108.

This is an arrangement by which two concentric propellers arranged close to each other may be driven in opposite directions by a single engine. The propellers are driven by one shaft inside another and there is a driving bevel gear attached to the central shaft, a driven gear attached to the tubular shaft and intermediate gears carried by a spider located in position on the central shaft. The central shaft is arranged to have a predetermined amount of spring in torsion, the crankshaft being coupled to one end of this shaft. The spring torque element may consist of a star-like member secured to the central shaft provided with radial blades engaging slotted bushes carried by a drum connected by gearing with the power unit.

AMPHIBIANS.

- 475,057. *Improvements in and connected with Control Mechanism for Amphibian Aircraft.* Perry, R., 30, Oak Street, Manchester 4, Lancaster. Dated May 11th, 1936. No. 13,357.

The aircraft proposed is stated to be capable of travelling on land, water or air, and has land wheels, a water propeller, a rotary wing and an airscrew. The arrangement described consists of means for connecting the engine to the various elements so that they may be driven as required.

BOMBS AND BALLISTICS.

- 475,377. *Gun Turret, Particularly for Aircraft.* de Gavardie, P. H. E., 65, Rue Nicolo, Paris 16^o, France. Convention date (France), June 20th, 1936.

The proposed gun turret is a movable unit supported by a universal suspension at approximately its centre of gravity. Aiming is accomplished in any direction of space solely by hand-operated rotation about the two axes of the universal suspension. The weapon is fixed rigidly to the gunner's cabin. The two movements of the unit about the two axes are operated by two independent cranks preferably mounted one on each side of the gunner's seat. The unit may be fixed by simultaneous braking on the two cranks.

CATAPULTS.

- 470,767. *Improvements in Electro-Magnetic Machines with Longitudinally Moving Armatures.* Sander, N., 33, Hook Road, Surbiton, Surrey. Dated Feb. 20th, 1936. No. 5,093.

This specification refers to electrically operated catapults and it is proposed to dispose along the runway a laminated iron core with a squirrel cage winding and to fit the carriage with a laminated armature with a polyphase winding. The resistance of the winding along the track being varied so as to produce the desired acceleration. A gap is provided in the live rails bridged with a polyphase transformer which serves to reduce and reverse the current beyond the gap so as to retard the carriage.

CONTROL OF AIRCRAFT.

- 476,673. *Aeroplane Wing Flaps.* Gray, W. E., 8a, Bank Parade, Edgware, Middlesex. Dated March 12th, 1936. No. 7,490.

The proposed flap may be divided along its span by a hinge, the rearward portion is arranged to be angularly adjusted with regard to the rest so that it can be turned out of the airstream into the shelter of the wake so as to over-balance the flap with a view to its operation.

- 475,163. *Aeroplane Wing Flaps.* Gray, W. E., 8a, Bank Parade, Edgware, Middlesex. Dated May 12th, 1936. No. 13,456.

It is proposed to use a slotted flap provided with a forwardly extending piece hinged to its nose, arranged so that when the flap is moved the front edge of this piece moves downward. When in normal position the piece lies flush with the wing.

- 471,583. *Improvements in and relating to Dual Control Devices of Aircraft or of Other Machines.* D'Oplinter, J. G. M. J. de W., 73, Roger Vanden Driessche Wolurve, St. Pierre, Belgium. Dated Feb. 15th, 1937. No. 4,472.

The dual control is of the type in which the wheel can be swung from one pilot to the other during flight, it is proposed also to swing the rudder bar, the change over of this control being obtained automatically by swinging over the wheel control.

473,379. *Improvements in or relating to Lifting Surfaces of Aircraft.* The Fairey Aviation Co., Ltd., North Hyde Road, Hayes, Middlesex, and Brown, A. C., 109, Cleveland Road, West Ealing, London, W.13. Dated Aug. 20th, 1936. No. 22,949.

This specification describes a type of wing flap consisting of two portions, the first, consisting of a flap which can be moved rearwardly and downwards, the second consisting of a split flap attached to the rear of the first flap. Three flying régimes are contemplated. Normal flight with both flaps folded. Taking off with the first flap only extended. Landing with both flaps extended.

472,845. *Improvements in and relating to Control Surfaces for the Wings of Aeroplanes.* Martin, J., Higher Denham, Uxbridge, Middlesex. Dated April 3rd, 1936. No. 9,897.

This arrangement applies particularly to lateral control surfaces projecting beyond the wing tips of an aeroplane, the surfaces being capable of angular adjustment by the pilot. The angular movement takes place about an axis coaxial with a main wing spar and the forces produced are transmitted directly to the spar. The arrangement may be used in conjunction with normal ailerons and it is stated that added efficiency may be obtained by adding a flap to the control surface, the angle of the flap being varied with that of the surface itself.

472,567. *Improvements in Aerofoils with Variable Camber.* Luttmann, H. C., 1, Hooley Range, Heaton Moor, Stockport, Cheshire. Dated Aug. 31st, 1936. No. 23,758.

It is proposed to place a subsidiary member behind the rear spar of a wing and to connect the two together by links pin-jointed at their ends. The rib linkage may comprise two sets of units in one series. There are units consisting of two cross links pin-jointed at their ends and in the other two crossed links picking up alternative pin-joints. The linkage is covered with a skin which may be flexible or composed of hinged panels attached to the mechanism of links.

475,500. *Aeroplane Wing Flaps.* Gray, W. E., 8a, Bank Parade, Edgware, Middlesex. Dated May 16th, 1936.

The split trailing edge flap proposed is supported from the wing structure by a pivoted link running from the wing to a pivot on the flap some distance from the leading edge. It is guided by an additional support near the leading edge consisting of a roller working in a track so shaped that the aerodynamical load on the flap is substantially balanced by the force on the link and the reaction between the track and the roller.

476,258. *Improvement in the Method of and Means for Controlling Aircraft.* Vickers Aviation, Ltd., and Ellis, D. L., both of Weybridge Works, Brooklands Road, Weybridge, Surrey. Dated June 6th, 1936. No. 15,890.

The wing is provided with an opening or recess in its upper surface near its trailing edge in communication with another opening in its upper surface at a point where a larger depression will occur in flight. A method of opening or closing the communicating passage is used so as to enable the pressure distribution to be changed at will.

CONTROLS.

