

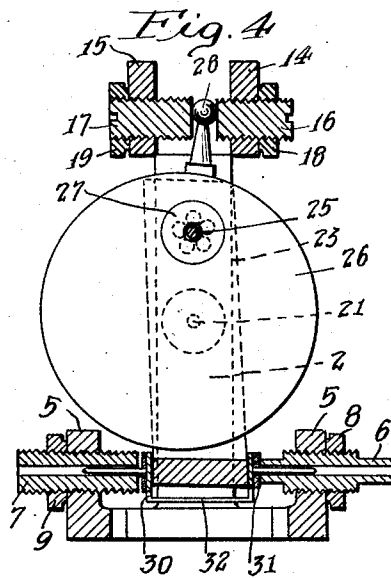
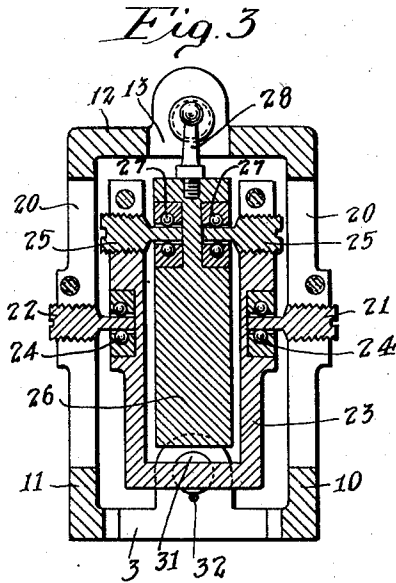
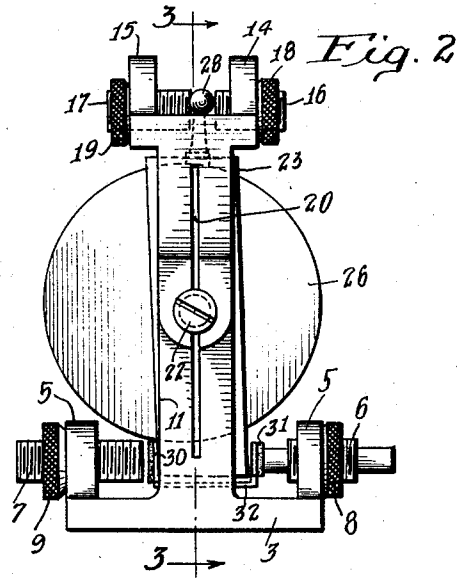
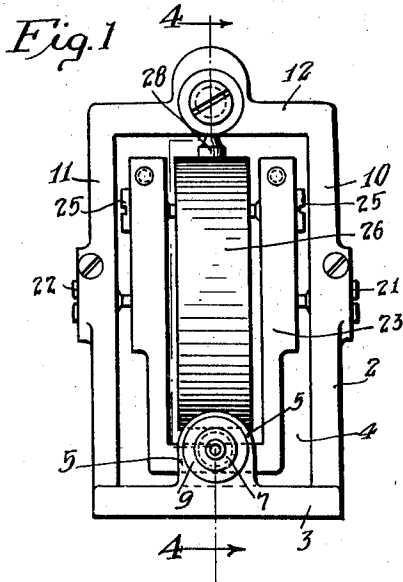
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POISE APPARATUS

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POISE APPARATUS

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8 Claims. (Cl. 137—139)

This invention relates to a poise apparatus, and particularly to a poise apparatus including means for actuating control elements, such as valves or electric contacts, which are in turn to be connected to an automatic apparatus, which is there-
5 by to be controlled by the poise apparatus.

The invention has been particularly designed for controlling apparatus which is adapted to automatically operate a controlled surface of an aeroplane so as to restore the aeroplane to a desired balance whenever the poise apparatus indicates that the aeroplane has deviated from a desired position.

One of the major difficulties of construction of a poise apparatus intended to control automatic apparatus as the poise is thrown off the balance has been the difficulty of securing a sufficiently sensitive response from the apparatus, while at the same time eliminating the tendency of the apparatus to hunt or oscillate in operation.

