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AUTOMATIC LANDING DEVICE FOR AEROPLANES

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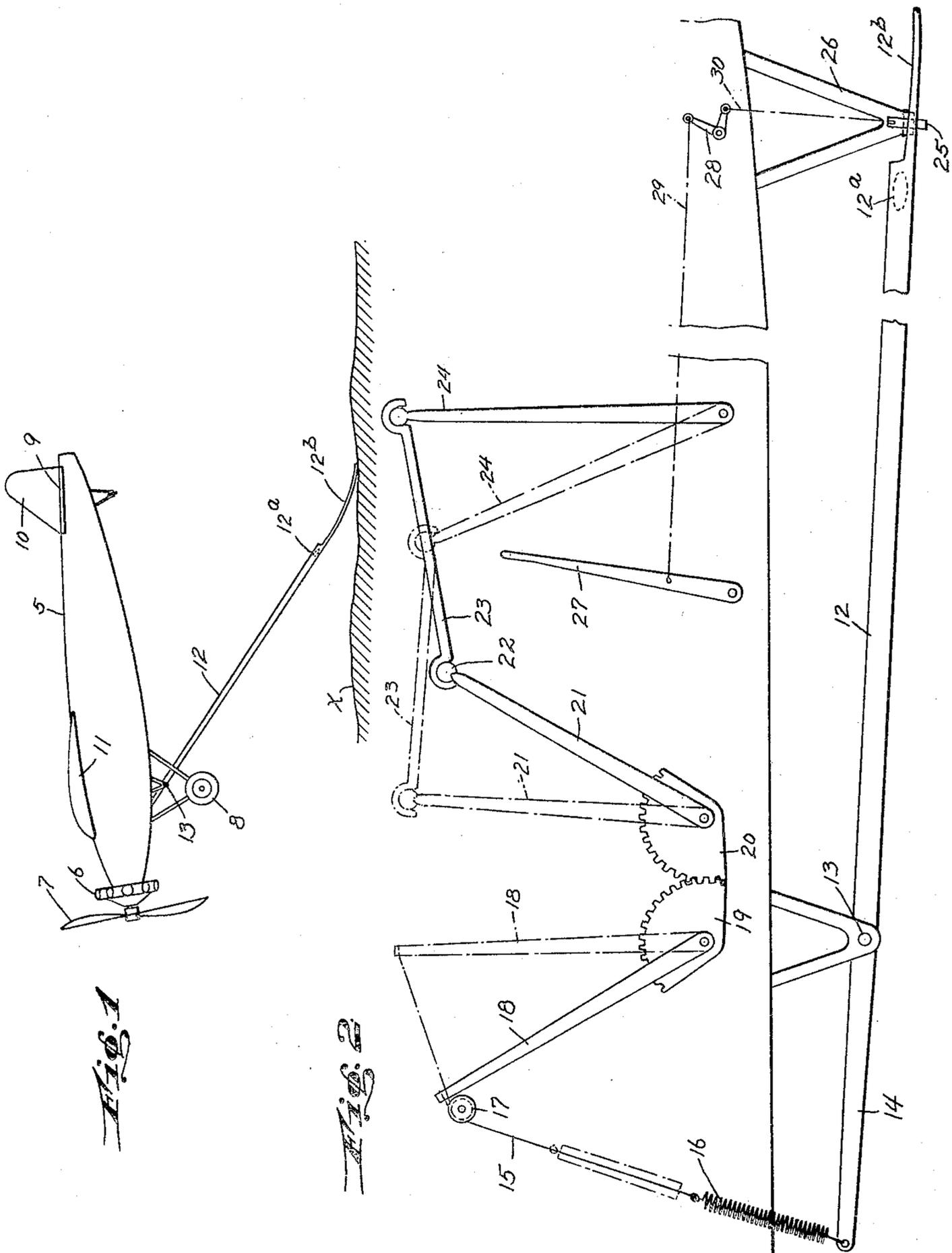


Fig. 1

Fig. 2

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AUTOMATIC LANDING DEVICE FOR AEROPLANES

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This invention relates to aeroplanes and particularly to the provision of an attachment to apparatus of this class for automatically controlling the landing of an aeroplane of any type, design or character; and the object of the invention is to provide a control device of the class specified involving a relatively long arm adapted to be dropped below the fuselage of the aeroplane and to engage the ground, water or other surface upon which the plane is about to land, and further to the provision of means for placing said arm in operative engagement with the joy-stick or other control of the aeroplane to automatically move said control into position to form an accurate landing on such surface; a further object being to provide resilient means for compensating for a sudden jolt or jar to which the depending arm may be subjected in engaging the ground or other surface; a further object being to provide the free end of the arm with a freely flexing tip which will compensate for any unevenness of a ground or other surface over which the arm passes in the operation of making a landing; a further object being to provide means for normally supporting the control arm of the device in raised position and for releasing the same; and with these and other objects in view, the invention consists in a control device of the class and for the purpose specified, which is simple in construction, efficient in use and which is constructed as hereinafter described and claimed.

