

April 25, 1961

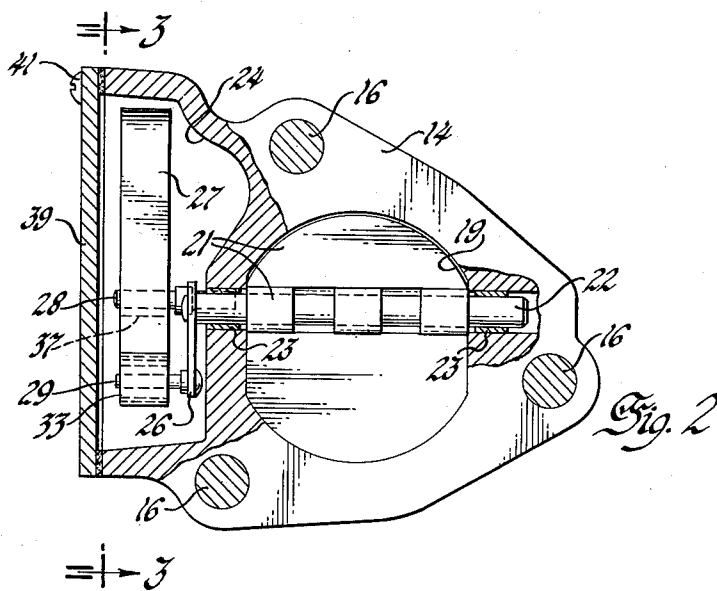
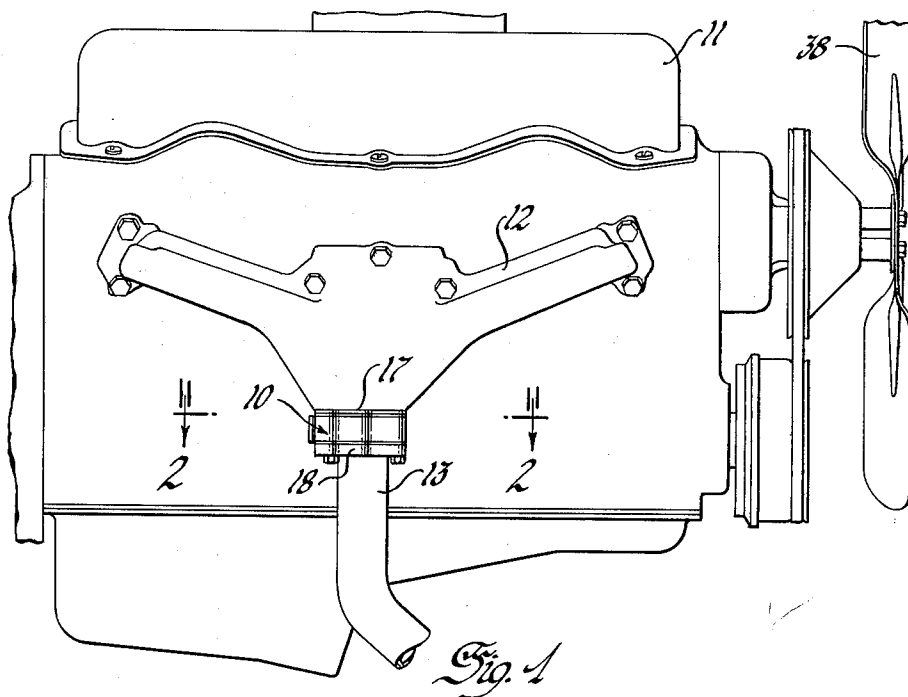
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HEAT CONTROL VALVE

