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FUEL CONTROL DEVICE FOR INTERNAL COMBUSTION ENGINES

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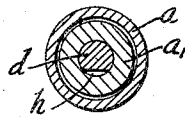


FIG. 2

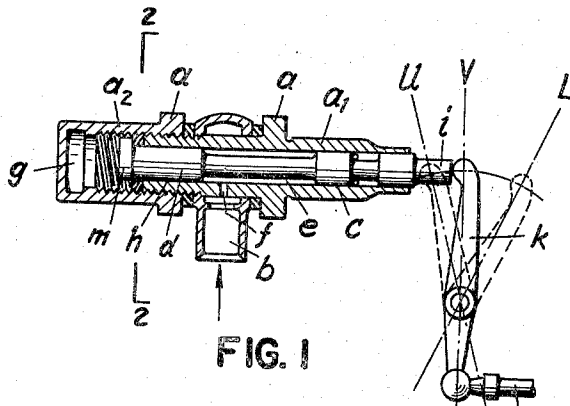


FIG. 1

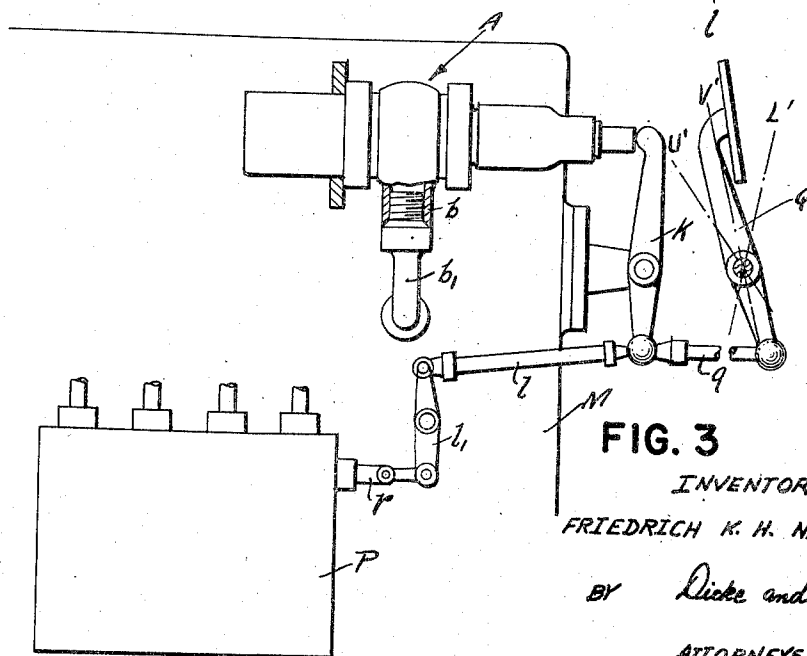


FIG. 3

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7 Claims. (Cl. 123—103)

The present invention relates to a fuel control device for internal combustion engines, and particularly those of motor vehicles.

The fuel control mechanism of internal combustion engines is frequently designed so as to permit an excessive fuel supply beyond that required for running the engine under a full load so that a sufficient fuel supply will be available to start the engine. The drivers of cars are frequently accustomed to adjust the fuel supply to such excessive amount when a greater engine output is required, for example, when driving up a hill. Such adjustment when continued for a greater length of time is, however, very detrimental to the engine, it reduces its useful life and increases the fuel consumption.

It is therefore an object of the present invention to provide a mechanism for preventing the fuel supply from being adjusted to such excessive amount during the normal operation of the engine, but permitting the output of the engine to be increased at certain times, that is, for example, when passing another vehicle, and especially when in passing such vehicle, an oncoming vehicle suddenly appears and requires quick acceleration of the car so as to avoid a collision.

An essential feature of the present invention for attaining this object consists in a mechanism for controlling the fuel supply of an engine, and particularly the engine of an automobile, which includes a resistance which does not prevent an arbitrary adjustment of the fuel supply when the car is stopped or the engine is running at a low speed, but which can be overcome only by the application of a certain force when the engine is running at higher speeds so as to permit an excessive fuel supply at such times.