469,906. *Improvements in or relating to Liquid Pressure Remote Control Systems.* Automotive Products Co., Ltd., Brock House, Langham Street, London, W.1, and Brown, F. V., of the same address. Dated Feb. 5th, 1936. No. 3,529.

In the case of double acting hydraulic control systems it is proposed to arrange for an alternative pipe system if one of the component parts of the system become

inoperative. The proposed system may comprise a reversible flow master unit, a double acting slave unit, a pair of normal pipe lines, a two-way manually actuated valve, a pressure controlled valve and an auxiliary pipe line.

470,088. *Improvements in Fluid-Operated Piston Apparatus.* Mery, F., 15, Via Giovanetti, Turin, Italy. Dated Feb. 3rd, 1936. No. 17,032.

This specification refers to an apparatus consisting of a piston working in a cylinder having a longitudinal slit. The piston has an arm extending outward through the slit and there is a closing member for the slit. It is proposed to use a number of cylinders, the edges of the slits may have parallel grooves and the slit closing member may be of U form so that the flanges may enter the grooves. The arrangement is stated to be suitable for aeroplane catapults.

ENGINES.

469,614. *Improvements in or relating to the Mounting of Internal Combustion Engines.* The Fairey Aviation Co., Ltd., North Hyde Road, Hayes, Middlesex, and Forsyth, A. G., "Venlaw," Burdon Lane, Cheam, Surrey. Dated Jan. 31st, 1936. No. 3,003.

The crankcase of an engine is carried from each side by two pairs of triangulated members. In order to provide for expansion or contraction of the crankcase the connections may be flexible. The engine crankcase may be strengthened by a pair of bolts or tie rods passing through transversely of the plane of conjunction of its valve, the supporting elements for the engine being connected to these ties.

469,615. *Improvements in or relating to Power Plants for Aircraft.* The Fairey Aviation Co., Ltd., North Hyde Road, Hayes, Middlesex, and Forsyth, A. G., "Venlaw," Burdon Lane, Cheam, Surrey. Dated Jan. 31st, 1936. No. 3,004.

It is proposed that the parts associated with the engine, such as cooling system, oil cooling system, supercharging system and means for preheating air supply are formed integrally with, and attached to, the crankcase of the engine itself, the said crankcase above is attached to the fuselage.

474,912. *Improvements in Means for Operating Control Gills of Engine Cowlings.* Short Bros. (Rochester and Bedford), Ltd., and Parks, A. G., of Seaplane Works, Rochester, Kent. Dated May 9th, 1936, and Feb. 19th, 1937.

This arrangement is stated to be particularly suitable for operating the sprocket which is a standard part of the N.A.C.A. cowling equipment. It is proposed to operate this sprocket by means of a hydraulic ram mounted coaxially through a nut and a high pitched thread, hence converting the reciprocating movements of the ram into rotary movements.

475,123. *Improvements in Cooled Motive Power Plants.* Société Française, Hispano-Suiza, Rue du Capitaine Guynemer, Bois-Colombes (Seine), France. Convention date (Belgium), Dec. 24th, 1935.

It is proposed to cool liquid-cooled engines by means of radiators of arcuate cross section which surround the crankcase on the side opposite to the cylinders. It is claimed that streamlining is improved by this arrangement and drawings are given showing various methods by which this streamlining can be carried out.

475,124. *Improvements in Resilient Suspensions for Aircraft Engines.* Société Française Hispano-Suiza, Rue du Capitaine Guynemer, Bois-Colombes (Seine), Paris. Convention date (Belgium), April 27th, 1936.

It is pointed out that resilient mounting of an engine makes it necessary to use a design of mounting in which the engine crankcase is not part of the struc-

ture. It is therefore proposed to use a resilient suspension for aircraft engines in which the load supporting and taking members, between which are interposed the cushioning members, are so located that they can be securely braced by means of rigid members subjected only to tensile or compression stresses. There may be a cradle structure attached to the engine and a cantilever frame connected to the aircraft with resilient members between them.

470,460. *Silencer for the Discharge of Internal Combustion Engines, and Particularly Those of Aircraft.* Aldo Guglielmetti, 39, Via Odavia, Rome, Italy, and Stipa, N., 9, Via Rovenna, Rome, Italy. Convention date (Italy), Feb. 12th, 1935.

The silencer proposed is of the form of an open-ended tube placed so that the tube is traversed by an air current in flight. The walls of the tube have substantially the shape of a venturi, the exhaust gas being discharged in the form of an annulus close to the smallest diameter of the tube. It is claimed that the reduced pressure helps the discharge of the gas. In the silencer described the exhaust gas is conveyed to an annular expansion chamber before being discharged, the expansion chamber being bent back on itself S-fashion.

470,473. *Improvements relating to Exhaust Silencers for Engines.* Blanchard, J. G., 1, Ravenna Road, Putney, London, S.W.15. Dated Feb. 14th, 1936. No. 4,512.

It is proposed to use a number of silencers in parallel placed within a streamlined part of an aircraft. The various units receiving gases form a common inlet and discharging them preferably to a common outlet.

471,156. *Improvements in and relating to Aircraft and Exhaust Systems Therefor.* Martin, J., Higher Denham, near Uxbridge, Middlesex. Dated Feb. 27th, 1936. No. 5,876.

It is stated that orifices for the discharge of exhaust gas and the ejection of exhaust gas increase the resistance of aeroplane fuselages. It is therefore proposed to use exhaust pipes which extend within the fuselage or nacelle contour, the gases being discharged at the tail end, and there are means provided for conveying a cooling current of air along the pipes. The manifold itself is surrounded with a pipe between which there is a flow of air, this air being mingled with the exhaust gas and discharged into the exhaust pipe itself.

471,177. *Improvements in Exhaust Discharge Arrangements for Internal Combustion Engines.* de Paravicini, T. P., The Old Manor, Abbots Ann, Andover, Hampshire. Dated Nov. 30th, 1935. No. 33,282.

It is proposed to utilise exhaust gas to provide a propulsive effect in aircraft. The gas is discharged into a rearwardly projecting manifold or manifolds having the orifice or orifices shaped as tapered nozzles so as to produce a pressure of one pound per square inch above the atmospheric pressure. The gases are discharged at, at least, twice the speed of the external air stream so as to cause a forward thrust. They may be discharged in the boundary layer of the air flowing over the aircraft so as to smooth out eddies.

