ABSTRACTS OF PATENT SPECIFICATIONS

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

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Aeroplanes, Construction

423,060. *Improvements in or Connected with Aircraft Fuselages.* The Blackburn Aeroplane and Motor Co., Ltd., Seaplane Base, Brough, East Yorkshire, and Bumpus, F. A., Elloughton, Brough. Dated Nov. 30th, 1933. No. 33,601.

The problem which this invention is designed to meet is the provision of fuel tanks which are readily removable without the limitation of being removable only through the cockpits, etc. The fuselage is of the monocoque type having an unobstructed aperture in its skin, preferably underneath, through which the tank may be introduced into or removed from the fuselage. This aperture is normally closed by a cover which is connected to or which forms part of the tank and which completes the continuity of the skin of the fuselage. The tank may be attached to the fuselage by bolts through the cover and steadying rings or devices may be used.

426,438. *Improvements in Windscreens for Aircraft.* Boulton and Paul, Ltd., Riverside Works, Norwich, and North, J. D., Hill House, Eaton, Norwich, and Bannell, 16, Newmarket Road, Norwich. Dated Feb. 6th, 1934. No. 3,849.

The windscreen described consists of three portions: a front portion fixed in position on the aircraft, a middle portion which normally mates with the front portion, but which is arranged on rails on the aircraft body, so that it may slide back, and a rear streamlined body which is also attached permanently to the aircraft. When the middle portion is pushed forward so as to mate with the front portion the whole forms an enclosed cabin, and as all portions are covered with a transparent substance the pilot's view is excellent. Should, however, the pilot prefer an open cockpit, he can push back the middle portion. The front portion then acts as an ordinary windscreen and the view is similar to that from an open cockpit.

426,268. *Improvements in and relating to Wings for Aircraft.* Vickers (Aviation), Ltd., and Wallis, B. N., both of Weybridge Works, Byfleet Road, Weybridge, Surrey. Dated Sept. 28th, 1933. No. 463/35 (divided out of 426,134).

It is stated that in the case of single spar wings for aircraft there is considerable difficulty in providing in the wing accommodation for a retracted chassis, petrol tank, etc., owing to the position of the wing spar. It is proposed to obviate this difficulty by splaying the upper and lower booms of the spar in the neighbourhood of the fuselage, so that the retracted chassis or the petrol tank may be accommodated between them.

Aeroplanes—General

422,980. *Improvements in or Relating to Aeroplanes.* Ruolle, M. A., 19, Rue Richard Lenoir, Paris, France. Convention date (France), Dec. 30th, 1932.

This arrangement consists of a propellerless aeroplane wherein a vacuum is produced above the machine and a pressure below. The engine drives exhausters which produce a reduction of pressure in the interior of the wings which are provided with a slot opening to the atmosphere and situated near the leading edge. The air is discharged underneath the aeroplane and there is a deflector for increasing the propulsion by deflecting the air rearwards.

427,186. *Improvements in or relating to Tailless Aeroplanes.* Petters, Ltd., and Capt. G. T. R. Hill, both of Westland Aircraft Works, Yeovil, Somerset. Dated Oct. 17th, 1933. No. 28,709.

This specification refers to tailless aircraft of the pterodactyl type, and refers specifically to machines in which the swept back portion of the wings constitute the main supporting surfaces, and in which the centre section is substantially straight and does not exceed 40 per cent. of the total span of the wings. The wing tip control surfaces are located wholly behind the trailing edge of the centre section. The machine may have one or more engines which may be enclosed in or faired into the wing. It may have short underwings and a tandem wheel undercarriage. It may also have a hull similar to that of a flying boat for operation from water.

427,017. *Tube Motor Aeroplane.* Zimmerman, R., Getrudstrasse 99, Zurich, Switzerland. Dated July 10th, 1933. No. 19,520.

This invention concerns an aeroplane which possesses several tubes arranged longitudinally. The purpose of the tubes is to capture the current of air which is caused by the revolving propellers, to guide the same through the tube where there is no resistance and out of its end through an outlet offering also no resistance. The air exit is described as taking place through an orifice which is roughly of the cross section of a normal aeroplane tail. It is stated that by this system the swells of air are reduced to a minimum and that the air flowing through the tubes increases the carrying power, the stability and easy sliding of the plane.

