

[54] **FUEL PUMPING APPARATUS**

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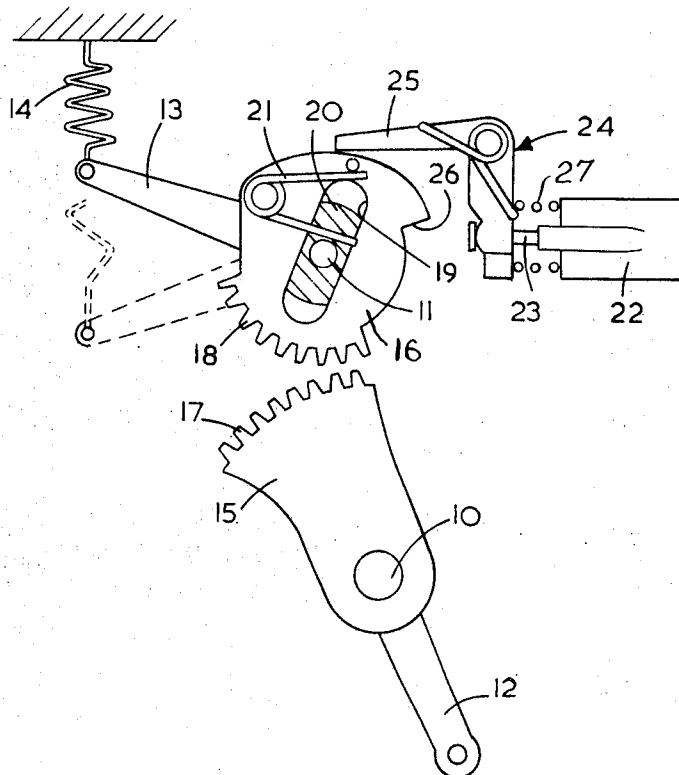
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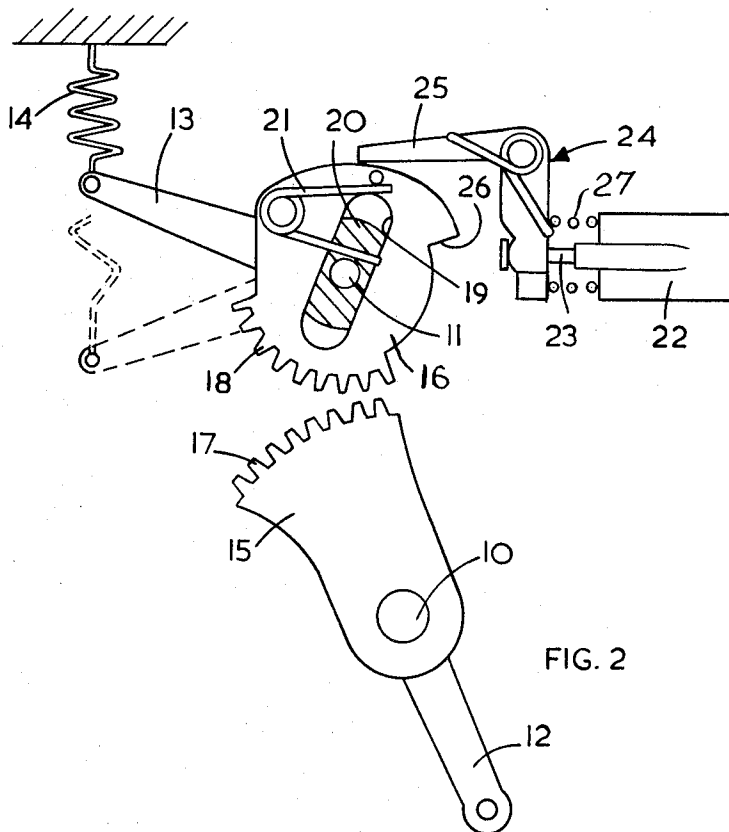
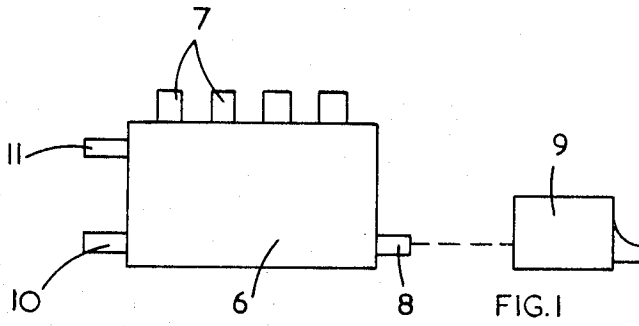
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**ABSTRACT**