It is the major object of the present invention to provide a poise apparatus of this type which is extremely sensitive in operation and in which hunt or oscillation of the apparatus is eliminated.

It is a further object of the present invention to provide an apparatus which may be readily adjusted or set so as to move the central or neutral position of the same as desired so as to compensate for different balance conditions in an aircraft or other device in which the poise apparatus is mounted.

A further object of the present invention is to construct a poise apparatus capable of operating a valve or valves.

Various further objects and advantages of the present invention will be understood from a description of the preferred form or example of an apparatus embodying my invention. For this purpose, there is hereinafter described with reference to the accompanying drawing a preferred form or example of the invention.

In the drawing:

Figure 1 is an elevation;

Figure 2 is an elevation at right angles to

Figure 1;

Figure 3 is a section on the line 3—3 of Figure 2; and

Figure 4 is a section on the line 4—4 of Figure 1.

Referring to the drawing, the apparatus is there illustrated as comprising a frame 2, having a base portion 3 in the form of a square with an opening 4 at the center. The base portion 3 is provided with diametrically opposite bosses 5, into which are screwed couplings 6 and 7 in axial alignment. These couplings are held by lock nuts
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8 and 9. These couplings 6 and 7 are thus adjustable axially in the various positions and may be employed for making contact with the moving parts of the poise. In the preferred form of the invention they serve as valves for permitting the passage of air into a vacuum line, although they might be employed as portions of electric contacts.

The frame 2 of the apparatus also includes vertical standards 10 and 11 which rise from the base 3 and at their upper ends are connected by a top frame bar 12. The top frame bar 12 is provided in the center with an opening 13 and at the opposite sides of said opening with lugs 14 and 15 threaded to stops 16 and 17 adapted to be locked in position by nuts 18 and 19. These stops 16 and 17 are intended for engagement, as later explained, with a pin on the main weight of the poise for damping the action of such main weight and also controlling the neutral position of the apparatus.

The standards 10 and 11 of the frame are split vertically, as indicated at 20 and in their centers threaded to the hubs of axles 21 and 22, respectively, which are in axial alignment and intended to support a U-shaped yoke 23. The U-shaped yoke 23 is provided preferably with antifriction bearings 24 of the ball type receiving the ends of the stub shafts 21 and 22. The upper ends of the yoke are each in turn threaded to the hub of the stub shafts 25, which are intended to provide a pivotal support for the main weight 26 of the apparatus. The main weight 26 is provided with antifriction bearings 27 of the ball type receiving the ends of the axles 25. These bearings 27 are positioned at a substantial distance from the center of gravity of the main weight, which weight is indicated as preferably in the form of a flat cylindrical disc. At the same side of the center of gravity of the weight 26 as the bearings 27, the weight 26 is provided with a damping pin 28 which extends through the opening in the top bar of the frame and is there preferably provided with a ball-shaped terminal intended to loosely contact it by the damping stops 16 and 17.

When the apparatus is intended to operate valves, needle valve heads 30 and 31 are provided for the couplings 6 and 7 and these are connected by a rod 32. The lower portion of the U-shaped yoke 23 fits between these needle valve heads in position to force one open and the other closed upon any operation of the apparatus.

In the operation of the apparatus herein described the weight 26 oscillates about the ball point of the damping pin 28, although the weight

is supported by the axles 25. A movement of the weight 26 in one direction causes a rotation of the yoke 23 about its axles 21 and 22 in the opposite direction. These combined motions are found to be highly effective in producing a mechanism in which a very slight tilting is sufficient to cause the controls to be actuated, while at the same time the response is immediate and free from any tendency of the apparatus to hunt or vibrate in operation. A slight change in the position of the apparatus is sufficient to cause it to immediately leave one position and assume the other without any vibration or hunting backward and forward.