The invention is fully disclosed in the following specification, of which the accompanying drawing forms a part, in which the separate parts of my improvement are designated by suitable reference characters in each of the views, and in which:—

Fig. 1 is a diagrammatic view indicating an aeroplane and the manner of using my improved control which is suspended therefrom; and,

Fig. 2 is an enlarged detail view of the control, diagrammatically illustrating its connection with the joy-stick or other control of the aeroplane, with part of the construction broken away.

For the purpose of carrying my invention into effect, I have indicated at 5 in Fig. 1 of the drawing, the fuselage of an aeroplane; at 6, the motor of the plane; 7 the propeller; 8 the landing gear; 9 the rear control wings of the aeroplane; 10 the rudder; and 11 the forward supporting wings. At 12, I have shown the arm of my improved automatically controlled device which is pivoted to the fuselage 5 as seen at 13 and includes a short extension 14 beyond the pivot 13, to which is attached a cable 15 in which is disposed a coil spring 16. The cable passes over a pulley 17 and has its end attached to a lever 18, the lower end of which includes a gear segment 19. The segment 19 meshes with another gear segment 20 attached to another lever 21, to the upper end of which is connected, by means of a ball universal joint 22 a coupling link 23, the free end of which is adapted to be detachably coupled with the joy stick 24 of the aeroplane.

As is the usual practice, the joy-stick 24 controls the steering of the plane; and in moving the stick forward into the position indicated in dotted lines in Fig. 2, the aeroplane will move downwardly, whereas a backward movement of the stick will move the plane upwardly. When the stick is in vertical position as seen in full lines, the aeroplane will assume a horizontal position with respect to its supporting surface. It will be understood that the arm 12 will be comparatively thin to produce the least amount of head resistance, and to provide the streamline characteristics thereto, the arm being weighted adjacent the lower end portion thereof as indicated at 12a to permit the arm to drop by gravity when the plane is in operation, into a position substantially at right angles to the longitudinal plane of the fuselage 5. This weighted portion may also act, to a slight degree, as a rudder assisting in the control of the aeroplane, as will be apparent.

Beyond the weighted portion 12a, the end of the arm is materially reduced in size to form a freely flexing or feather end 12b. If desired, this end may be composed of suitable spring steel so as to permit the arm to freely pass over uneven surfaces such as indicated

at x in Fig. 2 of the drawing, without imparting sudden movement to the joy-stick 24 which will be under the control of the operator at all times. In this connection, the
 5 spring 16 is also employed for this purpose, and especially for preventing sudden movement upon the stick 24 in the initial engagement of the arm with the ground or other surface.

10 The arm 12 is normally supported in inoperative position longitudinally of the fuselage by a suitable catch device 25 pivoted to the bracket 26. This device may be released through a hand lever or other control 27 coupled with the catch device through a bell
 15 crank 28 having a cable 29 coupled with the control 27 and a cable 30 coupled with the catch 25. It will also be understood that any other support and release for the arm
 20 12 may be employed. While I have shown the arm as pivoted and suspended beneath the fuselage, it will also be apparent that the same may be built into or contained within the boundaries of the fuselage.

25 It is desirable that the coupling of the link 23 with the joy-stick 24 be of a quickly attachable and detachable nature to permit disengagement of the link at any time for free and independent control of the stick 24 by
 30 the operator. In the use of my improved device, it will be understood that as the operator is nearing the ground or other surface upon which a landing is about to be made, the
 35 arm 12 is released through the operation of the catch 25 and the same will drop into a substantially vertical position. After the arm of the freely flexing end 12b thereof engages the ground, which will impart slight
 40 movement to the levers 18 and 21 and link 23, the joy-stick 24 is moved forwardly by the operator and coupled with the free end of the link 23, the operator holding onto the
 45 stick to be ready to right the plane, should any unforeseen object present itself, necessitating the making of an ascent to avoid an accident.

