ABSTRACTS OF PATENT SPECIFICATIONS

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

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Aerodromes

413,773. *Improvements in and relating to Elevated Centrally Pivoted Rotating Aerodromes or Airport Landing Grounds.* Frobisher, C., 8, The Crescent, Swaffham, Norfolk. Dated Feb. 7th, 1933. No. 3,674.

This specification describes an aerodrome where there is only one runway for aircraft but where this runway is arranged to rotate horizontally so that it can be moved into the appropriate position, according to the wind, to enable aircraft to land on it. It is suggested that the size of such a runway should be not less than 2,000 feet long and 300 feet broad. The rotating runway can be mounted on one tower, the extremities being supported as cantilevers, or a number of towers arranged in a ring may be used. The towers may be used as offices, etc. Methods of driving and braking the runway are described, and also methods of indicating to approaching aircraft the direction in which to land, it being understood that the direction of the runway is the same for winds differing 180 degrees in direction. The rotating runway may be arranged at differing heights above the ground according to local conditions, and various constructions appropriate to these different conditions are described.

Aerofoils

416,715. *Aircraft.* Zap Development Corporation, 230, Park Avenue, City and State of New York, U.S.A. Convention date (U.S.A.), Jan. 19th, 1932.

This specification refers to a method of increasing the lift of aerofoils by operating a flap attached to the underside and rear of the section; the flap, when operated, taking up an angle to the section, and, at the same time, moving back. It is proposed to connect a rod between the flap and the rear of the aerofoil so that when the flap is moved back by suitable mechanism this rod tends to take

up a vertical position thereby pushing down the rear of the flap. One type of mechanism is proposed in which rack and pinion gears are utilised for the purpose, the pinions operating upon threaded rods which carry nuts attached to the flap.

Aeroplanes—Construction

413,410. *An Improved Method and Means for Inserting and Positioning Distance Pieces in Tubular Structures.* Parnall, G. G., and Clarke, H. V., both of Coliseum Works, Park Row, Bristol. Dated Feb. 14th, 1933. No. 4,468.

In cases where bolts or rivets are used to secure parts to tubular members it is necessary to provide a distance piece between the opposite sides of the tube to prevent the latter dilating. In this case it is proposed to employ a split tubular distance piece which is introduced into the tube and then expanded by a taper tool. Claims are made for the general method and also for the special tool used.

412,717. *Improvements in and relating to Cockpit Wind-Shields, particularly for Aircraft.* Petters, Ltd., Bruce, R. A., and Davenport, A., all of Westland Aircraft Works, Yeovil, Somerset. Dated March 24th, 1933. No. 8,981.

It is proposed to provide, in addition to the pilot's windscreen, an additional windscreen behind the pilot to protect the occupant of the rear cockpit. This rear windscreen is arranged to enclose a sector arrangement of hood which can be closed rearward and which, when closed, encloses the rear occupant completely. Between the pilot's windscreen and the rear windscreen a slideable hood is fitted to enclose this space so that when both these hoods are closed both occupants are completely enclosed. The arrangement is shown arranged for the use of a rear gunner in a military aircraft, and it is pointed out that the latter is protected even when the rear cover is opened to enable him to use his gun. Arrangements are made for each of the occupants to leave the machine quickly when necessary.

416,543. *Improvements in or relating to Folding Wing Aeroplanes.* Baynes, L. E., of E. D. Abbott, Ltd., Farnham, Surrey, Dated Dec. 22nd, 1933. No. 36,111.

It is proposed to fold the wings of a high wing cantilever monoplane by swivelling the whole wing round a point adjacent to the rear spar so that it lies as near as possible to the centre line of the fuselage. Quick-release joints are provided in two places on the front spar, and provision is made for folding a cabin top out of the way when the wing is folded. Application of this method of folding to a twin-engined machine is described, and there are claims concerned with the design of the quick-release devices.

Aeroplanes—General

413,948. *Improvements in Auxiliary Lifting Means for Aeroplanes.* Wood, W. H., 248, Winona Drive, Toronto, Canada. Dated Dec. 6th, 1933. No. 34,266.

It is proposed to assist an aeroplane in rising by providing means intended to reduce the air pressure over the upper portion of the fuselage. The fuselage is provided with slots in its upper surface through which air is drawn by a fan operated by the engine or by other means. A member resembling a paddle-wheel is mounted on each side of the fuselage, the upper half of which is housed so that the lower half only is exposed to the air. These are described as stabilisers.

