

ABSTRACTS OF PATENT SPECIFICATIONS

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

Abstracts of Patent Specifications received by the Society are published in the Journal. It should be noted that these abstracts are specially compiled by Mr. W. O. Manning, F.R.Ae.S., for the Journal and are only of those actually received and subsequently bound in volume form for reference in the library. These volumes extend from the earliest aeronautical patents to date, and form a unique collection of the efforts which have been made to conquer the air.

The Council accept no responsibility whatever for the accuracy of the abstracts and in any case of doubt the full patent can be consulted when necessary in the library of the Society.

These abstracts are compiled by permission of the Controller of His Majesty's Stationery Office. Official Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, either sheet by sheet as issued on payment of a subscription of 5s. per group volume or in bound volumes 2s. each, and copies of full specifications can be obtained from the same address, price 1s. each.

Aeroplanes—Construction

428,896. *Improvements in or relating to Wind or Like Screens for the Cockpits of Aircraft, Motor Boats, or Motor Cycle Sidecars, or for Use in Similar Situations.* The Fairey Aviation Co., Ltd., Cranford, Hayes, Middlesex, and Tips, E. O., 434, Chaussée de Bruxelles, Jurnet Gosselies, Belgium. Dated 13th June, 1934. No. 17,499.

This specification describes a windscreen for a two-seater aircraft in which the double cockpit may be normally completely protected, while provision is made for easy entry into the cockpit, and also for extended protection for the rear occupant when standing up. It consists of a front fixed portion of normal form, followed by a portion which is hinged laterally to allow ease of entrance. This is followed by a rear portion which is hinged in such a way that while, normally, it protects the rear of the cockpit, the rear portion of the screen may be raised allowing the front of the rear portion to telescope into the rest. The screen, when raised, is stated to give adequate protection to the rear gunner.

429,311. *Improvements in or relating to Wing Structures for Aircraft.* Duncanson, F., Seaplane Base, Brough, East Yorkshire. Dated April 3rd, 1934. No. 10,018.

It is stated that numerous aeroplane accidents have occurred owing to the pilot flattening out too suddenly from a steep dive and causing the wings of the machine to break away from the body. It is proposed, therefore, to use a spar or spars in the wings in which there is a weaker spot about half-way between the wing root and the inner end of the aileron. It is suggested that under these circumstances failure would only cause an increase of dihedral and would leave the pilot still in control. It is suggested that if the spar factor was 6.4, a factor of 6.2 would be suitable for the weak spot, and it is stated that the device is particularly suitable for monospar wings with tubular reinforced spars.

- 431,089. *Improvements in or relating to Wing Structures for Aircraft.* Duncan-son, F., Seaplane Base, Brough, Yorks. Dated April 3rd, 1934. No. 10,017/34.

In the case of single spars of the tubular type used for aircraft wings, it has been found desirable to strengthen these members by other means than by adding corrugated sheet metal to the upper and lower surfaces. It is therefore proposed to use, in addition, four tubular booms, fitted as it were one on each corner of a square containing the tubular spar and connected to the spar itself by sheet metal disposed lengthways to the spar and welded both to the spar and to the booms.

- 430,759. *Improvements in or relating to Metal Beams.* Petters, Ltd., and Bruce, R. A., both of Westland Works, Yeovil, Somerset, and A.T.S. Co., Ltd., of 314, Clement's Inn, Strand, London, W.C.2. Dated Dec. 22nd, 1933. No. 36,099.

It is proposed to construct metal spars for aircraft with polygonal booms and corrugated webs, the lips of the polygonal booms being separated so that the corrugated web may be introduced between them and riveted thereto. The shaping of the spar towards the wing tip is arranged by riveting to both sides of the web, both top and bottom metal sheet rolled to a substantially L section which can be fitted inside the ends of the booms. The spar may be strengthened when required by introducing and bolting tubes into the booms or by means of angle pieces, plugs, etc.

- 429,186. *Improvements in or connected with Biplane Wing Systems for Aircraft.* Vickers (Aviation), Ltd., and Wallis, B. N., both of Weybridge Works, Byfleet Road, Weybridge, Surrey. Dated Nov. 25th, 1933. No. 33,005.

