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Leonard

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[54] **CONTROL DEVICE FOR USE WITH A FUEL INJECTION PUMP**

[75] Inventor: **Gordon Harris Leonard,** Chalfont St. Peter, England

[73] Assignee: **G. A. V. Limited,** Birmingham, England

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[52] **U.S. Cl.** ..... **74/469,** 123/179 L

[51] **Int. Cl.** **G05g 1/00**

[58] **Field of Search** ..... 74/469, 479; 123/179 L

[56] **References Cited**

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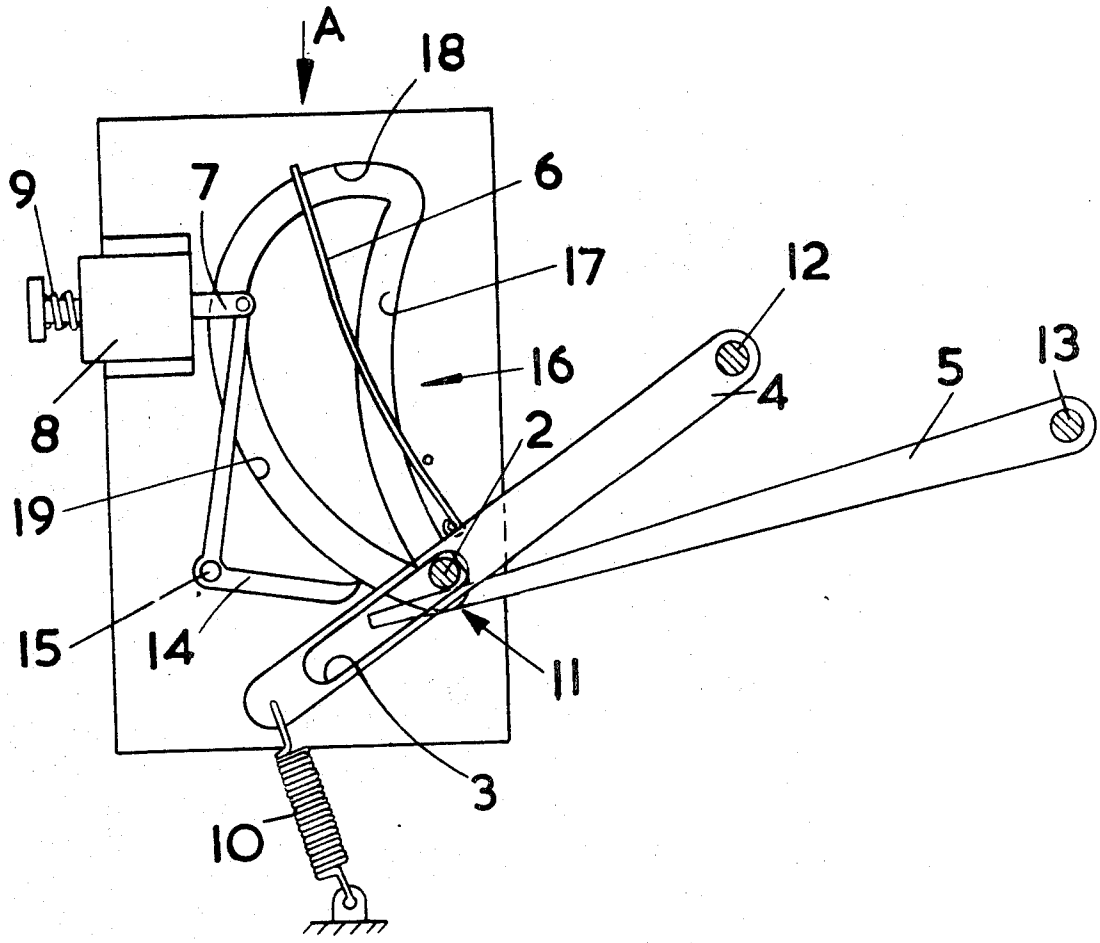
Primary Examiner—Charles J. Myhre
Assistant Examiner—Wesley S. Ratliff, Jr.
Attorney—Holman & Stern

[57] **ABSTRACT**

A control device for use with a fuel injection pump having a throttle control and a stop control includes a lever connected to the stop control, resilient means biasing the lever to a position in which the supply of fuel to the engine is prevented. Also provided is a second lever connected to the throttle control of the pump and which can engage a pin carried by the lever. The pin is movable by means of the lever into contact with a stop and in this position fuel can be supplied to the engine. When the stop is released the pin is released and the lever returns to a position in which no fuel will be supplied to the engine.

