UNITED STATES PATENT OFFICE.

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WIRELESS MEANS FOR CONTROLLING AEROPLANES.

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To all whom it may concern:

Be it known that I, CHARLIE L. VANDERBURG, a citizen of the United States, and a resident of Hutchinson, in the county of Reno and State of Kansas, have made certain new and useful Improvements in Wireless Means for Controlling Aeroplanes, of which the following is a specification.

My invention relates to improvements in wireless means for controlling aeroplanes, and it consists in the combinations, constructions, and arrangements herein described and claimed.

An object of my invention is to provide a simple device by means of which the movements of an aeroplane may be so controlled that it will respond directly to the will of the operator, thereby avoiding the necessity of carrying a passenger to manipulate it.

A further object of my invention is to provide means for effecting further operations connected with aeroplanes, such as the dropping of bombs or torpedoes.

A further object of my invention is to provide means for selectively operating any of a number of levers for accomplishing the above named results.

Other objects and advantages will appear in the following specification, and the novel features of the invention will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings forming part of this application in which similar reference characters indicate like parts in the several views and in which—

Figure 1 is a view of the wireless receiving circuits, Fig. 2 is a plan view of a portion of the selective mechanism, Fig. 3 is a section along the line 3—3 of Fig. 2, Fig. 4 is a section along the line 4—4 of Fig. 3, and Fig. 5 is a section on the line 5—5 of Fig. 2.

This controlling device is adapted to be used with any suitable sending device, and I have therefore not shown the sending device. The circuits of the receiving device form no part of the present invention, except in so far as they coöperate with the main solenoid which effects the operation of the selective mechanism. The receiving circuits will therefore be referred to briefly.

Referring now to Fig. 1, A denotes an aerial, B a tuning coil, C a coherer, D a decoherer, E a battery, F a relay, and E′ a battery on the circuit of another relay G. The operation of this circuit is the same as the ordinary circuit. The impulses received by the aerial A are passed through the tuning coil B, and these impulses are sent to the coherer C. The battery E and the relay F form part of a local circuit, and the closing of the contacts d, d', and d^2 of the relay F causes current to flow from the battery E′ through the decoherer. A branch circuit from the battery E′ actuates the relay G. The contacts g, g' of the latter relay connects the solenoid S with the lead wires 1 and 2 of 110 volt circuit. It will be apparent that every time an impulse is received by the aerial A, the solenoid will be actuated. The receiving system just described is designed to operate one portion of the selective mechanism hereinafter described. A similar receiving system is also shown in Fig. 1, the parts A′, B′, C^x, D^x, E^x, F^x, G^x and E′^{x} being duplicates of the receiving set just described, the only difference being that the two sets are differently tuned so as to make use of different impulses. The selective mechanism is best shown in Fig. 2. In this figure the solenoid S is shown as being provided with a core s to which is attached a pawl 3 for operating a ratchet wheel 4. The latter is mounted on a shaft 5 bearing a pinion 6, which meshes with a smaller pinion 7. The shaft 5 is supported in brackets 5^a on a base 8 upon which is mounted a circular table T arranged to turn on its center and being provided with teeth t on its under side near the edge of the plate. These teeth are arranged to mesh with the gear 7. Upon the upper edge of the table T is mounted an electromagnet M.

Disposed adjacent to the circular table T is an arc-shaped plate P, bearing a series of uprights like those shown at 9 in Fig. 3. Each of these uprights bears at its top a pivoted lever such as that shown at 10. One end of this lever is provided with an armature 11, while to the opposite end is attached an operating cord or arm 12, which leads to the particular piece of mechanism to be controlled. The lever 10 is normally held in a horizontal position by means of a spring 13, the lever resting against a stop 14. Between the upright 9 and the armature 11 is suspended a spring arm 15. This is provided with a cam lug 16 like that shown in