This specification describes a method of constructing biplane wings in which the spars are stated to be relieved of bending and torsional stresses by means of the provision of stress units which are held apart by spar sections, which are held against lift forces by diagonal interplane connections, which are stayed against drag and diagonal drag members and which are held against torsion stresses by interplane struts. The construction described shows a biplane of normal form having interplane struts arranged as in a Warren truss. The wing carries a number of stringers from root to tip which are connected by Warren bracing. A rib occurs at each interplane strut position and the single wing spar is tubular. Drag bracing is carried diagonally between the ribs both to the leading edge and trailing edge. The interplane struts are of lattice construction and are bolted rigidly to the plane members.

- 429,188. *A New or Improved Method and Means for Assembling and Connecting Intersecting Bracing Members.* Vickers (Aviation), Ltd., and Wallis, B. N., both of Weybridge Works, Byfleet Road, Weybridge, Surrey. Dated Nov. 27th, 1933. No. 33,113.

This specification refers to a method of constructing an aeroplane wing in which the structure consists of a number of intersecting spars arranged in the manner of a trellis. These spars are so shaped that when the wing is covered the desired wing contour is obtained. The joint between the spar sections consists of a hollow tubular member having a flange at each end to which the flanges of the spars are riveted. The spar web can also be bent partially round and be riveted to the tubular member. Detailed information is given about the manner of assembling such wings.

431,767. *Airplane Wings*. L.P.R. Co., 277, Park Avenue, City and State of New York, U.S.A. Dated Oct. 11th, 1933. No. 28,103. Specification not accepted.

It is proposed to place a small aerofoil of high aspect ratio well in front of and above the main plane itself. This aerofoil is connected by means of, say, a rod and crank connection, with a flap of normal type at the rear of the main plane itself. When these are operated together many advantages are claimed for the combination, such as increased lift at large angles and reduced drag.

431,895. *Improvements in or connected with the Construction of Cantilever Wings and other Aircraft Structures*. Short Bros., Ltd., and Gouge, A., both of Seaplane Works, Rochester, Kent. Dated July 28th, 1934. No. 22,090.

It is proposed to construct metal aircraft spars of four booms which are connected together by horizontal and vertical diagonal bracing members formed of tubes. The booms are of cruciform section of extruded duralumin and the bracing members are connected to the flats of the boom cruciform section by means, preferably, of gusset plates. One leg of the cruciform section may be longer than the others in order to facilitate this. The cruciform section may be tapered in section by means of milling off superfluous metal and an internal bracing of wire may be arranged by drilling holes diagonally through the section of the cruciform boom to take, say, eyebolts.

431,595. *Improvements in or relating to Wing Structures for Aircraft*. Duncan-son, F., Seaplane Base, Brough, E. Yorks. Dated April 3rd, 1934. No. 10,019.

In connection with aircraft wings constructed with single spars of tubular type, the spar is stiffened on the upper and lower surfaces with corrugated metal which may not cover the same area in each case, so that the neutral axis is not necessarily in the centre of the spar. The spar is constructed in two longitudinal sections which are riveted together by outwardly turned flanges; the joints need not necessarily be in the centre line of the spar. Instructions are given for assembling a spar so constructed with information about rib connections, etc.

Aircraft—General

429,948. *Improvements in Aeroplanes*. Boulton and Paul, Ltd., Riverside Works, Norwich, and North, J. D., Hill House, Eaton, Norwich. Dated Dec. 11th, 1933. No. 34,787.

This specification describes a compound aircraft in which the upper member is the lifting portion, termed the auxiliary aircraft, while the lower member, termed the main aircraft, is the machine which is to be launched with the assistance of the auxiliary member. As the upper member is lightly loaded and the lower member is heavily loaded, when they are together it is stated that there is lift force transmitted from the upper to the lower, and it is claimed therefore that this arrangement facilitates separation, as, on this occurring, the upper member will rise and the lower member will accelerate. Various claims are made in connection with the type of engines and propellers to be used and in connection with the method of control in flight.

