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(54) Engine starting device.

(57) A device for starting or restarting a vehicle engine detects that the engine is at rest and responds to depression of the clutch, or displacement of the gear selector into neutral in the case of an automatic transmission, to energise the starter motor. An oil pressure switch and/or the battery charging circuit may be used to detect when the engine is at rest. The device is particularly useful for restarting a stalled engine automatically simply by depressing a clutoh, or displacing the gear selector into neutral in the case of automatic transmission.

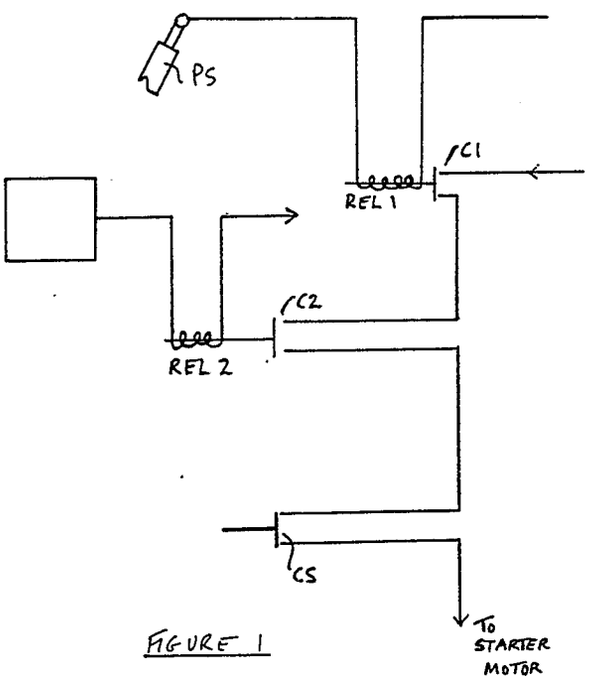

FIGURE 1

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Engine Starting Device

This invention relates to a device for restarting the engine of a vehicle when stalled, but which may also be used for starting the engine initially.

If the internal combustion engine of a car or other vehicle stalls, it is often a complex procedure to restart it, for example if reversing uphill and/or around a corner. Normally in these circumstances the driver would apply the footbrake, then the handbrake, depress the clutch, locate and turn the ignition key, press the accelerator, and then when the engine restarts he must reverse up the hill again.

I have now devised a device for restarting the stalled engine of a car or other vehicle.

In accordance with this invention, there is provided a device for restarting a stalled engine, comprising means for connection to an oil pressure sensor of the engine to detect when the engine stalls, and to respond by energising the starter motor.

Also in accordance with this invention, there is provided a device for restarting a stalled engine, comprising means for connecting into the charging circuit of the vehicle electrical system to detect when the engine stalls, and to respond by energising the starter motor.

Further in accordance with this invention, there is provided a device for starting an engine, comprising means for detecting that the engine is at rest and means responsive to depression of the clutch, or displacement of the gear selector into neutral in the case of an automatic transmission, to energise the starter motor. In this device, the means for detecting that the engine is at rest may for example respond to the oil pressure sensor and/or to the charging circuit of the vehicle electrical system.

In a preferred embodiment of the invention which will be described herein, if both low engine oil pressure and zero charging current are detected, then the starter motor is automatically energised once the clutch is depressed (or the gear selector is shifted into neutral in the case of an automatic transmission). The need to depress the clutch, or to shift the gear selector into neutral, ensures that the transmission will be disconnected whilst the engine is cranked. The deviced enables restarting of a stalled engine to be achieved in a simple manner; however the device can equally well be used to start the engine initially once the ignition has been turned on.

Embodiments of this invention will now be described by way of examples only and with reference to the accompanying drawings ,in which:

FIGURE 1 is a schematic circuit diagram of a device for starting and/or restarting the internal combustion engine of a car or other vehicle; and

FIGURE 2 is a schematic circuit diagram of a modified device for the same purpose.

Referring to Figure 1 of the drawings, the device comprises a first relay REL 1 connected in an electrical path from an oil pressure sensor PS of the engine. The device further comprises a second relay REL 2 connected in an electrical path of the battery charging circuit of the vehicle electrical system. Contacts C1 and C2 of the respective relays are connected in series with further contacts CS on a path to the starter motor. Contacts CS are coupled to the clutch, or to the gear selector in the case of an automatic transmission.

In use, if whilst the ignition is switched on the engine stalls, the current through relay REL 1 from the oil pressure sensor will rise, so likewise will the current flowing through relay REL 2 to the battery charging warning light. As a consequence relays REL 1 and REL 2 are energised and the contacts C1 and C2 close. Then if the clutch is depressed (or the gear selector shifted into neutral) so as to close contacts CS, the starter motor will be energised over the path shown to automatically crank and restart the engine. It will be appreciated that this path to the starter motor is different from the path by which the starter motor is normally energised, typically by operation of the ignition key.

