

## ABSTRACTS OF PATENT SPECIFICATIONS.

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

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### AERODYNAMICS.

478,512. *Improved Means for Stimulating the Air Flow Round an Aerofoil.* Garden, A. D., 58, Gloucester Terrace, Hyde Park, London, W.2. Dated July 17th, 1936. No. 19,832.

It is proposed to arrange that a portion or portions of an aeroplane are moved to form a wedge aerofoil, the latter being described as formed of two plates whose front edges are together and whose rear edges are separated. When exposed, the wedge aerofoil is above or below the wing in such fashion that it is wholly or in part overlapped by the wing.

479,598. *Improvements relating to the Reduction of Resistance of Bodies Moving in Fluids.* Miles, F. G., Reading Aerodrome, Woodley, Berkshire. Dated July 6th, 1936, No. 18,777, and Aug. 6th, 1936, No. 21,704.

It is proposed to suck away the boundary layer on an aeroplane surface through ducts connected to air sucking means, the area concerned being perforated nearly uniformly so that the surface is porous. The air sucked is preferably exhausted over the top of the rear portion of the fuselage. The ducts have various throttling devices to localise and control the abstraction as may be found desirable.

477,894. *Improvement in Lifting Means for Aircraft.* Master, S. D., 24, Church-gate Street, Fort, Bombay, India. Dated July 7th, 1936. No. 18,840.

It is proposed to produce a vertical lift aircraft of small overall size by using a lifting device consisting of wings or vanes arranged to form a hollow truncated cone or a square or polygonal pyramid. The latter provides a housing for one or more propellers, the latter being so arranged that air is forced into the wings and also through the top opening of the housing. It is claimed that an upward lift results.

## AIRCRAFT—CONSTRUCTION.

478,089. *Improvements in the Construction of Aircraft Wings.* Vickers (Aviation), Ltd., and Wallis, B. N., both of Weybridge Works, Brooklands Road, Weybridge, Surrey. Dated July 7th, 1936. No. 498.

In the proposed wing there is an upper portion consisting of the skin and upper part ribs and a lower portion with lower portion ribs without webs or shear bracing. These are combined to form the wing. In each section there is a boom located at the deepest portion, the boom being attached to the skin and to the part ribs. The booms take the horizontal component of the bending moments, the part ribs receiving the loads from the skin.

478,307. *Improvements in and relating to Fuselage, Body or Hulls of Aircraft.* Martin, J., Higher Denham, nr. Uxbridge, Middlesex. Dated July 13th, 1936. No. 19,448.

The bodies of aircraft are formed by channel section strips which are assembled in sets each consisting of a number of the joined channel section strips. The sets are connected together by bolting, riveting, or welding. The strips are curved or tapered to conform to the body with their flanges turned inward and are fastened together. Bulkheads are provided at suitable intervals.

477,541. *Improvements in or relating to the Construction of Wings and other Aircraft Bodies or Parts.* The Supermarine Aviation Works (Vickers), Ltd., and Mitchell, R. J., both of Woolston, Southampton, Hampshire. Dated July 2nd, 1936. No. 18,353.

In order to avoid the expensive riveting of the sheet metal covering of the wings, it is proposed to attach these sheets by means of wood screws. The plates may be joggled at their junctions in such a manner as to form an external recess above the junction. The wooden member is multiply forming part of the interior structure, and a strip member is provided which fits into the exterior recess. The wood screws are countersunk.

481,050. *New or Improved Means for Folding Monoplane Wings.* Short Bros. (Rochester and Bedford), Ltd., and McVie, R., both of Seaplane Works, Rochester, Kent. Dated March 18th, 1937. No. 7,961.

The proposed wing has a stub portion, the rear part of which folds forwards. The folding portion is first folded back into a fore and aft position and afterwards turned so as to tip up the wing. The folding wing is locked by fore and aft fasteners which support the wing when spread. These fasteners can be retracted for folding the wing. There is a hingeing extension for supporting the wing when the fasteners are unlocked.

481,058. *A New or Improved Method of Covering Aircraft Wing Surfaces and Bodies.* Short Bros. (Rochester and Bedford), Ltd., and Shepherd, P., both of Seaplane Works, Rochester, Kent. Dated April 16th, 1937. No. 10,889.

This arrangement specially applies to cases of wings where the leading portion is covered with metal, and the rear of fabric. The rear of the metal skin is joggled inwards and has thread holes, while a clamping member is provided pressing against the joggled part and having thread holes corresponding with those in the rear of the skin. The leading edge of the fabric is lapped round the clamping member and attached by stitching.

480,685. *Improvements in Thin Sheet Covered Aircraft Bodies, Wings and the Like.* A.T.S. Co., Ltd., 3/4, Clement's Inn, Strand, London, W.C.2, and North, J. D., Hill House, Eaton, Norwich, Norfolk. Dated Aug. 20th, 1936. No. 22,965.

It is proposed to attach straight lengths of stringers to the covering sheets when these are flat along selected lines which remain straight when the covering sheets are curved to their final form. Units thus formed may be attached to frame pieces which lie transversely to the stringers at intervals and impose the correct curvature on the covering. Two or three such units may be assembled to form a fuselage or wing.

479,532. *Improved Joint for a Folding Strut, Arm, or the Like.* Thornhill, P. W., 32, Heath Terrace, Leamington Spa, Warwickshire; and Onions, J. H., 18, Telford Avenue, Leamington Spa, Warwickshire. Dated Aug. 21st, 1936. No. 23,010.