A fuel pumping apparatus for an internal combustion engine includes a stop control member and a speed control member. Interengageable means is provided on the members respectively whereby movement of the speed control member can move the stop control member to a position to supply fuel to the engine, the engagement of the members being determined by an electro-magnetic means and a latch member being provided to retain the stop control member in a position to supply fuel to the engine until the electro-magnetic means is de-energised.

**9 Claims, 2 Drawing Figures**





## FUEL PUMPING APPARATUS

This invention relates to fuel pumping apparatus of the kind comprising an angularly movable speed control member and an angularly movable stop control member, the speed control member in use being operable to control the quantity of fuel delivered by the pumping apparatus and the stop control member being operable to stop the supply of fuel by the apparatus.

When such an apparatus is fitted to a compression ignition engine installed in a road vehicle the driver on leaving the vehicle must operate the stop control to stop the engine and must also operate an electrical switch which corresponds to the ignition switch of a vehicle fitted with a petrol engine, to cut off the supply of electric current to the accessories of the vehicle.

The object of the invention is to provide an apparatus of the kind specified in a simple and convenient form.

According to the invention an apparatus of the kind specified comprises in combination, resilient means biasing the stop control member to a position in which the supply of fuel by the apparatus is halted, interengageable members on the speed control and stop control members respectively whereby angular movement of the speed control member will effect angular movement of the stop control member away from said position to a second position, a latch member operable to retain the stop control member in said second position, electro magnetic means energisable when fuel is to be supplied by the apparatus, said electro magnetic means effecting operation of said latch member and said latch member acting when moved by the electro magnetic means, to move the interengageable members into engagement and to hold them in engagement until the stop control member attains said second position whereafter the latch member retains the stop control member in said second position until the electro magnetic means is de-energised.

In the accompanying drawings:

FIG. 1 is a diagrammatic layout showing the apparatus associated with an engine, and

FIG. 2 is a side elevation of a portion of the apparatus.

The apparatus comprises a pump 6 having a plurality of outlets 7 and driven by means of a drive shaft 8 from an associated engine 9. The outlets 7 are connected in use, by pipelines (not shown) to injection nozzles also not shown, mounted on the engine. This portion of the apparatus is well known. Also well known is the provision on the pump of an angularly movable speed control member 10 and an angularly movable stop control member 11. Such an apparatus is shown in U.S. Pat. No. 2,746,442 of Vernon D. Roosa. The members 10 and 11 are in the form of shafts which extend from the body portion of the pump. The speed control member as shown in FIG. 2, is connected to an arm 12 which can be moved by the driver operable accelerator pedal between a first position as shown, in which the minimum quantity of fuel is supplied by the pump and a second position in which the maximum amount of fuel is supplied by the pump.

In known forms of pump the stop control 11 is connected to a pull control operable by the driver of the vehicle to stop the engine when it is no longer required. In the present arrangement however the stop control member 11 is not provided with a separate control operable by the driver. Instead means is provided

whereby it can be moved by operation of the speed control member as will be explained. For this purpose the stop control 11 is provided with an arm 13 to which is coupled a coiled tension spring 14. The spring effects movement of the stop control towards a first position in which no fuel is supplied to the engine and the control is movable to a second position shown in dotted outline against the action of the spring 14 to permit fuel to be supplied to the engine.