471,371. *Cooling of Aircraft Engines.* Ellor, J. E., Grandell, South Drive, Chain Lane, Mickléover, Derby, England, and De Paravicini, The Old Manor, Abbots Ann, Andover, Hants, England. Dated March 8th, 1936. No. 6,731.

It is proposed to use a new means for controlling airstreams flowing through ducts housing the cooling surfaces of aircraft engines. These means comprise one or more adjustable flaps or shutters hinged at the rear edge and adapted

as moved about their hinges more or less to obstruct the air exit from the duct, each flap or shutter pointing forward into the duct air stream.

470,938. *Improvements in or relating to Engine Mounts.* United Aircraft Corporation, 400, South Main Street, East Hartford, Connecticut, U.S.A. Convention date (U.S.A.), May 21st, 1935.

The proposed mounting is resilient and has a mounting ring and a number of brackets having spaced hangers and a mounting block yieldingly connected to the hangers of the bracket by resilient connections spaced apart radially of the ring.

471,926. *Improvements in Cooling Systems for Aircraft Engines.* Ellor, J. E., Grandell, South Drive, Chain Lane, Mickleover, Derby, England.

It is proposed to mount the radiator of an aircraft engine in a tunnel in the wing, the tunnel being designed so as to convert some of the kinetic energy of the air stream to pressure energy before the radiator and to reconvert after the radiator. The tunnel has an intake in the leading edge of the wing and an outlet underneath the wing, the in-stream passing through the radiator in a direction the reverse of the direction of travel of the aircraft in a downward direction. Exhaust gas may be discharged into the rear of the radiator tunnel.

473,601. *Multiple Motor Drive for Aircraft.* Menasco Manufacturing Co., 6718, McKinley Avenue, Los Angeles, California, U.S.A. Convention date (U.S.A.), March 10th, 1936.

It is proposed to couple motors together by a gear so that a single propeller may be driven by more than one motor. The gear proposed has a single gear wheel on the propeller shaft into which are geared pinions driven by the motors. Interposed between the motors and the pinions there are over-running clutches so that if one of the motors cuts out it is automatically disconnected while the drive is continued by the other motors.

472,820. *Improvements in the Cooling of Engines, Particularly for Aircraft.* Ellor, J. E., Grandell, South Drive, Chain Lane, Mickleover, Derby, England, and de Paravicini, T. P., The Old Manor, Abbots Ann, Andover, Hants. Dated March 26th, 1936. No. 9,064.

It is proposed to place the cooling surfaces in a duct, the inlets and exits being placed in positions where the air is, when the machine is flying, at a pressure higher than the static, circulation of the air being enforced by fans. The inlets and exits are placed where the external pressures do not vary much whatever the speed of the aeroplane. The air forced through the duct is preferably at a speed of less than one-third of the forward speed of the aircraft.

472,850. *Improvements in Propulsion Units for Aircraft.* Tennant, W. J., 111/112, Hatton Garden, London, E.C.1. Dated April 21st, 1936. No. 11,428.

The proposed propulsion means consist of one or more rotary compressors for compressing motive fluid, one or more compression chambers for heating compressed fluid, one or more gas turbines for driving the compressors which are mechanically coupled with the turbines. Means are provided for controlling the supply of fuel and for producing propulsive power and for increasing the ratio of the power input to the compressors to the power available for propulsion so as to allow of a rapid increase of the quantity of fuel supplied to the combustion chamber.

- 473,340. *Improvements in Cooling Means for Internal Combustion Engines.* Ellor, J. E., Grandell, South Drive, Chain Lane, Mickleover, Derby, England, and de Paravicini, T. P., The Old Manor, Abbots Ann, Andover, Hants, England. Dated April 8th, 1936. No. 10,374.

It is proposed to cool aircraft engines housed in a cowling and driving a tractor airscrew by collecting air from openings in the leading edge of the wing, conducting it by ducts to the engine, and discharging it through an annular slot in the front of the cowling, so that the cooling air circulates in the reverse direction to the normal. Fan circulation is used, and it is claimed that the system can be used for either air or liquid-cooled engines.

- 473,341. *Improvements in Aircraft.* Ellor, J. E., Grandell, South Drive, Chain Lane, Mickleover, Derby, England, and de Paravicini, T. P., The Old Manor, Abbots Ann, Andover, Hants, England. Dated April 8th, 1936. No. 10,381.

It is proposed to cool aircraft engines by placing the radiators inside the leading edge of the wing and admitting air to them from slots in the leading edge. The air flows through the radiators in a direction approximately parallel to the wing spars, its pressure is increased by a fan and it is discharged by a slot in the wing trailing edge. Engine waste heat may be discharged into the air stream after the latter has passed the radiator. The pressure of the air is converted into kinetic energy before discharge.

- 472,334. *Improvements in Cooling of Air-Cooled Internal Combustion Engines for Aircraft.* Ellor, J. E., Grandell, South Drive, Chain Lane, Mickleover, Derby, England, and de Paravicini, T. P., The Old Manor, Abbots Ann, Andover, Hants, England. Dated April 8th, 1936. No. 10,372.

This scheme applies to engines having banks of cylinders in line and it is proposed to collect air from openings in the leading edge of the wing to lead it over the cylinders and to discharge it into the airstream flowing past the cowling, the discharge duct being shaped to convert pressure energy into kinetic and the exhaust gas being discharged into the airstream before the latter is discharged.

- 472,555. *Improvements in Aircraft.* Ellor, J. E., Grandell, South Drive, Chain Lane, Mickleover, Derby, England, and de Paravicini, T. P., The Old Manor, Abbots Ann, Hants, England. Dated April 8th, 1936. No. 10,373.

It is proposed to place an aero engine radiator in a position to the rear of the aircraft so as to help to balance the weight of the engine in the nose of the fuselage. The duct behind the radiator lies substantially within the profile of the fuselage and the airstream is discharged in the extreme rear of the fuselage.

- 475,250. *Flap Device for Cowlings of Air-Cooled Aviation and Other Engines.* Potez, H. C. A., Meaulte (Somme), France. Convention date (France), May 27th, 1936.

The movable flaps are hinged to the rear edge of the engine cowling upon the whole or a part of this edge. Stops are provided on which the flaps rest when in the position of minimum airflow, springs are provided for returning the flaps against the stops, and there is a control device for opening the flaps. The flaps may be pivoted on the trailing edge of the cowling and the control device may comprise two arc-shaped members connected with a mechanism which permits of displacing them in opposite directions so as to spread them out.