This specification describes a retractable aircraft chassis. In order that the wheel shall be horizontal after retraction, when the chassis is retracted rearwards, the two mounting axes of the main strut carrying the landing wheel are both inclined to the planes containing respectively the longitudinal and normal axes and the lateral and normal axes. One of the axes is also inclined to the plane containing the longitudinal and lateral axes. The effect is that the strut is turned during retraction so that the wheel is finally horizontal so that it can be retracted into a wing.

479,839. *Improvements relating to the Construction of Aircraft Structures or Components Thereof.* Greig, L. T. H., Granada, Mount Felard, Millbrook, Jersey. Dated July 8th, 1936. No. 18,964.

It is proposed to construct aircraft components, such as wings, fuselages, etc., by winding tensile reinforcement material into the desired form of the component, e.g., to form a lattice of wire or metal ribbon and also to wind strip material into the same form so as to form a virtually continuous skin, the whole being impregnated with a form of cement which can be hardened.

478,855. *Improved Means for Securing Fabric to Aircraft Wings and the Like.* The Fairey Aviation Co., Ltd., North Hyde Road, Hayes, Middlesex; Bray, F. C., Burray, 248, Great West Road, Hounslow West, Middlesex; Budd, O. J., 1, Grangewood Villas, Grange Road, Hayes, Middlesex; and Roberts, H. F., 21, Glebe Road, Hayes, Middlesex.

The top flange of the wing rib is of U section and it is transversed at intervals by eyelets, rivets, or the like, and the cord which is laid over the fabric is threaded to and fro through the latter and round under the eyelets, enabling the fabric to be pulled down partially into the rib U.

482,166. *Aeroplane Wing Structure.* Barkley, A. St. C., 318, Grand Boulevard, Detroit, Michigan, U.S.A. Dated Feb. 16th, 1937. No. 4,514.

The proposed wing has a multiple wing structure having a pair of longitudinal segments of fluted sheet metal which form a series of closed circular or polygonal passages extending along the length of the wing. Each passage is rigidly connected to the stressed skin of the wing. Fluted segments extend from the leading to the trailing edges of the wing between vertical spars.

482,782. *Improvements in the Construction of Wings for Aircraft.* Brodeau, A. H. J., 4, Villa Ornam, Paris, XVIII, France. Convention date (France), April 9th, 1936.

It is proposed to construct aeroplane wings of a sheet of material shaped to the wing camber and composed of agglomerated cork stuck between two layers of wood so that the wing is hollow. Balsa wood, sponge, ebonite, etc., may be used in place of the cork.

480,210. *Improvements in the Construction of Aeroplanes.* Renault, L., 8, Avenue Emile Zola, Billancourt (Seine), France. Convention date (France), Feb. 14th, 1936.

It is proposed to use a resilient assemblage between adjacent parts of an aeroplane. It is stated that this arrangement has the effect of reducing stresses and also of stopping vibration. These resilient connections may be made of rubber sleeves or less easily deformable rubber blocks.

480,221. *Improvements in or relating to Aircraft Structures.* Mercier, P. E., 9, rue Marbeau, Paris, France. Convention dates (France), April 29th, 1936, and Aug. 12th, 1936.

It is proposed to construct box spars for aeroplane wings by arranging on the periphery a number of partitions or frames arranged substantially parallel, longitudinal elements of wood in juxtaposition to each other, preferably glued together. The elements are approximately at right angles to the partitions, the whole assembly being bound together with hoops in a similar way to the hoops of a barrel.

480,269. *An Improved Self-Supporting Wing or Control Surface for Aircraft.* A.T.S. Co., Ltd., 3/4, Clement's Inn, Strand, London, W.C.2, and North, J. D., Hill House, Eaton, Norwich, Norfolk. Dated Aug. 20th, 1936. No. 22,938.

The proposed wing comprises a pair of main spars and sheet covering adapted to resist shear. The top and bottom covering extends between the spars over the length of the outer portion thus constituting a tubular member, and the covering is wholly or in part detachable between the spars over the length of the inner part where it extends round the nose and the tail constituting two tubular members, one with each spar. A strong rib at the juncture of the outer and inner wing portions receives the torque from the outer portion and conveys it to, and distributes it over, the two tubular members which constitute the inner portion.

480,273. *Improvements in Aeroplane Spars and other Members.* A.T.S. Co., Ltd., 3-4, Clement's Inn, Strand, London, W.C.2, and North, J. D., Hill House, Eaton, Norwich, Norfolk. Dated Aug. 20th, 1936. No. 22,966.

A corrugated web is secured to only one surface of a boom by riveting, welding, etc., directly through those surfaces of the corrugations which lie in contact with that surface of the boom, and the web is stiffened to resist shear by one or more stiff members secured to it across the corrugations and along lines extending between the booms.

482,488. *Monospar Cantilever Aircraft Wing.* Klemm, H., Waldburgstrasse 29, Boblingen, Germany. Convention date (Germany), June 26th, 1936.

It is proposed to use a hollow spar of elliptical or aerofoil shape forming the foremost portion of an aeroplane wing. The spar has a longitudinal stay plate near the point of widest cross section of the wing, and transverse members extending therefrom to the leading edge. The trailing portion of the wing is formed by part ribs with an ordinary covering.

## AIRCRAFT—GENERAL.

477,238. *Improvements in Aeroplanes.* Pollopas Patents, Ltd., 2 and 3, Charterhouse Square, London, E.C.1. Convention date (Germany), Feb. 19th, 1936.

It is proposed that an aeroplane as claimed in Specification 459,639 wherein the support or the upper portion thereof is pivotally mounted in such manner that the said support or the said upper portion may be inclined backwards, forwards or sideways. The upper portion of the support may also be telescoped up and down. The upper portion may be lowered so that it rests on one of the supporting surfaces or on the fuselage. Vertical planes are attached to the tips of the wings.