410,489. *Improvements in or connected with Flotation Gear for Aircraft.* Dagnall, R. F., 17, Stoke Road, Guildford, Surrey. Dated Nov. 16th, 1932. No. 32,389.

This invention provides means by which flotation gear for aircraft is automatically inflated when the aircraft touches the water. The lower forward part of the machine is provided with two spaced plates which are electrically connected by water, especially sea water, and allow a current to flow which operates the apparatus. These spaced plates can be duplicated as necessary, being connected in parallel. It is preferred to use liquid carbon dioxide for inflating the flotation gear, and this gas is carried in metal bottles which are sealed by a light breakable disc. This disc is arranged to be broken by the blow of a plunger, operated by a piston propelled by a cartridge which is, in its turn, fired by the current passed by the spaced plates. Manual operation is provided for in the event of failure of the automatic arrangements, and alternative methods of automatically generating gas are described.

Aeroplanes—Undercarriages

412,734. *Air Improved Differential Braking Device, Particularly Suitable for Wheels of Aeroplanes and other Vehicles.* (Madame) Y. L. Messier, 179, Boulevard Brune, Paris, France. Convention date (France), April 19th, 1932.

This specification refers to hydraulically-operated wheel brakes for aircraft in which arrangements are made for differentially operating the brakes on the wheels on either side of the machine. Reference is made to the British Patent 341,007, August 10th, 1928. The pressure for operating the brakes may be derived from a manually-operated pump and passes to a valve box. This valve box contains an arrangement by which valves are opened so that the pressure is first passed to the wheels equally. On the pressure being increased, a further valve is opened, the others being closed. This operation automatically allows the pressure to pass to the differential apparatus. This latter consists of a piston and cylinder, which piston carries a connecting rod which can be moved over a link connecting the pistons of two other cylinders which are connected to the wheels on each side of the aircraft. By sliding the connecting rod over the link, differential pressure is produced in the two cylinders and, therefore, in the wheels connected with them.

412,593. *Improvements relating to the Undercarriages of Aircraft.* The Comper Aircraft Co., Ltd., Heston Airport, Hounslow, Middlesex, and Flt. Lieut. N. Comper of the same address. Dated Dec. 29th, 1932. No. 36,815.

This undercarriage is of the retractable form in which each wheel is carried in a separate frame, there being a vertical post containing shock-absorbing devices on each side of the wheel and a triangular framework to the rear. The whole of this framework pivots on a point above the wheel and can be turned rearward about this point, so enabling it to be retracted into the wheel. A locking device is provided at the rear of the triangular framework and the wheel is allowed to project slightly in the retracted position so that the machine can land with the wheels retracted. Indicating devices are referred to for the purpose of reminding the pilot of the position of the wheels.

412,038. *Improvements in or relating to Landing Gear for Aircraft.* Clark, M. C., 53 and 54, Chancery Lane, London, W.C.2. Dated June 12th, 1933. No. 16,766.

This specification describes an amphibian gear for aircraft in which the wheels are in the floats. The floats may be pivoted forward so that they may be moved upwards to expose the wheel for alighting on land, or locked in a

fixed position for alighting on water. The floats may be so arranged that they are unlocked automatically for alighting on land, or it can be arranged that the wheels float upwards into the float when alighting on water; or these movements may be operated manually. An anchor, roughly of the mushroom type, is fitted to the nose of the floats so that their shape coincides with the curve of the floats. This is helped by the anchors being provided with rubber bumpers, which latter prevent accidental damage. Sprung rudders containing wheels are fitted to each float. The floats are fitted with water channels to reduce the water resistance of the wheel wells, and special strips forming skates are fitted for ice landings.

415,097. *Improvements in or relating to Brakes for Aircraft Wheels.* The India Rubber, Gutta Percha and Telegraph Works Co., Ltd., Aldwych House, Aldwych, London, W.C.2, and Tarris, F. J., of the above Company's Works at Silvertown, London, E.16. Dated Feb. 15th, 1933, No. 4,692; April 11th, 1933, No. 10,785; and Oct. 24th, 1933, No. 29,486.