430,068. *Improvements in Aeroplanes*. Boulton and Paul, Ltd., Riverside Works, Norwich, and North, J. D., Hill House, Eaton, Norwich. Dated Dec. 11th, 1933. No. 28,033.

In the case of compound aircraft it is preferred that the auxiliary aircraft should be above and the main aircraft below. It is proposed to construct the

auxiliary aircraft with a normal tail and the main aircraft with a tail supported with twin side by side fuselages or outriggers in order to allow the twin aircraft greater freedom to change fore and aft trim at the moment of release. Connections between the two are made from the bottom of the landing gear of the upper aircraft, on the wings of the lower aircraft, and by a releasable link located centrally and midway between the wings and tail.

430,071. *Improvements in Aeroplanes.* Boulton and Paul, Ltd., Riverside Works, Norwich, and North, J. D., Hill House, Eaton, Norwich. Dated Dec. 11th, 1933. No. 33,023.

In the case of compound aircraft it is proposed to assist the pilot to select the right moment for separation by providing at each point of attachment a pressure measuring device with indicators placed in view of the pilot, so that he could ascertain whether forces existed so that release of attachment would result in separation. It is pointed out that large compression forces at the rear connection would suggest the possibility of the tails contacting on separation and that if such a force existed the pilot would delay release. Means are described for preventing release until suitable conditions exist. Details are given of various suitable pressure measuring contrivances.

Autogiros

428,231. *Improvements in or relating to Rotative Wing Aircraft.* Coats, A. G., Gloucester House, Park Lane, London, and Hafner, R., Monthergasse 47, Vienna 13, Austria. Dated Nov. 9th, 1933. No. 31,300.

In the case of rotative wing or autogiro aircraft it is proposed to use rotor blades which are loaded or are arranged to have their centre of mass towards the tip in order to give them a large radius of gyration. The blade section should have a good L/D ratio and low resistance at small incidences. It should also have a section which permits a small movement only of the centre of pressure such as a symmetrical section. It is proposed to provide means enabling the incidence of the blades to be altered and also means by which the engine drive can be clutched or de-clutched. In this way it is stated it is possible to arrange for such an aircraft to take off and land vertically, without appreciable lateral motion.

Bombs and Ballistics

429,061. *Gun Mountings on Aircraft.* Sir W. G. Armstrong, Whitworth Aircraft, Ltd., and Lloyd, J., both of the Company's Works, Whitley, near Coventry, Warwickshire. Dated July 7th, 1933. No. 19,297.

It is proposed to protect the gunner in a service aircraft by enclosing him in a spherical shell covered with, preferably, bullet-proof glass. This shell is mounted on a vertical pivot and is provided with a vertical slot through which the gun can be fired. The shell rotates round its vertical pivot and the rotation is controlled, preferably, by an electric motor geared to the shell. This electric motor is energised by electric switches placed on each side of the gun slot and actuated by the pressure of the gun itself against them, so that if the gunner is trying to train his gun on an object the shell automatically rotates until the object comes on the sights. An internal shell revolving inside the other may be used in a similar manner for providing elevation automatically. These shells may be used together or independently.

431,550. *Improvements connected with Gun Turrets for Aircraft.* Short Bros., Ltd., and Parker, H. G., both of Seaplane Works, Rochester, Kent. Dated Dec. 1st, 1934.

It is proposed to place the gun turret at and above the after end of the fuselage or hull of an aircraft, the gunner firing forward; an extensive field of

fire is claimed for this position. The drawing shows a flying boat having the guns mounted in a body above the tail end of the hull out of which the fin and rudder project.

432,134. *Improved Form of Rapidly Removable Cover for Gun Turrets.* Boulton and Paul, Ltd., Riverside Works, Norwich, Norfolk, North, J. D., Hill House, Eaton, Norwich, Norfolk, Hughes, M. A., Westfield, Plumstead Road, Norwich, Norfolk, and Doe, A., St. Peters, Earlham Green Lane, Norwich, Norfolk. Dated Feb. 15th, 1934.

