B. HINKLER.

DUPLICATE CONTROLLING MEANS APPLICABLE TO AEROPLANES.

APPLICATION FILED OCT. 2, 1916.

1,277,590.

Patented Sept. 3, 1918.

4 SHEETS—SHEET 1.

Fig. 1.

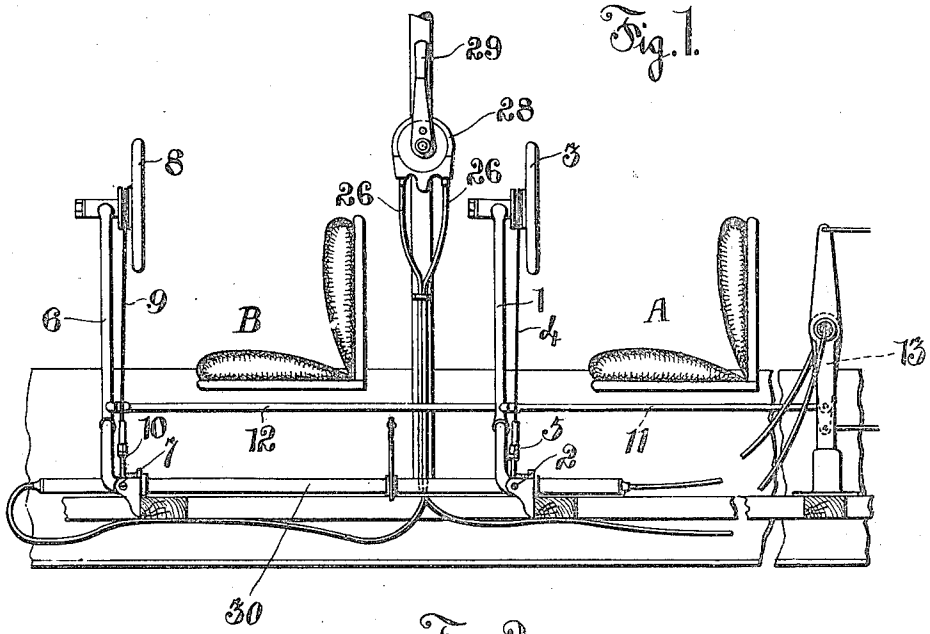
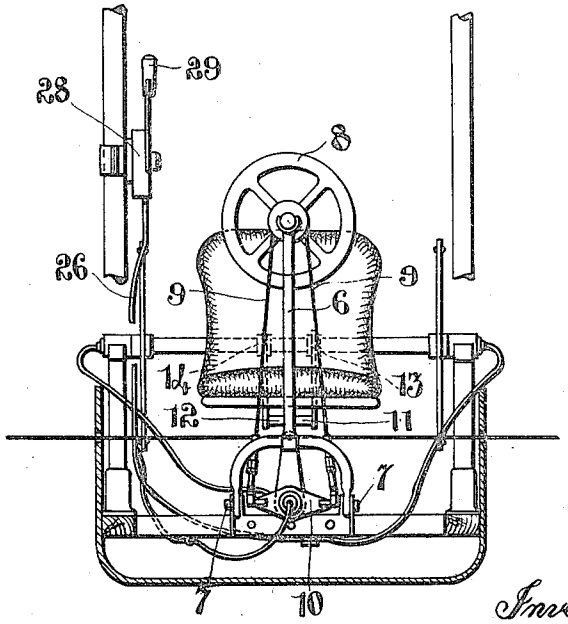


Fig. 2.



Inventor:-
Bert Hinkler
per:- Rayner & Co
Attorneys.

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Fig. 3.

