

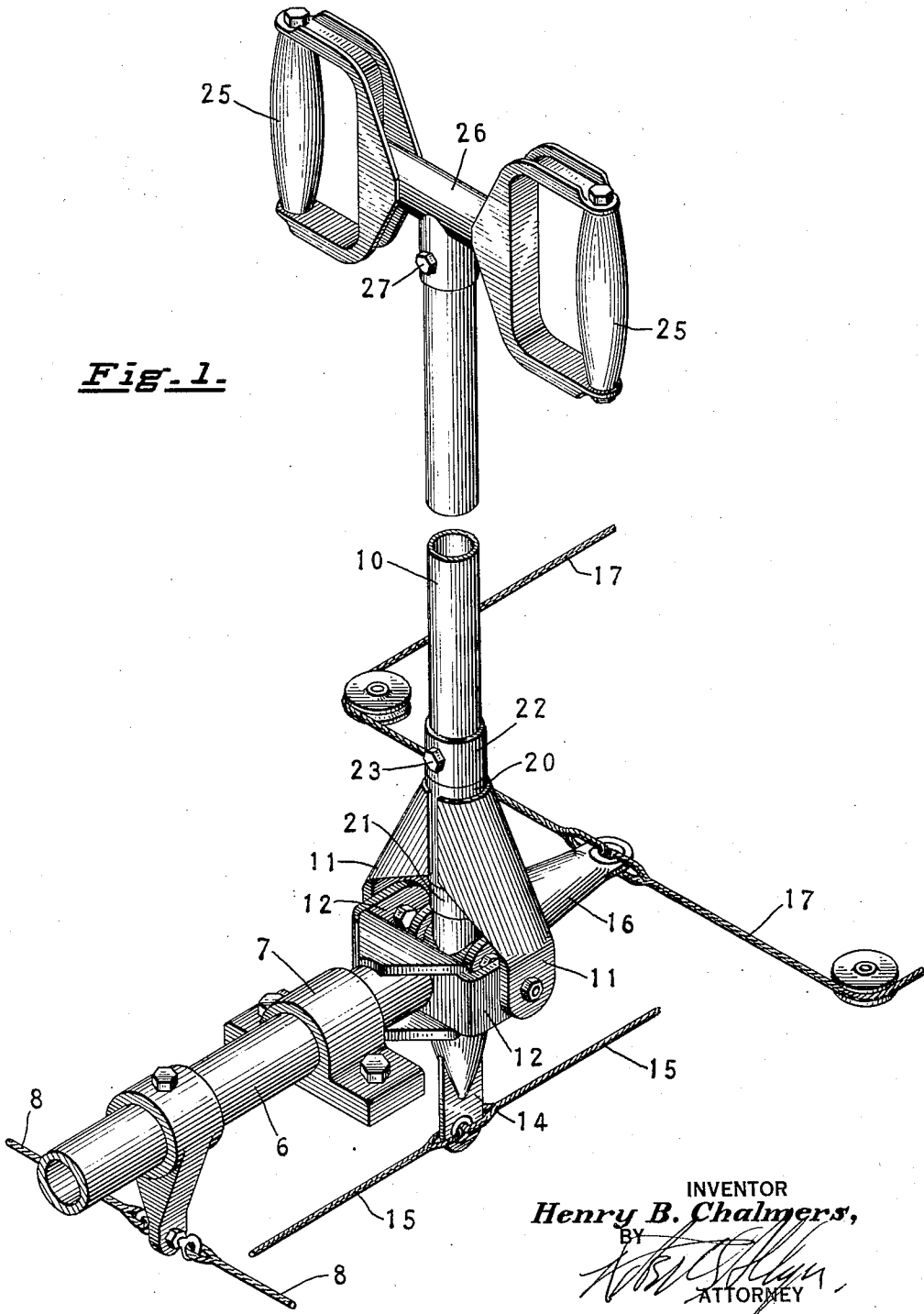
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AEROPLANE CONTROL