## AIRSCREWS.

481,014. *Improvements in or relating to Wind or Water Wheels for Use as Prime Movers, Propellers or as Sustaining Devices for Aircraft.* Daniel, P. G. L., 31, rue du Commandant Reviere, Colombes, Seine, France. Convention date (France), Sept. 7th, 1935.

The wheels proposed have vanes which have a rotational movement relative to the wheel and in a direction opposite to that of the wheel. Each vane is formed by a rigid framework having attached a sheet of elastic material so that the sheet curves under the action of the fluid.

## BOMBS AND BALLISTICS.

481,931. *Improvements in Ammunition Boxes or Holders.* Rethel, W., Grabenstrasse 10, Brandenburg (Havel), Germany, and Arado Flugzeugwerke Gesellschaft mit beschraenkter Haftung, Brandenburg (Havel), Germany. Dated Nov. 17th, 1937. No. 31,595.

This is an ammunition box holder for use in aircraft wings characterised by this, that the box-shaped ammunition holder is composed of several individual boxes arranged in series forming a communicating chamber, which consists only of a bottom, two longitudinal side walls, the bottom of the individual boxes at their neighbouring edges being connected by hinges in such manner with one another that the individual boxes can turn about the said edges.

## CATAPULTS.

478,427. *Improvements in and relating to Devices for Accelerating Aircraft for Launching Purposes.* Mitchell, C. C., 26, Chermiston Road, Corstorphine, Edinburgh 12. Dated May 18th, 1936. No. 14,074.

The device proposed is a type of catapult having a slotted cylinder carrying a piston behind which pressure can be generated. Connected to the piston and projecting from the cylinder is a fitting which works in the slot. The slot can be closed to pressure by means of an endless belt, inside the cylinder, carried by a pulley on the piston. Fluid under pressure may be admitted to the reverse side of the piston for braking purposes.

480,692. *Improvements in and relating to Apparatus for Accelerating Aircraft for Launching Purposes.* Mitchell, C. C., 26, Chermiston Road, Corstorphine, Edinburgh 12, Scotland. Dated Aug. 25th, 1936, No. 23,305, and Feb. 25th, 1937, No. 5,660.

The catapult proposed has a cylinder containing a piston, which latter is attached to a cord with a smooth exterior which is attached in its turn to the carriage holding the aircraft. The smooth cord passes through a gland and passes over pulleys. A by-pass arrangement is provided so that the carriage may be decelerated at the end of the run.

482,160. *A Method and Means for Launching and Landing Aircraft.* Plesman, A. Hofweg, 9, The Hague, The Netherlands. Convention date (Holland), Jan. 21st, 1936.

It is proposed to employ aircraft without means of enabling an independent

landing to be made, *i.e.*, without a chassis or floats. The aircraft when getting off or landing is supported by one or more auxiliary aircraft carrying the landing gear. Such aircraft may be launched by catapult and at the end of the journey can be caught by the auxiliary aircraft. These auxiliary aircraft are adapted to be coupled or uncoupled to the main aircraft during flight.

482,057. *Improvements relating to the Take-off of Aircraft.* Sir W. G. Armstrong Whitworth Aircraft, Ltd., and Lloyd, J., both of Whitley, Coventry. Dated Nov. 24th, 1936. No. 32,122.

It is proposed to accelerate the take-off of an aircraft by mounting it on a motor-driven truck of which the power/weight ratio is not less than that of the aircraft starting and accelerating the truck as quickly as possible while operating the aircraft engines, up to a speed at which the aircraft is air-borne, then releasing the aircraft and stopping the truck.

#### CONTROL OF AIRCRAFT.

478,190. *Improvements in and relating to Aircraft Wings.* Garden, A. D., 58, Gloucester Terrace, Hyde Park, London, W.2. Dated June 9th, 1936. No. 16,087.

The wing is fitted with a split flap and when this is lowered a rearwardly opening slot in the wing is uncovered. This slot communicates from the upper surfaces of the wing to the wedge-shaped cavity between the flap and the trailing edge.

477,395. *Improvements in Stabilising Devices for Aeroplanes.* Billioque, E. J. H., 39, Avenue du Belvedere, Le Pre Saint Gervais (Seine), France. Convention dates (France), May 24th, 1935, and March 3rd, 1936.

The aeroplane has a plane pivoted in front of its centre of pressure on an axle parallel to the pitching axis, the size being adjusted that it balances the effort produced by the resistance at the rear of the fuselage. The plane is normally allowed to float, but becomes operative and contacts with a stop when the nose of the aeroplane drops as the result of a stall. The device is only intended to play an active part below the stalling speed.

477,506. *A Device for Limiting the Aerodynamic Efforts on Aircraft.* Mercier, P. E., 9, rue Marbeau, Paris, France. Convention dates (France), April 10th, 1936; June 13th, 1936; Feb. 18th, 1937.

It is proposed to limit automatically the aerodynamic efforts ensuring the support of aircraft by control of the deflection of a flap with or without a slot. There is a combination of a flap, of a servo motor for operating the flap, of a member controlling the operating gear of the servo motor, the positions of which are a function of the deflection of the flap and the deformation of the wing caused by aerodynamical forces.

482,080. *Improvements in or relating to Aircraft Control Systems.* Mercier, P. E., 79, Boulevard Haussmann, Paris, France. Convention dates (France), June 11th, 1936, and June 18th, 1936.

It is proposed to use a form of aircraft control comprising the combination of movable fins or fins with flaps, mounted perpendicularly and arranged at the centre of gravity, and of vertical tail surfaces which are also movable or which are provided with flaps. It is stated that with this combination it is possible to turn an aeroplane without banking.

