May 8, 1962 J. B. ENGLISH ET AL 3,034,097

IGNITION SWITCH

Filed Oct. 8, 1959

3 Sheets-Sheet 1

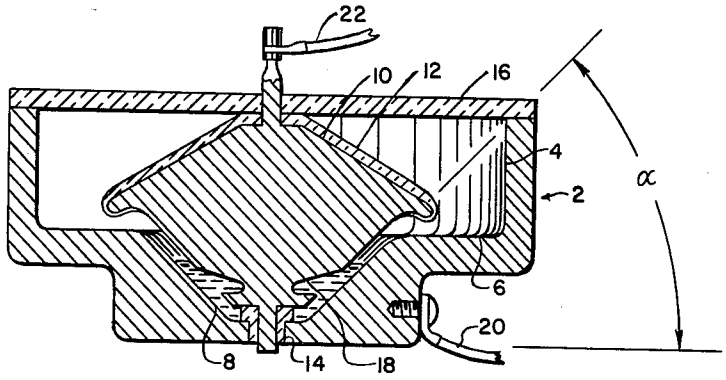


FIG. 1

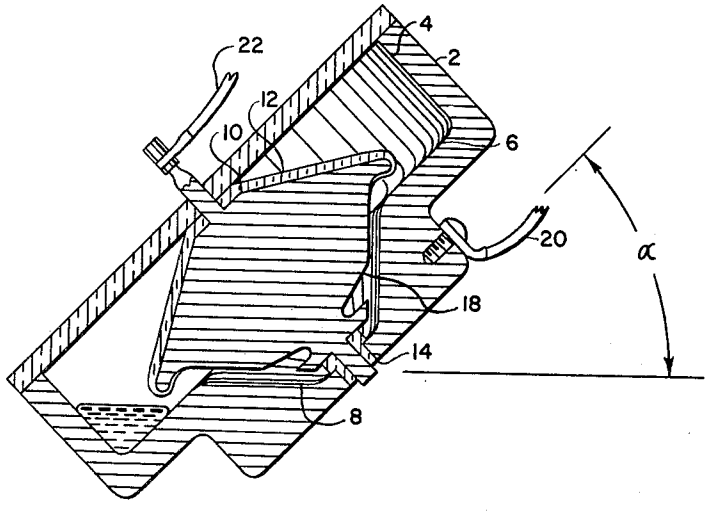


FIG. 2

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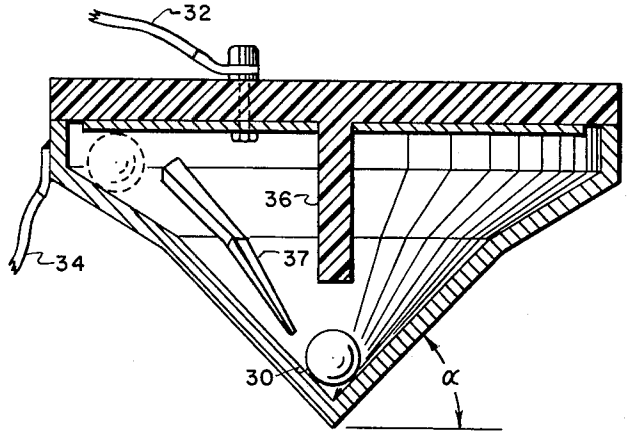