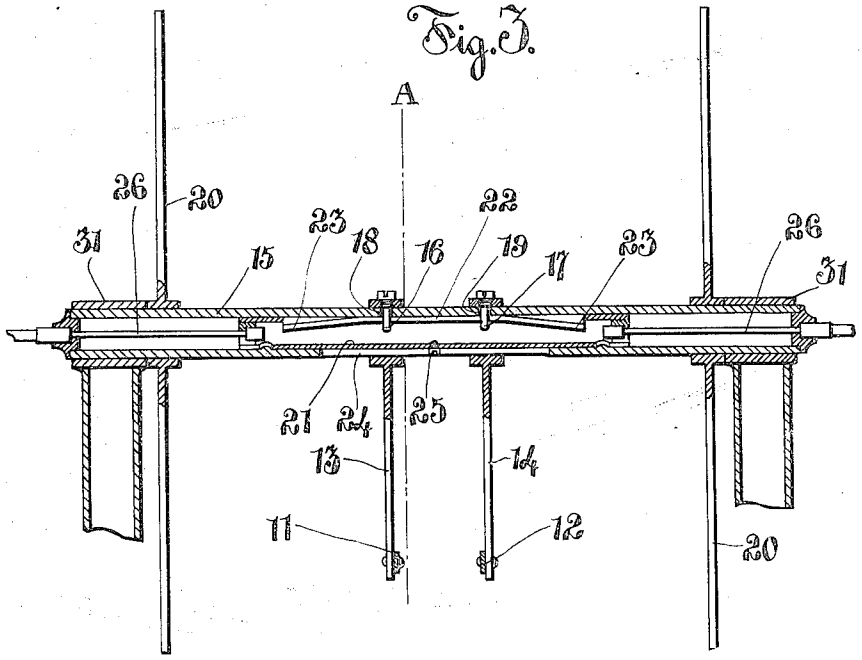


Fig. 5.

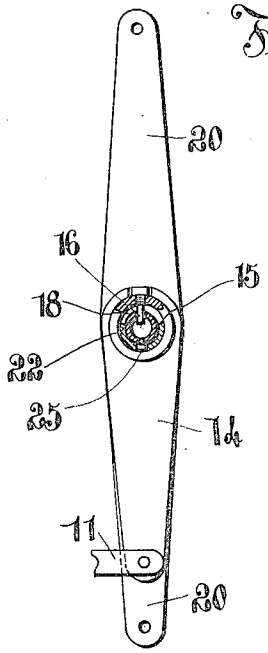
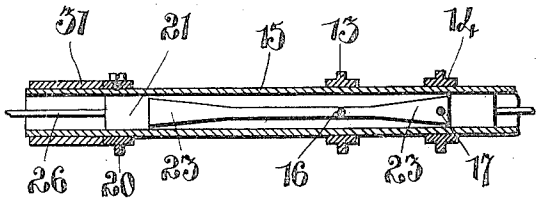


Fig. 4.



Inventor:-
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per:- Rayner & Co.
Attorneys.

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4 SHEETS—SHEET 3.

Fig. 6.

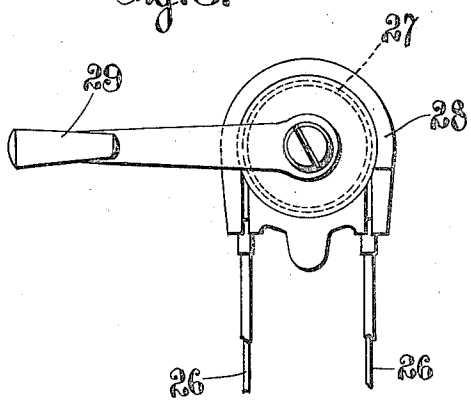


Fig. 7.

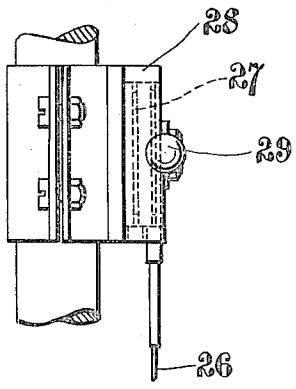


Fig. 8.

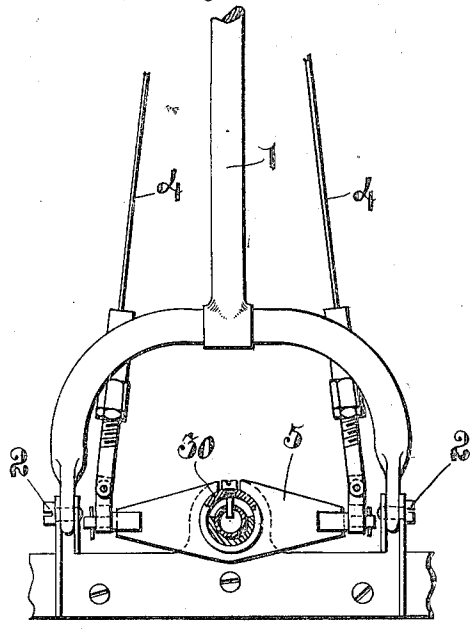
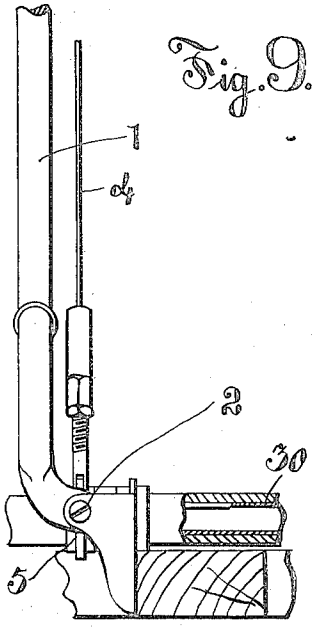