Filed Dec. 16, 1957

2 Sheets-Sheet 1



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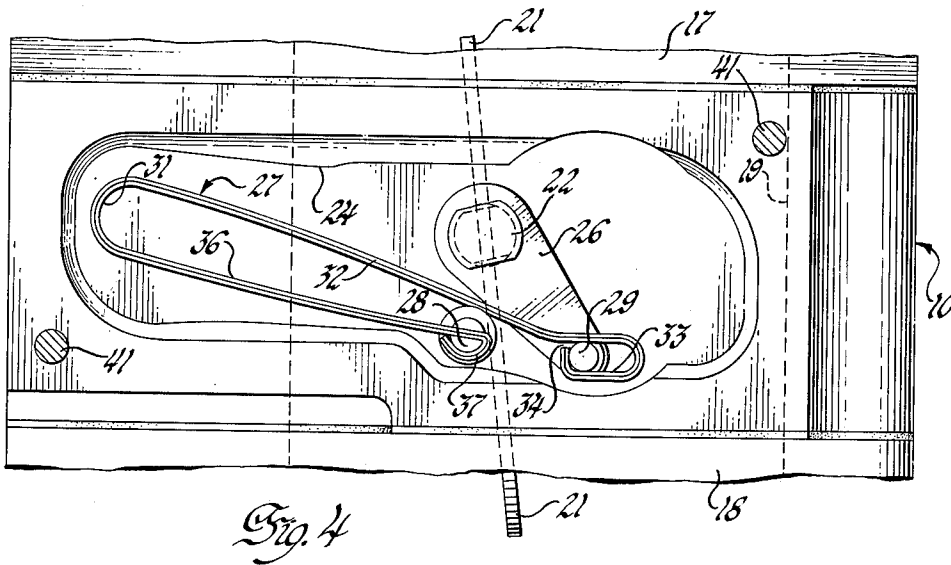
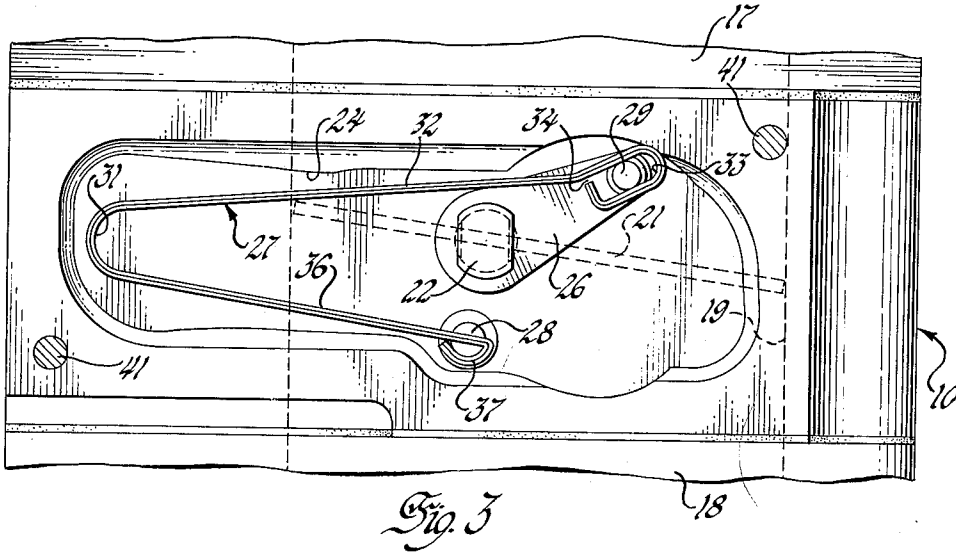
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HEAT CONTROL VALVE

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1 Claim. (Cl. 236—101)

This invention relates to heat control valves for engines and has particular relation to a heat control valve especially applicable for use with V-type 8 cylinder internal combustion engines for automotive use.

It has been customary heretofore to employ spiral thermostats and counterweights in the construction of heat control valves for engines for motor vehicles. The counterweights have been considered necessary to open the valves, the spring characteristics of the thermostats being required to close the valves. The thermostats and the counterweights have been considered to cooperate in providing means to prevent noise resulting from the vibration of the valves under the impact of the pulsating flow of the engine exhaust.

It is proposed to eliminate such counterweights and such spiral thermostats and to provide a new and simplified arrangement of elements which will prevent objectionable noise and vibration and open and close the heat control valve employed in controlling the flow of exhaust gas from the engine.

In the drawing:

Figure 1 is a side elevational view of an engine employing a heat control valve embodying the principles of the invention.

Figure 2 is a cross sectional view of the heat control valve taken substantially in the plane of line 2—2 of Figure 1 looking in the direction of the arrows thereon.

Figure 3 is a cross sectional view of the heat control valve taken substantially in the plane of line 3—3 of Figure 2 and showing the thermostat and valve in one operative position.

Figure 4 is a view similar to Figure 3 but showing the thermostat and valve in another operative position.

The heat control valve 10 embodying the invention is adapted to be employed with a V-type 8 cylinder internal combustion engine 11 of the type now generally employed in the propulsion of motor vehicles.

The engine 11 may have pairs of rows of cylinders each exhausted by an exhaust manifold such as that indicated at 12. A cross over passage is formed between the manifolds 12 and through the engine heads to convey the exhaust gas from one row of cylinders to the exhaust manifold for the other row of cylinders. The exhaust gas heats the induction system of the engine when the engine is started cold. When the engine is warm each of the exhaust manifolds may discharge to the atmosphere through exhaust conduits such as that indicated at 13.

The heat control valve 10 includes a body 14 adapted to be secured by bolts 16 between the outlet 17 leading from the exhaust manifold 12 and the flanged inlet 18 of the exhaust conduit 13. The body 14 has a transversely extending passage 19 therein which forms a continuation of the exhaust conduit means provided by the exhaust manifold 12 and conduit 13. The passage 19 is adapted to be controlled by an unbalanced valve 21 secured on a shaft 22 mounted in bearings 23 formed in the body 14 on opposite sides of the passage 19. One end of the shaft 22 projects through a dividing wall in the body 14

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and into a cavity 24 formed in one side of the body. An arm 26 is rigidly secured to the end of the shaft 22 within the cavity 24 for operating the valve 21 within the passage 19. A bi-metal thermostat 27 is also disposed within the cavity 24, one end of the thermostat being rigidly secured to a stud 28 projecting into the cavity 24 from the body 14, the other end being pivotally secured to a pin 29 projecting from the outer end of the arm 26. The thermostat has a bend 31 between the ends thereof, the bend being positioned so that the end 32 secured to the arm 26 will tend to move concentrically about the axis of the bend. In order to permit such movement the end 32 is provided with an elongated resilient loop 33 in which the pin 29 extends, the loop being formed to provide a gap at 34 when the pin 29 is projected into the loop 33. The gap 34 causes the loop 33 to frictionally engage the exterior surface of the pin 29 to provide an anti-rattle spring form of connection between the thermostat 27 and the arm 26. The opposite arm 36 of the thermostat 27 is also provided with loop 37 which tightly engages the pin 28 when one side of the loop is inserted in a slot in the stud 28. The stud 28 is rigidly mounted in the body 14 so that the end 36 of the thermostat is secured to the stud 28 against rotation in either direction.