8 Claims, 2 Drawing Figures



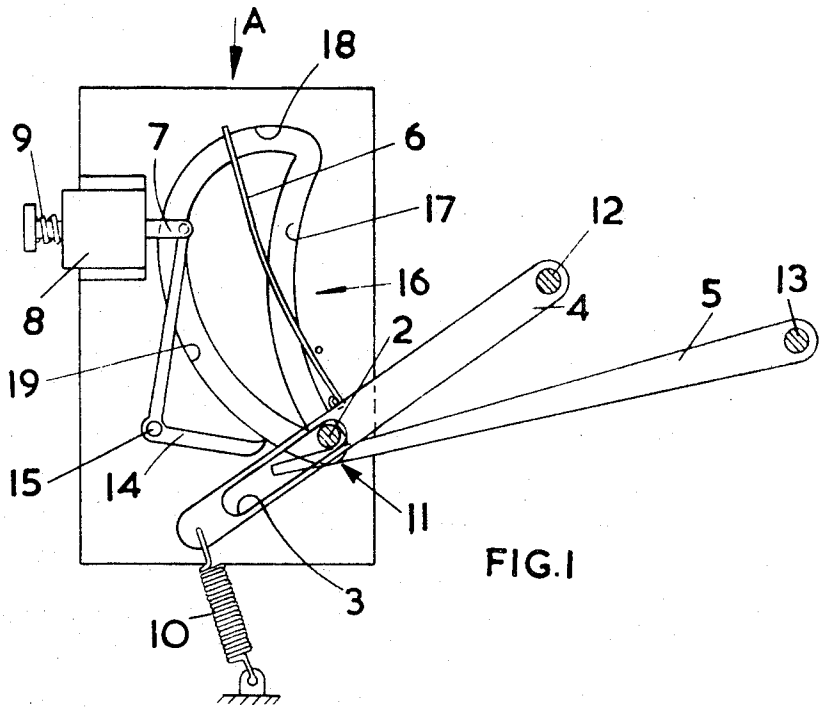


FIG. 1

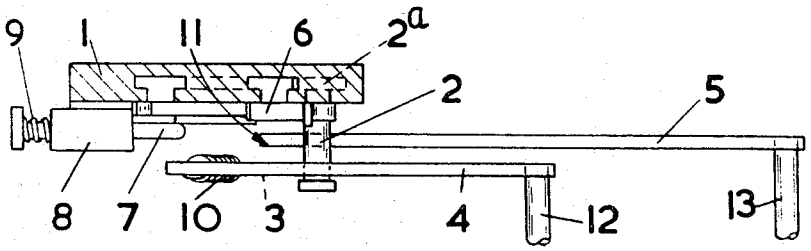


FIG. 2

CONTROL DEVICE FOR USE WITH A FUEL INJECTION PUMP

This invention relates to a control device for use with a mechanism of the kind including a first control member for effecting a first control operation and a second control member which is movable to effect a second control operation.

The object of the invention is to provide a control device for use with such a mechanism, whereby the second control member is automatically moved to a first predetermined position irrespective of the setting of the first control member, in the event of a catch contained in the device being released.

According to the invention a control device for use with a mechanism of the kind specified comprises in combination, a first lever which in use, is operatively connected to said second control member, resilient means biasing said first lever to a first position in which the second control member will be moved to said predetermined position, and a releasable catch operable to retain said first lever in a second position in which the second control member assumes a second predetermined position.

One example of a control device in accordance with the invention will now be described with reference to the accompanying drawings which show a device for use with a mechanism comprising a fuel injection pump.

FIG. 1 is an inverted plan view of the device and,

FIG. 2 is a side view in a direction of the arrow A of FIG. 1.

With reference to the drawings there is provided a first control member in the form of a lever 4 which is mounted upon a shaft 12. The shaft 12 is mounted in a bearing and is operatively connected to a stop control of a liquid fuel injection pump. The lever 4 is loaded by a coiled tension spring 10 to a position as shown in the drawings, in which the stop control prevents the supply of fuel by the pump. The lever 4 is also provided with an elongated slot 3 through which extends a pin 2. The pin 2 is slidable within the slot 3 and includes a head 2*a* which is located within a shaped groove 16 which is formed within a generally rectangular block 1 forming part of the device.