Fig. 9.



Inventor:—
Bert Hinkler
per:- Rayner & Co
Attorneys.

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4 SHEETS—SHEET 4.

Fig. 10.

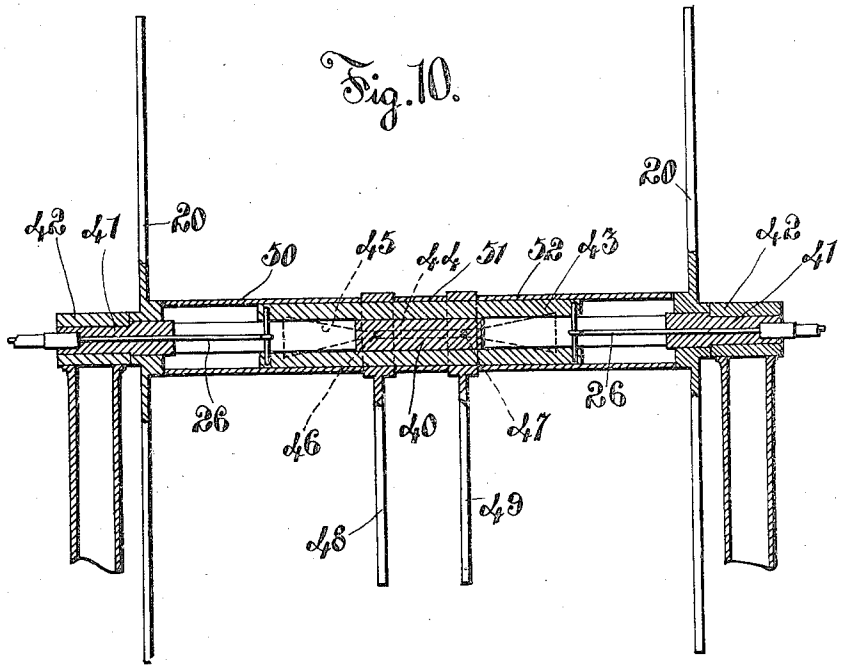


Fig. 11.

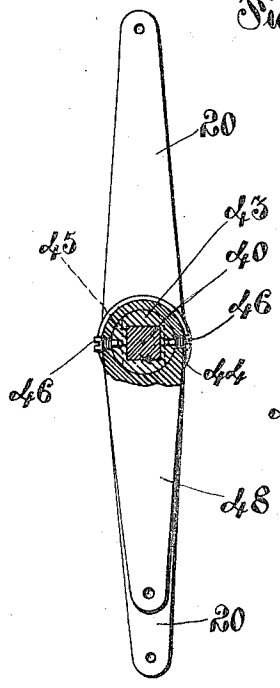
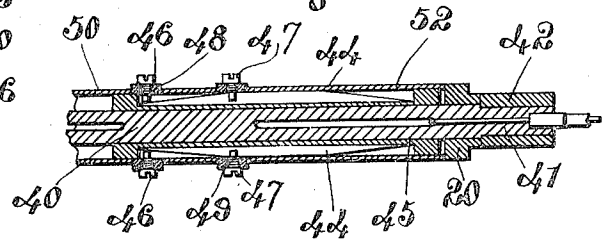


Fig. 12.



Inventor:-
Bert Hinkler.
per:- Rayner & Co.
Attorneys.

UNITED STATES PATENT OFFICE.

BERT HINKLER, OF NORTH BUNDABERG, QUEENSLAND, AUSTRALIA, ASSIGNOR OF ONE-HALF TO CHRISTIAN CHARLES DEAN, OF MONTROSE, LONDON, ENGLAND.

DUPLICATE CONTROLLING MEANS APPLICABLE TO AEROPLANES.