More specifically, the invention resides in the provision of a stop mechanism which may be adjusted in accordance with the speed of the engine or may be subjected to a certain control pressure, and thus opposes a further adjustment of the output control rods of the engine beyond a certain limit or stroke thereof by an increased resistance to such movement when the engine is running at a higher speed. For adjusting such stop mechanism or for subjecting the same to a pressure, the present invention preferably utilizes a fluid pressure produced by the running engine, for example, the pressure of the lubricating oil. The stop mechanism itself may consist of a piston or plunger or be rigidly connected to such plunger. Also, it may in some cases be advisable to permit an adjustment of the stop mechanism only after a certain delay in time, for which purpose the stop or plunger may be designed as a throttling member for regulating the supply or discharge of the control fluid.

Such a mechanism allows the driver the possibility of adjusting an excessive fuel supply in a case of emergency but calls a normally inadmissible increase in such supply to his attention by the increased resistance in the operation of the fuel control.

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Further objects, features, and advantages of the present invention will appear from the following detailed description and the accompanying drawing of a specific embodiment of the maximum fuel supply stop according to the invention.

Fig. 1 is a longitudinal cross section through the fuel control device in accordance with the present invention, Fig. 2 is a sectional view along line 2—2 of Fig. 1, and

Fig. 3 diagrammatically illustrates the relationship of the control device according to Fig. 1 with other parts of the internal combustion engine.

Referring to Figure 1, the housing *a* of the maximum fuel supply stop is preferably mounted at a suitable point near the control rods for regulating the output of the engine, and is preferably on the engine itself. This housing *a* consists of the two parts *a* and *a*₂ which are screwed together and between which the connection *b* is provided through which the control fluid, for example, the lubricating oil, may be supplied. The part *a*₁ is provided with an axial bore *c* which forms the cylinder for a plunger or slide valve *d* which has a reduced central portion forming an annular chamber *e*. This chamber *e* is connected both with the inlet *b* for admitting the lubricating oil through a duct *f*, and with a pressure chamber *g* in the housing part *a*₂ through a throttling groove *h* (Figure 2) which may be formed, for example, by a flat surface extending longitudinally along the periphery of the slide valve *d*. When in the right-hand end position as shown in the drawing, the right-hand end portion *i* of the slide valve *d* extends beyond the housing *a* toward the right into the range of movement of the pivotal lever *k* which may be connected to the output control member of the engine in any suitable manner, for example, by a connecting rod *l*. A stop member *m* on the slide valve *d* limits the stroke thereof as well as that of the stop *i* toward the right side.

Referring now to Fig. 3, the fuel control device assembly of Fig. 1 is indicated as A while reference character M represents the engine and reference character P its fuel pump. Reference character Q designates the accelerator or gas pedal. Position L' of lever Q indicates the idling position thereof, position V' the full-load position thereof while position U' represents the starting or overload position thereof. The lever *k* is connected to the pedal Q by a link *q* and to the fuel control rod *r* of the fuel pump P by link members *l* and *l*₁. The connection *b* is in communication with the engine lubricating system by way of pipe *b*₁.

The operation of the mechanism as described is as follows:

As long as the engine is at rest or runs at such a low speed that no effective oil pressure will be formed in the pressure chamber *g*, lever *k* may be freely adjusted by the stop *i* from the position V to the position U. The position V of the lever *k* corresponds to the full-load position and the position U to the starting or overload position of an output control member of the engine, for example, the accelerator or gas pedal Q, while the position L indicates the idling position of such control member.

It may be assumed that for starting the engine, the lever *k* has been placed in the position U and that the slide valve *d* has thus been shifted toward the left. If the speed of the engine is thereafter increased and the pressure of the control fluid, for example, the lubricating oil, is thereby likewise increased in the chamber *g*, the control slide *d* with the stop *i* will be shifted toward the right to the position shown in the drawing. The stroke of lever *k* will thus be limited to the position V so that the output control member can then only be adjusted intermediate the idling position L and the full-load position V, while beyond that point it can be adjusted only by overcoming the oil pressure in the pressure chamber *g*. The

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throttling groove *h* permits the oil to be forced out of the chamber *g* only under a very high pressure.