477,844. *Safety Means for Use in Preventing or Correcting Spinning in Aircraft.* Martin, J., Martin's Aircraft Works, Higher Denham, Uxbridge, Middlesex. Dated July 4th, 1936. No. 18,618.

In order to stop a spin when it has occurred it is proposed to fit flaps above the

fuselage and just in front of the tail unit, the flaps being on the top of the fuselage and pivoted longitudinally. When not in use they fold flush into the fuselage, but when opened they are claimed to divert air on to the rudder when the aeroplane is at a high angle of incidence.

#### CONTROLS.

477,194. *An Improved Arrangement for Locking the Control Surfaces of a Parked Flying Machine.* Junkers Flugzeug-und Moteurwerke, Aktiengesellschaft, 39, Junkerstrasse, Dessau, Anbolt, Germany. Convention date (Germany), Feb. 29th, 1936.

There is a brake provided to act on the control surface to be locked, or on a member adjacent thereto and connected therewith by rigid levers or links, the brake being arranged to lock the surface and being connected with a brake control member in the cockpit.

480,674. *Improvements relating to the Control of Fluid-Operating Systems Particularly for Aircraft.* Dowty, G. H., Arle Court, Cheltenham, Gloucestershire. Dated June 27th, 1936, No. 17,905; Aug. 14th, 1936, No. 22,453; Aug. 14th, 1936, No. 22,454; and Feb. 3rd, 1937, No. 3,232.

A hydraulic control system is proposed in which a continuously operating pressure circuit may be diverted to operate any one of a number of receivers selectively. The receivers may be double acting. There is provided a selector unit which can be operated to divert the entire flow to a receiver and a separate cut-out valve diverting flow from the main circuit to the valve unit only when selective control has been exercised. The selector unit comprises a number of spring-loaded non-return valves with mechanical operating means.

480,687. *Improvements relating to Fluid Pressure Flap-Operating Devices for Aircraft.* Dowty, G. H., Arle Court, Cheltenham, Gloucester. Dated Aug. 22nd, 1936. No. 23,159.

In the case of flaps operated from an engine driven pump, it is desired that the speed of operation may be high when the engine is idling and that the speed may be slow when the engine is running at high speed. A pressure fluid accumulator is provided which receives pressure fluid against resilient resistance and is arranged in parallel with the jack. This device forms a buffer which allows fluid pressure to be relieved when the engine is running fast. The resilient means may be compressed air or a spring.

477,817. *Improvements in Damping Joints for Control Surfaces of Aircraft.* Etablissements D.F., 188, rue d'Alesia, Paris, France. Convention date (France), July 28th, 1936.

In order to prevent flutter it is proposed to damp the movement of aircraft controls by means of a hydraulic damping device of the oscillating vane type which is arranged between the control surface and the fixed surface, the axis being coincident with the main hinge pin, the latter being connected with the pivot pin of the device. The pivot pin and the damping device may be combined.

480,180. *Improvements in or relating to Control Valves.* Automotive Products Co., Ltd., Brock House, Langham Street, London, W.1, and Church, E. C. S., Beechcroft, Kenilworth Road, Leamington Spa, Warwickshire. Dated Aug. 20th, 1936. No. 22,959.

This specification refers to control valves for liquid pressure control systems. A control valve for such a system consists of a single pressure creating unit which actuates a number of controlling elements comprising a separately operable valve

plunger controlling the supply of pressure liquid in one or more directions to each controlled element. A valve plunger which has been moved is returned automatically when the movement of the controlled element is completed. The plungers are returned by pressure acting on annular forces on the plungers and the latter are retained in position by locking mechanism.

482,404. *Improvements in or relating to Mechanical Remote Control Apparatus.* Exactor Control Co., Ltd., Exactor Works, Mount Pleasant, Alperton, Middlesex, and Parker, W. H., of the same address. Dated March 13th, 1937. No. 7,440.

A remote control system has a mechanical bond such as a cable between two stations connecting movable elements and spring means at each station for keeping the bond in tension. There is means for keeping the spring effort of one station nearly equal to that of the other.

#### ENGINES.

480,345. *Improvements in Cowlings for Aircraft Engines.* Birkigt, L., rue de Capitaine Guynemer, Bois-Colombes (Seine), France. Convention date (Belgium), Feb. 12th, 1936.

The cowling described is, in general appearance, similar to the normal cowling used with air-cooled radial engines, but, internally, the space behind the front aperture is shaped to form a radial diffuser, the cross-section areas of which are inversely proportionate to the middle diameters. The crankcase of the engine may have a cone-shaped member in front, and various methods are described for the purpose of improving cooling, etc.

480,478. *Improvements in or relating to a Pneumatic or Hydro-Pneumatic Device for the Remote Control of Movable Vanes for Use in Regulating the Flow of Air through a Slot or Orifice.* Etablissements Livre et Olivier, 66, rue Boissiere, Paris, France. Convention dates (France), Jan. 6th, 1936, and Nov. 14th, 1936.

It is proposed to operate the vanes which control the size of the aperture behind an engine cowling, by means of a fluid under pressure. Each vane has a projection which rests on a flexible chamber shaped somewhat like a pneumatic tyre, the vanes being operated when pressure is introduced into the chamber. The vanes are returned by means of springs. Compressed air or liquid may be used to operate the device.

478,909. *Mountings for Engines, Especially on Aircraft.* Getefo Gesellschaft fur Technischen Fortschritt mit beschränkter Haftung, 13, Waysch-strasse, Berlin, W.35, Germany. Convention date (Germany), Jan. 25th, 1936.

It is proposed to construct a mounting by arranging a bearing of resilient material such as rubber round the longitudinal axis of oscillation so that the rubber is solely subjected to shearing stresses. The resilient bearings are arranged round the engine on mounting rings possessing an axis which is co-axial with the axis passing through the centre of gravity of the system and parallel to the engine crankshaft. The rings are perpendicular and placed on each side of the centre of gravity.

