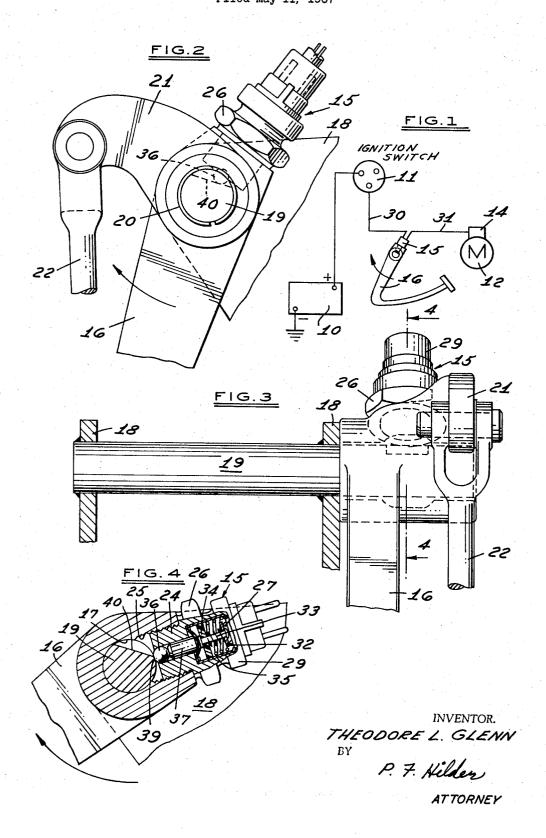
STARTER SAFETY SWITCH ON CLUTCH PEDAL Filed May 11, 1967



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3,419,115 STARTER SAFETY SWITCH ON CLUTCH PEDAL

ON CLUTCH PEDAL
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ABSTRACT OF THE DISCLOSURE

A starter safety switch of the cam operated type is mounted on the clutch pedal and is actuated by a stationary cam adjacent the pedal to interrupt the circuit from the start switch to the starter solenoid and prevent operation of the starter except when the clutch is disengaged. In the preferred form, the clutch pedal is provided with a bore receiving the stationary clutch pedal shaft, the starter safety switch is received within a bore intersecting that bore, and the cam for operating the switch is formed on that portion of the shaft covered by the pedal.

This invention relates to starter safety switches for preventing the starter motor of the vehicle from being 25 operated while the clutch is engaged.

Vehicles, e.g. automobiles, trucks, and tractors, usually are provided with a starter safety switch in a starter motor control circuit to prevent the starter from being operated except when the drive line is disengaged, as by depressing 30 the clutch or placing the gear shift lever in neutral position. In the present invention, the starter safety switch is mounted directly on the clutch pedal adjacent its pivotal mounting and is operated by a cam on the clutch pedal shaft so as to close the electrical circuit between the starter 35 solenoid and a manually operated start switch whenever the clutch pedal is depressed to disengage the clutch and to interrupt the circuit upon release of the clutch pedal. Accordingly, the starter is operable only when the clutch is disengaged, thus preventing starting of the vehicle when 40 the drive line is connected to the engine. By mounting the starter safety switch on the pedal, there is a reduced chance of malfunction or maladjustment, and a simpler more dependable construction is obtained.

Among the objects of the present invention are to provide an improved starter safety switch organization which is simple and dependable in operation; which is not subject to getting out of adjustment; which is easily and economically assembled; and generally to improve starter safety switch organization of the type described.

Other objects and objects relating to details and economies of construction will be more apparent from the detailed description to follow.

FIGURE 1 is a schematic drawing of a starter motor control circuit for a vehicle, incorporating the starter safety switch organization of the present invention.

FIGURE 2 is a side elevation of the organization, including a portion of the clutch pedal, the supporting clutch pedal shaft, the starter safety switch, and a portion of the clutch release rod.

FIGURE 3 is an elevation of the parts shown in FIG-URE 2, from the left of that figure.

FIGURE 4 is a cross section through the clutch pedal, shaft and safety switch taken on the line 4—4 of FIG-URE 3.

Vehicles provided with manual shift transmissions, e.g., automobiles, trucks, and tractors, conventionally are provided with a clutch interposed between the engine and the drive line, including the transmission. In order to prevent starting the engine while the drive line is connected, it is common to interpose a starter safety switch in the circuit between the manually operated start switch (which

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usually is combined with a key-operated ignition switch) and a solenoid controlling operation of the starter. The starter safety switch may either be placed on the transmission and be in the closed position only when the transmission is in neutral position, or it may be closed by depressing the clutch pedal to disengage the clutch and thereby interrupt the drive line. The starter safety switch of the present invention is of the latter type.

Referring now to the drawings, the starter control circuit is indicated in FIGURE 1. This circuit includes a battery 10, a combined ignition and starter switch 11, and a starter motor 12. The solenoid 14 mounted on the starter motor controls operation of the starter motor by actuation of an electrical switch (not shown), connecting the starter motor directly to the battery.

