

Nov. 23, 1948.

D. ROSSMAN
AIR CONTROL DEVICE
Filed May 21, 1946

2,454,480

FIG. 1.

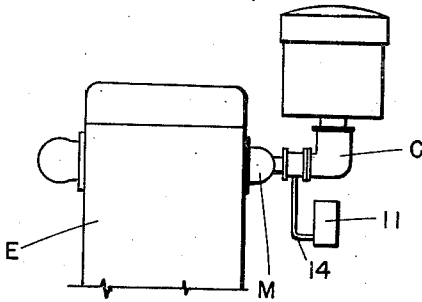


FIG. 2.

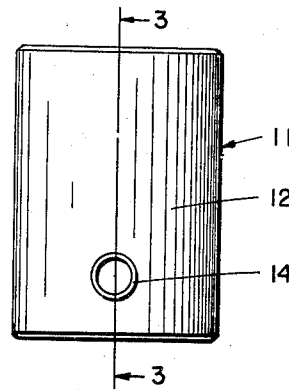


FIG. 3.

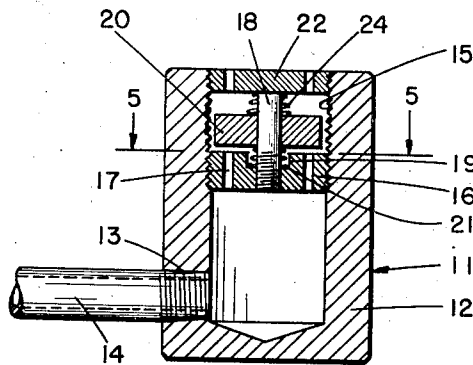


FIG. 4.

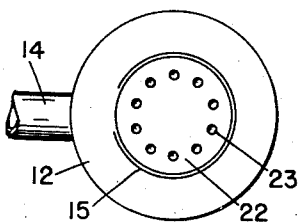
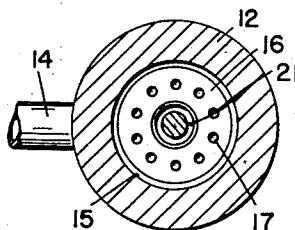


FIG. 5.



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2,454,480

AIR CONTROL DEVICE

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Application May 21, 1946, Serial No. 671,224

1 Claim. (Cl. 137—152)

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This invention relates to a device for use in automatically controlling the addition of air to the fuel mixture entering an internal combustion engine.

One object of my invention is to provide a simple automatic device for admitting additional air to the fuel mixture in an internal combustion engine when required. Another object is to provide an automatically acting valve device which will operate to shut off extra air supply when the engine is being started but permits entry of extra air at times, depending upon the vacuum produced by engine. Another object is to provide an auxiliary air mixing device which gives more efficient engine operation. These and other objects are attained by my invention which will be more fully described below, reference being made to the accompanying drawings, in which:

Fig. 1 is a side elevational view showing the manner of attachment of my air control device to the intake manifold of an internal combustion engine;

Fig. 2 is a side elevational view of the device;

Fig. 3 is a cross-sectional view thereof taken on the line 3—3 of Fig. 2;

Fig. 4 is a top elevational view;

Fig. 5 is a cross-sectional view taken on the line 5—5 of Fig. 3.

Referring to the drawings, a preferred form of my air control device 11 consists of a hollow cylindrical casing 12 closed at one end and having a hole 13 in the side near the closed end of the casing which is adapted for threaded engagement with the connecting tube 14. The hollow portion of the casing 12 is cylindrical and is provided with internal threads 15 extending for about half the depth of the cavity. An inside partition plate 16 is provided with outside threads on its edge adapted to fit the threads 15 of the cavity, this partition plate being disposed about midway in the cavity. The partition member 16 is provided with a series of holes 17 through the plate, these holes being arranged to allow the flow of air through the plate into the cavity below the plate, and disposed in the surface of the plate so that they are completely sealed off when the actuator plate is in direct contact with the top surface of the partition plate 16. An upwardly extending pin 18 is threaded into a hole in the central portion of the partition member 16, and a groove 19 is provided in the top surface of the partition around the pin 18, of sufficient size and depth to completely enclose the coil compression spring 21