Filed July 30, 1929. 2 Sheets-Sheet 1



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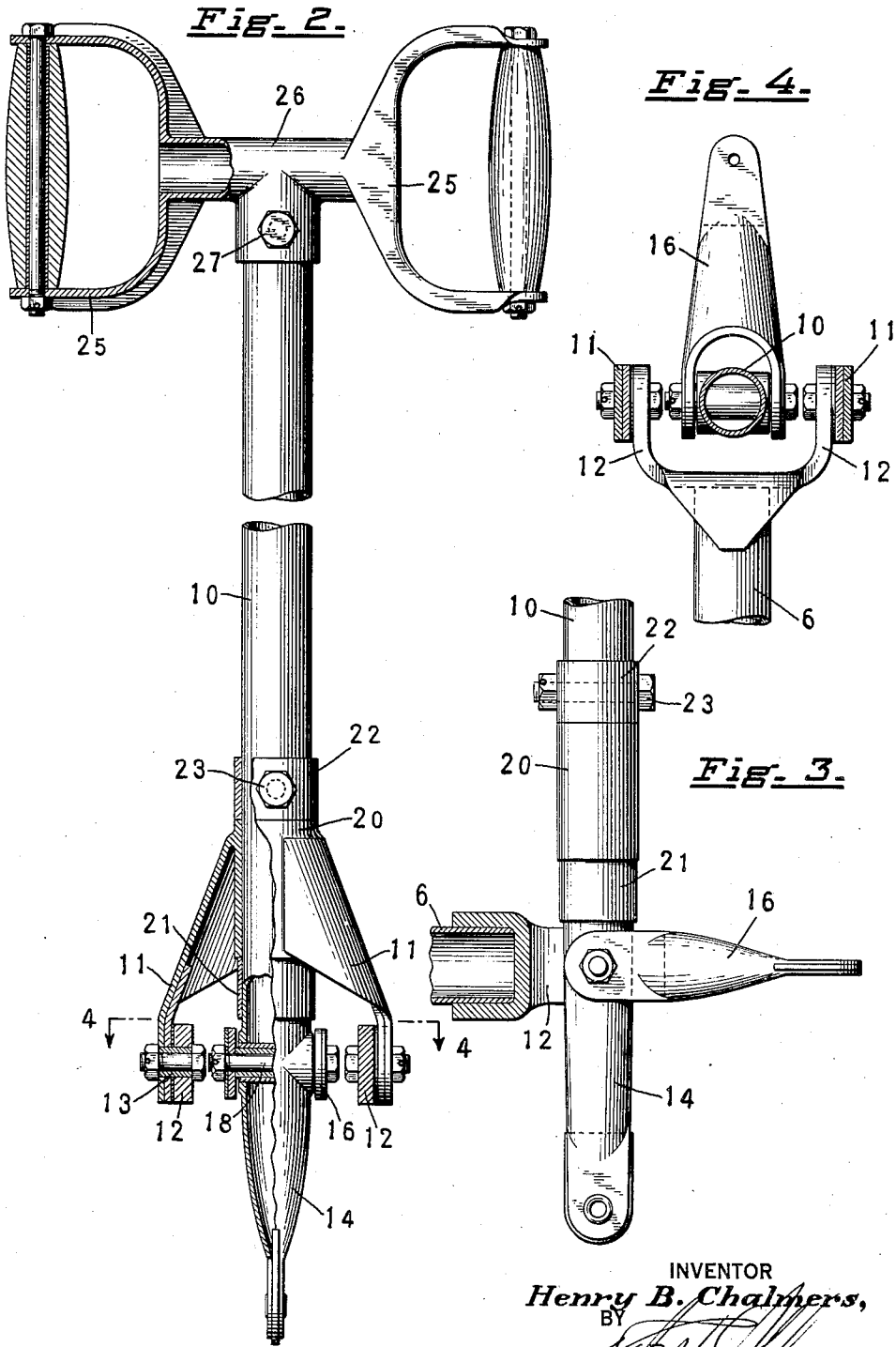
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AEROPLANE CONTROL

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The main object of my invention is to provide a simple but effective and reliable apparatus for controlling the various movements of an aeroplane.

5 Another object is to provide a construction in which the various control movements are co-ordinated naturally to the movements of the body of the pilot so as to facilitate actuation and thus greatly increase the safety of
10 operation of the plane.

Another object is to provide means of control entirely by means of the hands leaving the feet free for other purposes. This is particularly important when it is considered
15 that it is frequently necessary for the pilot to be strapped to his seat at which time it is very desirable that he should be able to use his feet for other purposes, which is extremely difficult if the pilot is obliged to also use
20 his feet for operating directional controls. In fact, in an ordinary construction it is frequently necessary for the pilot to actuate the controls in a direction contrary to the instinctive movements of the body and those
25 due to inertia. These features are particularly important with inexperienced pilots and especially in emergencies.

Specifically I have sought to provide a unitary or single control whereby the longitudinal, directional and lateral controls or steering means may be actuated by a single
30 handle or stick. It is customary to utilize foot pedals for the vertical rudder so as to turn to the right or left. It has been customary to utilize a single stick or lever for
35 operating the horizontal controlling surfaces for longitudinal control and also for controlling the ailerons or other devices for maintaining lateral control and stability.

40 The directional control surface is commonly termed the rudder. I wish it understood that the invention is concerned primarily with the mechanism by which these various components of control are themselves directly
45 or indirectly actuated.