The starter safety switch 15 of the present invention is interposed in the circuit between the ignition and start switch 11 and the solenoid 14. When the starter safety switch is open, the circuit to the solenoid 14 is interrupted and the starter cannot be operated. When the switch 15 is closed, the circuit between the starter switch 11 and the solenoid is completed and the starter can be operated by means of the start switch 11.

Referring now to FIGURES 2 and 3, the starter safety switch 15 is mounted directly on the clutch pedal 16 of the vehicle. The clutch pedal 16 is provided with a transverse bore 17 adjacent its upper end which is received on a stationary clutch pedal shaft 19 mounted on a portion 18 of the vehicle. A snap ring 20 received within a circumferential groove at the outer end of the shaft 19 retains the clutch pedal.

The clutch pedal 16 may also be provided with an arm portion 21 pivotally receiving a clutch release rod 22 which is connected with the vehicle clutch (not shown). In FIGURES 1, 2 and 3, the clutch pedal 16 is shown in clutch-engaged position. By depressing the clutch pedal, the pedal is rotated clockwise as viewed in the drawings to release the clutch.

Referring now to FIGURE 4, the starter safety switch comprises a pluglike body 24 provided with screw threads threadingly engaged within a bore 25 in the clutch pedal intersecting the bore 17 for receiving the clutch pedal shaft. Flats 26 may be provided on the body for engagement with a wrench to facilitate insertion or removal of the switch 15 from the clutch pedal.

The body 24 of the switch includes a pair of spaced contacts 27 in the head 29 of the switch which are connected with wires 30 and 31 leading to the manual starter switch 11 and the solenoid 14, as indicated in FIGURE 1.

The circuit between the contacts 27 is completed by a movable disclike member 32 which is carried by a shank and head portion 34. A spring 33 surrounding the shank of part 34 permits overtravel of part 34 after the member 32 engages the contacts 27. The assembly of part 34 and member 32 is biased away from the contacts 27 by a spring 35.

The switch 15 is cam operated by means of a ball 36 and plunger 37 received within a bore 39 coaxial with the body 24 of the switch. The metal surrounding the outer end of the bore may be swaged over slightly or a stripped bore otherwise provided to retain the ball and plunger.

A flat 40 is formed on the clutch pedal shaft 19 to serve as a cam for operating the switch 15. Preferably, the flat is located on that portion of the shaft received within the bore 17 of the clutch pedal so as to act directly on the ball 36 of the switch.

When the clutch pedal is positioned as indicated in FIGURES 1 and 2, the ball 36 of the switch is riding on the flat 40 of the clutch pedal shaft, and the vehicle clutch is engaged. In this position of the clutch pedal 16, the starter safety switch 15 is open and the starter motor 12 cannot be operated. Upon depressing the clutch pedal

to disengage the clutch, the ball 36 of the switch rolls along the flat 40 as the pedal turns on the shaft 19 until the ball reaches the cylindrical portion of the shaft 19. About this time, the ball 36 and plunger 37 have forced the member 32 against its spring bias into position to 5 complete the circuit between the spaced contacts 27, thus completing the circuit between the start switch 11 and the solenoid 14 so that the starter can be operated.

The starter safety switch organization above described is dependable and is not readily subject to damage or 10 to misadjustment. Moreover, the tolerances of the parts are critical to its operation. Provided that the flat 40 is properly positioned when assembling the clutch pedal shaft 19 on to the tractor, the switch 15 will be dependable in operation and no further adjustment is necessary. More- 15 pedal to release the clutch. over, the moving parts are enclosed and thus protected from weather and from damage during operation of the vehicle.

What is claimed is:

1. In a vehicle having an engine, a drive line, a clutch 20 for connecting the engine and drive line and a clutch pedal for releasing the clutch: a starter, an electrical circuit for controlling operation of the starter and a cam operated safety switch in said circuit, said switch being mounted on the clutch pedal, and a stationary cam lo- 25 cated adjacent the clutch pedal and positioned to operate the switch to complete the circuit through the switch upon operation of the pedal to disengage the clutch.

2. In a vehicle as claimed in claim 1, the clutch pedal being mounted for limited rotary movement on a stationary supporting shaft, the switch-operating cam being located on the shaft, and the safety switch being mounted on the clutch pedal adjacent the shaft and having a por-

tion engaged and operated by the cam.

3. In a vehicle as claimed in claim 2, the clutch pedal having a bore for receiving the shaft and an intersecting bore for receiving the safety switch, the portion of the shaft within the shaft-receiving bore having a cam surface for operating the switch.

4. In a vehicle as claimed in claim 3, the safety switch being spring-biased to open position and being moved to closed position by the cam upon operation of the clutch

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