1,277,590. Specification of Letters Patent. Patented Sept. 3, 1918.

Application filed October 2, 1916. Serial No. 123,306.

To all whom it may concern:

Be it known that I, BERT HINKLER, subject of the King of Great Britain and Ireland, residing at Gavan street, North Bundaberg, Queensland, Australia, have invented certain new and useful Improvements in Duplicate Controlling Means Applicable to Aeroplanes, of which the following is a specification.

My invention relates to means to enable two persons to take control of a machine or mechanism, such for example as an aeroplane or the like either together or separately.

According to my invention there is provided the combination with duplicate controlling mechanism, a clutch device whereby either controlling mechanism may be engaged, or both may be engaged simultaneously, with the object or objects to be controlled.

The invention will now be described as applied in an aeroplane, and is illustrated in the accompanying drawings, in which Figure 1 is a general side view showing the seats for a pilot and observer in an aeroplane, duplicate controls and the disposition of two clutch devices used therewith.

Fig. 2 is an end view of Fig. 1.

Fig. 3 is a sectional elevation of one form of clutch.

Fig. 4 shows a central horizontal section of Fig. 3 with the clutch in a different position.

Fig. 5 is a section on the line A A of Fig. 3.

Figs. 6 and 7 show the controlling switch for the clutch.

Figs. 8 and 9 are detail views to a larger scale.

Figs. 10, 11 and 12 are views corresponding to Figs. 3, 4 and 5 of a modified construction of clutch device.

Referring first to Figs. 1 and 2, it will be seen that the well known wheel and column control is illustrated, but it is to be understood that the invention may equally well be applied to any other form of controlling mechanism. The pilot's seat A is provided with a column 1 hinged at 2 about a horizontal axis (see also Figs. 8 and 9) and the column carries a hand-wheel 3 connected by flexible cables 4 to a lever 5. The observer's seat B is provided with exactly similar controlling means indicated respectively by 6, 7, 8, 9, 10. The two columns 1, 6 are connected respectively by links 11, 12 to cranks 13, 14 mounted on a transverse member behind the pilot's seat A.

Referring now to Figs. 3, 4 and 5, the cranks 13, 14 are each mounted to rotate on a sleeve 15. Pins 16, 17 fixed in the hubs of the cranks project into the interior of the sleeve 15 through slots 18, 19 formed therein. These slots extend circumferentially to any desired extent, say 120°, so that free relative movement of the cranks and sleeve is possible to this extent. The sleeve 15 has secured on it radial arms 20 and is mounted to rotate in suitable bearings 31. The arms 20 are connected to the part to be controlled (say the elevator planes) and operate it when the sleeve 15 is rotated.

Within the sleeve 15 there is mounted to slide freely a tube 21. This tube is slotted longitudinally as shown in Figs. 3 and 4 and the slot is made of uniform width about the middle of its length, but is widened out at each end 23, the widened portion extending over an arch conveniently equal to that covered by the slots 18, 19. This tube 21 and its slot 22, 23 are so dimensioned and disposed that the pins 16, 17 both enter the slot, and when the tube is in the middle position of its longitudinal movement they both engage the narrow part 22 of the slot. When the tube is moved endwise to either limit of its movement, the widened part 23 of the slot is brought opposite one pin, but the other pin remains in the narrow part 22 of the slot. The tube 21 is rotatively engaged with the sleeve 15 by a set screw or lug 25 on the tube 21 entering a slot 24 in the sleeve 15, this arrangement permitting relative endwise movement but locking them together for rotational movement.

The longitudinal movement above referred to, of the tube 21 is imparted to it manually through the medium of Bowden wires 26 or other suitable means. These wires are operated by the switch device illustrated in Figs. 6 and 7. This switch consists of a drum 27 mounted in a suitable casing 28 and having the wire secured on it to give a positive action. The drum may be made of such size that more than one controlling wire 26 can be attached to it, so that several clutch devices may be operated by it. Thus for example in an aeroplane one wire may be arranged to operate on the

controls for the planes, and another wire on the engine controls. The drum 27 carries and is rotated by a handle 29 which is preferably arranged to have a movement of 180°; thus three positions of the handle at right angles to one another are obtainable, with three corresponding positions of the tube 21, these latter positions being the two limits of endwise movement and the mid-position. The three positions of the handle are preferably indicated on the outside of the casing 28 by words such as "Pilot," "Dual," "Observer," to indicate which controls are operative.