Airscrews

425,649. *Driving the Propellers of Aircraft.* Bock, G. A., Alberton, Queensland, Australia. Dated March 19th, 1934. No. 8,542.

It is proposed to use the combination of a crankless motor and a motor with the usual crankshaft, an extension shaft from the latter passing through the shaft of the forum. Each shaft may carry a concentric propeller, or there may be one propeller which may be connected by clutch gear to either motor. A laminary motor is stated to be suitable for the crankless motor.

Armament

426,911. *Improvements in or relating to Devices for Reducing the Recoil of Guns on Aircraft.* Birkigt, M., Rue du Capitaine Guynemer, Bois-Colombes, Seine, France. Convention date (France), March 1st, 1934.

In this device, intended for use where a gun is fitted to fire through the propeller shaft, the barrel of the gun is normally extended by a flame protector formed by a tube having a larger bore than the bore of the gun. This flame protector extends forward of the propeller and carries a double-walled cone-shaped member. In the centre of this member there is a hole to permit the bullet to emerge, while the powder gases are constrained to pass between the walls of the cone, and are hence directed backwards. The powder gases, striking the forward wall of the cone, produce a reaction in the opposite direction to the recoil of the gun.

Control of Aircraft

423,709. *Improvements in or Relating to Head Wind Brakes for Aircraft.* Junkers-Flugzeugwerk Aktiengesellschaft, 40, Junkerstrasse, Dessau, Germany. Convention date (Germany), July 3rd, 1933.

This braking device is intended to be specially suitable for reducing the nose diving speed of an aircraft. It consists of a strip mounted on the underside of the wing and parallel to the span. The strip should extend over half the wing, should be fitted within the front 40 per cent. of the chord and should project from the wing to an amount not exceeding 6 per cent. of the chord. It may be operated manually or automatically, *i.e.*, operated by a mechanism which comes into use when the speed of the aeroplane exceeds a predetermined figure. It is claimed that the effect of the device is greater when the wing is at a small or negative angle of incidence. Several methods of constructing the device are described.

423,752. *Improvements Relating to Aircraft Controls.* Hawker Aircraft, Ltd., Canbury Park Road, Kingston-on-Thames, Surrey, and Camm, S., of the same address. Dated Oct. 16th, 1933. No. 28,599.

This specification describes a method of operating aeroplane controls, such as ailerons, by means of a mechanism which can be substantially contained within the thickness of the wing. The control cables are attached to a pulley which can therefore be rotated when the controls are moved. This pulley is fitted on a spindle carrying a crank which is connected to the aileron lever, which is approximately horizontal, by means of a link. A balance weight may also be incorporated. Several means of obtaining the same result are described.

423,565. *Improvements in Aeroplanes.* Boulton and Paul, Ltd., Riverside Works, Norwich, Norfolk. Dated July 20th, 1934. No. 21,265. Convention date (U.S.A.), Nov. 3rd, 1934.

It is pointed out that ailerons are effective for lateral control at small incidence angles of the wings, but become ineffective at large angles. It is therefore proposed to use a different method of control at large incidence angles, preferably combined with ailerons for use at small angles. This different method consists of a method of decreasing the lift on that side of the aeroplane which it is desired to drop by means of what is called a spoiler passage in the wing, the upper opening of which is forward of the lower opening. It is stated that at large angles of incidence there is a flow through this passage from below the wing to the upper surface which destroys the normal flow over the wing and also the lift. Various methods of opening and closing the spoiler passage are described, and methods are given by means of which the device may be combined with ailerons.

426,689. *Improvements in or relating to Aeroplanes, Seaplanes, or other Heavier-than-Air Flying Machines.* Jona, A., 14, Via Georgio Jan, Milan, Italy. Dated June 29th, 1934.

It is proposed to provide a hinge connection between the wing of an aeroplane and the fuselage so that the two systems are capable of performing independent rolling movements, the control cables of the ailerons being connected to fixed positions on the fuselage in such a manner as automatically to move the ailerons in the direction necessary to return the wing to its normal position. The hinging of the wing may be damped hydraulically or otherwise and/or may be controlled by a spring device and the top wing only of a biplane may be hinged, the lower wing carrying ailerons operated by the pilot in the usual manner. A method is described of overcoming propeller torque and the arrangement is claimed to provide automatic lateral stability.

