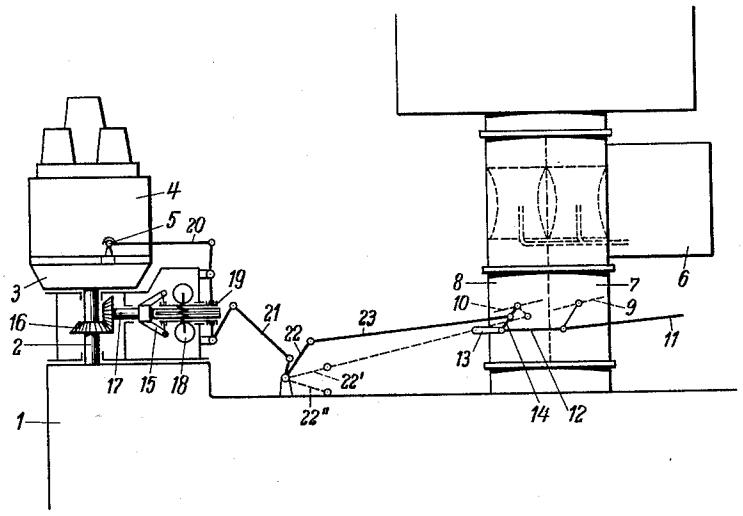
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CONTROL DEVICE FOR INTERNAL-COMBUSTION ENGINES

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CONTROL DEVICE FOR INTERNAL-COMBUSTION ENGINES

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This invention relates to a control device for internal combustion engines and more particularly to a control device adapted for use in automotive-vehicle engines. Objects of the present invention are preferably to provide a simplified control mechanism and an improved manner of action of the same.

The development of engines particularly of internal combustion engines serving as power plants for automotive vehicles leads more and more to automatic operation. Due to this tendency the engines are more and more provided with automatic operating controls. Particularly noticeable is a trend to establish control devices on various parts of the engine dependent upon the speed. Thus it is, by way of example, desired in carburetor engines to affect the carburetor by way of the speed, eventually, in connection with the load in order to obtain greater economy on the one hand and maximum power on the other hand. The same applies to the ignition timing, and in a corresponding manner to diesel engines. Furthermore, in order to secure smoothness of operation, or to prevent overrunning of the engine there are, by way of example, control devices provided which, as a definite speed is exceeded, effect a throttling down or stopping of the engine.

In order to simplify the arrangement and operation of those control devices necessary for the above described purpose, the invention provides an arrangement wherein a speed governor, for example, a mechanical governor is used mutually for several devices to be controlled dependent upon the speed. Applied to carburetor engines such a governor may, by way of example, control the fuel-air mixture by controlling the throttle valve (for example, of an auxiliary carburetor, eventually, in connection with a partial control of the throttle valve of a main carburetor) and further also ignition timing (for example, by controlling the distributor). By interposing corresponding transmission agents, linkages, lost motions, or the like, the control may be accommodated to the respective control function as necessary for each case.

In the accompanying drawing one form of the invention is illustrated schematically by way of example. The ignition distributor 3 is driven from the crank or camshaft of the internal combustion engine 1 by means of a vertical shaft 2. The housing 4 of the distributor 3 may be moved in rotational direction by the lever 5 to advance or retard the spark. The carburetor 6 of the internal combustion engine, for example, a down-

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draft carburetor has two air inlets 7 and 8 whose area may be controlled by throttles 9 and 10 respectively. The throttle 9 serving as main control is operated by a linkage 11, for example, by the accelerator pedal. The linkage 11 on the other hand is connected to the auxiliary carburetor throttle 10 by means of a link 12 embracing the lever 14 (of the throttle 10) with a lost motion 13 whereby under normal conditions the throttle 10 is not operated by the linkage 11. The air inlet 7 is, for example, so proportioned that its area is only sufficiently large enough for the capacity of the engine in the lower speed range. Hereby it is rendered possible to assure improved engine behavior at part-load conditions and also smooth transition in the course of the combustion process when the throttle is suddenly opened or closed.

However, in order to obtain the necessary area for the air passage at higher speeds, the air inlet 8 is now automatically cut in at higher respectively rising speed. Furthermore, in order to effect this cutting in and at the same time a change of ignition timing from retarded to advanced spark a speed governor 15 is provided which, by way of example, is arranged on a secondary shaft 17 driven from the distributor shaft by a pair of bevel gears 16. This speed governor 15, as its fly weights 18 move outward, actuates a control sleeve 19 for the mutual control of the linkage 20 for the ignition distributor and for a linkage 21, 23 coupled by the bell-crank 22 for the throttle of the auxiliary carburetor. The lever 22 being so arranged that at rising speed it effects an opening of the throttle 10 at first up to the dead-center position 22' and then in sequence a closing of the throttle as the control movement advances up to the position 22'', the point 22'' being a position corresponding to a definite upper limit speed permissible for the engine. If, at this speed, the throttle valve 9 is also in part-open or wide-open position then, as this speed is exceeded, the throttle 9 is also actuated in a closing direction by means of the link 12. For this purpose the linkage 11 may be provided with elastic play.