- 475,525. *Improvements in or connected with Cowling Flaps for Aircraft Engines.* Dodson, E., 66, Lewin Road, Streatham, London, S.W.16. Dated May 22nd, 1936. No. 14,512.

The flaps are arranged at the trailing edge of the cowling, each flap being pivoted on or near its leading edge, being capable of being operated so that all the flaps, when moved simultaneously, form a circle larger in diameter than the cowling. The leading edge of each flap is curved and opposite to each flap. The trailing edge of the cowling is also curved so that when the flap is operated the leading edge fits against the cowling so as to make a good joint. The flaps may be controlled by hand, by a thermostat, and by fluid pressure through a piston or diaphragm.

- 474,872. *Improvements in or relating to Power Plant comprising a Plurality of Internal Combustion Engines for Motor Vehicles, More Particularly Aircraft.* Dornier-Metallbauten, G.m.b.H., Friedrichshafen, Lake Constance, Germany. Convention date (Germany), March 21st, 1936.

It is proposed to use a number of engines which can be coupled to a hollow shaft through which passes a power transmission shaft common to all the engines, arrangements being made so that each engine can be coupled or uncoupled to this shaft. Friction clutches may be used.

FIRE PREVENTION.

- 471,639. *Improvements in and relating to Aircraft.* "Yacco," S. A. F., 42, Avenue de la Grande Armée, Paris, France. Convention date (Belgium), Oct. 8th, 1935.

This is a device for extinguishing carburettor fires, especially with radial engines, the cylinder heads of which project through a hood characterised by the feature that the carburettor and the outlet nozzles of the fire extinguishing means are arranged in the interior of the hood, which is provided at the front with closable openings. The space surrounded by the hood opens at the rear.

HELICOPTERS.

- 474,005. *Improvements in and relating to Aircraft.* Hinkson, H. S., and Lovell, G. H., both c/o Miss I. Cook, General Post Office, Georgetown, Demarara, British Guiana, South America. Dated Sept. 1st, 1936. No. 23,951.

The aircraft proposed is of the helicopter type and is fitted with a parachute which is closed on the ascent and opened on the descent. Ascending and descending propellers are provided above and below the body and propellers are also provided for forward motion. It is claimed that the machine is simple, reliable, easily handled and inexpensive.

ICE FORMATION.

- 473,883. *Means for Preventing the Formation of Ice on Exposed Surfaces.* The Harshaw Chemical Co., Elyria Lorrain, Ohio, U.S.A. Convention date (U.S.A.), Feb. 20th, 1935.

It is proposed to distribute an ice-destroying liquid over the surface by allowing it to exude in a capillary flow on to the front of the surface so that it is spread over the surface in a film. The liquid is conducted by a tube which has a fine slot opening and containing a fibrous wicking. Glycerine is preferred for the liquid.

INSTRUMENTS.

469,032. *Improvements relating to Position Indicators for Aircraft Parts, such as Undercarriages and Flaps.* Dowty, G. H., Arle Court, Cheltenham, Gloucestershire. Dated Jan. 16th, 1936. No. 1,471.

For the purpose of indicators for retractable undercarriages, flaps, tail wheels, or the like, it is proposed to use an instrument having simulation parts capable of assuming positions visually corresponding to the real part. These are adapted to alter their appearance in accordance with movements of the corresponding real parts. Hence, the instrument comprises a pictorial representation of parts moving with the real parts by positive inter-connection so as to correspond therewith.

475,375. *Improvements in or relating to the Mounting of Gyroscopic Instruments in Aircraft.* Askania-Werke, Aktiengesellschaft Vormals Centralwerkstatt Dessau und Carl Bamberg-Friedman Kaiserallee 87/88, Berlin-Friedenau, Germany. Convention date (Germany), July 19th, 1935.

It is proposed to mount the gyroscopic instruments separately from the indicating means in any convenient part of the aircraft, connection being made by remote control mechanism. These instruments may be mounted together in a common carrier so that they can be easily removed from the aircraft.

474,602. *Improvements in or relating to Electrical Warning and Indicating Devices.* Automotive Products Co., Ltd., Brock House, Langham Street, London, W.1; Brown, F. V., of the Company's address; Gambrell Bros. and Co., Ltd., and Onwood, A., both of Merton Road, Southfields, London, S.W.18. Dated April 3rd, 1936. No. 9,939.

It is proposed to use an alarm to indicate to the pilot the position of the wheels for landing, the alarm being controlled by a capsule or its equivalent which is sensitive to the air speed of the aircraft. There is an electric switch controlled by the chassis, a switch automatically controlled by the air speed giving a warning if the speed falls below a predetermined value while the chassis is partially or wholly retracted. The devices proposed may be put out of action by a switch controlled by the pilot.

475,656. *Indicating Instruments for Aircraft.* Pioneer Instrument Co., Inc., 754, Lexington Avenue, Brooklyn, New York, U.S.A. Convention date (U.S.A.), May 25th, 1935.

In order to provide an indicating means for aircraft fitted with a retractable chassis there is an air speed indicator with an air speed scale and means co-operating with this scale and connected with the chassis for fixing the pilot's attention to one portion of the scale when the chassis is extended and to another portion when the chassis is retracted. In order to do this the upper range of the scale is made less visible when the chassis is extended and the lower range of the scale less visible when the chassis is retracted. There is also an auxiliary indicator.

JET PROPULSION.

471,368. *Improvements relating to the Propulsion of Aircraft.* Whittle, F., Blackamoors, Harston Road, Trumpington, Cambridgeshire. Dated March 4th, 1936. No. 6,505.

This is an apparatus for jet propulsion. There is an air compressor which divides the output from the first compressor into a first stream which is passed out through a propulsion nozzle and a second stream, an internal combustion engine supplied by the second stream and a gas turbine supplied by the exhaust gas from the engine which drives the air compressor. The exhaust gas may

contribute to the thrust by fluid reaction. The engine may be a compressor-burner-gas turbine combustion.

KITES.

471,599. *Improvements in Kites.* Low, A. M., 1, Woodstock Road, Chiswick, London, W.4. Dated March 14th, 1936. No. 7,704.

There is described a means whereby the effective point of attachment of the cord may be varied. There are two attachments each of which can hold the cord and at least one which releases its hold when the cord is jerked. Two points of attachment are proposed between which the cord is wound, so that successive jerks release successive half turns and at each release altering the point of attachment.