The operation of this mechanism is as follows:—Assuming the handle 29 to be in its mid-position (at Dual) the tube 21 is also at its mid-position and both the pins 16, 17 are engaged with the narrow part 22 of the slot. Each crank 13, 14 is therefore rotatively engaged with the tube 21, and thereby with the sleeve 15 and arms 20. Consequently, movement of either column 1, 6 about its horizontal pivots is transmitted to the arms 20. If now the handle 29 of the switch be moved to either of its other two positions, ("Pilot" or "Observer") the tube 21 is moved endwise to a position like that shown in Fig. 4. Here it will be seen that the pin 17 is in the broad part 23 of the slot, and therefore is not engaged with the tube 21, within the limits determined by the circumferential extent of the slot 19. The crank 14 and column 6 are therefore inoperative as regards the control of the arms 20.

A similar clutch is arranged between the levers 5, 10 which are operated by the hand-wheels 3, 8. It will be seen from Figs. 1 and 2 that the clutch, indicated generally by the reference character 30 is disposed longitudinally of the two seats A, B and below them. Some parts of this clutch are shown in the detail views Figs. 8 and 9, but as the construction is exactly similar to that above described, no further detailed description need be given.

When two clutches are used, as indicated in Fig. 1 (one for the warp control and the other for the elevator control) it is preferred to arrange for their simultaneous operation by connecting both in series on one pair of connecting wires 26. As shown in Fig. 1, one wire 26 is connected from the switch lever 29 to one end of the clutch device 30. The other end of this clutch is connected to one end of the clutch behind the seat A and the other end of this second clutch is connected to the second Bowden wire.

Figs. 10, 11, and 12 show a modified construction of clutch device in which the sliding tube is mounted outside instead of inside the member carrying the arms 20. In this construction a shaft 40 of square or other angular section is formed with cylinder ends 41 on which it turns in suitable bearings 42. The arms 20 are secured on the angular portion and therefore turn with it. A tube 43 is mounted to slide endwise on the shaft 40 being similarly shaped on the inside, but the outside of this tube is cylindrical. Grooves 44, with widened ends 45 are formed on opposite sides of this tube, on the outer periphery thereof, and these slots are engaged by pairs of pins 46, 47 on each of the cranks 48, 49 respectively, these cranks being otherwise free to rotate on the tube 43. Sleeves 50, 51, 52 surround the tube 43 and serve as distance pieces to prevent the cranks 48, 49 from being displaced along the tube 43. The tube 43 is moved endwise by Bowden wires connected to it in any convenient manner, or by other suitable means.

The operation of this clutch is exactly similar to that first described and no further description need be given.

It will be understood that various other modifications may be made in the precise details of construction of this clutch, and also that it may be applied to other forms of controlling gear than that above described, and that all such modifications are held to lie within the scope of the present invention.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a dual control mechanism a clutch device comprising a longitudinally slidable tube formed with a longitudinal slot widened at each end and two concentric members having pins engaging said slot, substantially as set forth.

2. In a dual control mechanism the combination of an object to be controlled, two controlling means, a slotted sleeve, two ring-members mounted on said sleeve, an operative connection between each of said controlling means and one of said ring members, a pin on each of said members projecting inward through said sleeve, a longitudinally slidable tube within said sleeve and formed with a longitudinal slot widened at each end, said pins engaging said slot, means rotatively connecting said sleeve and said tube, and an operative connection between said sleeve and the object to be controlled.

3. In an aeroplane the combination of two controlling levers, a slotted sleeve, two members rotatively mounted on said sleeve, pins on said members extending inward through slots in said sleeve, a tube slidable longitudinally within said sleeve and formed with a longitudinal slot widened at two places, said pins engaging said slot, means for moving said tube longitudinally, a key rotatively engaging said tube and said sleeve, and an operative connection between said

sleeve and a part of the aeroplane to be controlled.

4. In a dual control mechanism, the combination of two groups of similar controlling devices, a series of objects to be controlled allocated one to each member of each of said groups, a plurality of clutch devices allocated one to each object to be controlled, an operative connection connecting all of said clutch devices in series, each of said clutch devices comprising two concentric members whereof one is slotted longitudinally the slot being of varying width, and is movable longitudinally relatively to the other concentric member, ring members also mounted concentrically, pins on said members engaging said longitudinal slot, and an operative connection between said second concentric member and an object to be controlled.

BERT HINKLER.