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CONTROL DEVICE FOR SOLID-INJECTION INTERNAL-COMBUSTION ENGINES

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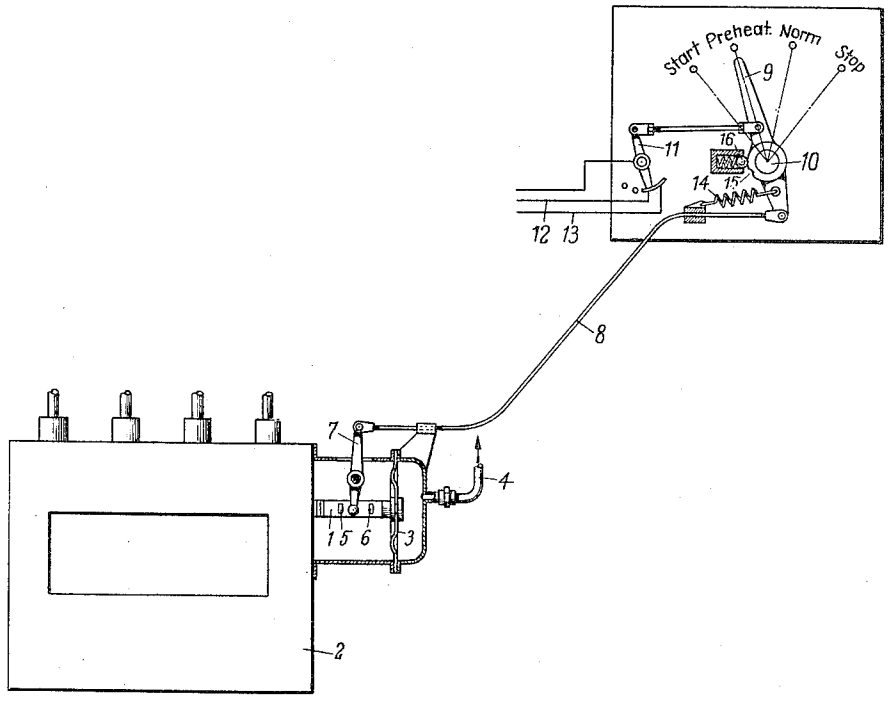

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CONTROL DEVICE FOR SOLID-INJECTION INTERNAL-COMBUSTION ENGINES

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This invention relates to a control and operating device for internal combustion engines, particularly solid-injection internal combustion engines adapted for use in motor vehicles and it is an object of the invention to facilitate and simplify operation of the engine by providing simplified control and operating devices. Another object of the invention is to provide an especially suitable combination of operating controls for the starter and for the fuel-metering device.

An important object of the invention is to provide mutual engine controls for stopping the engine, for actuating the starter and for setting the engine fuel controls to an overload volume, intended for starting, under a single operating member.

According to another feature of the invention starting the starting device and setting the fuel controls to an overload or starting position takes place simultaneously by setting said operating member to a mutual starting position.

A further feature of the invention makes provision for an especially suitable controllability of the operating member permitting to set it to preliminaries to starting, for example, to preheating by a cut in of incandescent glow plugs or such like, particularly in such a manner that said operating member can be set consecutively into stop position, normal position, position for preliminaries to starting and starting position. A still further feature of the invention relates to a spring supported device which is adapted to return said operating member from starting position or position for preliminaries to starting again to normal position. According to another feature of the invention provision can be made by suitable stops that the normal control (by the operator or automatically) of an amount of fuel between an amount for idling and an amount for full load can take place unaffected by said operating member, when the same is in its normal position.

Other objects and advantages of my invention will be brought out during the following description of the form of my invention which I have chosen to illustrate the features, principles, and advantages thereof. On the drawing is shown a schematic layout of the control device provided by the invention. The fuel-metering control member 1 of the fuel injection pump 2, for example, for an automotive Diesel engine is actuated, during normal operation, by a diaphragm 3 whose one side, through a line 4, is in communication with the intake manifold of the engine in such a manner that in a known manner

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the pressure below atmospheric behind a throttle valve (which can be set by the driver) in the intake manifold affects the diaphragm 3. Accordingly, with the throttle in closed position the diaphragm 3 is drawn rightwards, whereby the fuel-metering control member 1, for example, a rack adapted to turn the piston plungers, sets the controls for fuel delivery to an amount for idling, whereas with the throttle in open position, hence lesser pressure below atmospheric, the fuel-metering control member 1 is shifted leftwards to full-load volume. The fuel-metering control member 1 is provided with two stops 5 and 6 between which a lever 7 may freely play within certain limits. The lever 7, by means of a Bowden wire 8, a linkage or the like, is connected with a hand lever 9 supported on a shaft 10. The lever 9 may be set into four positions being designated on the drawing by "Stop," "Normal," "Preheating" and "Start." Coupled to the lever 9 is a further lever 11 which may be arranged directly on the shaft 10 or, as shown on the drawing, on a parallel shaft. The lever 11 serves as shift lever for the electric circuit and in position "Preheating" closes an electric circuit 12 for the incandescent glow-plugs and in position "Start" a circuit 13 for the starter. Eventually, provision may also be made for an arrangement in which the current still flows through all or at least several of the incandescent glow-plugs during actuation of the starter. A tension spring 14 returns the lever 9 into the normal position when the said lever (for example, manually set to preheating or starting) is released by the driver. A ball 16 drops into a socket 15 so that in effect the normal position is positively positioned and can not be passed. Whereas when the lever is moved into "Stop" position it is kept there by the spring 14. The electric circuits 12 and 13 controlled by the lever 11 are disconnected in the "Normal" and "Stop" positions of the lever 9.