In the case of rotatable gun turrets for aircraft, it is proposed to provide a removable top so as to allow the gunner to escape in case of emergency. The gun turret is circular in section with rounded ends and is framed with hoops and upright members. It has a slot for the gun barrel. The removable top is framed in a similar manner and is connected to the main turret by a number of vertical dowel pins so that it can be pushed off when required. A locking device consisting of another dowel, secured by an easily removable split pin, is also described.

Control of Aircraft

427,422. *Improvements in or relating to Gyroscopic Apparatus for Example, for Air and Other Craft.* Brown, J. P., Waldron Eyot Hotel, South Croydon, Surrey. Dated Oct. 24th, 1933, No. 29,473; and Nov. 7th, 1933, No. 30,904.

Specification 341,519 is referred to and it is stated that in such apparatus when the spindle shifts angularly so that its axis no longer coincides with that of the rotor, a small component of the friction produces a couple tending to cause precession of the gyro rotor into realignment with the spindle. Thus, if the spindle changes its orientation in space the rotor will tend to follow it and thus also change its orientation in space. In order to avoid this, means are provided for imparting to the spindle a follow-up movement relatively to the craft so that the moment the rotor axis shifts relatively to the craft the spindle is given a corresponding movement to bring it back into alignment with the rotor. So the present invention comprises, in gyroscopic apparatus, the combination with gyroscopic mechanism of the type specified, of servo means actuated by the movement of the rotor axis relative to the spindle about an axis of control at right angles to the spindle axis, and serving to impart to the spindle a follow up movement relatively to its support about that axis of control to bring the spindle axis again into a plane containing the rotor axis and the said axis of control.

430,941. *Improvements in or connected with Aircraft.* Boulton and Paul, Ltd., Riverside Works, Norwich, Norfolk, and North, J. D., Hill House, Eaton, Norwich, Norfolk. Dated June 8th, 1934. No. 17,028.

The scheme described is the operation of a wing flap by means of a bellows placed between it and the plane, the opening and closing of the flap being assisted by varying the air pressure within the bellows. This main flap is connected to a small auxiliary flap also placed on the underside of the wing, but opening forward. This flap collects high pressure air when open, and this air is conducted into the bellows and assists in the opening of the main flap. In order to close the latter a passage is opened from the bellows to a low pressure region above the plane. The valves and flap gears are connected by a link gear so that they operate appropriately according to the movement of the control by the pilot.

431,071. *Improvements in or relating to Control Levers for Aircraft, or Similar Rocking Lever Devices in Control Mechanisms.* Coats, A. G., Gloucester House, Park Lane, London, W.1, and Hafner, R., Mantlergasse 47, Vienna, 13, Austria. Dated Jan. 1st, 1934. No. 38.

In the event of an aircraft flying under such conditions as to impose a permanent load on the control stick, it is proposed to relieve this load by the following construction. The stick is provided with two segments of a sphere which are engaged with fixed annular spherically-shaped bearing rings, which are mounted so that the amount of friction may be adjusted. It is stated that this construction sets up a strong wedging action which will hold the stick against reverse action.

Engines

427,342. *Cowling for Aircraft Engines.* Armstrong Siddeley Motors, Ltd., and Reynolds, R., both of Armstrong Siddeley Works, Park Side, Coventry, Warwickshire. Dated Dec. 13th, 1933. No. 35,053.

It is stated that in the case of cowling of the type now used for radial air-cooled engines in aircraft there is a tendency for the engine to be overcooled at high speed if the cooling is adequate for climbing conditions. It is proposed, therefore, to fit in front of the cowling a fixed saucer-shaped member which has openings in it of trapezium form arranged opposite the cylinders or cylinder blocks of the engine. Arrangements are made for these openings to be opened or partially closed, etc., at the desire of the pilot.

429,542. *Improvements in Radiators or Condensers for Evaporative Cooling Systems of Aircraft Engines.* The Fairey Aviation Co., Ltd., Cranford Lane, Hayes, Middlesex, and Williams, L. H., Hillside, Swakeley's Road, Ickenham, Middlesex, and Lyon, G., Ranmoor, Fulmer Road, Gerrards Cross, Bucks. Dated April 19th, 1934. No. 11,825.