The particular embodiment of the maximum fuel supply control as shown in the drawing excels by its simple and inexpensive construction, the small amount of space required by it, and its low weight, permitting it to be mounted at any suitable point of the engine or the control rods thereof.

Evidently, the stop *i* may also be made to act upon an opposed stop provided directly on the output control rod. The direction of movement of the opposed stop may also be vertical to the direction of movement of the control stop *i* or it may be arranged so that the control stop *i* cannot even be forced back by the driver. For returning the stop to its inactive position when the engine is running at a low speed or when the oil pressure is low, a return spring may also be provided. Rather than by oil pressure, the control stop may also be actuated by any other suitable means, for example, by a mechanical speed-regulating device or the like. The control stop and the actuating plunger may also consist of separate elements which may be connected, for example, by one or more connecting rods.

The present invention is applicable to both Diesel and carburetor engines, as well as any other type of combustion engine. Its application is also not limited to motor vehicles but may also be used for other purposes.

Although my invention has been illustrated and described with reference to the preferred embodiments thereof, I wish to have it understood that it is in no way limited to the details of such embodiments or to the specific examples described, but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed my invention, what I claim is:

1. A device for regulating the fuel supply of an internal combustion engine having a fuel control member, comprising a stop member connected with said control member and adapted to move from a position corresponding to the idling position of said control member through a full-load position up to an overload position thereof, a control stop cooperating with said stop member and adapted to be movable so that the stroke of said stop member coming from the idling position will thereby be limited intermediate, the full-load and overload positions, and means responsive to the speed of the engine for moving said control stop to restrain the stroke of said stop member when in the full-load position thereof and with the engine running at relatively higher speeds and to oppose the stroke of said stop member when exceeding said full-

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load position at least by an increased resistance to such movement, while permitting said stop member to be substantially freely adjusted up to the overload position with said engine running at relatively lower speeds, said speed responsive means consisting of a pressure-responsive member directly connected to said control stop, a cylinder associated with said pressure-responsive member, and means for supplying a hydraulic agent from said engine to said cylinder by an engine driven pump.

2. A device as defined in claim 1, wherein the fuel control member and said pressure-responsive member together form an integral element slidable in said cylinder.

3. A device as defined in claim 1, further comprising a throttling connection intermediate said supply means and said cylinder.

4. A device as defined in claim 3, wherein said supply means terminate at the outside of the pressure-responsive member, and a pressure chamber provided intermediate one end of the pressure-responsive member and the cylinder, said throttling connection consisting of a groove in said pressure-responsive member.

5. A device as defined in claim 1, further comprising a housing forming said cylinder, said housing comprising two parts screwed together, one of said parts forming a cylinder bore, and the other part forming a cylinder cover enclosing a pressure chamber and provided with a pair of stop members, an inlet member for supplying a hydraulic medium intermediate said pair of stop members and on said housing, said pressure-responsive member being slidable within said cylinder bore and having a control stop at one end, the other end of said pressure-responsive member forming a piston surface and limiting the extent of said pressure chamber, said pressure-responsive member having a recess, means for connecting said recess with said inlet member, and throttling means connecting said recess with said pressure chamber.

6. A device as defined in claim 5, wherein said throttling means are formed by a groove in the peripheral surface of said pressure-responsive member.

7. A device as defined in claim 1, further comprising a retarding mechanism for retarding the movement of said control stop.

References Cited in the file of this patent

UNITED STATES PATENTS

2,077,555	Frantz	Apr. 20, 1937
2,111,284	Gill et al.	Mar. 15, 1938
2,455,573	Fant	Dec. 7, 1948
2,527,177	Dach	Oct. 24, 1950