Changing the ignition timing from retarded to advanced spark may, with rising speed, take place continuously or, eventually, also according to another desired principle, by way of example, when the engine exceeds the number of revolutions corresponding to the position 22' of the lever 22, the ignition timing may (for example, by engaging an elastic play in the linkage 20 or by corresponding arrangement of linkage motions) be

kept constant or essentially constant or in sequence changed to retarded spark. If further control devices depending for their operation upon the engine speed are contemplated on the engine or drive they may likewise be connected to the mutual governor. The invention in spirit and scope is, for example, also applicable to diesel engines.

It will be obvious that the details of construction may be varied from those shown in the drawings. I therefore do not limit myself to such details.

What I claim is:

1. In an internal combustion engine, a first device to be controlled dependent upon the engine's speed, at least a second device to be controlled dependent upon the engine's speed, a mutual speed governor for both said devices, and mutually independent means for actuating both said devices, one of said devices comprising a fuel supply control device for the engine, said one device and said means for the actuation thereof being so constructed and arranged that as the engine's speed increases the fuel delivery increases up to a predetermined speed beyond which the delivery decreases sequentially.

2. In an internal combustion engine, a carburetor, a control device for said carburetor to be controlled according to a given principle, an auxiliary carburetor, a control device for said auxiliary carburetor, a speed governor depending for its action upon a change in engine speed, means for controlling said control device for said auxiliary carburetor by said speed governor, a further device to be controlled dependent upon the engine speed and means independent from said first means for actuating said further device by the action of said speed governor according to a principle different from that of said first control device.

3. In an internal combustion engine, the combination according to claim 2, said last recited control device being the device for controlling the ignition timing of the engine.

4. In an internal combustion engine, the combination according to claim 2, further including: linkage means connecting said control device for said carburetor with the said control device of said auxiliary carburetor and including a lost motion connection whereby upon actuation of one of said control devices the other one of said control devices cooperates therewith over only a part of the entire control range.

5. In an internal combustion engine, a control device for controlling the fuel charge, a control device for controlling the ignition timing, a speed governor depending for its action upon a change in engine speed, means for actuating said first recited control device by the action of said speed governor and means for actuating said second recited device by means of said speed governor independently of said first recited device, wherein said first recited control device and said means serving for its actuation are developed in such a manner that as the speed is increased the fuel delivery is at first increased and when a definite speed is exceeded in sequence decreased.

6. In an internal combustion engine, a speed governor, an ignition distributor, a fuel supply control device, means for transmitting the control movements of the speed governor to the distributor thereby to actuate the said distributor substantially in proportion to the speed of the governor, and means for transmitting the control movements of the speed governor to the fuel supply control device thereby variably to actuate said device first in one direction and thereafter in the opposite direction of movement.

7. In an internal combustion engine, a carburetor, a control device for said carburetor to be controlled according to a given principle, an auxiliary carburetor, a control device for said auxiliary carburetor, a speed governor depending for its action upon a change in engine speed, means for controlling said control device for said auxiliary carburetor by said speed governor, a further device to be controlled dependent upon the engine speed and means for actuating said further device by the action of said speed governor according to a principle different from that of said first control device.

8. In an internal combustion engine, the combination according to claim 7, said last recited control device being the device for controlling the ignition timing of the engine.

9. In an internal combustion engine, the combination according to claim 7, further including: linkage means connecting said control device for said carburetor with the said control device of said auxiliary carburetor and including a lost motion connection whereby upon actuation of one of said control devices the other one of said control devices cooperates therewith over only a part of the entire control range.

10. In an internal combustion engine, a first device to be controlled dependent upon the engine's speed, at least a second device to be controlled dependent upon the engine's speed, a mutual speed governor for both said devices, and means for actuating both said devices, one of said devices comprising a fuel supply control device for the engine, said one device and said means for the actuation thereof being so constructed and arranged that as the engine's speed increases the fuel delivery increases up to a predetermined speed beyond which the delivery decreases sequentially.

11. In an internal combustion engine, a carburetor, a first device for controlling said carburetor according to a given principle, an auxiliary carburetor, a second device for controlling said auxiliary carburetor, a speed governor depending for its action upon a change in engine speed, means for controlling said second device from said speed governor, a third device for controlling the ignition timing of the engine according to the engine speed, means for controlling said third device from said speed governor according to a principle different from that of said first device, and linkage means connecting said first device with said second device and including a lost motion connection whereby upon actuation of one of said first and second devices the other cooperates therewith over only a part of the entire control range.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,072,696	Burghoffer	Sept. 9, 1913
1,186,037	Purdy	June 6, 1916
1,819,743	Duncan	Aug. 18, 1931
2,315,183	Bicknell et al.	Mar. 30, 1943
2,621,482	Meade	Dec. 16, 1952