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FUEL CONTROL MEANS FOR AIRSHIP ENGINES

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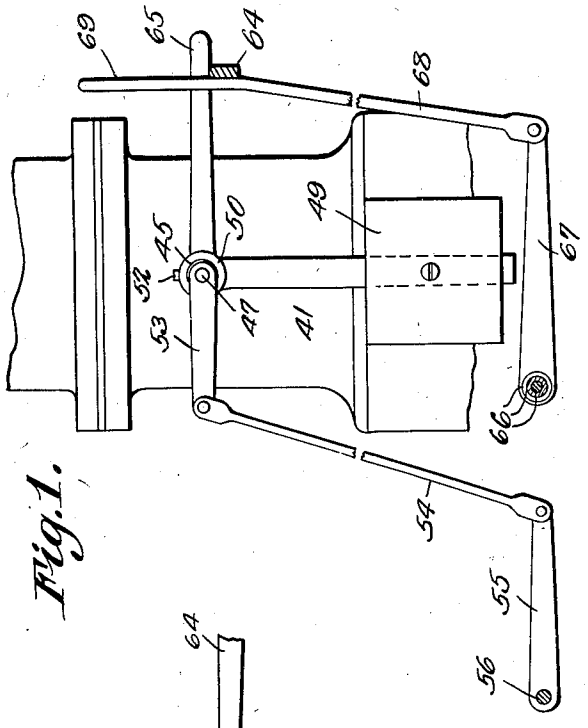


Fig. 1.

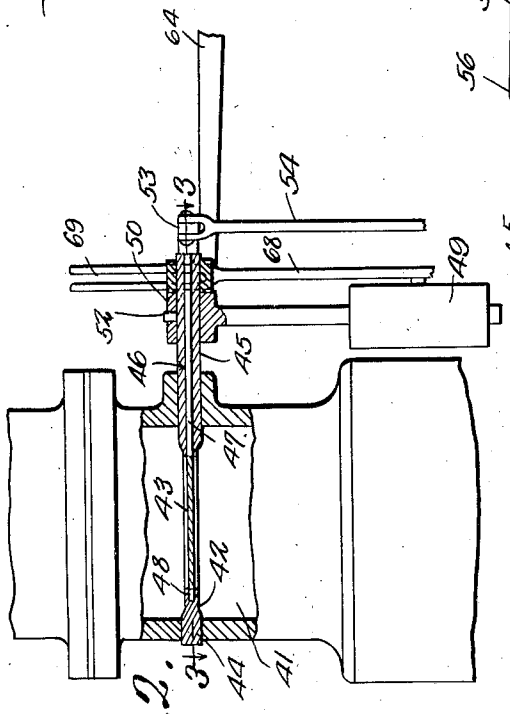


Fig. 2.

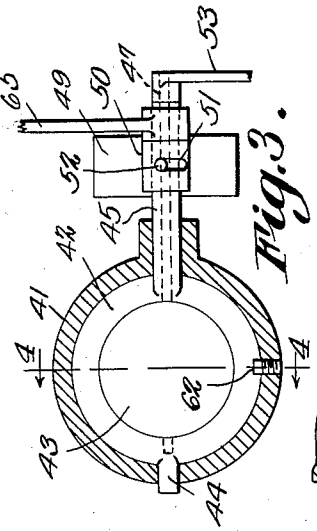


Fig. 3.

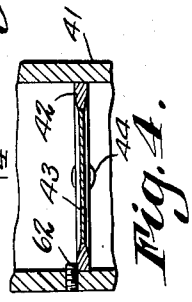


Fig. 4.

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FUEL CONTROL MEANS FOR AIRSHIP ENGINES

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1 Claim. (Cl. 277—69)

This invention relates to means for controlling the supply of fuel to internal combustion engines such as used on airships of either the heavier-than-air type or of the lighter-than-air type.

It is an object of the invention to provide means controlled by a pendulum whereby the flow of fuel can be controlled, this pendulum operated means being utilized in addition to supplemental means under the control of the aviator and constituting a means whereby the operation of the motor can be speeded up through the admission of additional fuel when the motor is tilted in one direction and retarded, through the cutting down of fuel supply, when the motor is tilted in another direction.

A further object is to provide mechanism of this character which is especially adapted for use as a means for stabilizing airships by speeding up propellers when necessary to exert a lifting force.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel details of construction and combinations of parts hereinafter more fully described and pointed out in the claim, it being understood that changes may be made in the construction and arrangement of parts without departing from the spirit of the invention as claimed.