426,439. *Improvements in Automatic Course Redresser for Aircraft.* Societa Anonima Sviluppi Aeronautici (S.A.S.A.), 184, Corso Umberto I, Rome, Italy. Convention date (Italy), Feb. 8th, 1933.

This apparatus is intended to control the rudder of an aircraft automatically and receives its indications from a compass or gyroscopic device, etc., from which appropriate electrical currents are transmitted to the apparatus controlling the rudder. This apparatus consists of three wheels mounted on the same centre: the two outer are rotated in opposite directions by an electric motor or other convenient means, while the centre carries a grooved rim which accommodates the rudder cables. Solenoid controlled pawls are provided working on ratchet teeth on the outer wheels so that the inner wheel may be coupled to either of the outer wheels so as to rotate with it. De-clutching mechanism is described and also a safety device to prevent both wheels being clutched in simultaneously.

425,645. *Improvements in or relating to Aircraft.* The Fairey Aviation Co., Ltd., Cranford Lane, Hayes, Middlesex, and Lobelle, M. J. O., Langley Road, Langley, Bucks. Dated Feb. 14th, 1934. No. 4,928.

It is proposed to provide at the tail end of the fuselages of aircraft certain fins in pairs lying in the direction of the airflow for the purpose of assisting control during a spin. These fins may be fitted above or below the fuselage, may be of various shapes in plan form and their sections may be similar to those of aerofoils, or they may be symmetrical. The angle of convergence of the fins may be varied by mounting them so that they may be turned about longitudinal axes.

Engines

424,498. *Improvements Relating to Air-Cooling of Radial Cylinder Internal Combustion Engines.* MacClain, A. L., 1218, North Main Street, West Hartford, Hartfort, Connecticut, U.S.A. Dated Aug. 22nd, 1933. No. 23,331.

It is stated that it is possible to increase the cooling of air-cooled radial engines for aircraft by arranging baffles between the cylinders so as to block the space between the cylinders except for the space between the individual cooling fins. For the cylinders the type of baffle proposed consists of a shaped plate fitting closely to the cylinder and connected by a nut and bolt to a spring bridging the space between and behind the cylinders. The engine is shown fitted with a cowl of the Townend Ring type and it is proposed to use baffles of a similar type to the cylinder baffles for the cylinder heads, but in this latter case the baffles are preferably attached to the ring.

424,546. *Improvements in or Relating to Fluid-Reaction Propelling Apparatus.* Endres, H., 116, Kullerstrasse Solingen, Germany. Convention dates (Germany), Aug. 15th, 1933; Nov. 9th, 1933; April 3rd, 1934.

It is claimed that the efficiency of the usual helical propellers for aircraft is very poor and that the speed they impart is very low, it is therefore proposed to substitute a fluid reaction propelling device which consists of a main jet from which compressed air issues and which is surrounded by a nest of similar nozzles. The apparatus contains a piston which is operated partially by compressed air and partially by a vacuum produced in spaces communicating with the nozzles. It is stated that with this apparatus the relative wind is utilised very largely for producing thrust force.

425,031. *Improvements in and Relating to Variable Speed Gearing.* Cassaque, G. R., Parellon La Bouvreuil, Avenue Guynamar Cazoux (Gironde), France. Convention dates (France), Feb. 8th, 1933; March 27th, 1933.

This is a type of differential gear which is arranged to balance the torque of the propeller drive with that of the supercharger so that when variations in speed of the propeller shaft occur suitable corresponding variations will be obtained in the speed of the supercharger. The gear is of the sun and planet type with two sets of planet pinions which can be clutched so that the differential action may be stopped if the supercharger is not required. Modifications of this arrangement are described.

425,046. *Improvements in and Relating to Propulsion of Aircraft.* Stenning, G. A., 63, Queen's Park Road, Brighton, Sussex.