MISCELLANEOUS.

468,777. *Apparatus for Landing of Land and Sea Aircraft.* Weichardt, R., Burgermeister-Smidtstrasse 59, Bremen, Germany. Convention date (Germany), April 27th, 1935. Specification not accepted.

It is proposed to provide a landing deck which can be towed by a small ship. The deck is to be floating and also hydrodynamically supported. It is to be made of material lighter than water or is to be a hollow body of any desired material.

469,049. *Hydraulic Circuits and Controls Therefor.* Dunlop Rubber Co., Ltd., 32, Osnaburg Street, London, N.W.1, Wright, J., and Trevaskis, H., of the Company's Works at Fort Dunlop, Erdington, Birmingham, Warwickshire. Dated Feb. 19th, 1936. No. 5,013.

This specification describes methods for the remote control of machine and camera guns by hydraulic means. A valve is provided containing a displaceable valve body and by a static column of liquid against one end of which column the said body is maintained in spring loaded contact and in an inoperative position from which the said body is displaceable to an operative position against the spring by pressure exerted upon the other end of the said column by a hand-operated plunger positioned in a remote control.

469,050. *Hydraulic Circuits and Operating Devices Therefor.* Dunlop Rubber Co., Ltd., 32, Osnaburg Street, London, N.W.1, Wright, J. and Trevaskis, H., of the Company's Works, Fort Dunlop, Erdington, Birmingham, Warwickshire. Dated Feb. 19th, 1936. No. 5,014.

This specification concerns hydraulic means for operating guns or camera guns on aircraft, and is concerned with a hydraulic circuit and valve control permitting the operation of such guns from the chief flying control during flight. There is a hydraulic circuit, part of which passes through a valve on the handle of the control which valve is normally closed by a spring. The valve has a pressure inlet, outlet and return ports selectively opened and closed by a plunger.

469,054. *Pneumatic Control Apparatus for Mechanisms such as Machine Guns and Camera Guns on Aircraft.* Dunlop Rubber Co., Ltd., 32, Osnaburg Street, London, Wright, J., and Trevaskis, H., of the Company's Works, Fort Dunlop, Erdington, Birmingham, Warwickshire. Dated March 12th, 1936. No. 7,452.

This specification is concerned with pneumatic control apparatus for trigger actuation on aircraft for the control of machine and camera guns. The flying control for aircraft has a handle on which is placed the gun control which consists of spring loaded inlet and exhaust valves and an operating member displaceable along an axis passing through opposite sides of the part.

470,200. *Electrical Means for Indicating Relative Movements of Parts of Aircraft.* S. Smith and Sons (Motor Accessories), Ltd., Cricklewood Works, Edgware Road, Cricklewood, London, N.W.2, and Russell, V. J. S., of the Company's address. Dated May 4th, 1936. No. 12,548.

The object of this arrangement is to give information to the pilot of relative movements between different parts of the machine, such as folding chassis, and to inform him whether locking apparatus has operated, etc. It consists of an electrical rheostat operated by such relative movements, an electro-magnetic indicator, and further means responsive to the action of the locking gear.

473,395. *Improvements in and relating to Kites.* Van Ittersum, W. H. A. G., Soestdijker, Straatweg, 221, Zuid Bilthoven, The Netherlands. Convention date (France), Jan. 27th, 1936.

The kite proposed has two horizontal rotors and the lift is produced by the Magnus effect. Each rotor consists of two half cylindrical shells radially shifted relative to each other so that they are self-rotating in a wind. The rotors may, alternatively, be driven by an electric motor supplied with current from the ground.

474,862. *Safety Device for Aircraft.* Voiciechauskis, B., II Apyl Mokesciu Inspekeija. Siaulioi, Lithuania. Dated Nov. 16th, 1936. No. 31,238.

In view of the difficulty of getting an occupant out of an aeroplane in an emergency, it is proposed to provide a rail along which the occupant and his seat moves upwards or downwards and he is pushed out through an opening in the fuselage. In an aeroplane flying over the sea it is proposed to provide that the occupant becomes enclosed in a safety cabin boat. In cases where there are many occupants an emergency room is provided where they are expected to go in cases of emergency. They are then brought to the boat.

NAVIGATION.

474,821. *Improvements in Signalling for Aerial Navigation.* Braunstein, R., 6, Avenue Malakoff, Paris, France. Convention date (France), Feb. 4th, 1935.

It is proposed to fly captive balloons or kites above the fog and over the point to be signalled, and to provide them with means for sonorous signals in day time and luminous signals at night. The cable may also have signals and the balloon lights may be sodium lamps. The signals may be codified for giving the height of the balloon. The balloon may be made to descend so that the aircraft can follow it down to earth. On reaching the ground the balloon may be housed in a subterranean chamber which can be covered.

ORNITHOPTERS.

470,537. *Improvements in Oscillating Wing Aircraft.* Budig, F., 37, Quais des Grandes, Augustins, Paris VI, France. Convention date (Germany), Aug. 24th, 1935.

It is proposed that a pair of supporting and propelling wing portions are reciprocated about an axis substantially parallel to their chord to be partially telescoped within a central fixed hollow wing portion. The curvature of these wing portions may be such that the polar co-ordinates of points taken successively beyond the telescopic wing portion from tip to adjacent its root relatively to an axis of oscillation of the wind are of gradually decreasing magnitude.

PARACHUTES.

469,207. *Improvements in Parachutes.* Capel, L. J. M., 22, Rue de Musee, Marseilles, France. Convention date (France), May 14th, 1935.

It is proposed to provide means whereby a parachute can be quickly opened by means of a system of inflatable chambers secured to the canopy and made up of a chamber adopted to extend round the canopy adjacent to its periphery and a number of radially arranged chambers connected to the periphery chamber, and means for connecting the periphery chamber to a source of compressed gas adapted to be carried by the parachutist.

470,228. *Improvement to Parachute Packs.* Quilter, J. R. C., and Gregory, S., Stadium Works, Woking, Surrey. Dated Jan. 2nd, 1937. No. 108.

It is stated that it has been usual to fold the shroud lines in zigzag manner, back and forth across the pack cover, each hank thus formed being passed over a loop of webbing designed to retain the lines in place. It is proposed, instead of this arrangement, to employ webbing or loops of sufficient number and size to accommodate the folded shroud lines, one or more of the loops being adapted to vary in size at the expense of another loop in order to allow the lines an easy exit.