In the case of surface radiators for aircraft the radiators extending over the upper and lower surfaces of the wings it is proposed to join the upper and lower surface with some circular fins in the interior of the wing for the purpose of increasing the surface. Air is allowed to pass through the fins and through the interior of the wing, its entrance being controlled by manually operated ports. Alternatively, the fins may be replaced by corrugated tubular connections between the upper and lower portions of the surface radiator, through which air is permitted to flow in the same manner.

430,002. *Improvements in and relating to Power Transmission Couplings.* Strandgren, C. B., 14 rue Galliani, Versailles, France.

The specification describes a type of coupling between two shafts which each carry a disc, which discs are opposite to each other. One disc carries two chain wheels connected by a chain, and the chain wheels have slots which are engaged by pins attached to the other disc. A gear wheel may be substituted for the chain. Various modifications are described, including arrangements in which there are more than two chain wheels connected by chains.

430,905. *A New Method and Means for Reducing the Resistance of Air-Cooled Engines and Like Obstructions on Aircraft.* Thurston, A. P., Bank Chambers, 329, High Holborn, London, W.C.1.

In order to reduce the resistance in flight of air-cooled aircraft engines it is proposed to smooth out the airflow by means of small members called riders, which are of aerofoil shape in cross section and which are of accurate shape in end view. These occupy approximately the position of a Townend ring, but

are shaped in such a way that they rotate round the engine centre automatically when the machine is in flight. It is claimed that the effect is to produce a smoothing effect on the airflow with a consequent reduction of resistance.

Helicopters

432,124. *Improvements in Aircraft of the Helicopter Type.* Asboth, O., 1, Gower Street, London, W.C.1. Dated Oct. 18th, 1933. No. 28,864.

In the case of lifting rotors it is proposed to form the inner portion of the blade with a section of low incidence so as to produce an autogyration effect while the outer portion of the blade has an incidence lessening from the inner portion to the wing tip. The machine has two three-bladed rotors with blades of this type rotating about the same axis, which can be driven in opposite directions by the motor. Alternatively, the autogyrotory portion of the blade may be increased in effect by using additional shorter blades which may be de-clutched when motor power is being used. Automatic controls of the compressed air or hydraulic type are referred to.

Instruments

429,319. *Improvements in Optical Devices for the Control of Flight.* Nistri, W., 11, via Francesco Negri, Rome, Italy. Convention date (Italy), July 21st, 1933.

It is proposed to fit a special panel in place of the usual instrument board in aircraft, on to which the indications of the various instruments are projected by an optical system, light being obtained from an electric lamp. The optical system appertaining to the compass contains a Wollaston prism controllable by the pilot which produces a rotation of twice the angular amplitude in the image of the system of needles. It is stated that the instruments required for this arrangement may be much smaller than usual and that they may also be much simpler as no amplifying mechanism is required. It is also claimed that the images of the indications of the instruments which correspond to the predetermined conditions of flight can be arranged so that when these conditions are satisfied the images assume a simple geometrical arrangement relatively to one another.

Miscellaneous

428,716. *Improvements in and relating to Ground Apparatus for Facilitating the Landing of Aircraft.* Low, A. M., 1, Woodstock Road, London, W.4. Dated Feb. 19th, 1934. No. 5,352.

It is proposed to place a system of coils under a landing deck for aircraft, which coils are to be fed with alternating current so that the coils will generate eddy currents in aircraft approaching so as to cushion the descent of the aircraft. It is also proposed to arrange the coils so that they are under the control of the pilot of the aeroplane by means of a remote control apparatus so that an aeroplane descending with one wing dipped may be righted by an appropriate energisation of the coils.

431,551. *Improvements in Stabilising and Damping Devices.* Fabry, J., 218 rue de Rivoli, Paris, France. Convention date (France), Dec. 1st, 1933.