This specification describes a method of propelling aircraft by ejecting fluid from a jet. By this means a zone of low pressure is induced within the aircraft and propulsion is partially effected by means of slots in the wing of the machine through which air is drawn and partially by the reaction of the jet. It is stated that the manner in which a vacuum formed within an aircraft may be utilised to effect movement of the craft will present no difficulty to those skilled in the art.

423,719. *Cowlings for Air-Cooled Aircraft Engines.* Armstrong-Siddeley Motors, Ltd., and Reynolds, R., both of Armstrong-Siddeley Works, Parkside, Coventry, Warwickshire. Dated Feb. 3rd, 1934. No. 24,426.

This specification describes a modified form of Townend Ring intended to facilitate the cooling of air-cooled engines, usually of radial form, by directing the air flow on to those parts of the engine which require most cooling. The ring is of aerofoil form having an inner and outer surface and the rocker boxes are inside the ring. The inner side of the section is flat and is parallel to the cylinder fins. The space above the cylinder is consequently screened from the direct flow of air.

407,530. *Improvements in or Relating to Radiators for Aircraft Engines.* Ferlay, G., 66, Rue Pierre Larousse, Paris, France. Convention date (France), March 12th, 1932.

It is proposed to use as a radiator a casing conforming to the shape of the leading edge of the wing and having inside it a venturi-shaped passage in the divergent part of which the radiator is situated. The air inlet of the passage is on the leading edge of the wing, and the outlet is in the form of a slot on the upper side of the wing.

427,094. *Improvements in the Propulsion of Shafts.* Hurd, G., 12, Rhodes Terrace, Beddington Grove, Wallington, Surrey, and Triggs, C. S., 155, Stafford Road, Croydon, Surrey. Dated Aug. 16th, 1933. No. 22,857.

It is stated that one of the hindrances to the progress of aviation is the practice of connecting one engine to one propeller so that if the engine stops the propeller stops also. It is proposed, therefore, to drive aircraft propellers from several engines, so that if one of the engines fails it will be automatically cut out. The engines may be arranged radially round the propeller shaft, each driving a gear wheel gearing into the propeller shaft gear wheel, the drive being taken through free wheel clutches. Other arrangements may be used for the engines; they may, for instance, be coupled in line through a bevel gear box, so that a number of engines may drive a number of propellers where axis of rotation is at right angles to the engine crankshaft axis.

Flying Boats

422,982. *Improvements in and Relating to Water Stabilisers for Flying Boats.* The Blackburn Aeroplane and Motor Co., Ltd., and Rennie, J. D., both of Seaplane Base, Brough, Yorks. Dated Jan. 6th, 1934. No. 552.

The form of stabiliser described consists of two wing floats which may be of usual form held in position on each side of the hull by means of stub wing extensions which start from the upper portion of the hull and extend downwards towards the water. An air space under the stub wings is thereby ensured, and it is claimed that the arrangement assists the ventilation of the main step.

Helicopters

423,005. *Improvements in or Relating to Aircraft with Rotating Wing Systems.* Breguet, L., 24, Rue Georges Bizet, Paris, France. Convention date (France), May 27th, 1933.

The specification refers to gyroplanes of the type described in British patent No. 373,771 of March 21st, 1930, and has for its object the improvement of the autorotation effect produced when the engine stops, the autorotation being obtained by automatically reducing the incidence of the blades of the rotor under these conditions. The blades are carried by a short arm and are pivoted to it. When under power an angle is produced between this arm and the blades, but when autorotation occurs the blades and the arm are in a straight line. This movement, controlled by a mechanism, produces the alteration of the angle of incidence. The incidence regulator consists of an arm extending in a front-wise direction connected to a ring universally mounted with respect to the vertical shaft through a connecting rod disposed obliquely so that the angle it makes with the arm is less than 90°. A mechanism for the same purpose comprising toothed sectors and pinions is also described.

424,140. *Improvement Relating to Aircraft of the Gyroplane Type.* Jones, T., Cwmbach, Pontyates, Carmarthenshire, Wales. Dated Aug. 21st, 1933. No. 23,240.

The machine proposed is fitted with lifting rotors revolving on a horizontal axis and which are kept in rotation by the movement of the machine through the air. It is proposed to impart initial rotation to these rotors by belt or rope, driving them from the landing wheels. A further claim is concerned with the shape of the leading or trailing edges of the winged rotors, which may be deeply recessed or which may be formed of a succession of circular discs.