Fig. 4, arranged to engage an arm 17 on the upright 9. The levers 10, as stated above, are designed to control the movements of the respective mechanisms, such as rudders, ailerons, wings, etc. Thus it will be seen that the end lever in Fig. 2 will be operated if the machine is to go up, and alternate levers may be brought into play for guiding the machine to the right, left, down, etc., as the case may be. The levers adjacent to these levers 10 are like that shown at 18 in Fig. 5. They are provided with armatures 19 arranged to be actuated by the magnet M and with a spring 20, and a stop 21, similar to the levers 10. The end of the lever 18 however, opposite the armature 19, is provided with a downwardly extending rod 22, having a hook at its bottom arranged to engage a pivoted semi-circular member 23. The ends of this member 23 are journaled in bearings 24 on the base 8, so that when any of the levers 18 is actuated the circular member 23, which in this case I have shown as a wire, is lifted.

Pivotally secured to the wire 23 is a link 25, which connects with a bell crank lever 26, which is pivoted at 27, and whose short arm is provided with a pin 28 arranged to enter a slotted arm 29, which is pivotally connected at 30 to the pawl 3.

The means for locking the member 23 in its upper position consists of a lever 31, which is pivotally mounted at 32 on the base 8, the lower end of the lever being under the tension of a spring 33. It will be apparent that when the member 23 clears the end of the lever 31, the latter will be brought underneath the member 23 in the position shown in Fig. 5, thereby locking the member 23 in its upper position. In order to unlock the pivoted member 23, I provide a cord 34 which passes over a pulley 35 secured to the end portion of the base 8, thence forwardly and upwardly through the base, being attached to a lever 36. A weight W is suspended by a cord *w* which passes over a pulley 37, and thence around the edge of the rotary table T.

From the foregoing description of the various parts of the device, the operation thereof may be readily understood.

The sending device, as explained before, may be of any suitable form. The impulses coming into the aerial A are relayed in the manner already described, and for each closing of the key on the sender (not shown) the solenoid S is actuated. It must be understood that the tuning coil B is tuned to receive these impulses. When the solenoid draws in its core *s* the pawl turns the ratchet wheel 4 in the direction indicated by the arrow in Fig. 3. The play of this pawl is about half an inch. In the drawings I have indicated the ratchet wheel as having small teeth, and the pawl will ride over a number of teeth in its backward movement. The turning of the ratchet wheel will turn the table T in the direction indicated by the arrow in Fig. 2. The normal position of the magnet is that indicated by dotted lines in Fig. 2. Let us suppose that it is desired to turn the aeroplane to the right. The cord which operates the proper lever for turning the aeroplane to the right is attached to the fifth lever, and therefore the operator sends five impulses. The core *s* of the solenoid will be reciprocated five times, and the table will be turned so as to bring the magnet M underneath the lever 10 in the position shown in Figs. 2 and 3. The apparatus is locked by the spring pressed dog 38. The operator now sends an impulse from another sending device, and these impulses are received by the aerial A', the tuning coil B' being adjusted to receive the impulses, and the magnet M (see Fig. 1) is actuated in precisely the same manner that the solenoid was actuated by the companion receiving circuit. The lever 10 is pulled down into the dotted line position shown in Fig. 3, and in its movement depresses the spring arm 15 whose cam lug 16 engages underneath the arm 17 on the upright 9, as shown in Fig. 4, thereby locking the lever in position. Disposed on the edge of the table T adjacent the magnet M is a pin 40, which clears the lower ends of the arms 15 except when one of these arms is in its locked position. This forms part of the releasing mechanism. When it is desired to release the device so as to shift the magnet underneath some other lever, a single additional impulse is sent to the solenoid S. This steps the table around underneath the adjacent lever 18, but the pin 40 engages the spring arm 15 during this movement and pushes the cam lug 16 clear of the arm 17 on the support 9, whereupon the arm 15 springs upwardly and permits the table to turn. An impulse is now sent to the magnet M. The inner end of the lever 18 is drawn downwardly and the outer end is drawn upwardly, and the semi-circular member 23 is raised by means of the rod 22, the locking lever 31 springing underneath the member 23 to lock it in position. The upward movement of the semi-circular member 23 causes the disengagement of the pawl 3 through the medium of the link 25, bell crank lever 26, and the arm 29. It also causes the disengagement of the dog 38. The ratchet is thus free and the weight W immediately brings the table back to its original position, as shown in dotted lines in Fig. 2. As the table swings around the lug 41 (see Fig. 2) engages the lever 36 (see Fig. 3), thereby pulling the locking lever 31 from underneath the semi-circular member 23, the latter being immediately pulled downwardly by the spring 42 (see Fig. 5). The down-