It will be observed that the ball point of the damping pin 23 acts as a fulcrum for the oscillatory movement of weight 26, which takes place while pivotal suspension of said weight at 25 follows an arc about the pivotal suspension 21—22 of the yoke 23. It follows that, in order to avoid jamming, said ball point must be capable of vertical displacement with respect to stops 16, 17. In a broad sense it may, therefore, be stated that the oscillation fulcrum of weight 26 is free to move in a vertical sense, while being laterally adjustable in the plane of oscillation.

While the particular form of the apparatus herein described is well adapted to accomplish the objects of the invention, various modifications and changes may be made, all without departing from the principles of the invention, and the invention includes all such changes and modifications as come within the scope of the appended claims.

I claim:

1. A poise apparatus comprising a pendulum weight having an extension about which it is adapted to oscillate, adjustable contact members engaging said extension, a U-shaped yoke pivotally mounted in its medial portion and in turn pivotally supporting the pendulum weight above the center of gravity of said weight, a controlling device connected to said yoke, and means for adjusting actuation of said controlling device.

2. A poise apparatus comprising a supporting member pivotally mounted so as to be oscillatable in a substantially vertical plane, a pendulum weight pivotally suspended from said supporting member at a point above the pivotal mounting of said member, the point of suspension of said weight being above its center of gravity, and an oscillation fulcrum for said weight, said fulcrum being capable of vertical displacement with respect to the pivotal mounting of said supporting member.

3. A poise apparatus comprising a supporting member pivotally mounted so as to be oscillatable in a substantially vertical plane, a pendulum weight pivotally suspended from said supporting member at a point above the pivotal mounting of said member, the point of suspension of said weight being above its center of gravity, and an oscillation fulcrum for said weight, said fulcrum being capable of vertical displacement with respect to the pivotal mounting of said supporting member, and being laterally adjustable in the plane of oscillation of said weight.

4. A poise apparatus comprising a supporting member pivotally mounted so as to be oscillatable in a substantially vertical plane, a pendulum weight pivotally suspended from said supporting member at a point above the pivotal mounting of said member, the point of suspension of said weight being above its center of gravity, an oscillation fulcrum for said weight, said fulcrum being capable of vertical displacement with respect to the pivotal mounting of said supporting member, and a controlling device adapted to be actuated by one of said two first mentioned parts.

5. A poise apparatus comprising a supporting member pivotally mounted so as to be oscillatable in a substantially vertical plane, a pendulum weight pivotally suspended from said supporting member at a point above the pivotal mounting of said member, the point of suspension of said weight being above its center of gravity, an oscillation fulcrum for said weight, said fulcrum being capable of vertical displacement with respect to the pivotal mounting of said supporting member, and being laterally adjustable in the plane of oscillation of said weight, and a controlling device adapted to be actuated by one of said two first-mentioned parts.

6. A poise apparatus comprising a controlling device, an actuating member therefor pivotally mounted in its medial portion so as to be oscillatable in a substantially vertical plane, a pendulum weight pivotally suspended from said actuating member at a point above the pivotal mounting of said member, the point of suspension of said weight being above its center of gravity, and an oscillation fulcrum for said weight, said fulcrum being capable of vertical displacement with respect to the pivotal mounting of said actuating member.

7. A poise apparatus comprising a controlling device, an actuating member therefor pivotally mounted in its medial portion so as to be oscillatable in a substantially vertical plane, a pendulum weight pivotally suspended from said actuating member at a point above the pivotal mounting of said member, the point of suspension of said weight being above its center of gravity, and an oscillation fulcrum for said weight, said fulcrum being capable of vertical displacement with respect to the pivotal mounting of said actuating member and being laterally adjustable in the plane of oscillation of said weight.

8. A poise apparatus comprising a controlling device, an actuating member therefor pivotally mounted in its medial portion so as to be oscillatable in a substantially vertical plane, a pendulum weight pivotally suspended from said actuating member at a point above the pivotal mounting of said member, the point of suspension of said weight being above its center of gravity, an oscillation fulcrum for said weight, said fulcrum being capable of vertical displacement with respect to the pivotal mounting of said actuating member, and means for effecting lateral adjustment of said fulcrum in the plane of oscillation of said weight.

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