423,371. *Improvements Relating to Aircraft.* Flettner, A., Neue Bayreutherstrasse, 7, Berlin, W.30, Germany. Application date, Aug. 22nd, 1933. No. 23,355.

This is a helicopter aircraft in which the helicopter airscrew is capable of having the incidence of the blades altered, for control purposes, for lifting purposes, and also for autogyration. The incidence alteration is not necessarily the same for all parts of the blade and it may be effected automatically as the rotational speed increases. In this latter case the blades are mounted on a shaft on screwed collars so that as the blades move outwards under centrifugal force their incidence is altered, the outward movement being controlled by a spring. Separate steering blades may be used. Each blade is controlled by means of a lever at the hub by means of which the incidence may be controlled.

426,686. *Improvements in and relating to Gyroplanes or Helicopters.* Van Poelvoorde, P. J., 24, Rietzanger Lane, The Hague, the Netherlands. Convention date (Netherlands), May 18th, 1933.

This is a method of stabilising helicopter aircraft, which it is proposed to effect by forming the machine with two rigid units, the upper being the lifting unit and the lower the load-carrying unit. These are connected together by one or more flexible connections which are attached to the lifting unit at a point below its centre of gravity. Calculations are given which purport to show that there is produced by this arrangement a righting movement, when the lifting unit is tilted.

426,197. *Improvements in or relating to Rotative Wing Aircraft.* Coats, A. G., Gloucester House, Park Lane, London, W.1, and Hofner, R., Mantlergasse 47, Vienna 13, Austria. Dated Aug. 25th, 1933. No. 23,646.

It is proposed to provide mechanism by means of which a rotative wing aircraft may be flown either as a helicopter or as an autogiro, here called a windmill plane. The variation of the setting of the blades for the two methods of flight is to be obtained automatically and depends mainly on the speed of rotation of the blades. It is stated that at high speeds of rotation the dihedral angle is greater and by connecting the blades through a crank and connecting rod to a fixed point on the vertical rotating shaft this alteration of dihedral may be used to effect the alteration. A governor may also be used and also the deformation of a part carrying the main drive. A free wheel device may be interposed on the driving shaft or a clutch device actuated by a quick pitch thread.

Instruments

425,009. *Improvements in Directional Stabilising Apparatus for Aerial or Marine Craft or Navigational Instruments.* Schneider and Cie., 42, Rue d'Anjou, Paris, France, and Fieux, J., of the same address. Convention date (France), Dec. 1st, 1933.

This device is of the type comprising a combination between a gyroscopic direction mark and a servo motor acting on the rudder. The apparatus permits the instantaneous reading of the mean course and the rapid determination of the drift. The gyroscopic system of reference may be similar to the well known system utilised for the direction of torpedoes. There is combined with the usual distribution of the fluid an additional distribution for each side of the servo motor piston, these acting in series with the first distribution and coming into action by an action of the gyroscope exerted through the intermediation of a friction transmission between the vertical suspension frame of the latter and the movable members of the additional distributions under the effect of the change of sense of direction to which the vessel is subjected after the termination of each yaw.

425,964. *Improvements in Safety Indicators for Aeroplanes.* Shanley, F. R., 11, Prince George Avenue, Takoma Park, Maryland, U.S.A. Dated June 15th, 1933. No. 17,081.

It is claimed that an instrument indicating at any moment the stresses on the structure of an aeroplane would be useful for civil aircraft, and it is stated that the criterion necessary to accomplish this is the value of g which may be acting on the aeroplane at the moment combined with the pitot head reading. The instrument proposed has a weight supported by a spring which is arranged to extend under acceleration. This weight carries an electric contact which may make contact with a plate controlled by a corrugated pressure disc actuated from the pitot. The contact side of the plate is arranged to conform with a calculated curve, so that contact is made at differing accelerations at different pitot pressures. The current passed may light a lamp on the pilot's dashboard.