In the case of aerial bombs, torpedoes, or other similar objects, it is proposed to improve their fore and aft stability in motion by means of an improved method of finning. The fins proposed are thicker towards their extremities than next to the body, and have flat inclined leading edges and flat tops. This particular shape is said to confer the stability claimed.

- 431,442. *Improved Reciprocating Blade Propeller or Impeller, Particularly for Use on Ships, Airplanes and Pumps and Compressors and Like Apparatus.* Le Clezio, L., Andeville (Oise), Paris, France. Convention dates (France), Nov. 3rd, 1933, and Oct. 6th, 1934.

The propeller described consists of a reciprocating element operating in a tube arranged so as to act like a piston on the outward stroke and to fold on the return so as to permit the water to flow by. It consists of a number of blades up to eight folding backwards from the centre, and it is claimed that the arrangement may be used for sustaining or propelling aircraft, although it is apparently normally intended for ship propulsion.

- 431,067. *Improvements in and relating to Aircraft.* The Supermarine Aviation Works (Vickers), Ltd., and Black, A., both of the Company's Works, Woolston, Southampton, Hants. Dated Dec. 30th, 1933. No. 36,698.

In order to prevent the passengers or the crew of aircraft from slipping on those portions of an aircraft on which they are obliged to walk on entering or leaving, it is proposed to spray such portions with metal, it being stated that the roughness so produced is sufficient.

- 430,802. *An Improved Device for Removing Ice from Structures such as Aeroplane Wings Exposed to Ice-forming Conditions.* United Air Lines, Inc., 221, North La Salle Street, Chicago, Illinois, U.S.A. Convention date (U.S.A.), Nov. 28th, 1933.

In order to remove ice from the leading edges of aircraft wings it is proposed to cover the front part of the wing with a flexible curtain fitting close to the nose and extending some way over the upper and lower surface. This curtain is adapted to be drawn backwards and forwards over the leading edge by means of, say, an electric motor, thereby bending the curtain and breaking the ice off the surface.

Model Aircraft

- 428,053. *Improvements in or relating to Toy Aeroplanes.* Hermann Auge, Krelingstrasse 35, Nuremberg, Germany. Dated Oct. 7th, 1933. No. 27,703.

The toy aeroplane described is of normal form and has a cylindrical metal body, the propeller being driven through gearing from a torsionally acting helically coiled metal spring. The plane is located on the body by hooks engaging with holes in the body and is kept in place by an elastic band. The under-carriage has curved resilient members which are pivoted on the body.

Parachutes

- 428,389. *Improvements in or relating to Parachutes.* Muller, M., Waterloo Ufer 14, Berlin, S.W.61, Germany. Dated Nov. 13th, 1933. No. 31,602.

In order to avoid severe shocks to the human body when a parachute of the normal type opens rapidly at high speed, it is proposed to provide a small parachute between the main parachute and the man. This small parachute is arranged to open first with the aid of springs and its resistance slows down the velocity of the system before the opening of the main parachute. A small additional parachute may also be added making three in all. Full details of packing arrangements are described.

430,793. *Improvements in or connected with Aircraft.* Utin, S., 54, High Street, Marylebone, London, W.1, and Arnold, F., 39, Wimpole Street, London, W.1. Dated Oct. 26th, 1934. No. 30,751.

It is proposed to fit a parachute to an aeroplane so as to enable the latter to be landed safely in emergency. The parachute is folded in a container carried on the upper part of the aeroplane, approximately over the centre of gravity. The top of the parachute carries a metal plate which normally forms the lid of the container, and there is attached to this plate a rod carrying a piston which normally fits inside a tube in the interior of the aeroplane. To operate, the pilot releases a spring which forces the piston out of the tube, and consequently, the parachute out of the container.

Piloting

429,133. *Improvements in or relating to Automatic Steering Devices.* Askania Werke Aktiengesellschaft, vormals Centralwerkstatt Dessau und Carl Bambergfriedenu, Kaiserallee 87/88, Berlin-Friedenau, Germany. Convention date (Germany), Aug. 2nd, 1933.