The mechanism described is concerned with an arrangement for operating differentially fluid-operated brakes on the wheels on the opposite sides of aircraft. The main braking device which operates the brakes on the wheels to the same extent is controlled by the pilot, but the differential braking occurs only after the pilot has operated his control. This differential braking is effected by two members on opposite sides of the rudder bar which are operated by the rudder bar and which release the pressure, and therefore also the braking effect, from the appropriate wheel. In one form of the mechanism a system of toggle linkage is introduced operated by fluid pressure which prevents the differential braking from coming into operation on the ground until the rudder bar is centralised. Valves of the Schrader type, controlled by springs, operated by pistons, are used for the control of the fluid.

412,876. *An Improved Hydraulic Apparatus for Controlling Brakes.* (Madame) Y. L. Messier, 179, Boulevard Brune, Paris, France. Convention date (France), Feb. 4th, 1933.

This specification refers to aircraft wheel brakes operated by hydraulic means, *i.e.*, by oil under pressure. It is proposed to provide a piston operating in a cylinder and connected to the tail skid of the aircraft, so that the loads produced on the tail skid on landing operate the piston and produce a hydraulic pressure which operates the brakes. Arrangements are made for an over-riding control by the pilot for the brakes to be released when the skid leaves the ground, so as to prevent the machine turning over, and for a shock-absorbing device connected to the tail skid.

416,440. *Improvements in Aircraft Brakes.* The Dunlop Rubber Co., Ltd., 32, Osnaburg Street, London. Goodyear, E. F., Wright, J., and Trevaskis, H. W., of the Company's Works, Foleshill, Coventry. Dated May 10th, 1933. No. 13,564.

This specification describes a system of hydraulic brakes for aircraft in which equal or differential braking may be obtained, and in which provision is made against excess pressures. There is a central chamber filled with oil, from which project angularly two cylinders containing pistons. The rods for these pistons are connected to a triangular frame at one end, and at the other they are connected to the pistons by a ball head, which is used to seal an aperture in the piston through which fluid may pass. The pistons are kept in contact with the rods by springs, except at the lower end of the travel when the motion of the pistons is limited by a stop. The outer end of the pistons is connected to the brakes. The whole chamber, as well as the pistons, is full of oil, and pressure

is produced in it by means of a pump or by other suitable means. Differential braking is produced by moving the triangular frame which is connected to the rudder bar.

Airscrews

413,237. *Improvements in or relating to Land Planes.* Dornier-Metallbauten G.M.B.H. and Dr. Ing. C. Dornier, both of Friedrichshafen, Lake Constance, Germany. Convention date (Germany), March 4th, 1933.

In the case of aeroplanes fitted with two or more propellers mounted either on or in front of the leading edge of the wing it is proposed to arrange that the engine and propeller pivots on a horizontal axis so that the propeller can be raised in relation to the ground when taking off and returned to the normal position when the aeroplane is in flight. It is claimed that this arrangement enables a much lower chassis to be used than is normally possible, which facilitates the design of a folding chassis. The arrangement for pivoting the engine and the mechanism for folding the chassis can be combined, so that one operation effects both.

413,993. *Improvements in or relating to Land Planes.* Dornier-Metallbauten G.M.B.H. and Dr. Ing. C. Dornier, both of Friedrichshafen, Lake Constance, Germany. Convention date (Germany), March 11th, 1933.

It is proposed, that in the case of an aeroplane with its motor fitted in the front end of the fuselage, that provision be made to permit the propeller, with or without the motor, to be tilted upwards for the purpose of enabling the height of the landing chassis to be reduced. When the aeroplane is in flight the propeller is moved into the normal position with the motor shaft horizontal, and the mechanism enabling this to be done can be interconnected with that controlling a folding chassis, so that the chassis is folded when the propeller axis is horizontal, and the chassis is protruded when the propeller axis is tilted upwards.

415,622. *Improvements in Propelling Mechanism for Aircraft.* Ludwig Netter, 262, Ringstrasse-Otterstadt, near Speyer on the Rhine, Germany. Convention date (Germany), Dec. 12th, 1932.

The propeller described is of the paddle-wheel type. The radius arm is provided at its extremities with shafts carrying blades, which shafts are mounted at 90° to each other. The blade is mounted preferably at an angle of 45° to the blade shaft. The blade shafts are rotated by means of a bevel gear at the speed of rotation of the whole propeller, and the result is a feathering action which provides the desired propulsion. An arrangement of mechanism is described by means of which the pilot can advance or retard the piston of the maximum propelling action of the blades.