Kites

422,970. *Improvements in or Relating to Kites.* The Bias Bindings Co., Ltd., Gorgie Road, Edinburgh, Scotland, and Turner, J., of the same address. Dated Oct. 14th, 1933. No. 28,422.

The kite proposed is of a rhomboidal shape and is arranged so that the fabric threads are on a bias relative to the upright and cross members. At each corner a pocket is formed to receive the ends of the upright and cross members, the length of these being slightly greater than the corresponding dimension of the kite, so that they take up a curve when placed in position. The kite is flown with the convex side facing the wind and it is stated that the curvature provides stability in flight.

Miscellaneous

424,703. *Vehicle Collision Guards.* Nasbet, A., 6, Reynoldson Street, Sunderland. Dated Nov. 2nd, 1933. No. 30,414.

This specification refers to collision guards primarily intended for use on motor vehicles, but stated to be capable of adoption for aeroplanes. The cross bars at the back or front of the vehicle are carried by cylinders containing springs which absorb collision shock. There is a weak spring for slight shocks and a stronger spring which comes into action if a severe shock occurs.

426,385. *Means for the Control of Two-Way-Moving Devices such as a Ship's Rudder.* Martin, E. G., Travellers' Club, Pall Mall, London, S.W.1. Dated Oct. 4th, 1933. No. 26,281/34. Divided out of application No. 27,289/33.

This specification describes a mechanism primarily intended for operating a ship's rudder. A steering wheel of normal design controls a winch which has drums of differing diameters. There are a pair of bights, the two ends of which are oppositely wound on the larger and smaller winch diameters respectively. Alternatively the drum may carry coned pulleys so as to alter the leverage between the wheel and the rudder as the angle of the latter is increased. The rudder wires are connected to the rudder through a spring shock absorbing device.

426,015. *A Wheel having Feathering Vanes adapted for use in Air or Water as a Motor or Propeller.* Sprigings, W. A., 59, Bernard Street, St. Albans, Herts. Dated Nov. 30th, 1933. No. 33,605.

This specification refers to feathering blade motors or propellers where a number of blades are caused to present their edges and their surfaces in sequence to their surrounding elements. It is proposed that the motor should have blades which substantially along their whole width terminate in anchorage with a disc or a shaped root and that the root should transmit axial motion to the blades.

Ornithopters

425,949. *Flying Machine with Oscillating Wings.* Eberhart, R., Engelburg, Switzerland. Dated Aug. 3rd, 1934.

It is proposed to connect the oscillating wings by a ball and socket joint to a common driving shaft and to have a pressure surface at right angles to the axis of oscillation, whereas supporting elements are fixed on the driving shaft which have a ball bearing surface obliquely intersecting the driving shaft and bearing against the pressure surface. Two reciprocating elements are provided for controlling the adjustment of the wings relatively to the longitudinal axes of the machine.

426,460. *Balanced Rotary Feathering Wings.* René de Tyron-Montalembert, Villa St. Christophe, Avenue Fernand Martin, Villefranche-sur-mer, Alpes Maritimes, France. Convention dates (France), July 18th, 1933; May 9th, 1934.

This specification describes a system of rotating blades for raising and propelling aircraft, which are arranged to be driven by toothed gearing in such a way that there is imparted to the blades a rotative movement round the main shaft and a movement round their own axes, means being provided for regulating the action of the blades on the air. There is a system of this type on both sides of the aircraft so that the action of one balances that of the other. In this way, for each rotation of the driving shaft, the simultaneous lowering and starting lowering of the two wings will also expel the air downwards on either side of the fuselage and the volume of air comprised between the descending movements of the two other wings continuing their rotation and before the retractive movement of the upward stroke will be violently pushed towards the rear and underneath the apparatus so as to produce a violent reaction similar to that produced by the simultaneous lowering of the two wings of a bird.

Undercarriages

424,265. *Improvements in or Relating to Brake Mechanism.* Elektronmetall, Gesellschaft mit beschrankter Haftung, Counstatt, Stuttgart, Germany. Convention date (Germany), Aug. 30th, 1932.