478,935. *Improvements in or relating to Cowlings for Aircraft Engines.* Mercier, P. E., 9, rue Marbeau, Paris, France. Convention dates (France), Dec. 23rd, 1936, and Feb. 5th, 1937.

This cowling is intended for radial engines and has two concentric passages, one within the other. The cooling air flows into the inner passage, passes over the engine cylinders and is then turned back through the outer passage and is



finally discharged to the atmosphere. The concentric passages are annular, and the inner passage adjacent to the inlet diverges in the direction of the airflow while the outer conduit converges in the direction of the airflow. The heated air is discharged through an adjustable slot near the nose of the cowling.

479,822. *Improvements in and relating to Driving Machinery for Aeroplanes.* Allmanna, Svenska, Electricischa Aktiebolaget Vasteras, Sweden. Convention date (Sweden), May 29th, 1936.

It is proposed to use the energy of the exhaust gas of a motor in a turbine which, in addition to driving a supercharger, also drives an auxiliary propeller. The engine drives a normal propeller through a reduction gear and, fitted concentrically, there is a smaller propeller driven by a radial flow turbine actuated by the exhaust gas. The shaft from the other side of the turbine drives the supercharger.

479,826. *Improvements in and relating to Aircraft.* The British Thomson-Houston Co., Ltd., Crown House, Aldwych, London, W.C.2. Convention date (U.S.A.), June 26th, 1936.

It is proposed to use a single supercharger for supercharging an engine and also a passenger cabin for use at high altitudes. The compartment to be supercharged and the engine are connected in series, so that the air supplied to the compartment is warmed by compression and that the compartment is ventilated and the air is cooled before reaching the engine. Multi-stage supercharging may be used and there may also be an exhaust heated device for warming the air supplied to the compartment or a device for cooling it.

478,830. *Improvements in or relating to Aircraft.* Westland Aircraft, Ltd., Yeovil, Somerset, and Petter, W. E. W., of the Company's address. Dated Sept. 18th, 1936. No. 25,390.

In engine layouts where the engine is disposed within the aeroplane wing it is stated to be desirable that the engine shaft shall lie forward of the main wing spar. It is proposed that the engine crankcase shall conform substantially with the nose of the wing, and that the cylinders shall extend rearwards, the engine being of a V-type. The engine is mounted at each end upon brackets which connect with the main wing spar.

478,752. *Improvements in or relating to the Mounting of Aircraft Engines.* Getefo Gesellschaft fur Technischen Fortschritt mit Beschränkter Haftung, 13, Wayrschstrasse, Berlin, W.35, Germany. Convention date (Germany), Sept. 28th, 1935.

In order to take the engine mounting loads produced when an aeroplane is diverted from a dive into an ascent it is proposed that this strain is taken by rubber in compression. In a radial engine rubber blocks are mounted at intervals round the periphery of the engine casing which support the engine radially and other rubber blocks between axially opposed surfaces of engine members and frame members. These axially placed rubber blocks resist the forces produced on the engine mounting by the manoeuvre described above.

482,135. *Improvements relating to Aeroplane Wings.* The Bristol Aeroplane Co., Ltd., Fedden, A. H. R., and Owner, F. M., all of Filton House, Bristol, Gloucestershire, and Copley, J. W., 44, Norton Road, Bristol, Gloucestershire. Dated May 4th, 1937. No. 25,962.

This specification is concerned with aircraft having the engines buried in the wings, and refers to an engine with horizontally disposed cylinders having the crankshaft axis fore and aft, supported near the middle of its length by a front frame, and at the rear by a rear frame, the frame forming part of the wing spars. The proposed engine is air-cooled, and ducts are formed in the wing for conveying cooling air. Part of the wing bracing may be formed by the engine crankcase.

- 482,151. *Improvements in the Installation of Supercharged Internal-Combustion Engines in Aircraft Structures.* The Bristol Aeroplane Co., Ltd., Fedden, A. H. R., and Owner, F. M., all of Filton House, Bristol, Gloucestershire. Dated Nov. 2nd, 1936. No. 29,806.

This specification is concerned with supercharged aircraft engines in which the air is cooled after supercharging. It is proposed to house the cooler within the aircraft wing and to use intakes which supply air both to the cooler and to the supercharger. There may be branched pipes, one branch of each leading to the supercharger and the other to the cooler. The supercharger may be driven directly or by an exhaust turbine, and an oil cooler may be incorporated in the installation.

- 481,394. *Improvements in or relating to Engines arranged to Accommodate Co-axially Disposed Firearms.* Gadoux, E. M., 16, Quai de Seine La Frette (Seine-et-Oise), France, and Crousse, L., 6, rue Rougemont, Paris, France. Convention date (France), Jan. 12th, 1937.

The main axis of the proposed engine about which transmission is effected is free of parts so that it can accommodate a gun barrel. Separate motor units are disposed about the main axis on radial shafts. These drive a hollow central shaft by gearing. Alternatively an arrangement is suggested in which two co-axial propellers may be driven in opposite directions.

- 483,055. *Improvements in and connected with the Cowling and Air-Intakes for Power Units of Aircraft.* Martin, J., Higher Denham, near Uxbridge, Middlesex. Dated Oct. 9th, 1936. No. 27,480.

The cowling proposed is intended for air-cooled engines. It has openings in front, some of which collect the cooling air while others collect the air for the carburettors, so that the air for each is kept completely separate. A separate opening may be made through which air can be supplied to an oil-cooler.