The speed control 10 and the stop control 11 are provided with interengageable members 15, 16 respectively. The member 15 is rigidly mounted on the speed control member and defines an arcuate peripheral surface which is provided with teeth 17. Moreover, the interengageable member 16 defines a similar surface having teeth 18 however, the member 16 is not rigidly connected to the control member 11. The interengageable member 16 defines an elongated aperture 19 in which is located a guide 20 which is secured to the stop control member 11. The interengageable member 16 can therefore be moved relative to the guide 20 and a hair pin spring 21 is provided to bias the member so that the teeth 17 and 18 are out of engagement.

Also provided is an electro magnetic device 22 which is energised when an electrical control switch of the vehicle is in the on position. The device 22 has an output member 23 which when the device is energised, is moved to the right as seen in the drawing. Associated with the output member 23 is a bell crank lever 24, having one arm pivotally connected to the output member 23 and having its other arm 25 bearing against the peripheral surface of the interengageable member 16. The two arms of the bell crank lever are relatively spring loaded and the arrangement is such that when the device 22 is energised the arm 25 will urge the interengageable member 16 against the action of the spring 21 so that the teeth 17 and 18 engage with each other.

When the teeth 17 and 18 are in engagement angular movement of the speed control member 10 between the first and second positions will effect movement of the stop control member 11 between the first and second positions. In order to retain the stop control member in the second position the peripheral surface of the interengageable member 16 defines a step 26 which engages with the end of the latch member constituted by the arm 25 of the bell crank lever 24, when the stop control has been moved to its second position. Moreover, when the stop control member 13 is moved to its second position the pressure exerted by the arm 25 on the periphery of the disc is insufficient to overcome the effect of the spring 21 so that the interengageable member 16 slides under the action of the spring 21 so that the teeth 17 and 18 are moved out of engagement. When this occurs the speed control member can be moved between its first and second positions without imparting any movement to the stop control member.

When the driver requires to stop the engine it is merely necessary for him to de-energise the device 22 and this includes a spring 27 which effects movement of the bell crank lever 24 so that the arm 25 thereof moves out of engagement with the step 26. When this has occurred the spring 14 moves the stop control to its first position thereby preventing any further fuel being supplied by the apparatus to the engine.

I claim:

1. A fuel pumping apparatus of the kind specified comprising in combination, an angularly movable speed control member and an angularly movable stop control member, the speed control member in use, being operable to control the quantity of fuel delivered by the apparatus and the stop control member being operable to stop the supply of fuel by the apparatus, resilient means biasing the stop control member to a first position in which the supply of fuel by the apparatus is halted, interengageable members on the speed control and stop control members respectively whereby angular movement of the speed control member will effect angular movement of the stop control member away from said first position to a second position, a latch member operable to retain the stop control member in said second position, electro magnetic means energisable when fuel is to be supplied by the apparatus, said electro magnetic means effecting operation of said latch member and said latch member acting when moved by the electro magnetic means, to move the interengageable members into engagement and to hold them in engagement until the stop control member attains said second position whereafter the latch member retains the stop control member in said second position until the electro magnetic means is de-energised.

2. An apparatus as claimed in claim 1 in which said interengageable members disengage from each other when the stop control member attains said second position.

3. An apparatus as claimed in claim 2 in which the interengageable member on the stop control member is retained against angular movement relative to the stop control member but is permitted movement relative to the member substantially normal to the axis of angular movement of the stop control member.

4. An apparatus as claimed in claim 3 in which the interengageable member on the stop control member is provided with a slot and the stop control member is shaped to permit said relative movement.

5. An apparatus as claimed in claim 3 in which said interengageable members are provided with teeth.

6. An apparatus as claimed in claim 5 including resilient means acting to bias the interengageable members out of engagement with each other, said resilient means being overcome by the action of said electro magnetic means when said means is energised.

7. An apparatus as claimed in claim 6 in which said resilient means comprises a spring acting intermediate the stop control member and the interengageable member associated therewith.

8. An apparatus as claimed in claim 7 in which said latch member comprises one arm of a ball crank lever the other arm of said lever being connected to an armature associated with said electro magnetic means.

9. An apparatus as claimed in claim 8 in which the arms of the bell crank lever are resiliently loaded relative to each other.

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