This device consists of a manually operated oil pump by means of which oil under pressure is produced. The oil is distributed to the braking devices on the wheels through a plug cock with passages so arranged that the braking may be equal in both wheels or differential as desired. This plug may be controlled by a connection to the rudder bar. The oil pump carries an additional cylinder which contains a piston moving in unison with the pump piston. This cylinder contains oil and is connected to the pump cylinder, its object being to ensure that the pump cylinder is always full of oil and to prevent the entry of air.

425,207. *A System of Retractable Landing Gear for Aeroplanes.* Société d'Inventions Aeronautiques et Mecaniques S.I.A.M., of 1, Route des Alpes, Fribourg, Switzerland. Convention dates (France), March 27th, 1934; May 9th, 1934.

This specification describes a method of raising and lowering a landing gear hydraulically. The gear is shown as pivoted at its upper end, and folding by rotation round this pivot, the actuating means being a hydraulic piston and cylinder operating on a crank pin. The fluid pressure is produced by an engine-driven pump, and the actuating piston and cylinder are double acting, the pressure on the reverse side of the piston being produced by a hydraulic reservoir with air pressure. The incorporation of this device enables the landing gear to be returned to its lowered position by hydraulic means. A special device is

included for the operation of trapdoors and a single lever control for the pilot is also described.

407,392. *Improvements in or Relating to Braking Systems for Aircraft.* Vickers (Aviation), Ltd., Pierson, R. K., and Duncan, T. S., all of Weybridge Works, Byfleet Road, Weybridge, Surrey. Dated Sept. 17th, 1932, No. 25,910, and March 2nd, 1933, No. 6,357.

This specification describes a method of compressed air braking for aircraft in which the pressure may be equally provided to the brakes on each side according to the will of the pilot, or differential braking can be done by means of a control operated by the rudder bar, or excess pressure may be applied to the brakes for parking purposes. In the latter case a separate valve box is provided, operated by an independent lever for opening a valve on the pipe direct from the air cylinder and closing off the rest of the mechanism. The mechanism for operating the brakes for landing consists of a lever operated by the pilot which acts on the inlet and exhaust valves through a spring-loaded diaphragm so that the pressure is applied in a servo motor manner, the greater the lever pressure the greater the air pressure, and hence the greater the braking effect. The connection from the rudder bar acts on a rocking lever and hence acts on the valves differentially.

426,134. *Improvements in or connected with Wheel Landing Gear for Aircraft.* Vickers (Aviation), Ltd., and Wallis, B. N., both of Weybridge Works, Byfleet Road, Weybridge, Surrey. Dated 28th Sept., 1933, No. 26,713, and 27th Sept., 1934, No. 27,715.

In the case of retractable chassis for aircraft, owing to the position which it is necessary for the wheel to occupy when the chassis is extended, it is difficult to arrange for the chassis to fold into the wing. In order to facilitate this it is proposed to arrange that the chassis, when folding, shall swing about two axes, one in the fore and aft direction, the other lateral. In one example of the proposed construction a supporting member mounted in a fore and aft direction in the wing receives the butt end of the wheel carrier member in the form of a fork in such a manner as to permit the fork to swing laterally from the extended position to the recess in the wing. A sheave, rotatably mounted on the tube, carries two spaced pivots for attachment of the butt end of the fork permitting the fork to swing backwards when caused thus to swing by a controlling member consisting of a cam or the like. The locking device comprises two pairs of diametrically opposite bolts which are adapted to engage with corresponding holes in the sheave and fork. Various modifications are described.

427,185. *Improvements in and relating to Landing Gear for Aircraft.* The Supermarine Aviation Works (Vickers), Ltd., and Dickson, R. S., both of Woolston, Southampton, Hants. Dated Oct. 17th, 1933. No. 28,707.

There is described a type of folding chassis, in which, in the case of a chassis designed to fold backwards into a wing, arrangements are made for the wheel to be turned approximately ninety degrees, so that it may be completely buried in the wing. The chassis consists of a post projecting downwards which carries the wheel and is pivoted at its upper end so that it can swing backwards. A rear diagonal stay is provided, the upper end of which slides on a diagonal rod in the wing. The upper end of this stay is thus moved sideways in the wing as the chassis is folded, and as the lower end is attached to the wheel which is pivoted, the wheel is turned to a degree depending on the angle of the diagonal rod. Applications to other types of chassis are described.