50 Under normal conditions, however, as the plane gradually approaches the ground, the arm 12 will operate to gradually force the joy-stick 24 backwardly through the movement imparted to the levers 18, 21, through
 the segmental gears 19 and 20 and the link 23. With this apparatus, a perfect landing may be made at all times under normal conditions.
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My invention is especially valuable for use in making night landings when it is extremely difficult for a pilot to judge the distance of his aeroplane from the ground. At
 60 the same time, my invention will find its value in flying through fog wherein the arm may be used as a feeler to indicate the position of the aeroplane with respect to the ground or other surface over which the aeroplane is passing, the signal being transmitted to the operator

through the movement imparted to the link 23, which is normally supported in position adjacent the joy-stick 24.

70 It will be apparent that the feeler rod when depending from an aeroplane will also function as an indicator to advise or indicate to the operator the condition of the ground on which the aeroplane is about to make a landing. If the ground should be very uneven,
 75 transmitting sudden impulses to the upper end of the arm, the operator will know that a dangerous landing is to be expected or may continue his flight to seek a better landing place.

80 It will be understood that my invention is not necessarily limited to the specific manner of supporting the control device in connection with an aeroplane as herein set forth, nor to the manner of placing the arm of this
 85 device in operative engagement with the joy-stick or other control of the aeroplane, nor is my invention limited to the use of a control arm of any particular length and contour. Various other changes in and modifications
 90 of the construction herein shown and described may be made within the scope of the appended claims without departing from the spirit of my invention or sacrificing its advantages.

95 Having fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

100 1. In an aeroplane employing a joy-stick control, a device for automatically controlling the landing of the aeroplane, said device comprising a member adapted to be moved into position below the landing gear of the
 105 aeroplane to engage the surface upon which the plane is about to land in advance of the engagement of the aeroplane therewith, means for placing said member in operative engagement with said joy-stick, said means involving a link readily attachable and detachable with respect to the joy-stick, and a pair of oppositely disposed levers, one of said
 110 levers being coupled to said link and the other with said member and means for transmitting the movement of one lever to the other lever.

115 2. In an aeroplane employing a joy-stick control, a device for automatically controlling the landing of the aeroplane, said device comprising a member adapted to be moved into position below the landing gear of the
 120 aeroplane to engage the surface upon which the plane is about to land in advance of the engagement of the aeroplane therewith, means for placing said member in operative engagement with said joy-stick, said means involving a link readily attachable and detachable with respect to the joy-stick, a pair of oppositely disposed levers, one of said
 125 levers being coupled to said link and the other with said member and means for trans-

mitting the movement of one lever to the other lever, and a coil spring interposed between said member and second named lever.

stick and the lower end portion of said arm being weighted.

In testimony that I claim the foregoing as my invention I have signed my name this 27th day of June 1931.

EARLE C. MORSE.

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3. In an aeroplane employing a joy-stick control, a device for automatically controlling the landing of the aeroplane, said device comprising a member adapted to be moved into position below the landing gear of the aeroplane to engage the surface upon which the plane is about to land in advance of the engagement of the aeroplane therewith, means for placing said member in operative engagement with said joy-stick, said means involving a link readily attachable and detachable with respect to the joy-stick, a pair of oppositely disposed levers, one of said levers being coupled to said link and the other with said member and means for transmitting the movement of one lever to the other lever, a coil spring interposed between said member and second named lever, and means for normally supporting said member in raised position.

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4. The combination with an aeroplane, of a landing control device involving an arm pivotally supported in connection with the aeroplane and adapted to project beyond the landing gear thereof when in operative position to engage the ground in advance of said landing gear, means involving a manually operated member for placing said arm in operative engagement with the joy-stick control of the aeroplane to automatically control the plane in making a landing, the free end of said arm having a freely flexing portion compensating for the irregular ground surfaces, and said means comprising two pivoted levers, gear segments for placing said levers in operative engagement whereby the movement of one lever is transmitted to the other, one of said levers being coupled with said arm and the other with said joy stick.

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5. The combination with an aeroplane, of a landing control device involving an arm pivotally supported in connection with the aeroplane and adapted to project beyond the landing gear thereof when in operative position to engage the ground in advance of said landing gear, means involving a manually operated member for placing said arm in operative engagement with the joy stick control of the aeroplane to automatically control the plane in making a landing, the free end of said arm having a freely flexing portion compensating for the irregular ground surfaces, said means comprising two pivoted levers, gear segments for placing said levers in operative engagement whereby the movement of one lever is transmitted to the other, one of said levers being coupled with said arm and the other with said joy stick, a spring interposed between said arm and first named lever for preventing the transmission of sudden movement of the arm to said joy

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