416,139. *Improvements in Gearing for Propellers.* Rowledge, A. J., Ellerolia, Trowels Lane, Littleover, Derby, England. Dated May 18th, 1933. No. 14,410.

This specification describes a mechanism for enabling an engine to drive two co-axially mounted propellers in opposite directions. One propeller shaft is driven directly by a gear wheel on the engine shaft gearing direct with a gear wheel on the propeller shaft. The other propeller shaft, which is mounted inside the first, is driven by a second gear wheel on the engine shaft which is connected to the gear wheel on the second propeller shaft by means of two pinions gearing with each gear wheel. The gears are arranged so that the propeller speeds can be reduced if desired and so that the speeds of the two propellers may be equal.

Armament

414,287. *Improvements in Means for Mounting Guns on Aircraft.* Birkigt, M., Rue de Capitaine Guynemer, Bois-Colombus (Seine), France. Convention date (France), April 15th, 1933.

This specification refers to gun arrangements in aircraft in which the gun is mounted on the engine so as to fire through the hollow propeller shaft; such propeller shaft being mounted in a line between the cylinders and driven by a gear. It is proposed to prevent the loss of oil from the point where the gun enters the propeller shaft by providing helical grooves in one of the elements concerned, so that the oil is forced back into the casing. A packing piece of rubber or other suitable material may also be employed.

414,300. *Improvements in Means for Mounting Guns on Aircraft Engines.* Birkigt, M., Rue de Capitaine Guynemer, Bois-Colombus (Seine), France. Convention date (France), Dec. 2nd, 1933.

In the case of guns arranged to fire through the propeller shafts of geared engines, it is proposed to arrange a firm attachment for the forward portion of the gun barrel in the casing carrying the propeller shaft. The gun may be clamped to this casing by means of a nut carrying a flame deflector. Arrangements for providing against loss of oil as described in Specification 414,287, of 1934, may be provided. In order to provide for the expansion of the gun when heated by firing, the rear fitting attaching the gun to the engine is arranged with a slider and guideways. A secondary or safety fixing may be provided to come into action after a breakage of the main fixing.

Autogiros

413,069. *Improvements in and relating to Aircraft with Freely Rotative Wings.* De la Cierva, J., Bush House, Aldwych, London, W.C.2 Dated March 13th, 1933. No. 7,623.

This specification describes methods by means of which the airscrew torque may be neutralised in autogiro aircraft of the type controlled by tilting of the rotor or controlling the pitch angles of the rotor blades. This is effected by arranging the slipstream to impinge on surfaces so that an aerodynamical couple may be produced neutralising the motor torque. These surfaces may be set at appropriate angles or may be of differing cambers and may consist of strut fairings, special surfaces, tail plane, etc. In order to prevent a yawing effect in such aircraft due to the slipstream impinging on a rear fin it is proposed to place fins on the extremities of the tail planes so that they are radial to the slipstream, so that the yawing effect is neutralised.

414,546. *Improvements in Aircraft with Aerodynamically Rotatable Wings and Power Plant therefor.* The Cierva Autogiro Co., Ltd., of Bush House, Aldwych, London, W.C.2. Convention date (U.S.A.), Oct. 28th, 1932.

This specification is concerned with methods of transmitting engine power to the autogiro rotor for starting purposes. The shaft driving the rotor is inclined upwards, and the gear for driving it may be either inclined upwards from the engine crankshaft, or parallel with the latter, the shaft in each case being geared to the crankshaft. If necessary, a bevel gear may be interposed between the engine and the shaft driving the rotor. A clutch is described for cutting out the engine, and also a special coupling of the slipping-tooth type for limiting the torque that may be applied to the rotor. The parts of the mechanism adjacent to the engine may be incorporated with the engine.

416,820. *Improvements in or relating to Aircraft.* Dr. Ing. Claude Dornier, Friedrichshafen, Lake Constance, Germany. Convention date (Germany), Feb. 16th, 1933.

In order to enable small wings to be used on aircraft for the purpose of increasing speed, and at the same time to enable the landing speed to be kept down to a safe figure, it is proposed to construct an aeroplane with the small wing area and to fit, in addition, a rotor of the autogiro type which may be placed inside the fuselage when the machine is in flight. The blades of the rotor may be attached to wires which are also attached to a sleeve on the shaft. On this sleeve being drawn down the blades are moved into a position parallel to the shaft, the whole arrangement being hinged so that it may then be swung into a position inside the fuselage. Or the blades may be moved into a position in line with the flight path so as to offer a minimum resistance.