475,241. *Improvements in the Suspension of Parachutes.* Aerostatica Avoria, Società in Accomandita Semplice, 22, Via Pellegrino Matteucci, Rome, Italy. Convention date (Italy), March 6th, 1936.

The proposed parachute has a variable area apex vent and rigging lines reaching the elastic members that constrict said apex vent, characterised in that the connection of the rigging lines is such that the non-tensioned elastic members assume a flat position concentrically one with respect to the other and the strength of the attachment of the rigging lines to said elastic members is maintained even when one of them should break. The parts subjected to great stress are stitched herring-bone fashion.

475,245. *Improvements in Parachute Equipment. Notably in Safety Arrangements of Release Grips.* "L'Aviorex" Dreyfus Freres, 50, Rue Henri-Barbusse, Clichy (Seine), France.

This specification is concerned principally with devices in which the parachute is released by means of a Bowden control operated by a hand grip or lever and it is proposed to use a device intended to prevent involuntary release of the parachute. The grip or lever is pivotable about an axis so that the locking means are arranged so that unlocking force must be directed toward that edge of the grip on which the hand of the parachutist engages in order to move the grip pivotably.

PILOTS AND PILOTING.

476,816. *Improvements in or relating to Apparatus for Training Aircraft Pilots.* Link, E. A., 10, Avon Road, Binghampton, New York, U.S.A. Dated June 19th, 1936. No. 17,069.

After describing the usual methods for informing an aircraft pilot of his position in the air, the specification describes a method of training which consists of employing a dummy aircraft which has apparatus for transmitting to the pupil signals stimulating radio direction signals. Means are provided for automatically generating alternative signals and for transmitting them to the pupil. There is also a trainer capable of directional control within which the pilot may be enclosed so that his vision is confined to his instruments, and provided with earphones through which signals can be heard, and it may also have a visual indicating device or devices.

ROTORCRAFT.

470,757. *Improvements in or relating to Rotary Wing Aircraft.* Hutchison, H. H., and Gibson, J. J., 69, Welbeck Avenue, Portswood, Southampton. Dated Feb. 17th, 1936. No. 4,724.

This specification refers to the arrangement of a rotor hub adapted to be tilted by a lever operated by the pilot. The rotor hub is displaceable along a guide member connected with and fixed transversely with reference to the fuselage so that the displacements of the member along the guide are executed about the centre of lift of the rotor.

474,611. *Improvements in Blades for Aircraft Sustaining Rotors.* De la Cierva, J., Bush House, Aldwych, London, W.C.2. Dated May 1st, 1936. No. 12,359.

It is stated that normal methods of blade construction do not allow of the mass centre being situated sufficiently far forward. It is also desirable to minimise the bending forces in the blade and not to alter the natural frequency of the blade. It is therefore proposed to locate any additional mass either at the extreme root or near the node of the gravest mode of flexural oscillation. In certain cases it is desirable to place the weight somewhat outboard of the nodal point.

476,597. *Improvements in or relating to Rotary Wing Systems for Aircraft.* Nagler, B., Rennweg 59, Vienna III, Austria. Convention date (Austria), Feb. 8th, 1936.

It is proposed to construct blades for rotary wings by using a number of drawn tubular sections arranged lengthwise of the blades, each section having a uniform profile, the members are secured together to form the blade profile and structure.

476,598. *Flying Machine.* Nagler, B., Rennweg 59, Vienna III, Austria. Convention date (Austria), Feb. 8th, 1936.

This specification relates to aircraft having an airscrew and a rotating wing, both of which are power driven until the necessary height has been reached. The proportion of power transmitted to the airscrew and the rotary wing can be varied, the rotor can be inclined and there are two deflecting surfaces extending in the direction of the slipstream, one being fixed and adapted to counteract any tendency of the machine to overturn about its longitudinal axis owing to engine torque, the other is adjustable and can create a reaction about the rotor axis.

471,820. *Method and Apparatus for the Vertical Steering of Aircraft.* Deutsche Versuchsanstalt für Luftfahrt E. V., Rudover Chaussee, Berlin-Adlershof, Germany. Convention date (Germany), March 12th, 1935.

It is proposed to effect the longitudinal control of rotary wing aircraft by tilting the rotating wings about an axis transverse to the pitching plane of the aircraft and simultaneously actuating an elevator in the same direction giving opposite control moments.

469,554. *Landing and Launching Device for Aircraft.* Brie, R. A. C., 26, Orford Gardens, Strawberry Hill, Twickenham, Middlesex. Dated Jan. 23rd, 1936. No. 2,203.

This proposal is primarily intended for use with rotating wing aircraft landing on ships. It consists of an apparatus incorporated in the ship structure carrying a small supporting platform capable of being swung inboard or outboard above the deck level and of being trained to suit the relative wind. The platform may be supported on a vertical pillar being overhung by means of a bracket, the bracket being rotatable on the pillar.

471,510. *Improvements in and relating to Aircraft having Rotative Sustaining Means.* Cameron, P., 7, Lancaster Crescent, Kelvinside, Glasgow. Dated Jan. 1st, 1936. No. 25.

This specification refers to a hub for the rotor of a rotary wing aircraft which is arranged to enable the head to tilt universally. There is a driving member in fixed bearings, a driven member capable of a limited universal movement and also there are arrangements for manual control of the blade angle. The blades may also move radially. The head has hinge members for the blades, bearings for the hinges and means for turning the bearings so as to alter the angle of incidence.

471,509. *Improvements in and relating to Aircraft having Rotative Sustaining Means.* Cameron, P., 7, Lancaster Crescent, Kelvinside, Glasgow. Dated 1st Jan., 1936. No. 24.

This specification relates to rotor blades which can be extended and retracted. As the blades flex upwards in varying degrees according to the state or position of the aircraft there is difficulty in retracting and extending. The means proposed act only on the blade at the moment when the flexure is small and each blade has resilient means which, when the flexure of the blade offers too great resistance to extension, takes up the movement of the blade operating means and transfers same to the blade when its flexure is less.

470,982. *Improvements in and relating to Means for Landing and Launching Gear.* Brie, R. A., 26, Orford Gardens, Strawberry Hill, Twickenham, Middlesex. Dated Feb. 28th, 1936. No. 6,036.