FIG. 3

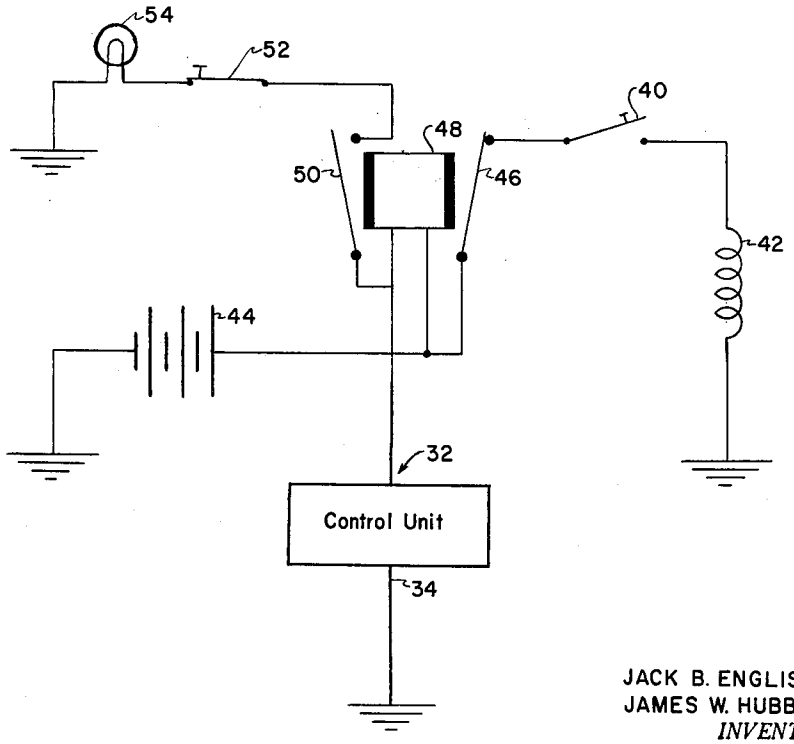


FIG. 4

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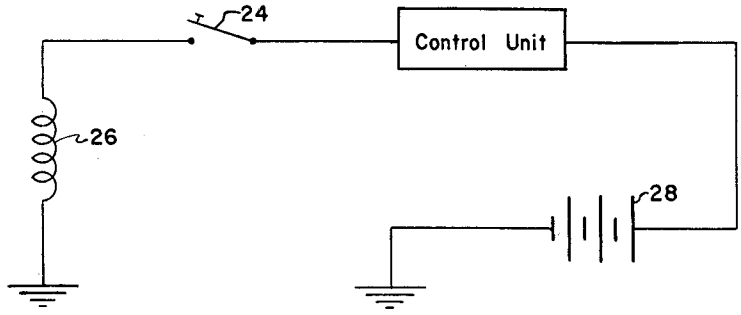