- 477,627. *Aircraft Cowling.* Read, J. R., High Gable, Sutton Avenue, Challaston, nr. Derby, England. Dated Aug. 7th, 1935. No. 21,811.

This cowling has parts for the admission of cooling air and the flow of air may be regulated by a number of shutters controlling the discharge orifice. The shutters swing about individual fulcrums so that their rear edges are moved away from or towards the remainder of the cowling. Each shutter overlaps so that there are no gaps between the shutters.

- 481,986. *Improvements in or relating to the Actuation of Suction-driven or Pressure-driven Apparatus by Internal Combustion Engines.* de Havilland, H., and the de Havilland Aircraft Co., Ltd., both of Hatfield Aerodrome, Hatfield, Hertfordshire.

It is proposed to use the combination of pressure-actuated auxiliary apparatus for the aircraft and conduits connecting the apparatus with a Venturi system associated with the engine exhaust. It is also proposed to combine the pressure actuating apparatus and conduits connecting the apparatus to at least two pressure points of the engine, the said points being selected so that the pressures are complementary to each other.

#### INSTRUMENTS.

- 478,094. *Improvements in Methods and Apparatus for the Distant Recording and Indications of Displacements or Deformations and Their Applications.* Mercier, J., 131, Boulevard de la Seine, Neuilly-sur-Seine, France. Dated Feb. 26th, 1937. No. 5,792.

The deformations are transmitted to the indicating means by way of an elastic transmission. The transmission is to be rendered practically rigid by eliminating the elastic device or by rendering it rigid at the moment when the deformation

has to be indicated with great precision. The device is said to be suitable for retractable undercarriages.

480,849. *Improvements in or relating to Instrument Boards for Aircraft.* Shevlin, J. T., 15, South Street, London, E.C.2. Dated July 28th, 1937. No. 20,931.

It is proposed that each measuring instrument should comprise four measuring mechanisms which are so arranged upon the board that the mechanisms referring to the same driving mechanisms are located one under the other vertically, so that the measuring mechanism groups are arranged side by side in a corresponding manner to the driving mechanisms, and the mechanisms which register corresponding features of the driving mechanisms are arranged horizontally. Under zero conditions the pointers are horizontal.

#### KITES.

481,617. *A New or Improved Kite.* Arthur, J., 18, Gardener's Crescent, Edinburgh, 3. Dated Oct. 22nd, 1936. No. 28,696.

The proposed kite has a main kite surface, stretching members for stretching said kite surface, a tail section attached at its forward portion to the posterior portion of the main kite surface and an ancillary body section superimposed upon the central portion of the main kite surface and so attached to the front of the kite surface and to the tail surface in rear of the attachment of the latter to the main kite surface that air currents can flow under and distend the ancillary body section when the kite is in flight.

#### MISCELLANEOUS.

481,375. *Improvements in and relating to Apparatus for Training Aviators.* Link, E. A., 10, Avon Road, City of Binghampton, New York, U.S.A. Dated Sept. 19th, 1936. No. 25,528.

The apparatus proposed consists of a dummy aircraft mounted on and manoeuvrable relatively to a support by means of dummy aircraft controls. Indicating instruments are provided which are co-ordinated with the machine and which indicate in the same manner as on a real aeroplane. A compass which simulates the action of a real compass when the aeroplane is turned or banked is provided. Instruments simulating an air speed indicator, a climb indicator and an altimeter are provided, which are arranged to act as they would in a real aeroplane.

#### MODEL AIRCRAFT.

483,018. *Improvements in or connected with Model Aeroplanes.* Back, W. E., Mancroft Towers, Oulton Board, Suffolk. Dated Oct. 9th, 1936, No. 27,417; Oct. 23rd, 1936, No. 28,835; and Dec. 8th, 1938, No. 33,658.

This is a proposal for a toy aeroplane or glider in which the plane is attached elastically to the fuselage so that under the influence of a lifting force greater than the weight of the machine the wing will move so as to reduce the angle of incidence. The wing can swivel if the aeroplane strikes an obstacle, and the tail plane is arranged in the same way. There are also claims regarding the construction.

#### PARACHUTES.

478,384. *Improvements in Parachutes.* Sedlmayr, G., Berlinerstrasse 167/168, Berlin-Temple-Hof., Germany. Convention date (Germany), Sept. 16th, 1935.

It is proposed to avoid the danger of the parachute rupturing owing to eccentric opening shocks, by arranging that the canopy of the parachute shall yield to the

shock. The proposed canopy has an air vent and the shroud lines run from one side to the other over the apex. All or certain of the shroud lines fastened on both sides only at the lower skirt of the canopy are differently connected to the skirt of the air vent in the canopy, so that the parachute canopy can be displaced within certain limits on the carrier forward by the suspension lines.

478,476. *Improvements in or relating to Parachutes.* Capel, W. J. M., 18, rue d'Alsace, Toulouse, Haute-Garonne, France. Convention date (France), May 1st, 1936.

It is proposed to use liquefied carbon dioxide gas to cause the opening of a parachute. In order to do this the gas may be discharged into a chamber or sleeves attached to the canopy.

482,316. *Improvement in Method of Closure of Parachute Packs.* Caspar, F. A., Pak Parachute Co., Ltd., 175a, Streatham Road, Mitcham, Surrey. Dated Oct. 30th, 1936. No. 29,491.

The proposed pack has dual releasing means, a fastening device for a releasable flap consisting of a tab with a widened terminal portion held by a pair of studs held by a spacing member to which latter the studs are fastened by the two releasing means. Operation of either means allows the tab to be freed.

481,455. *Improvement in Method of Folding Parachutes.* Caspar, F. A., and Pak Parachute Co., Ltd., both of 175a, Streatham Road, Mitcham, Surrey. Dated Dec. 5th, 1936. No. 33,382.