In its preferred form my invention contemplates a rotatable shaft extending fore and aft which serves as a support and in turn actuates the ailerons through control wires
50 or otherwise. This shaft is supported in suit-

able bearings above or beneath the pilot's seat. To this shaft is hinged by a special yoke on a horizontal axis a vertically extending stick or lever to the lower end of which is connected the elevator wires or similar devices,
55 actuated by tilting the stick forward and back. The turning of the main shaft for controlling the ailerons is effected by tilting the stick to the right or left as the case may be. This lever or stick is also rotatably mounted
60 and is provided with one or more handle members for rotating the stick and actuating the vertical rudder by wires or other suitable means.

Fig. 1 is a diagrammatic perspective view
65 showing the general relation of my invention to an aeroplane and its controls. It should be understood, however, that the invention is not limited to any particular type or construction
70 of plane.

Fig. 2 is a vertical rear view and partial section showing the principal parts of the apparatus involved in my invention.

Fig. 3 is a side view and partial section of the same.

Fig. 4 is a horizontal section and plan view of the improved apparatus.

The main shaft 6 extending fore and aft of the plane is supported in stationary bearings 7 and is connected by wires 8 or otherwise
80 wise to the ailerons.

The vertical control stick 10 constitutes the main actuating lever and is mounted in a yoke having arms or forks 11 which are hinged to the forks 12 on the front end of the
85 main shaft 6. The hinge connection may be effected by means of suitable bearings 13 which make it possible to assemble and disassemble the parts conveniently. These bearings support the control stick 10 on a
90 transverse axis so that the control stick may be tilted forward and back.

An extension 14 projects downwardly from the control stick 10 and serves as a means for actuating the elevator wire 15 or similar device.

The arm 16 which is hinged to a bearing member 18 which extends transversely through the stick and is connected by suitable wires 17 or otherwise to the vertical
100

rudders. This arm 16 swings transversely with the rotation of the stick 10 on its vertical axis but it is not affected by the tilting of the stick 10 forward and back.

5 The tilting of the stick 10 from side to side of course turns the arm 16 somewhat on an axis longitudinal of the plane but this has no control effect on account of the universal connection between the rudder wires 17 and
10 the arm 16. Similarly the rotation of the stick 10 on a vertical axis has no material effect on the elevator wires 15 because of proper universal connection between these parts. So also the tilting of the stick 10 from
15 side to side has no appreciable effect on the elevator wires 15. Obviously the operation of the parts as above described has no effect on the main shaft 6 except when the vertical stick 10 is also tilted from side to side.

20 For constructional purposes the sleeve 20 is secured to the forks 11—11 and the ring 21 is secured to the stick 10 immediately below the sleeve 20 and serves as a stop to prevent the stick from being pulled upwardly. The
25 bushing 22 is secured to the stick 10 by means of a tapered bolt 23 with suitable nut and cotter pin so as to support the control stick on the bearing sleeve 20. By withdrawing the bolt 23 the control stick may be dropped
30 down through the sleeve 20.

Movement of the control stick 10 is preferably effected by two handle members 25—25 on opposite ends of the T-shaped piece 26 which is secured to the upper end of the
35 stick 10 by a tapered bolt 27, nut and cotter so that the handle members may be conveniently attached or detached.

It will be understood from the foregoing that the main shaft 6 may be provided with
40 a number of such control sticks for multiple control for testing purposes or otherwise. It should also be understood that if desired one of the controls of a plane might be made as herein shown and described and that the
45 plane might also be provided with the usual type of control stick and the usual accompanying foot pedals so that the plane can be controlled either by use of my invention or by the usual method.

50 The handles may be provided with suitable triggers for actuating machine guns or releasing bombs or for controlling signalling means, etc.

Obviously the stick may have a single
55 handle, for instance the cross piece of the T 26 may have a one-hand grip.

It should be understood that changes may be made in details of construction and arrangement without departing from the spirit
60 or scope of my invention.

I claim:

65 Aeroplane control apparatus comprising a shaft mounted in bearings and extending longitudinally of the plane and rotatable in its bearings, a yoke secured to said shaft and

having side arms, a second yoke having arms hinged to the arms of the first yoke on a normally horizontal axis, said second yoke having a normally vertical bearing, a control stick rotatably supported in said bearing and adapted with said second yoke to tilt forward and backward, and adapted through said second yoke to rotate said shaft, an arm hinged to said stick on a normally horizontal axis but connected to said stick to move from side to side when said stick is rotated about its axis, said shaft, stick and arm being adapted to actuate the controls by the swinging of the stick from side to side, the movement of the stick fore and aft and the rotation of the stick about its axis respectively.

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