Control of Aeroplanes

413,456. *Improvements in or relating to Means for Controlling Aircraft.* Tower, L. R., and Boeing Airplane Co., both of 200, West Michigan Street, Seattle, King, Washington, U.S.A. Dated April 19th, 1933. No. 11,486.

It is proposed to fit an auxiliary flap on aircraft controls. This flap is controlled by wires which are operated by the pilot and which are independent of the main controls, and the arrangement is such that the angle of the flap to the control surface remains constant whatever the position of the controls. This arrangement is intended to be used as a method of balancing the controls of an aircraft and is also to be used in cases where, owing to the stoppage of one engine of a twin-engined aircraft, there is a load on the rudder.

412,057. *Improvements in Aeroplane Construction.* Zap Development Corporation, Dunkalk, P.O. Baltimore, Maryland, U.S.A. Convention dates (U.S.A.), Aug. 8th, 1932, July 21st, 1933.

This specification refers to a method of lateral control of aircraft wings in which the aileron is separate from the wing itself and is hinged above the rear of the wing in the region where the airflow is downward. A preferred position is to place the aileron so that its nose is vertically above the trailing edge of the wing by about one aileron chord, though other positions can be used according to circumstances. These ailerons can be used with or without flaps of the Zap-type, which are stated to stimulate the flow round the ailerons, when pulled down, and it is also claimed that these ailerons affect the flow round the major aerofoil section, in addition to their own reaction. Full details of operating mechanism are given.

413,662. *Improvements in or connected with Aircraft.* L.P.R. Company, 277, Park Avenue, New York City, New York, U.S.A. Convention date (U.S.A.), Jan. 18th, 1933.

This specification refers to wing flaps of the type used to increase the lift of wings and which are hinged to the lower rear surface of the wing some distance in front of the trailing edge. In order to reduce the force required to operate these flaps it is proposed to arrange a connection between the rear of the flap when it is open and the trailing edge of the wing consisting of a flexible membrane in the form of a bellows which can be rendered approximately airtight. Arrangements are made so that when the flap is pulled down an orifice is opened. This latter projects forward into the air stream and communicates with the interior of the bellows so that the pressure produced by the velocity of the air assists the opening of the flap. When the flap is not in use the appliance folds back into the wing. The bellows is connected to the wing by an arrangement of chains so as to prevent bulging.

412,740. *Improvements in or relating to Means for Controlling Aircraft.* Tower, L. R., and Boeing Airplane Co., both of 200, West Michigan, Seattle, County of King, Washington, U.S.A. Dated April 19th, 1933. No. 12,441.

This specification refers to auxiliary flaps which may be mounted on the trailing edges of the rudder, elevators, or ailerons of aircraft for the purpose of assisting the pilot to move these controls, and also for the purpose of providing a bias when necessary, as in the case of the rudder of a two-engined aircraft with one engine stopped. The means for adjusting the flap is independent of the means for operating the control, and consists of cables and supports arranged in a parallelogram so that the flap is maintained at a constant angle to the centre line of the machine whatever the position of the control surface.

414,592. *Improvements relating to Automatic Controlling Devices for the Surfaces of Aircraft or Watercraft.* Siemens and Holske Aktien Gesellschaft Berlin-Siemensstadt, Germany. Convention date (Germany), May 11th, 1933.

In the case of aircraft equipped with an automatic pilot, apparatus is proposed by which out-of-trim conditions, such as that caused by the failure of one engine on a twin-engined aeroplane, may be compensated for by the action of an auxiliary device dependent for its action on the main automatic appliance. The auxiliary device preferably acts on auxiliary control surfaces such as the Flettner, though in the case of the elevator control it is preferred to alter the angle of the tailplane.

415,268. *Method of and Means for Increasing the Efficiency of Aerofoils and Hydrofoils and Reducing the Tendency of Aircraft to Stall.* Dr. G. D. Mattioli, 10a, Via Rogati, Padoa, Italy. Convention date (Italy), Sept. 9th, 1932.

This specification describes a proposed method of preventing the stalling of aerofoils by placing wires, lathes or bars in the neighbourhood of the leading edge in order to produce turbulence in the boundary layer. It is stated that, if the boundary layer is turbulent, the adherence of the fluid to the surface of the aerofoil is considerably reduced, thereby reducing the viscous effect exerted thereon by the main body of the fluid, this viscous drag having been found to be the chief cause of the premature detachment of the fluid currents.