The method of folding proposed consists in doubling back the peripheral margin of the canopy before folding the gores upon one another, so that the tension in the rigging lines when the parachute is released serves to pull forward the doubled back portion and thus provide an open mouth into which the air readily enters.

#### REFUELLING.

480,276. *Improvements in Apparatus for Refuelling Aircraft in the Air.* Sir Alan Cobham, K.B.E., Ford Aerodrome, Yapton, Sussex, and Flight Refuelling Co., Ltd., 8, Sergeant's Inn, Temple, London, E.C.4. Dated Aug. 21st, 1936. No. 23,021.

It has been proposed to weight the connection cord with a bag containing liquid so as to prevent damage to an aircraft picking up the bag. It is now proposed to substitute a balloon containing sufficient of a granular solid to weight it, the remainder of the balloon being filled with air or gas. Light material such as cotton wool or feathers may be used for filling the balloon.

#### ROTORCRAFT.

477,349. *Improved Wing Arrangement for Rotary Wing Aircraft.* Asboth Helicopters, Ltd., 48-49, High Street, Bloomsbury, W.26. Convention date (Germany), April 29th, 1936.

It is proposed to make the inner part of the rotary wing blades of zero or small incidence, and an outer part of larger incidence, the angles of incidence gradually increasing from one to the other, the angles of incidence again decrease to the blade tip. The outer blade part may decrease in chord at its inner end.

477,369. *Improvements in or relating to Control Apparatus for Aircraft with Autorotative Wing Systems.* Hamilton Motors (London), Ltd., and Theed, W. O. L., both of 466-490, Edgware Road, London, W.2. Dated June 29th, 1936. No. 17,973.

It is proposed that both the wheel brakes and the rotor clutch shall be controlled by a servo motor deriving power from the suction of the engine. There is a single main control for the servo motors having three positions, in one of

which the clutch is disengaged and the wheel brake applied, in another the clutch is engaged and the wheel brake applied.

480,750. *Improvements in Aircraft of the Cyclogyro Type.* Walton, G. W., 30, Inverness Terrace, London, W.2. Dated Aug. 26th, 1936.

A number of vanes are distributed round the axis of a rotor each being rotatable round an axis substantially parallel to the rotor axis. The vanes are geared to the rotor and they rotate relative to each other with a phase displacement. It is preferred that the vanes rotate in the same direction as the rotor, in the opposite direction to it and at one half its speed.

479,461. *Improvements in or relating to Aero-Revolving Wings or Blades.* Hay, D., 18, Atholl Crescent, Edinburgh, Scotland. Dated Aug. 6th, 1936. No. 21,712.

This specification relates to the rotors of rotary winged aircraft and it is proposed to eliminate the various flapping, drag and inclined pivots at present used by substituting a mechanism in which each blade root is provided with a cross member having ball ends engaged in oppositely inclined elongated slots found in the rotor hub. The ball ends roll or travel in the slots and during normal flight the ball ends are at the outer extremity of the slots with their axis approximately horizontal. When the rotor is being run up preliminary to flight the cross member pivots, with the result that the pitch of the rotor is changed.

483,043. *Improvements relating to Aircraft.* Driver, R. H., 5, Pattenham Road, Perton, near Wolverhampton, Staffordshire, and Share J. B., Merridale Works, Merridale Street, Wolverhampton, Staffordshire. Dated Oct. 7th, 1936. No. 27,173.

It is proposed, in combination with normal wings, to use rotors elongated axially and disposed transversely under the wings of the aeroplane. The rotors have a special cross section which is claimed to induce auto-rotation, and the rotors may be retracted into the wing above them. It is stated that, when auto-rotating, the rotors produce an upward lift, and that a machine fitted with them cannot be stalled.

482,722. *Improvements in and relating to Aircraft.* Fischer, G. A., 47, Second Avenue, Gillingham, Kent, and Mancini, J., Homeland, 29, Marshall Road, Rainham, Gillingham, Kent. Dated Oct. 3rd, 1936. No. 26,824.

The proposed aircraft has flapping wings or wings adapted to rotate about a common axis in which the wings are provided with flaps or shutters, means being provided whereby the position at which the flaps or shutters open or close may be adjusted.

#### SEAPLANES.

480,923. *Improvements in Devices for Removing Seaplanes and other Similar Machines from the Water.* Etablissements Verboom et Durouchard, 64, rue Campans, Paris, France. Convention date (France), May 23rd, 1936.

The arrangement proposed consists of a slipway inclined between a horizontal portion which can swivel, and a further horizontal portion which floats on the water. The parts can be rigidly attached to each other when the water level is constant, but can be hinged when there are tides. It is stated that the apparatus is suitable for use on an aircraft carrier.

## UNDERCARRIAGES.

480,598. *Improvements relating to Shock-Absorbing and Self-Aligning Means for Tailwheels and the like of Aircraft.* Dowty, G. H., Arle Court, Cheltenham, Gloucester. Dated Aug. 22nd, 1936. No. 23,161.

It is proposed to provide a shock absorbing device for tailwheels which will allow of a long travel and also cause the wheel to be self-aligning. The mechanism is contained within a tubular member containing compression springs, and an appliance consisting of a face cam with a face at the angle of  $45^\circ$  kept in contact with a similar cam by means of a compression spring. This appliance returns the wheel to the fore and aft position after it has been rotated on its pivot.

479,398. *Apparatus with a Plurality of Driving Shafts for the Control of Aircraft Landing Gear.* Strube, C., 127, Avenue de Versailles, Paris, France. Dated April 1st, 1937. No. 9,278.