FIG. 5

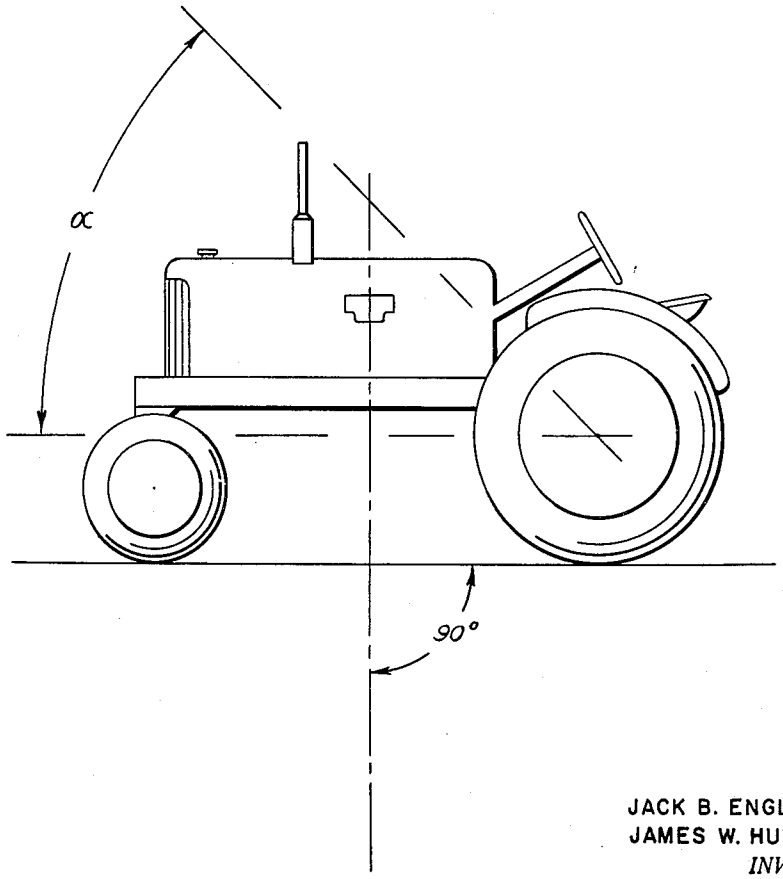


FIG. 6

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IGNITION SWITCH

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2 Claims. (Cl. 340—52)

This invention relates to a control unit for vehicles and more particularly to an improved device for breaking the ignition circuit of a vehicle when the vehicle assumes a predetermined position.

The main object of this invention is to provide a control unit which will maintain a continuous ignition circuit while the vehicle is in a substantially horizontal position and which will break this circuit when the vehicle reaches a predetermined angle from a horizontal position.

A further object of this invention is to provide a control unit having a conductive fluid or mobile means is insensitive to normal operating conditions of the vehicle and sensitive to a predetermined tilt of the vehicle from a horizontal position.

A still further object of this invention is to provide a control unit that is inexpensive and easy to install on any type vehicle.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIGURE 1 is a view, partially in cross-section, of one embodiment of the control unit in a substantially horizontal position;

FIGURE 2 is a view, partially in cross-section, of the control unit tilted at a predetermined angle;

FIGURE 3 is a view of another embodiment of the control unit;

FIGURE 4 is a wiring diagram of the preferred control unit within a vehicle ignition system;

FIGURE 5 is a wiring diagram of an alternate control unit within an ignition circuit; and

FIGURE 6 is a diagram of a vehicle showing the angle at which the vehicle must be tilted to actuate the control unit.

Referring to the drawings and more particularly to FIGURE 1, the preferred embodiment of unit housing 2 is formed with vertical sides 4, an intermediate plateau 6, and a frusto-conical section 8. A conductive body 10 having a layer 12 of insulating material around its upper (extremities) is mounted within an insulated support 14 at its lower end and within the non-conductive cap 16 at its upper end. An undercut section 18 is provided within the body 10. A first electrical lead 20 is attached to the housing and a second electrical lead 22 is attached to the body 10. The annular space formed between the body 10 and the frusto-conical section 8 is partially filled with a conductive fluid such as mercury.

FIGURE 2 shows the apparatus of FIGURE 1 in a critical angle wherein the conductive fluid is not in contact with body 10. Thus there is a discontinuity between the first lead 20 and the second lead 22.

The control unit of FIGURE 1 may be positioned within an ignition circuit as shown in FIGURE 5. The ignition switch 24 is placed in series with the control unit, the ignition coil 26, and the power supply 28. Thus the vehicle may be stopped by breaking the circuit with either the switch 24 or by tilting the control unit.

FIGURE 3 illustrates an alternate embodiment of the control unit. First the conductive fluid is replaced with a conductive solid 30. Second the control unit is changed from a normally closed circuit to a normally open circuit. That is, during normal vehicle operation the continuity between first lead 32 and second lead 34 is disrupted.

The circuit is completed when the vehicle reaches the predetermined critical angle α. The baffle 36 prevents the conductive solid 30 from assuming a position, as shown by the dotted lines due to external vertical forces. Baffle 37 prevents the solid 30 from assuming a position as shown by the dotted lines due to external centrifugal forces.

The control unit of FIGURE 3 is placed in an ignition circuit as illustrated in FIGURE 4 wherein ignition switch 40 in series with the ignition coil 42, power supply 44 and normally closed contact 46 of holding relay 48 form the ignition circuit continuity. The control unit is connected in series with the holding relay coil and a power supply. This circuit is open until the vehicle and the control unit are tilted to the critical angle α at which time the movable contact within the control unit completes the control unit circuit. At this time the relay breaks the contact 46 and closes the contact 50. This opens the ignition circuit and closes a secondary indicator circuit through manual switch 52, and indicator light 54. The ignition system will remain opened and the indicator circuit will remain closed until both the control unit circuit and the indicator circuit are opened. The control unit circuit may be opened by leveling the vehicle. The indicator circuit may be opened by opening the manual switch 52. Manual switch 52 is preferably a resiliently actuated-normally closed contact switch.