414,378. *Improvements in or relating to Aircraft.* Abbott, E. D., and Baynes, L. E., both of E. D. Abbott, Ltd., Farnham, Surrey, and Travers, H. G., of Moor Cottage, Berkhampsted Common, Berkhampsted, Hertfordshire. Dated Feb. 1st, 1933. No. 3,090.

It is proposed to provide a cheap, compact and low-powered aeroplane suitable for dual control or solo flying by arranging that the pilot and passenger sit closely in tandem, the legs of the passenger being astride the back of the pilot. It is claimed that this arrangement makes the provision of a double set of instruments unnecessary and that one joystick only need be provided. Dual rudder controls are arranged for, and a disconnection gear may be fitted to them when the machine is used for tuition. Drawings are given of a tractor and pusher aeroplane constructed in accordance with the specification.

416,326. *Improved Control Surfaces for Air and Watercraft.* Hartshorn, A. S., The Royal Aircraft Factory, South Farnborough, Hants. Dated May 11th, 1933. No. 13,730.

In the case of ailerons which are balanced by displacing the hinge point rearwards and which have unsymmetrical leading edges, it is proposed to vary the shape of the leading edge along the span of the wing. For instance, the

aileron may have its nose coincident with the lower surface of the wing at the outboard end. At the middle of the aileron the nose may be coincident with the centre of the wing section, and at the inboard end the nose may be coincident with the upper surface of the wing. Thus, lines joining the leading edge of the aileron to the aileron hinge lie in different angular positions relative to the trailing portion of the aileron. Other methods of varying the nose section are proposed.

414,209. *Nozzle Gap Supporting Plane.* Knoll, J., 22, Enderstrasse, Breslau 10, Germany. Dated July 3rd, 1933. No. 18,854.

This specification is concerned with ailerons of the type in which the aileron is close to the plane in normal flight, but can be moved backwards when operated so as to leave a nozzle-shaped gap between it and the plane in front of it. The flap or aileron is supported by means of a sliding pivot or a system of pivoted links arranged so that the flap or aileron receives a motion compounded of a translation and a rotation for the purpose of enabling the aileron to take up a position (1) close to the wing for rapid flight; (2) spaced rearwardly from the wing so as to form a nozzle-shaped gap so as to increase the lift on the wing when starting; (3) spaced rearwardly from the wing and tilted thereto for slow flight and reducing landing speeds. In addition an auxiliary flap may be arranged in the aileron adapted to be pulled down so as to serve as a brake and also as a means of increasing the lift coefficient. Several methods of carrying out the movements by differing mechanical devices are described.

416,879. *Improvements in or relating to the Control of Aircraft.* Fairey, C. R., Cranford Lane, Hayes, Middlesex. Dated Oct. 26th, 1933. No. 29,736.

It is stated that in the case of aircraft with slotted wings the slots give an anti-spin yawing moment up to a fairly large angle of incidence, but that at larger angles the slot may aggravate the spin. In the case of a flat spin, opening both slots makes the spin flatten. Closing the inside one leads to a flatter and faster spin, while closing the outer slot reduces the spin. It is proposed, therefore, to interconnect the slots with the rudder so that the operation of this member may bring about the opening or closing of the slots as desired. Mechanism is described for the purpose of carrying this out and an arrangement is given by means of which the slots may be disconnected from the rudder bar at the will of the pilot.

416,813. *Improvements relating to Automatic Pilots for Aircraft.* Sperry Gyroscope Co., Inc., Manhattan Bridge Plaza, Brooklyn, New York, U.S.A. Convention date (U.S.A.), Sept. 2nd, 1932.

The object of this invention is to amplify and reduce the weight of automatic piloting apparatus and to enable such apparatus to perform its functions smoothly and without the use of electrical circuits. The apparatus described comprises the combination with a gyroscope, of differential flow means actuated by the movement of the aeroplane and the gyroscope, a hydraulic servo motor system for operating controls, the servo motor being controlled by hydraulic means pneumatically operated. The gyroscopes may also be used as directional indicators for the guidance of the pilot. The gyroscopic control may be cut out of action by the pilot when desired.

