

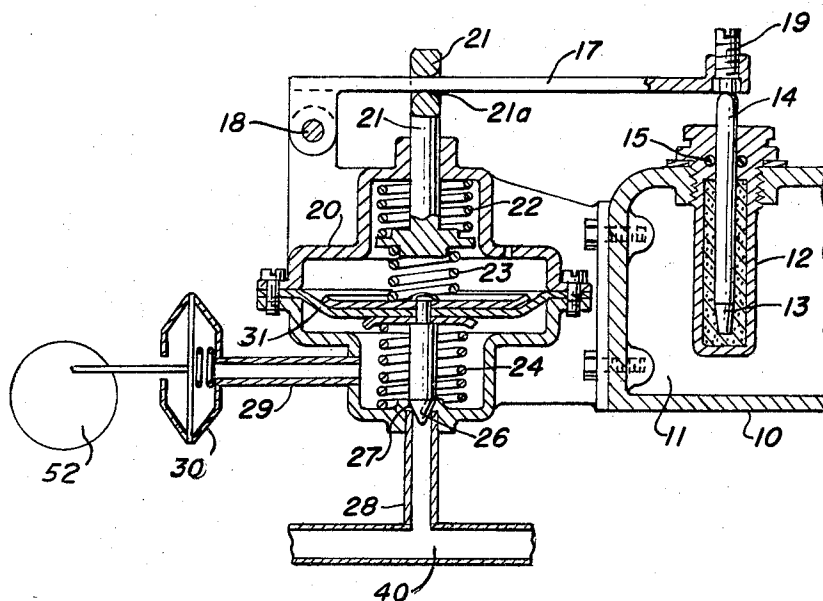
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SPARK TIMER FOR INTERNAL COMBUSTION ENGINE

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SPARK TIMER FOR INTERNAL COMBUSTION ENGINE

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6 Claims

ABSTRACT OF THE DISCLOSURE

This invention pertains to a means of controlling the suction operated spark advance on an internal combustion engine to varying degrees by a temperature actuated suction regulator between the engine intake manifold and the suction operated spark advance motor to give a limited and adjustable and variable suction operated spark advance with a cold motor as it warms up compared to the suction operated spark advance with a hot motor at similar part throttle operation. This provides lower exhaust emissions during warm up, faster warm up, and faster heater operation among other advantages.

An object of this invention is as stated in the abstract.

Another object of this invention is the use of a heat sensitive motor such as wax to provide a variable control of the regulation of the suction magnitude going from the intake to the suction operated spark advance motor.

Another object is to have yielding means for urging a limited suction control in a regulator between the intake manifold and the suction actuated spark advance mechanism in combination with a temperature sensitive motor connected to an engine developed temperature such as exhaust or cooling water and having said motor (which could be wax, etc.) buck said yieldable means to greatly reduce it at selected engine temperatures for an almost unregulated intake suction past said regulator to said suction operated spark advance motor for normal spark advance with a warmed up motor and a variable degree of relative retard with a motor operating below a selected temperature or a cold motor.

Other features of this invention will be pointed out in the accompanying specification and claims.

I have illustrated my invention by way of example in the accompanying drawing, which is a plan view, partly in section, of one form of the invention.

I have shown an engine 10 with cooling water 11 in which a temperature sensing motor unit 12 is emersed. Suitable material, such as wax 13, provides the motive power to push plunger 14 upward at about a predetermined temperature. A seal, such as O-ring 15, may be used if necessary or a diaphragm between plunger 14 and housing 12, as selected. Arm 17 is pivoted at 18 and causes adjustment screw 19 at the end to contact plunger 14. Suction regulator 20 supports plunger 21 with a slot 21a to engage arm 17 so as to move with that portion of arm 17 in contact with slot 21a. Spring 22 is strong enough so that when plunger 14 is down in the cold engine position as shown the force on springs 23 and 24 is such that there is considerable pressure on spring 23 against spring 24 so that there will be a regulation of pressure between tube 28 that goes to the engine intake and tube 29 going to the suction operated spark advance motor 30 to give a greatly reduced suction to operate said spark advance mechanism with a cold motor than with a hot motor. Much less suction on the lower side of diaphragm 31 is necessary in line 29 and the area under diaphragm 31 to close valve 26 when pressure from spring 23 backs the diaphragm 31 hold up force of spring 24 so valve 26 will close on less pressure in line 29 when

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the engine is cold, as shown, than when hot and spring 24 bucks all the pressure dwelling in the intake manifold 40 on cruises and idle, so valve 26 will not close on idle or cruises from intake suction.