This specification relates to rotary wing aircraft and provides means for enabling them to be operated from stations adjoining a sheet of water. The small platform required is located near the shore but over the water. The platform may be movable to permit of training.

472,306. *Improvements in and relating to Aircraft with Auto-Rotative Wings.* The Cierva Autogiro Co., Ltd., Bush House, Aldwych, London, W.C.2. Convention date (U.S.A.), April 2nd, 1935.

This specification describes a rotary wing aircraft in which the engine is situated below the centre of gravity, the airscrew or airscrews in front and the occupants between the engine and airscrew. The engine is connected with the airscrew by a driving shaft. The airscrew axis passes approximately through the centre of gravity and there is a bevel gear between the driving shaft and the propeller shaft. The pilot's seat is situated well in front so that his view is excellent. Fuel tanks are situated on the centre of gravity, and the engine is enclosed in a compartment whose forward wall at least is fireproofed.

472,547. *Improvements in and relating to Aircraft with Autorotative Wings.* The Cierva Autogiro Co., Ltd., Bush House, Aldwych, London, W.C.2, England. Convention date (U.S.A.), April 2nd, 1935.

This is a rotary wing aircraft in which the engine can be connected to the airscrew and also to a wheel of the undercarriage through reduction gearing. Arrangements are provided to prevent simultaneous driving of both the wheel and the airscrew. The driveable undercarriage wheel may be steered. The rotor may be driven by the engine. The engine may be cooled by an engine driven blower and there is a clutch so that the blower is automatically connected when the airscrew is disconnected.

- 475,230. *Improvements in and relating to Aircraft with Rotative Wings.* The Cierva Autogiro Co., Ltd., Bush House, Aldwych, London, W.C.2. Convention date (U.S.A.), Jan. 13th, 1936.

This arrangement is applicable to helicopters and also to rotary wing aircraft where there is a transmission of power from the engine to the rotary wing for the purpose of starting the latter and which are fitted with a land chassis. It is proposed to drive one or more of the chassis wheels for the purpose of enabling the machine to travel on a road under its own power. The road wheels are driven from the same gear box controlling the motor and means are provided for preventing the wheels and rotor being driven simultaneously, and there is a single friction clutch in the transmission systems, both of the rotor and the wheels.

- 474,681. *Improvements in and relating to Aircraft with Autorotative Sustaining Rotors.* Juan de la Cierva, Bush House, Aldwych, London, W.C.2. Dated Nov. 4th, 1936. No. 12,619.

In the case of rotating wings it is stated that an improvement of efficiency is obtained if displacement of the blade in the plane of rotation in a leading direction is associated with a decrease of angle. This specification describes a method of combining this action with an automatic or semi-automatic operation of the starting method.

- 476,596. *Improvements in or relating to Rotary Wing Systems for Aircraft.* Naylor, B., Rennweg 59, Vienna III. Austria. Convention date (Austria), May 16th, 1936.

This specification refers to rotor blades which can flap about axes intersecting one another at the axis of rotation of the wing system, and of turning about axes extending longitudinally of the blades. The blades are turned by levers mounted on a carrier, pivotally mounted on the carden so as to be capable of turning with it about the pivotal mounting of the latter on the driving shaft. The movement of the steering rod is transmitted to the blades through the universal joint, the centre of which is located at the point of intersection of the flapping axes and the axes of rotation of the wing system.

UNDERCARRIAGES.

- 475,019. *Improvements in and relating to Undercarriages for Aircraft.* Elektronmetall G.M.B.H., Pragstrasse 25, Stuttgart-Bad Constatl, Germany. Convention date (Germany), June 15th, 1936.

This arrangement is described in connection with a wheel support of the fork type and is concerned with the method of attaching the wheel axle. The ends of the axle are reduced in diameter and the surfaces of contact consist of radial teeth and are drawn tightly together by means of a screw bolt.

- 474,460. *Improvements in or relating to the Control of Aircraft Brakes.* Bendix, Ltd., King's Road, Tyseley, Birmingham 11, and Roberts, G. P., of the Company's address. Dated May 15th, 1936. No. 13,738.

This is an arrangement for operating brakes for parking differentially for steering, or for retarding ground movement. Two levers are provided which operate valves and which can be moved together by a hand control and which can be moved differentially by cams on a shaft which is controlled from the rudder bar.

473,768. *Improvements relating to Aircraft Undercarriages.* Dowty, G. Arle Court, Cheltenham, Gloucestershire. Dated May 7th, 1936. No. 12,955.

It is proposed to provide a unitary shock absorbing system for undercarriages capable of ready adjustment so as to cope with changing conditions. A wheel mounting is formed as a unit comprising a frame pivotally mounted so as to be deformable under landing load against a shock absorber. There is provision for the variation at choice of the position of the axes of pivots, ratio between vertical wheel travel. The resistance of the shock absorber can be readily varied. A wheel containing an internal shock absorber may be used.

470,581. *Fluid Pressure Braking and Steering Apparatus.* Dunlop Rubber Co., Ltd., 32, Osnaburg Street, London, Wright J., and Trevaskis, H., of the Company's Works at Fort Dunlop, Erdington, Birmingham, Warwickshire. Dated Feb. 19th, No. 5,012, and Nov. 10th, 1936, No. 30,592.

This specification concerns fluid pressure braking and steering apparatus and the apparatus proposed has a pair of hydraulic valves, each with an outlet port and also with an inlet and return port, which latter ports are spaced apart along the axis of each valve casing and are closed in the inoperative position by the wall of a hollow piston, one end of which piston is open and remains coaxial with the outlet port, the said wall being formed with posts displaceable in one direction to register with the inlet port and in the other direction to register with the return port.

469,407. *Improvements in and relating to Brakes for Aircraft Wheels.* The India Rubber, Gutta Percha and Telegraph Works Co., Ltd., Thames House, Millbank, London, S.W.1, and Tarris, F. J., of the Company's Works at Silvertown, London, E.16. Dated Jan. 23rd, 1936. No. 2,225.

This specification is concerned with fluid controlled or vacuum controlled brakes and is arranged for differential braking so that the aircraft may be steered on the ground. It is proposed to use a control mechanism having a pair of auxiliary control devices each comprising means, such as a valve or plunger, to release partially or wholly the braking pressure in that brake set to which the device is connected, a movable element in alignment with and controlling the said brake releasing means and a plunger which is separate from and additional to the brake releasing means and which is acted upon directly by the actuating fluid from the main control device wherein the movable element and the plunger are mounted for simultaneous movement as an integral unit.