In operation the control unit of FIGURE 1 is fixed to the vehicle such that the conductive fluid assumes a position as shown in FIGURE 1. A wire extending from the power supply is connected to one terminal of the control unit and a wire extending from the ignition coil is connected to the other terminal of the control unit to complete the circuit. An ignition switch 24 may be positioned within this circuit as shown in FIGURE 5. The movement of the vehicle due to vibrating, starting, stopping, and the like tends to cause the fluid to flow out of the frusto-conical section 8 of housing 2. This flow is impeded by the conical shape of body 10 in combination with the undercut section 18 thereof. A reserve supply of fluid is held in the undercut section 18 of the body. The electrical continuity from the first terminal through the housing 2, fluid, body and into the second terminal is not disrupted during normal operation of the vehicle. When the vehicle reaches a critical angle α the fluid in the control unit flows into the upper portion of the housing as shown in FIGURE 2.

The embodiment (FIGURE 3) in combination with a holding relay as shown in FIGURE 4, provides an additional safety feature. The circuit through the control unit once the holding relay coil is open during normal operation of the vehicle. The indicator circuit is also open as the contact 50 of the holding relay is open. The ignition circuit is closed by both the ignition switch and the holding relay contact 46 being closed. When the vehicle assumes the critical angle α, the control unit completes the control unit circuit thus energizing the holding relay coil which in turn opens contact point 46 and closes contact 50. The holding relay maintains the contact 50 in a closed position until the indicator light circuit is broken, as by opening manual switch 52. The ignition circuit cannot be completed until both the indicator circuit and the control unit circuit are opened. Thus the vehicle may not be operated after reaching the critical angle until the vehicle is positioned in an angle less than the critical angle and the manual switch is opened.

It is believed the foregoing description conveys a good understanding of the objects and advantages of our invention. The appended claims have been drawn with a view to covering all legimate modifications and adaptation.

We claim:

1. A control unit including a conductive housing defining a chamber; said chamber having an inverted frusto-conical section, an intermediate horizontal portion connected to said inverted frusto-conical section, and a vertical portion connected to said horizontal portion; a conductive body fixably mounted within said chamber and insulated electrically from said chamber defining an annular space between said inverted frusto-conical section and said body; an undercut within the lower portion of said body; a first electrical lead attached to said body; a second electrical lead attached to said housing; said annular space being filled with a conductive fluid to a point above said undercut section such that when said chamber is in an upright position said conductive fluid completes a circuit between said body and said chamber and such that when said chamber assumes a predetermined angle from said upright position said body is isolated electrically from said chamber.

2. In an ignition circuit wherein a lead extends from a battery to an ignition switch, to an ignition coil and then to ground the improvement comprising a holding relay having an energizing coil operating a first armature to maintain a normally open switch open, and operating a second armature to maintain a normally closed switch closed, said energizing coils being series connected in said ignition circuit; an indicator light; a normally closed manual switch; a control unit, comprising a conductive

housing defining a chamber having an inverted frusto-conical section, an intermediate horizontal portion connected to said inverted frusto-conical section and a vertical portion connected to said horizontal portion with a conductive body fixably mounted within said chamber and insulated electrically from said chamber defining an annular space between said inverted frusto-conical section and said body with an undercut in the lower portion of said body having a first lead connected to said body, a second lead connected to said housing, and a liquid within said control unit adapted to make contact between said first lead and said second lead when said control unit assumes a predetermined level; a first circuit including said battery, said energizing coil and said control unit; and a second circuit including said first lead, said normally open switch, said normally closed manual switch, and said indicator light.

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