In the modified circuit shown in Figure 2, the oil pressure relay REL 1 has an additional pair of contacts CL which serve to latch this relay once a relay REL 3 has been energised. These contacts CL are connected in series with the ignition light via the switch CS on the clutch or transmission. Diode A prevents ignition current from illuminating the oil pressure light and diode B prevents current from the oil pressure sensor energising relay REL 3 which is intended to be energised only when the switch CS is closed, in which case its contacts C3 are closed to energise the starter motor if the oil pressure relay REL 1 has been latched.

It will be appreciated that the devices which have been described enable a stalled engine to be restarted in a simple manner. However, the devices may also be used to start the engine initially once the ignition has been turned on. It will further be appreciated that the clutch (or gear selector) switch acts as a safety feature to prevent the engine from being cranked whilst the transmission is engaged.

Claims

1) A device for starting or restarting an internal

combustion engine of a vehicle, comprising means for detecting that the engine is at rest and means responsive to depression of th clutch, or displacement of the gear selector into neutral in the case of an automatic transmission, to energise the starter motor.

2) A device as claimed in claim 1, in which the means for detecting that the engine is at rest is arranged to respond to an oil pressure sensor of the engine.

3) A device as claimed in claim 1, in which the means for detecting that the engine is at rest is arranged to respond to a battery charging circuit of the vehicle electrical system.

4) A device as claimed in claim 1, in which the means for detecting that the engine is at rest responds to both an oil pressure sensor of the engine and to a charging circuit of the vehicle electrical system.

5) A device for restarting a stalled internal combustion engine of a vehicle, comprising means for connection to an oil pressure sensor of the engine to detect when the engine stalls, and to respond by energising the starter motor.

6) A device for restarting a stalled internal combustion engine of a vehicle, comprising means for connecting into a battery charging circuit of the vehicle electrical system to detect when the engine stalls, and to respond by energising the starter motor.