471,488. *Improved Brake Operating Means for Aircraft.* Fitt, G., and Barber, P. M., both of Tankerton Garage, Tankerton, Kent. Dated March 3rd, 1936. No. 6,440.

It is proposed to use an apparatus by means of which aircraft brakes cannot be applied unless the tail member is on the ground. There is a source of fluid under pressure from which branch two channels, one leading to a safety valve, normally open to the atmosphere, but closed by movement of the tail member, the other leading to a brake valve controlled by the throttle lever so as to be open over the full or nearly full working range of the lever, but closed during the last movement of the lever towards the closed position.

470,928. *Improvements in and relating to Undercarriages for Aircraft.* Brie, R. A. C., 26, Orford Gardens, Strawberry Hill, Twickenham, Middlesex. Dated Feb. 25th, 1936. No. 5,631.

It is stated that the requirements for undercarriages for rotary winged aircraft are different from those for aeroplanes, an extra long shock absorbing travel

being advisable for landing, while for getting off no springing arrangement is necessary. Under certain circumstances, however, on getting off some shock absorbing arrangement may be required. It is proposed to use, therefore, an undercarriage which includes a locking device operated by the pilot for positively locking together relatively moving members of the undercarriage so as to prevent it from developing its full extensibility.

471,944. *Improvements in or relating to Landing Gear for Aircraft.* Delanne, M. H., 17, Rue Servandoni, Paris, France. Convention date (France), June 29th, 1935.

In order to reduce the weight and resistance of aircraft, it is proposed to use a chassis consisting of a single wheel supported in a stirrup connected to the fuselage in such a manner as to be retractable. The proposed tail support consists of two wheels spaced apart laterally, they may be mounted on the extremities of the tail plane.

470,967. *Improvements in or relating to Vehicle Brakes.* The India Rubber, Gutta Percha and Telegraph Works Co., Ltd., Thames House, Millbank, London, S.W.1, and Tarris, F., of the Company's Works, Silvertown, London, E.16. Dated Jan. 23rd, 1936. No. 2,226.

In a brake mechanism there is a multi-way valve having connections for pipes and passages leading from the connections to openings in the upper surface of the base, a flexible diaphragm to form one wall of a chamber affording communication between the openings and means applied to that side of the diaphragm remote from the openings selectively to effect a lateral shift of the diaphragm over small areas adjacent to the openings so as to apply the diaphragm directly thereto and close them against passage of pressure fluid.

473,387. *Improvements in or relating to Retractable Alighting Gear for Aeroplanes.* Ehrhardt, P. G., 15, Grillparzenstrasse, Frankfort, Main, Germany. Convention dates (Germany), Nov. 14th, 1935, and Nov. 10th, 1936.

In this folding chassis it is proposed that the gaseous medium for shock absorbing is separated from the liquid medium which transmits shocks and which operates the retracting gear by a flexible partition. The gaseous medium is under pressure in the retracted position as well as in the unfolded position so long as they do not carry the weight of the machine. Means are provided for indicating the fluid pressures on the pistons belonging to the struts and eventually on the tail skid, and a sole measuring instrument is provided so that the pilot can control on the ground the weight and distribution of the fuel and useful load.

473,425. *Improvements relating to Locking and/or Indicating Means for Retractable Aircraft Undercarriages.* Dowty, G. H., Arle Court, Cheltenham, Gloucester. Dated March 12th, 1936. No. 7,507.

Means are proposed to prevent accidental retraction of undercarriages while the machine is standing on the ground. The means may operate directly on the undercarriage itself, or may cut out the retraction gear. Yielding of the shock-absorbing gear may operate a switch cutting out indicating lights.

473,202. *Improvements in and relating to Retractable Undercarriages for Aircraft.* Dowty, G. H., Arle Court, Cheltenham, Gloucester. Dated April 8th, 1936, No. 10,380; Dec. 9th, 1936, No. 33,845; Jan. 4th, 1937, No. 236; and Jan. 12th, 1937, No. 951.

The arrangement proposed relates to the locking of folding chassis operated by hydraulic jacks. The locking means for holding the gear in either of its extreme positions may be operated by the supply to the jack of fluid in excess of

that required to raise and lower the chassis. Where the jack is double acting locking means are provided except when such means are moved by lost motion of the jack. The locking member may be resiliently urged to lock and pressure operated to unlock. The lock may be operated by a minor piston moved by fluid pressure on its way to or from the jack cylinder or it may be operated directly by pressure in a cylinder through which pressure is transmitted after completion of stroke to the jack.

475,222. *Improvement in Landing Gear for Aircraft.* Saulnier, R., 5, Rue de Monceau, Paris, France. Convention date (France), Nov. 23rd, 1935.

This specification claims improvements on the chassis described in specification 456,632. In order to ensure that the gear shall unfold even if there is a failure to the oil supply to the jack, it is proposed to introduce a safety apparatus intended to produce the requisite movement. A further modification is introduced by a piece of apparatus intended to lock the jack in the unfolded position.

475,504. *Improvements in or relating to Retractable Undercarriages for Aircraft.* The Supermarine Aviation Works (Vickers), Ltd., Mitchell, R. J., and Black, A., all of the Company's Works, Woolston, Southampton, Hants. Dated May 19th, 1936. No. 14,165.

This is a pneumatically operated retracting chassis in which the source of gas under pressure is supplied from a cylinder. There is an emergency cylinder containing liquid for generating gas under pressure for use in case the main supply fails. There is also, in addition to the control valve, a shuttle valve in the pipe between the cylinder and the gear. This shuttle valve controls the change over between the cylinder and the emergency cylinder.

473,756. *Improvements relating to Aircraft Undercarriages with Resilient Wheel Units.* Dowty, G. H., Arle Court, Cheltenham. Dated March 16th, 1936. No. 7,908.

The wheel is fitted with an internal shock absorber, one portion of which is fixed to the non-rotating hub and the other is guided for reciprocating movement in said hub. Each part is fixed to the radial side of a frame which is articulated for deformation and the sides of which are adapted to be attached pivotally at axes which are spaced apart to an otherwise complete undercarriage. The deformation of the frame while landing against the restraint of the shock absorber results in a substantially greater wheel movement.