ward movement of the semi-circular member 23 causes the disengagement of the pawl 3 and the dog 38 from the ratchet 4 and the apparatus is now in its normal position ready to be operated again. It will be understood that this releasing movement is very quick, and in fact after a single impulse has been sent to bring the magnet M under any one of these release levers 18, and an actuating impulse has been sent to actuate the release lever, one may immediately operate the apparatus to effect the selection and operation of another lever.

From the foregoing description of the device, it will be seen that the apparatus will select and operate a lever corresponding to a particular part of the aeroplane to be moved, and that the part will be immediately locked in position until the releasing impulse is sent. I have shown the levers 10 and 18 as being spaced apart a considerable distance, but this is for the purpose of illustration only and as a matter of fact they may be arranged closer.

I am aware that various modifications might be made of this device, especially as to sizes of parts, but I reserve the right to all such modifications as fairly fall within the spirit and scope of the invention.

I claim:

1. In wireless means for controlling aeroplanes, a series of actuating levers, locking means for each of said levers, a magnet arranged to be brought into operative relation with each of said actuating levers, means for locking the magnet in its shifted position, a series of releasing levers, said release levers alternating with said actuating levers and being arranged to be operated by said magnet, the operation of any of said releasing levers serving to release the locking mechanism of said magnet.

2. In wireless means for controlling aeroplanes, a solenoid, a pivoted table, means operated by said solenoid for turning said table and for locking it in its turned position, a magnet carried by said table, a series of actuating levers disposed adjacent said table and arranged to be operated by said magnet, and a series of release levers alternating with said actuating levers and arranged to be operated by said magnet, the movement of said releasing levers serving to release the locking mechanism of said table, and means for automatically rotating the table into its normal position.

3. In wireless means for controlling aeroplanes, a pivoted table provided with teeth on its under side, a solenoid, a ratchet, a pawl connected with the core of said solenoid and arranged to engage said ratchet, means for preventing a reverse movement of said ratchet, gears operated by said ratchet and arranged to mesh with the teeth on the table for turning the latter, a magnet carried by the table, a series of actuating levers, an alternate series of releasing levers, a common member operated by each of said releasing levers, and connections between said common member and said pawl for raising the latter from said ratchet.

4. In wireless means for controlling aeroplanes, a rotary table, a magnet carried thereby, a series of actuating levers, means for moving said magnet into operative relation with each of said actuating levers, means for locking each of said actuating levers, and means carried by the table and arranged to engage said locking means for releasing said actuating lever.

5. In wireless means for controlling aeroplanes, a pivoted table, a magnet carried thereby, means for turning said table, means for operating the magnet, a series of actuating levers, a series of releasing levers alternating with said actuating levers, a common member arranged to be operated by each of said releasing levers, means for locking said common member in its operative position, and means carried by said table for releasing said locking means.

6. In wireless means for controlling aeroplanes, a pivoted table, a magnet carried thereby, means for turning said table, means for operating the magnet, a series of actuating levers, a series of releasing levers alternating with said actuating levers, a common member arranged to be operated by each of said releasing levers, means for locking said common member in its operative position, means carried by said table for releasing said locking means, and means for returning the table to its normal position.

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Witnesses:

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