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around the pin 18 when the contiguous surfaces are brought together. The actuator plate 20 is provided with a hole through its center for sliding freely on the pin 18, the actuator plate being smaller in diameter than the cavity in the casing 12 so that air may pass around the outside edges between the actuator plate 20 and the threaded walls of the cavity in the casing 12. The actuator plate 20 is proportioned so that it has a thickness of about one-eighth to one-fourth the diameter of the cavity in the casing 12 in order to provide a somewhat elongated annular passage way for air between the outside edge of the actuator plate 20 and the inside wall of the cavity of the casing. The variable force on the actuator plate created by the different rates of flow of air around said plate between the edge surface thereof and the inside wall of the casing 12, in addition to the difference in actual static pressures, is believed to be involved in the automatic valving produced in the position of the actuator plate relative to the orifices in the orifice plate. A closure disc 22 is provided with outside threads adapting it to be screwed into the threads 15 in the cavity walls of the casing, and this disc is also provided with a series of small holes 23 arranged to admit air from the outside. A coil compression spring 24 is placed on the pin 18 between the closure disc 22 and the moveable actuator plate 20 to prevent the latter from closing the orifices in said closure disc.

The actuator plate 20 is thus arranged between two light carefully adjusted compression springs 21 and 24, to allow the plate to move freely longitudinally on the pin 18 in the space between the inner surface of the closure disc 22 and the outer surface of the partition 16. The cross-sectional area of the holes 23 of the closure plate, the area of the annular opening between the edge of the actuator plate and the walls of the cavity of the casing 12, and the area of the holes 17 in the partition member 16 are selected to be approximately equal. The holes through the partition 16 and the plate 22 are distributed so that the flow of air therethrough will be substantially uniform over the cross-sectional area of the cavity of the hollow casing.

As indicated in Fig. 1, my air control device is for use on an internal combustion engine E, by connecting it through the connecting tube 14 to the intake manifold M of the engine between the engine and the usual carburetor C in which the primary mixing of the fuel and air is performed. The end of the casing 12 which is

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closed by the closure plate 22 is open to atmosphere and is directed upwardly. When the vacuum and/or the frictional air force are sufficiently high, the actuator plate closes the orifices, and at intermediate conditions the actuator plate takes intermediate valving positions to control the amount of auxiliary air admitted to the engine.

The admission of auxiliary air to the combustion chambers, depending upon the magnitude of the vacuum created by the engine and to the frictional force of the air moving around the actuator, gives better performance by the engine, smoother operation at all speeds, and greater fuel economy. My automatic device does not interfere with the operation of starting the engine nor with its operation while idling.

I claim:

An air control device comprising, a body having a cylindrical cavity closed at one end and having an outlet near said closed end adapted to be connected to an intake manifold of an internal combustion engine; a partition member having orifices therethrough disposed within said cavity, and having an axial pin extending toward the open end of said cavity, said orifices being arranged to be closed by a moveable actuator plate; an actuator plate having an axial hole and adapted to slide on said pin, said plate being smaller in diameter than said cavity to provide an annular passageway for air around

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its edges, said plate having substantial thickness in the range from about one-fourth to one-eighth of the diameter of said cavity; spring means adapted to hold said actuator plate at times out of contact with said partition member; closure means in the open end of said body cavity having orifices therethrough distributed over its area; and spring means adapted to hold said actuator plate out of contact with said closure means; the air conduits through said closure means, through said partition member, and in the annular space around said actuator plate being of approximately equal cross-sectional areas.

DAVID ROSSMAN.

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