It is stated that in the case of the controls of heavy aircraft in gusty weather, automatic control, as normally used, results in the aircraft swinging back too far, thereby passing the desired course line. The specification describes means by which, it is stated, this difficulty may be obviated. It is proposed to transmit the deflections of the system to the force controller through the intermediary of a damped resilient connection comprising two levers rotatable with respect to each other; said two levers being connected to one another by means of a spring coupling and also by a damping device so that upon the return of the deflection the force controller is caused to influence the control motor in the opposite direction before the value of the deflection has returned to zero. The apparatus is described in connection with a jet tube as described in British Patent Specification No. 397,805.

Pilots and Piloting

431,049. *Improvements to Optical Projection Apparatus.* Miles, G. H., Burlington, Richmond Road East, New Barnet, Herts. Dated Nov. 29th, 1933. No. 33,457.

This specification describes an apparatus for teaching motor car driving, etc., by which an indication of a road is shown on a transparent screen in front of the driver and moved in accordance with the movement of the controls. A modification of the arrangement is described for use in teaching the flying of aircraft. The route which appears on the screen is erected in dummy on a flat plate which is illuminated electrically and can be moved in accordance with the movement of the controls.

Undercarriages

428,265. *Cantilever Type of Landing Gear for Flying Machines.* Messerschmitt, W., 118a, Haunstetterstrasse, Augsburg, Germany. Convention date (Germany), Aug. 23rd, 1933.

In the case of aircraft having landing wheels carried on cantilever struts it is proposed to place a rupturing zone or fouling point at the place where the strut emerges from the fuselage or wing. The advantage claimed is that, in cases where the landing imposes loads greater than the strut is designed to bear, rupture occurs at a place which will do the minimum damage to the aircraft and will minimise the risk of turning over. The strut can be made shock-absorbing in any known way, and the load required to rupture may be different in different planes.

427,829. *Improvements in Brakes.* The Dunlop Rubber Co., Ltd., 32, Osnaburg Street, London, N.W.1, and Goodyear, E. F., Wright, T., and Trevaskis, H., all of the Company's Works, Foleshill, Coventry, Warwickshire. Dated Dec. 22nd, 1933, No. 36,083, and May 12th, 1934, No. 14,408.

The brake controlling devices are fitted on each side of the pilot's rudder bar and are worked through the toes of his boots so that either brake can be used differentially. The device used consists of a piston working in a cylinder operated by a lever, the pressure produced by the piston in the cylinders being directly transmitted to the wheel brakes. The pressure from the lever is transmitted to the pistons through a ball-headed connecting rod, the ball working in a recess in the piston itself. In order to enable the brakes to be held on when the machine is at rest an additional manually operated control is provided. This consists of a ball valve which can be put out of action by the pilot, but which can be permitted to close the return fluid path from the wheel brakes, thus preventing these from being released.

428,539. *Improvements relating to Retractable Aircraft Undercarriages.* Hawker Aircraft, Ltd., Canbury Park Road, Kingston-on-Thames, Surrey, and Camm, S., of the same address. Dated Nov. 15th, 1933. No. 31,867.

The undercarriage described has the wheel carried between two shock-absorbing struts connected to the front spar of the wing which are supported by two diagonal struts connected to the rear spar of the wing. Retraction takes place backwards, the whole undercarriage swinging on the pivot on the front spar, the rear struts being folded backwards. One system of operation described consists of a system of cords and pulleys by means of which the undercarriage is lifted and also the rear struts are unlocked from their operating position and carried backwards by means of a pulley rotating a lever carrying the end of the strut. These two operations are carried out simultaneously by means of a cord operated by the pilot which pulls on a pulley round which the retracting cord passes, thus giving a differential action. The undercarriage is returned by means of a separate cord which is arranged to swing the rear strut into position and to re-lock the gear. An alternative mechanism is described in which a bevel differential gear is used to effect the same purpose, but in this case retraction takes place by means of pinions gearing into toothed segments.

429,867. *Improvements in or relating to Landing Gear for Aeroplanes.* Societé d'Inventions Aeronautiques et Mecaniques, S.I.A.M., 1, Route des Alpes, Fribourg, Switzerland. Convention dates (France), May 24th, 1934, and June 27th, 1934.