As the temperature of the motor 10 increases and plunger 14 rises to its hot engine position where plunger 21 will rise reducing the pressure on spring 23 above diaphragm 31 so that spring 24 urges diaphragm 31 upwardly so that operating (idle and cruise) manifold suction at line 28 will produce no valve 26 closing then line 29 will operate at substantially full intake manifold suction and normal suction operated spark advances will take place with a warmed up motor. There will also be the governor operated spark advances as a function of engine speed which is usual with a governor under the breaker cam in the distributor 52.

As the temperature of the motor 10 decreases, as when standing overnight in a cold garage, the wax in container 12 will contract and the plunger 14 will be lowered, allowing spring 22 to push on the flange of stem 21 and in turn on spring 23 with a force such that the suction in line 28 from the intake manifold will be regulated by valve 26 so that much less than full intake manifold suction will go out through line 29 through the vacuum operated spark retard, not shown. In this way when the engine is cold by the construction and design of the springs 22, 23, 24 and the adjustment screw 19 in arm 17 the suction at cold idle in the intake manifold could be around 12" to 14" Hg and the regulated suction in line 29 might be only 6" to 7" of Hg., giving a portion of the vacuum operated advance while the engine is cold and giving the full vacuum advance with no regulator action when the engine is warmed up.

The regulator motor 20 is secured to pivot 18 and temperature sensing motor 12 by suitable brackets to maintain the relative position between them. Line 28 may go to the intake manifold or to the spark advance port just above the high edge of a carburetor butterfly or to a speed sensing valve as shown in my pending application Ser. No. 593,363, entitled "Spark Timing Control," dated Nov. 5, 1966.

I have illustrated my invention in these various forms; however, many other variations may be possible within the scope of this invention.

To those skilled in the art to which this invention relates many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. The disclosures and description herein are purely illustrative and are not intended to be in any sense limiting.

I claim as my invention:

1. A pressure regulator comprising an exhaust conduit, an inlet conduit, a valve mounted for movement to control the flow of fluid through one of the conduits, vacuum operated means for moving said valve in response to either of a pair of pre-selected vacuum ranges, and heat responsive means for selecting one of said ranges.

2. A device as defined in claim 1 wherein the means for moving said valve comprises a housing, a flexible diaphragm mounted in the housing and dividing said housing into a pair of chambers, means mounting said valve on said diaphragm, yieldable means in one chamber for moving the diaphragm in one direction, and yieldable means in the other chamber for moving the diaphragm in the opposite direction.

3. A device as defined in claim 2 wherein the yieldable means in the other chamber comprises a plunger, a spring between the plunger and diaphragm, and a spring between the housing and diaphragm.

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4. A device as defined in claim 3 wherein the heat responsive means comprises a lever pivoted on the housing, means pivotally connecting the plunger to the lever, and a heat responsive brake for holding the lever against pivoting at a selected temperature range and for releasing the lever for pivoting at a selected higher range.

5. A device as defined in claim 4 wherein the brake comprises a housing, a plunger reciprocally mounted in the housing, and a heat softenable material in the housing for preventing movement of the plunger below the softening temperature of the material.

6. A device as defined in claim 5 wherein the material is wax.

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References Cited

UNITED STATES PATENTS

1,785,902	12/1930	Hardman	123—117
2,394,792	2/1948	MacMillan	123—117.1
2,809,619	10/1957	Norris	123—117.1
2,876,754	3/1959	Obermaier	123—117

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