Engines

416,065. *Air-Cooled Engines for Aircraft.* Armstrong Siddeley Motors, Ltd., Green, F. M., and Reynolds, R., of Armstrong Siddeley Works, Park Side, Coventry. Dated Feb. 8th, 1933. No. 3,850.

In cases where air-cooled engines are fitted with ring cowling to reduce resistance, it is stated that there is difficulty in obtaining adequate cooling at

low air speeds owing to inadequate flow of air. It is proposed to provide the ring at its rear with a system of movable flaps which can be out-turned to induce an increased flow, and also to provide a ring of approximately aerofoil section, the boxes containing the valve gear being contained in this section. The ring is composed of two plates, one passing over the engine and the other under the valve gear boxes, the two being joined behind the engine. Alternative methods of operation are described.

413,349. *Improvements in or relating to Cooling Arrangements for the Cylinders of Internal Combustion Engines Used in Aircraft.* The Bristol Aeroplane Co., Fedden, A. H. R., and Owner, F. M., all of Filton House, Bristol. Dated Jan. 14th, 1933. No. 1,314.

As the blast of air near the centre of an airscrew has been found to be inadequate for the purpose of cooling the engine, it is proposed to provide a cooling fan, concentrically mounted on the airscrew shaft and driven by the engine for additional cooling purposes. The fan may be driven either at engine speed or faster than the engine by means of a gear.

Helicopters

413,336. *Improvements in or relating to Aircraft of the Helicopter Type.* Dr. Ing. C. Dornier, Friedrichshafen, Lake Constance, Germany. Convention dates (Germany), Jan. 16th, 1933, and Jan. 27th, 1933.

This specification describes a helicopter aircraft in which the lifting propeller or propellers are inclined forward in order to enable the aircraft to be propelled without an additional airscrew. The lifting propellers may be driven directly by an engine through gearing, or by means of a reactive method—air under pressure being allowed to escape through holes near the blade tips. In this latter case the air may be used for cooling the engine. The lifting propellers are so designed that they may autorotate when disconnected from the engine. Claims are made for methods of avoiding the turning effort of the propellers and also for the shape of the body of the machine and of the passenger accommodation. The blades of the propeller may be adjustable, and it is considered advantageous to provide the propeller blades with flaps, capable of being adjusted by the pilot, so that the power of each blade during each revolution is variable periodically.

413,941. *Improvements in or relating to Aircraft of the Helicopter Type.* Dr Ing. C. Dornier, Friedrichshafen, Lake Constance, Germany. Convention date (Germany), Feb. 17th, 1933.

In the case of helicopters in which the lifting propellers are driven by the reaction principle, it is proposed to hinge the blades on the horizontal axis in the known manner and to cover the joint with a flexible sleeve so that the joint is airtight. It is also proposed to use a broad basis for the hanging of the blades and also substantial stops, so that the wiring arrangement which, it is stated, is often used with such machines to limit the travel of the blades, may be dispensed with.

413,184. *Improvements in or relating to Rotatable Supporting Wing Arrangements for Aircraft.* Dr. Ing. Claude Dornier, Friedrichshafen, Lake Constance, Germany. Convention date (Germany), Feb. 2nd, 1933.

In the case of lifting propellers for helicopter aircraft driven reactionally by air jets rotating with the propeller, it is proposed to provide means by which these jets may be moved so that the plane in which they act no longer coincides with that in which the propeller rotates. This is accomplished by arranging a manual control so that these jets may be operated together or separately.

415,917. *Improvements in or relating to Aircraft Provided with Rotatable Wings or Blades.* Dr. Ing. C. Dornier, Friedrichshafen, Lake Constance, Germany. Convention date (Germany), Jan. 26th, 1933.

In the case of helicopter aircraft it is proposed to use two co-axial lifting screws, one of which may be driven by the engine which is connected to it by a clutch, or it may be driven by the reaction principle. The other screw may be allowed to rotate freely or may be driven in either direction by the engine, also through a clutch. The screws may be revolved round their longitudinal axes or moved out of their plane of rotation or out of their radial positions.

414,399. *Improvements in and relating to Helicopter or Rotative Wing Aircraft.* Bechert, P., and Schmidt, R., of Saag, Czechoslovakia, and of Schönbühel, near Melk, Lower Austria, respectively. Dated Oct. 31st, 1932. No. 30,584.