Also provided is a second control member in the form of a lever 5 which is mounted upon a shaft 13 and the shaft 13 is operatively connected to the throttle control member of the fuel pump. The position in which the lever 5 is shown is the minimum or idling position of the throttle control member, and movement of the throttle control to effect an increase of fuel will effect movement of the lever 5 in the clockwise direction. The free end of the lever 5 is formed as a pivotal latch 11 bears against the pin 2.

The groove 16 is specially shaped and includes a first portion 17 which is of arcuate form and has a radius which is struck from the centre of the shaft 13. The radius of the portion 17 is however less than the length of the lever 5. The groove portion 17 is extended at opposite ends by curved portions 18 and 19, portion 18 being shorter than portion 19. Moreover, extending across the groove at the junctions of the portions 18 and 19 thereof is a catch member 7. The catch member 7 is loaded by a coiled compression spring 9 to an inoperative position in which it is withdrawn from across the groove and it is retained in its operative position as shown, by energisation of a solenoid 8.

The operation of the device will now be described. In the position shown the associated pump cannot supply fuel because of the position of the lever 4. In order to start the engine to which fuel is supplied the lever 5 must first be moved in the clockwise direction and this has the effect of moving the pin 2 along the portion 17 of the groove 16. In addition the lever 4 is moved against the action of the spring 10. During movement of the pin a leaf spring 6 is tensioned and when the lever reaches the junction of the portions 17 and 18 of the groove the spring 6 moves the pin 2 along the portion 18 thereby releasing the pin from contact with the lever 5. The pin 2 comes to rest against the catch member 7 and in this position the lever 4 is retained in a position in which the pump can supply fuel. Moreover, the lever 5 is free to move when the throttle control member of the pump is set to provide the maximum fuel in which position the lever 5 will assume a position about 90° removed in the clockwise direction, from the position in which it is shown.

In the event that the solenoid 8 is de-energised in the event of a fault causing interruption of the electric supply or deliberately by the operator the catch member 7 will release the pin 2 and the lever 4 will move back under the action of the spring 10 to the position shown thereby preventing further supply of fuel. The sequence described must then be repeated to enable the engine to be operated normally. However, for emergency operation it is possible to set the throttle member to the half throttle position to allow the engine to be started. In this position the pin 2 is still in the portion 17 of the groove but the lever 4 has been moved an amount sufficient to allow flow of fuel. The latch 11 on the lever 5 allows the lever 5 to be re-engaged with the pin 2 in the event that the catch member 7 has been operated.

FIG. 1 shows the provision of a further catch member 14 mounted on a pivot 15 and operated by the catch 7. The catch member 14 is moved to a position to prevent the pin 2 reaching the junction of the groove portions 17 and 19, when the catch member 7 is released. In this case therefore the engine cannot be started until the catch member 7 is re-set.

I claim:

1. A control device for use with a mechanism of the kind including a first control member which is movable to effect a second control operation, the control device comprising in combination, a first lever which is operatively connected to said second control member, resilient means biasing said first lever to a first position in which the second control member will be in a first and a releasable catch operable to retain said first lever in a second position in which the second control member will be in a second predetermined position.

2. A control device according to claim 1 including a pin movable with said first lever, said pin when said first lever is in said second position being engaged with said catch.

3. A control device according to claim 1 including a slot formed in said first lever, said pin being located within said slot, a block having a face, a guide groove formed in the face of said block, and a head portion on said pin, said head portion being engaged within said guide groove.

4. A control device according to claim 3 including a second lever, said second lever in use, being operatively connected to said first control member, said second lever when said first lever is in said first position being operable to move the pin along a first portion of said guide groove and resilient means operable when the pin reaches the end of said first portion of the groove, to effect movement of the pin along a second portion of the guide groove into engagement with said catch, said pin during this movement being disengaged from said second lever.

5. A control device according to claim 4 including a third portion of said guide groove interconnecting the free ends of said first and second portions thereof, said pin moving along said third portion of the guide groove when said catch is released.

6. A control device according to claim 5 in which said second lever is provided with a latch at its end for engagement with said pin, said latch pivoting to allow the second lever to return to its initial position when the pin is released by the catch.

7. A control device as claimed in claim 6 in which said catch is spring loaded to a position out of the path of said pin, electromagnetic means being provided to urge the catch into a position to engage said pin.

8. A control device as claimed in claim 7 including a further catch operable to prevent said pin moving to the start of said first portion of the guide groove when said first mentioned catch is out of the path of said pin.

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