The chassis described is of the usual type with a shock-absorbing leg attached to the front spar and a rear diagonal leg running to the rear spar. Folding is permitted by hinging the rear leg at a point along its length so that it may be swung out of the way while the rest of the chassis rotates rearwards and upwards about the front spar. Locking when extended is carried out by means of a member attached to the rear part of the diagonal, which member carried a hook which is engaged by a hydraulically controlled mechanism. In a modification described, this hook may be used for locking, whether the mechanism is extended or retracted.

429,167. *Improvements in or relating to Tail Skid Shoes for Aircraft.* Aktiengesellschaft der Eisenund Stahlwerke vormals Georg Fischer, Schaffhouse, Switzerland. Convention date (Germany), Jan. 31st, 1934.

The inventor proposes to increase the wear-resisting properties of tail skids by welding on a layer of white iron, which may be alloyed with chromium, etc., for the purpose of increasing hardness.

431,042. *Improvements relating to Tail Wheels and the Like for Aircraft.* Dowty, G. H., 17, Lansdowne Crescent, Cheltenham, Gloucestershire. Dated Jan. 31st, 1934, No. 6,233, and Feb. 16th, 1935, No. 5,088.

In the case of tail wheels for aircraft it is considered desirable that the tail wheel shall be resiliently mounted and that the wheel shall be self-centring. The construction described consists of telescopic tubes with a spiral spring for resiliency coupled with an arrangement by which two concentric members have each an angular force kept together by a spring when the load is off the tail skid. The two angular concentric spring mounted faces will tend to take up a position in which the two angular faces are together, this action providing the self-centring. It is also proposed that the resiliency shall be checked by a braking device consisting of a band brake acting between the telescopic tubes.

430,831. *Improvements relating to Landing Gear for Aircraft.* Norton, J. B., Capt., Marston Hall, Grantham, Lincolnshire. Dated Jan. 11th, 1934. No. 1,100.

This specification describes a device for the automatic landing of aircraft in which the operating element is a skid, normally folded, but which, when landing, projects downwards behind and below the chassis. On contact with the ground this skid releases a spring which operates the control column in the appropriate direction for flattening out. Damping is provided by means of a hydraulic mechanism and the amount of damping may be controlled by a centrifugal governor driven by a small fan, the damping being thus proportional to the forward speed at the time of landing.

430,842. *Aeroplane Brakes and Their Controls.* Dunlop Rubber Co., Ltd., 32, Osnaburgh Street, London, N.W.1, Goodyear, E. F., of the Company's Works, Foleshill, Coventry, Warwickshire, and Trevaskis, of the Company's Works, Fort Dunlop, Erdington, Birmingham. Dated March 14th, 1934. No. 8,037.

This specification describes a method of operating aircraft brakes in which the brakes may be applied through a lever operated by the pilot on the joystick, and operated differentially by means of a mechanism connected to the pilot's rudder bar. This mechanism consists of two diagonally placed relay mechanisms which are operated together by the lever operated by the pilot or which are operated differentially by means of a rotatable slot mechanism from the pilot's rudder bar.

Wireless

428,212. *Improvements in and relating to Direction Finding Apparatus.* The British Thomson Houston Co., Ltd., Crown House, Aldwych, London, W.C.2. Convention date (U.S.A.), Oct. 26th, 1932.

Among other objects it is proposed to provide an improved direction finder which will provide both substantially constant angular sensitivity and symmetrical angular indication. The direction finding system may comprise non-directive and rotatable directive antennæ, means for combining oscillations received by the antennæ to produce distinctive currents whenever the directive antennæ is at an angle to the null position with respect to a radio transmitter and means, including a non-linear resistor having a substantially instantaneous response to the distinctive currents for producing a direct current variable in accordance with the position of the directive antennæ. Oscillations received on directional and non-directional antennæ are modulated and combined and caused to produce distinctive current which, through a substantially instantaneous responsive non-linear resistor, are caused to give a direct current indication of the position of the directive antennæ.