This is an apparatus for controlling aircraft landing gear comprising in combination a plurality of different driving shafts, each of them being adapted to actuate a single driven shaft by means of irreversible transmissions and a differential mechanism, while the driven shaft is adapted to actuate a mechanism connected with the aircraft landing gear.

479,094. *Improvements relating to Undercarriages for Aircraft.* Fandi, F, 5, Bahnhofstrasse, Kronberg, Frankfort-on-Main, Germany. Dated July 28th, 1936, No. 15,475, and July 20th, 1937, No. 20,114.

The proposed chassis has each wheel carried by an inclined shock-absorbing strut pivoted at its upper end. The strut is guided by an auxiliary strut, one end of which is pivoted to the main strut and the other end to the aeroplane. This strut is placed some way down the main strut so that the change of track of the wheel under shock absorption is less than it would be if a divided axle type of chassis were used. The outward movement of the wheel can be largely offset by the inward movement of the wheel due to the relative longitudinal shock-absorbing moment of the two parts of the shock-absorbing strut.

478,778. *Retractable Landing Gear of Aeroplanes.* Mercier, J., 118, Champs Elysées, Paris, VIII, France. Convention date (Belgium), Feb. 24th, 1936.

In this chassis the wheel is carried by a strut hinged in the middle; this strut is hinged to the aircraft frame at one end and is further connected to the frame by a quadrilateral linkage. The landing gear is controlled by a jack which is mounted on the aircraft frame, the head of which has two levers hinged to it, the other ends of the levers are hinged to the aircraft frame and the upper element of the folding strut.

481,288. *Means for Lifting, Lowering or Supporting Aircraft.* Dowty, G. H., Arle Court, Cheltenham, Gloucestershire. Dated Aug. 15th, 1936. No. 22,537.

It is proposed to provide aircraft with a lifting jack system arranged as part of the undercarriage leg. The jack plunger is telescopically slidable in an undercarriage leg and can be thrust down by fluid pressure, the same means being normally used as are used for the retractable chassis.

481,449. *Improvements relating to Retractable Undercarriages for Aircraft.* Dowty, G. H., Arle Court, Cheltenham, Gloucestershire. Dated Sept. 14th, 1936. No. 25,042.

In order to enable a retractable chassis to be extended if the pressure source fails it is proposed to provide between the cylinder and jack a spring or other resilient medium in which energy is stored during retraction, which energy can be used for extending the chassis.

480,277. *Improvements in Brakes for Aircraft.* Dunlop Rubber Co., Ltd., 32, Osnaburg Street, London, N.W.1, Beharrell, G. E., Wright, J., and Trevaskis, H., all of the Company's Works, Fort Dunlop, Erdington, Birmingham, Warwickshire. Dated Aug. 21st, 1936. No. 23,029.

Hydraulic brake and steering apparatus for aircraft comprising a pair of master cylinders and pistons positioned apart on parallel axes, a member which extends between and engages the ends of the piston rods, rollers contacting with the member, a pressure distributing member or members operating on the rollers and movable transversely of the axes of the said pistons by connection to a rudder bar or pedals, characterised by the provision of a flexible connection connecting the rollers to a hand control, the connection incorporating spring loaded means for the purpose specified.

482,474. *Improvements to Aeroplane Retractable Undercarriages.* Hall, F. H., Cleave Cottage, Holford, Bridgwater, Somerset. Dated Dec. 29th, 1936, No. 35,565, and Dec. 28th, 1937, No. 35,843.

It is proposed to use a cartridge operated jack for operating a retractable chassis. There is a jack consisting of a piston and a cylinder, the piston being connected to the chassis and the cylinder connected to a chamber which holds a gas producing cartridge which can be fired from the exterior. There may be a spring-loaded striker pin acting on a firing pin and normally held cocked by a trigger or trip device.

481,804. *Improvements in Brake Control Mechanism for Aircraft.* Bendix Aviation Corporation, 105, West Adams Street, Chicago, Illinois, U.S.A. Convention date (U.S.A.), Sept. 18th, 1935.

The braking system proposed has a pair of rudder stirrups each having a brake pedal and a master cylinder associated therewith in such a way that the master cylinder is actuated upon relative movement of the brake pedal with respect to the rudder stirrup characterised in that both the rudder stirrups and the master cylinders are each independently pivoted on a supporting member fixed to the aircraft.

481,946. *Improvements in or relating to the Control of Aircraft Brakes.* Bendix, Ltd., King's Road, Tyseley, Birmingham, 11, and Roberts, G. P., of the same address. Dated Sept. 21st, 1936. No. 25,580.

The control mechanism proposed has valves controlling the supply of fluid under pressure to brakes on wheels on opposite sides of an aeroplane, which valves are mounted with their axes parallel in a casing and are actuated by cam members pivotally mounted on a rocking lever and extending in opposite directions from the pivot, and means operated by a hand control are provided for rocking the lever to advance both cams into engagement with the valves and further means operated from a rudder bar are provided for rocking the cams simultaneously about their pivot to advance one cam and retract the other to actuate the valves differentially.

481,997. *Fluid Pressure Brake and Steering Controls for Aircraft.* Dunlop Rubber Co., Ltd., 32, Osnaburg Street, London, N.W.1, and Beharrell, G. E., Wright, J., and Trevaskis, H., of Fort Dunlop, Erdington, Birmingham, Warwickshire. Dated Dec. 4th, 1936. No. 33,281.

In the pneumatic braking system it is proposed to provide a pneumatic parking apparatus comprising chambers connected respectively to one of the pressure reducing valves, to one of the brake applying means, and to the air container, characterised by valve members coaxially displaceable in one direction against spring load. One of the chambers is formed between a pair of flexible diaphragms converted to one of the valve members, the adjacent ends of which members are normally spaced apart.