In the accompanying drawing the preferred form of the invention has been shown.

In said drawing:

Figure 1 is a side elevation of the fuel intake of the engine and showing its controlling pendulum and associated parts.

Figure 2 is an elevation of Figure 1 viewed from the left thereof, a portion of the structure being broken away to show the double butterfly valve in section.

Figure 3 is a section on line 3—3, Figure 2.

Figure 4 is a section on line 4—4, Figure 3.

As heretofore stated the present improvements are designed for use in connection with airships. For example internal combustion engines can be located at desired points on the airship for driving propellers independently of each other. The propellers can be located so that when any one of them is driven it will exert an upward force. In the present instance the engine or motor has means whereby it can be accelerated automatically or manually for the purpose of exerting a lifting force to maintain the airship substantially horizontal. The location of the motors and propellers has not been indicated because the present invention relates to the fuel controlling means for the motors a portion of only one of which has been illustrated. This motor has a fuel intake 41 controlled by a butterfly valve of peculiar construction. As shown the butterfly valve includes an outer section 42 in the form of a ring and an inner section 43 in the form of a circular plate adapted to close the opening in the ring. The outer or ring section has diametrically opposed trunnions 44 and 45 bearing in the walls of the intake 41, the trunnion 45 being tubular and extended well beyond the wall of the intake. The passage 46 in the tubular trunnion 45 receives a stem 47 constituting one trunnion of the inner valve member 43 and another short trunnion 48 extends from the member 43 and bears in the outer member 42, the two trunnions 47 and 48 being diametrically opposed.

A pendulum 49 which is adapted to swing transversely of the airship is provided with a sleeve 50 which is mounted loosely on the trunnion 45 and has a short circumferential slot 51 into which projects a stud 52 extending from trunnion 45. One end wall of the slot bears against stud 52 when the airship or other motor support is on an even keel. Should the airship or other support of the motor dip downwardly, the end wall of the slot 51 would thrust against stud 52 and cause the valve member 42 to swing about the axis of its trunnion.

For normal operation the engine is controlled by the opening and closing of the inner member 43 of its valve. This operation is effected by a crank arm 53 which is secured to the end of stem 47 and joined by a connecting rod 54 to a crank arm 55 extending from an intermediate rock shaft 56. This rock shaft is extended forwardly to a point where it can be actuated in any suitable manner by the aviator either to accelerate or to cut down the motor.

Should the motor tilt in one direction the pendulum 49 would exert a thrust through its stud 52 so as to cause the outer ring member 42 to open and increase the area through which fuel can flow to the engine. Consequently the increased flow of fuel will result in acceleration. Should the motor be tilted in the opposite direction the pendulum would not function because the member 42 would be held against swinging upwardly at its inner side by a stop pin 62 provided for that purpose.

The pendulum has an arm 64 adapted to swing upwardly and downwardly and this arm projects

under an arm **65** secured to and extending laterally from the adjacent tubular trunnion **45**. Thus should the motor tilt in one direction, the pendulum **63** would cause the arm **64** to press upwardly against arm **65** and rotate the valve member **42**, thereby causing acceleration of the motor.

While the motor can be accelerated automatically, as explained, it can also be accelerated manually. For this purpose there is provided a rock shaft **66**, adapted to be rotated by any suitable means. This shaft has a crank arm **67** to which is pivotally connected a lifting rod **68** having a fork **69** which straddles the adjacent arm **65**. Thus when arm **67** is swung upwardly its forked rod **68** will thrust upwardly upon arm **65** and cause the valve member **42** controlled thereby to open. Obviously, however, the independent upward movement of arm **65** by the actuation of rod **54** or arm **64** will not be interfered with.

What is claimed is:

The combination with the fuel intake of a motor, of a butterfly valve therefor including a ring constituting an outer valve section tiltably mounted and normally in closed position within the intake, a trunnion co-axial with the ring, a pendulum suspended from and having a lost motion connection with the trunnion for maintaining the ring horizontal independently of the pitch of the motor when the motor is either level or tilted downwardly in one direction, said connection constituting means for rendering the pendulum non-effective when the motor is tilted in the opposite direction, thereby to leave the ring in normal or closed position, a plate carried by the ring and tiltable in either direction relative thereto, said plate constituting the inner valve member and normally closing the ring, the ring and plate being tiltable about a common axis, a stem projecting from the plate and rotatable within the trunnion, and means under the control of a pilot for tilting the plate independently of the ring and pendulum.

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