When the engine 11 is not in operation the valve 21, arm 26 and thermostat will be in the relative positions indicated by Figure 3. In such positions the thermostat 27 will apply force to the arm 26 to close the valve 21 in the passage 19 against the force of gravity and against the flow of exhaust gas through the passage 19 from the exhaust manifold 12 to the exhaust conduit 13. Under such circumstances and when the engine is started cold the exhaust gas will flow across the engine to the opposite exhaust manifold of the engine and to the atmosphere through the exhaust conduit leading therefrom. At such time the engine fan 38 will be circulating air over the engine and around the part of the exhaust conduit means embraced within the body 14. However, the air being circulated will not tend to cool the thermostat 27 to prevent the thermostat from commencing to open the valve 21. The location of the thermostat within the cavity 24 prevents such circulating air from contacting the thermostat. As the engine becomes warmer the body 14 will tend to radiate heat to the thermostat 27 and the stud 28 and pin 29 will tend to conduct heat to the thermostat 27. The thermostat being located within cavity 24 will tend to be heated by such radiated and conducted heat and will tend to be shielded from radiating heat to other surrounding bodies by the body 14. As the engine continues to become warmer the configuration of the thermostat 27 will change by further relative movement between the opposite ends of the thermostat. The end secured to the pin 29 being free to rotate about the bend 31 will tend to move toward the opposite wall of the cavity 24 and toward the stud 28. The loop 33 will permit the eccentric movement of the arm necessitated by the arm 26 being shorter than the end 32 of the thermostat. However the gap 34 which provides resilient contact between the loop 33 and the pin 29 will tend to apply a brake to the pin 29 thereby preventing fluttering movements of the valve 21 and rattling of the connecting means between the thermostat 27 and the arm 26. As the valve 21 commences to open the exhaust gas will tend to flow through the passage 19 and this will tend further to accelerate the opening movement of the valve 21. However the thermostat 27 should be strong enough to prevent the force of gravity and flow of exhaust gas in the passage 19 from opening in the valve 21 until the flow of exhaust gas through the passage heats the body 14 to a predetermined extent. During the time required for so heating the body 14 heat will be continuously radiated and conducted to the thermostat 27 which will tend to further open the valve 21. When the body 14 reaches

the predetermined temperature required the valve 21 will be completely open within the passage 19 to provide a minimum obstruction to the flow of gas through the passage 19. When the valve 21 is entirely open the flow of exhaust gas through the cross-over passage previously referred to will decrease to such an extent that the induction system of the engine will not be excessively heated.

In order further to shield the thermostat 27 from the ambient air and from radiating heat to or from surrounding bodies it may be desirable to employ a cover 39 for closing the cavity 24. The cover may be removably secured to the body 14 by screws indicated at 41.

I claim:

A heat control valve for engines comprising a body having a passage therethrough and being adapted to be mounted in an exhaust conduit through which products of combustion from an internal combustion engine are exhausted to the atmosphere, a shaft mounted in said body and extending across said passage and having a valve mounted thereon within said passage and an arm mounted thereon without said passage, said valve on said shaft being an unbalanced valve tending by gravity to rotate said shaft with the flow of fluid therein from the closed to the open positions of said valve, said arm by gravity tending to rotate said shaft from said closed to said open positions of said valve, and a thermostat closing said

valve against the force of gravity affecting said valve and said arm and against the flow of fluid in said passage, said thermostat embracing a band having a pair of ends extending laterally from the open side thereof, said thermostat at one of said ends being secured rigidly to said body against rotation in either direction and at the other of said ends being movable in response to variations in temperature of said body, said other of said ends being pivotally connected to said arm and moving said arm and said valve into said closed position of said valve when said engine is inoperative and moving with said arm and said valve into said open position of said valve in response to the force of gravity and to the operation of said engine and to the flow of fluid in said passage and to a predetermined increase in the temperature of said body, said connection between said arm and thermostat comprising a pin on said arm and a resilient loop on said thermostat frictionally engaged with said pin thereby providing a damping effect on the movement of said valve.

References Cited in the file of this patent

UNITED STATES PATENTS

1,393,172	Seek	Oct. 11, 1921
1,869,553	Ellis	Aug. 2, 1932
1,989,909	Boydston	Feb. 5, 1935
2,005,869	Meinzinger	June 25, 1935
2,766,768	Brown et al.	Oct. 16, 1956