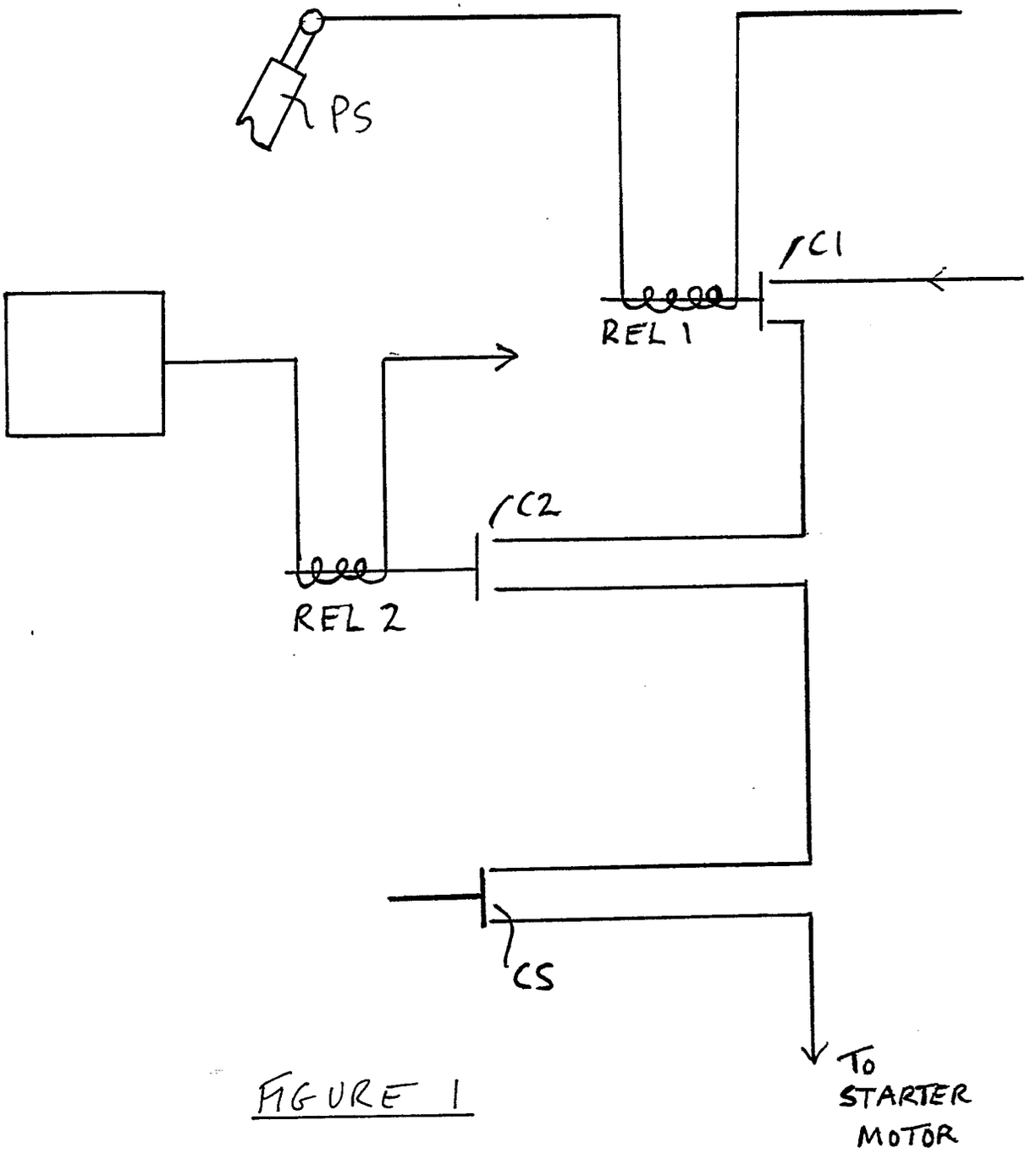

FIGURE 1

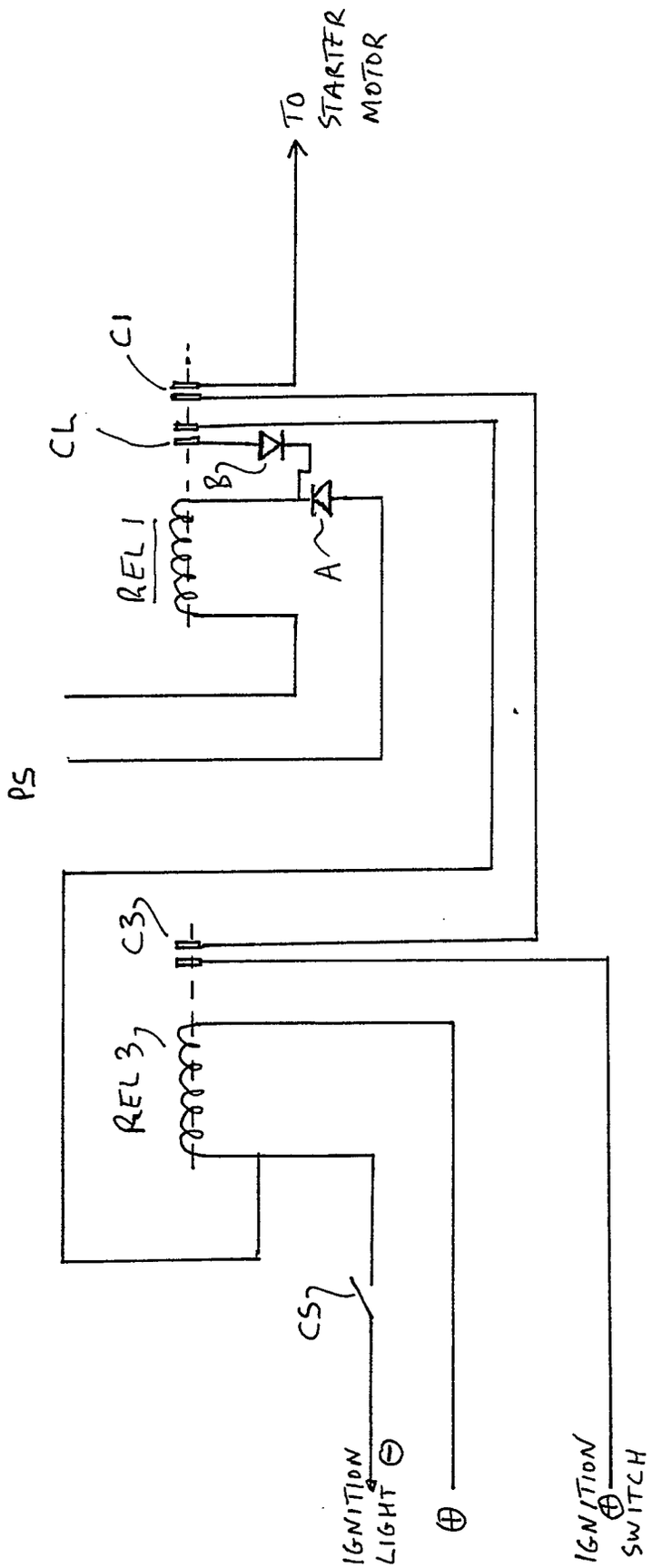
TO
STARTER
MOTOR
C1
CL
B
REL 1
A
PS
C3
REL 3
CS
IGNITION
LIGHT
IGNITION
SWITCH

FIGURE 2

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 31 3720

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	GB-A-2139289 (BOWCOTT) * page 1, lines 28 - 43 * * page 2, lines 37 - 41 *	1.	F02N11/08
X	DE-A-3707098 (MANGOLDT) * page 1, lines 1 - 21; figure 1 *	1.	
A	DE-A-2401266 (BRENDEL) * page 1, line 29 - page 2, line 6 *	1-6.	
A	EP-A-158605 (CORNACCHIA)		
A	DE-A-2615029 (WOLFF)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

F02N

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	09 APRIL 1990	BIJN E.A.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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