A helicopter lifting screw arrangement is described in which there are two lifting screws, one surrounding the other, the first being of annular form. The screws are so designed that approximately the same rate of downward flow is maintained over the combined disc. It is claimed that this arrangement increases efficiency and gives stability to the aircraft. A captive helicopter with this arrangement is described.

Instruments

416,766. *Control Indicator for Aircraft.* Cebrelli, M., Aeroporto di Elmas, Cagliari, Italy. Dated Dec. 18th, 1933. No. 35,638.

It is proposed to provide a control indicator for aircraft which comprises in the instrument board of the aircraft a central dial with the indices of the banking and turning indicators and the indicators of the horizontal and climbing speeds, and two adjustable indicators at the sides of the central dial, which allow the values of the horizontal and of the climbing speeds to be predetermined. The horizontal and climbing indicators are provided with anemometric capsules actuating a lever the motion of which is transmitted to the needle of the indicator. There is also on the spindle a disc with concentric and oblique grooves which operates a lever connected to the central air speed indicator.

Model Aeroplanes

413,466. *Improvements in Toy Aircraft.* Wilmot, Mansom and Co., Ltd., and Bristow, J. W., Triang Works, Morden Road, Merton, London, S.W.19. Dated May 3rd, 1933. No. 12,937.

This is an arrangement intended to prevent damage to the propeller of a toy aeroplane on crashing. The device permits the propeller to pivot on its spindle if it receives a hard blow, and consists of a spindle in wire bent into an eye at the propeller end, which eye fits into a nick on the propeller. It is secured in position by a separate clip made of sheet metal which is, in its turn, covered by a cap, the last two members being secured to the propeller by a separate pin.

Ornithopters

415,566. *Improvements in or relating to Ornithopters.* Verdier, P., 70, Fauberg Saint-Jean, La Puy (Haute-Loire), France. Convention date (France), July 20th, 1932.

The machine proposed is an ornithopter having two sets of wings, one behind the other, arranged to beat alternately, so that, it is stated, the propulsion and support are continuous. The wings are caused to beat by engine power,

but it is claimed that they will continue to beat when the engine is stopped. The twist of the wings while beating is controllable by the pilot.

Seaplanes

413,472. *An Elastic Connecting Device between the Floats and the Body of a Water Plane.* (Madame) Y. L. Messier, 179, Boulevard Brune, Paris, France. Convention date (France), May 14th, 1932.

This specification describes a means of constructing a chassis for float seaplanes in such a way that the strut legs themselves become the shock-absorbing members. The body is connected to the float solely by these shock-absorbing members, though these members may be stabilised structurally by stays. The front shock-absorbing strut may be attached rigidly to the fuselage or wing with its movable part jointed upon the float, while the rear shock-absorbing strut may be jointed to the fuselage and to the float. Longitudinal play is provided for in the joints where necessary.

Seaplanes and Flying Boats

415,736. *Improvements in or relating to Seaplanes.* Dornier Metallbauten G.M.B.H. and Dr. Ing. C. Dornier, Friedrichshafen, Lake Constance, Germany. Convention date, March 3rd, 1914.

In this specification it is proposed to obviate the necessity for fitting the engines and propellers of seaplanes high in the structure. It relates to seaplanes having at least two propellers, one on each side of the structure. These propellers are fitted approximately in line with the chord of the wing, and are in such a position that they would normally dip into the water. In order to do this the propellers are arranged to be swung upwards from a centre, but an arrangement may be incorporated by which they are also vertically displaced. Wing floats may be arranged to fold into the engine nacelles, and the mechanism controlling this may be interconnected with the mechanism for swinging the propellers.

REVIEWS

Airships in Peace and War

By Capt. J. A. Sinclair. Published by Rich and Cowan. Price 18/-.

Capt. Sinclair was Executive Officer at Polegate Air Station, and his book contains an authoritative account of the general history of airships, with special reference to the development during the war and afterwards. He is, as might be expected, a firm believer in the airship, and although his advocacy is naturally *ex parte*, he has made out a strong case for the retention of airships for certain service duties.

As he points out, the airship was particularly useful during the late war for convoy duties, and also took a considerable part in the anti-submarine campaign. Its power of hovering like a hawk over its victim while delivering the *coup de grace* in the shape of a well-directed bomb accounted for many of these raiders, while the large duration of flight peculiar to the airship was also most valuable. In fact the author believes that the airship is the natural antidote to the submarine, and that duties of this nature cannot be satisfactorily carried out by either aeroplanes or seaplanes.