Owing to the distance between the stops 5 and 6, the fuel-metering control member 1 will not be moved by the lever 7 when the lever 9 is in "Normal" position. Eventually, the same applies also for the "Preheating" position shown on the drawing. Whereas, when the lever is brought into "Starting" position then the fuel-metering control member is shifted by the stop 5 to "Starting" or overload volume exceeding the full-load volume. As the lever 9 is moved into "Stop" position, the fuel-metering control member 1 is shifted rightwards by the stop 6 and therewith the fuel delivery cut out.

In accordance with the broader aspects of the

invention various different embodiments of the invention may be employed within the scope of the accompanying claims.

What I claim is:

1. Control device for injection internal combustion engines comprising, a control device for regulating the amount of fuel between a stop position and an overload amount exceeding the normal full-load position, a starting device, an operating member, means for actuating said starting device by said operating member, and means connected to said operating member and adapted to shift the said control device when adjusted in one direction to the stop position and when adjusted in the other direction to the overload position.

2. Control device for injection internal combustion engines comprising, a control member for regulating the amount of fuel, a starting device, an operating member, means for shifting said control member by said operating member and means for actuating said starting device by said operating member, said operating member being shiftable in such a manner that in one position of said operating member said control member for regulating the amount of fuel is set to stop position and in a second position said starting device is switched in and simultaneously said control member for regulating the amount of fuel is set to an overload amount exceeding the full-load setting.

3. Control device according to claim 1 including, a device for facilitating to starting and means for actuating also said device by said operating member.

4. Control device according to claim 1 including, a device for preheating the combustion chamber of the engine and means for actuating also said device by said operating member.

5. Control device according to claim 2 including, a device for facilitating to starting and means for actuating also said device by said operating member in such a manner that the positions are consecutively as follows: stop position, normal position in which none of said devices is actuated, position for facilitating to starting and starting position in which said control member for regulating the amount of fuel is simultaneously set to overload amount.

6. Control device for injection internal combustion engines comprising, control device for regulating the amount of fuel between a stop position and an overload amount exceeding the normal full-load position, a starting device, an operating member, means for actuating said starting device by said operating member and means for shifting said control device for regulating the amount of fuel by said same operating member wherein said control device for regulating the amount of fuel comprises, a control member, means for shifting said control member independently of said operating member, stop means on said operating member and stop means cooperating with said latter stop means on said means for shifting said control member dependent upon said operating member and wherein such a play is provided between said stop means that said control member can be freely shifted by said shifting means independently of said operating member in a normal control range between no-load position and a normal full-load position without being interferred with by said stop means if said operating member is in an intermediate normal position, however, said stop means come into operating position and shift said control member into a stop respectively overload position when said operating member is shifted into corresponding positions.

7. Control device according to claim 6, wherein said control member for regulating the amount of fuel is an axially shiftable member and said stop means are formed by two stops on said last member and a lever coupled with said operating member and forming part of the shifting means, said lever being shiftable between said two stops and in its end position permitting to carry along said control member by means of said stops.

8. Control device according to claim 1 in combination with spring supported means by which said operating member is brought from an actuating position for said starting device back into a non-actuating position.

9. Control device according to claim 2 including, a normal position of said operating member between stop position and starting position in combination with spring supported means by which said operating member is brought from starting position back into normal position.

10. Control device according to claim 2 including, a normal position of said operating member between stop position and starting position in combination with spring supported means by which said operating member is brought from starting position back into normal position, said last means are arranged in such a manner that by setting said operating member to stop position, the same is held in this position by said spring supported means.

11. Control device according to claim 1 including, a normal position of said operating member between a position in which said starting means is actuated and a position in which said control device for regulating the amount of fuel is in stop position, in combination with a spring supported click device by means of which said operating member is kept in normal position.

12. Control device according to claim 2, including a device for preheating the combustion chamber of the engine and means for actuating said preheating device from said operating member in such a manner that the positions occupied are consecutively as follows: Stop position, normal position in which none of said devices is actuated, position for preheating the combustion chamber, and starting position in which said control member for regulating the amount of fuel is simultaneously set to overload amount.

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