Aug. 13, 1940. A. A. HEINZELMANN 2,211,011

VACUUM CONTROLLING DEVICE

Filed March 28, 1938 2 Sheets-Sheet 1

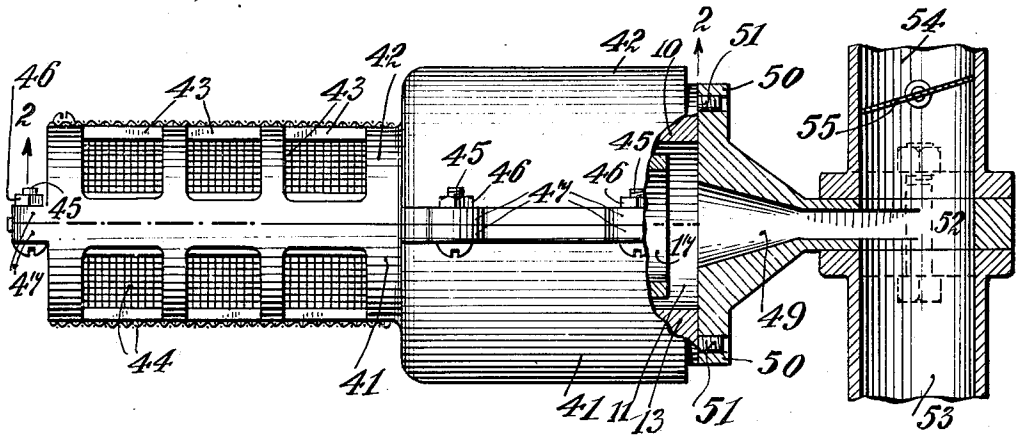


Fig. 1.

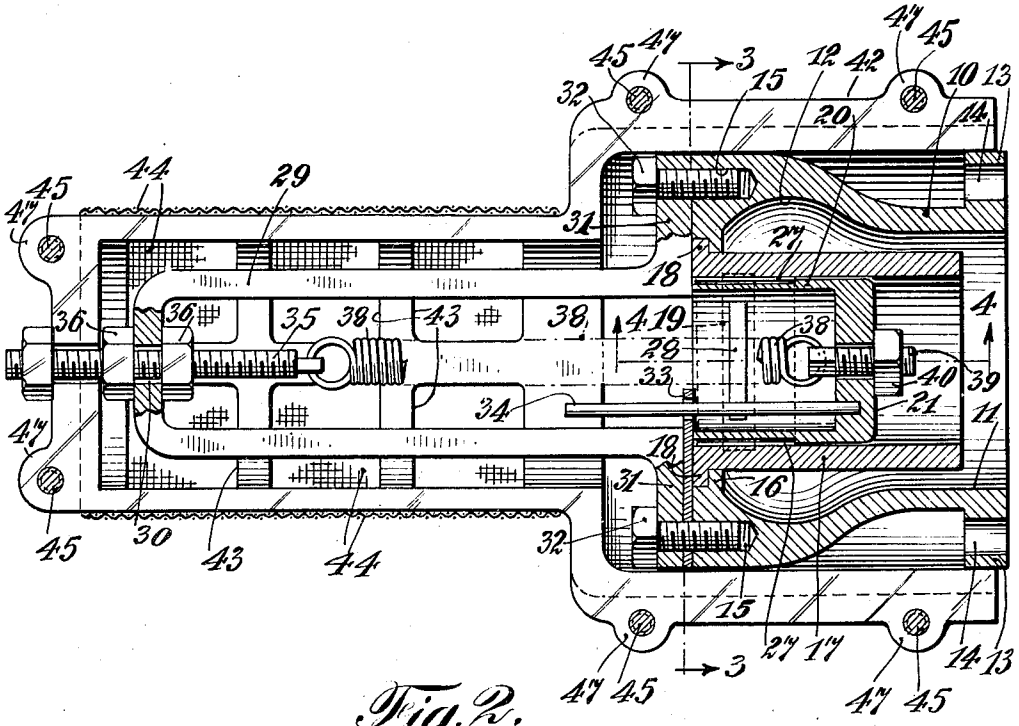


Fig. 2.

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INVENTOR.

Howard Greenman
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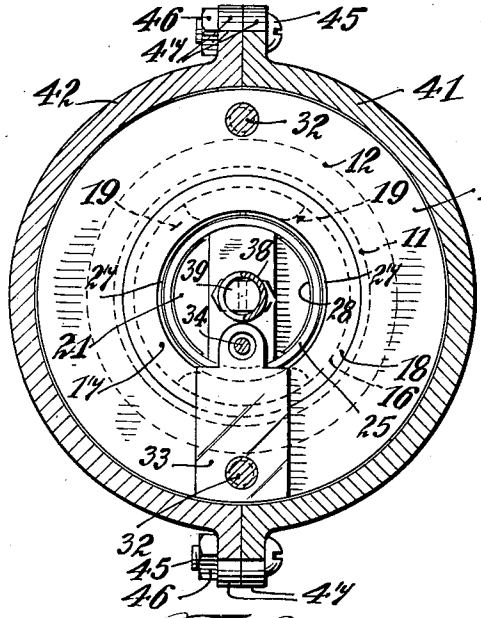


Fig. 3.

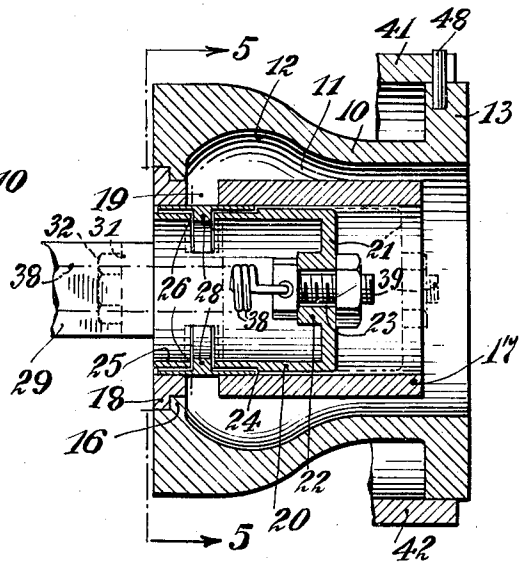


Fig. 4.

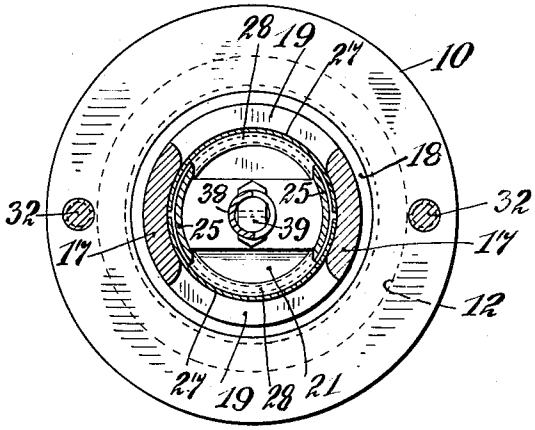


Fig. 5.

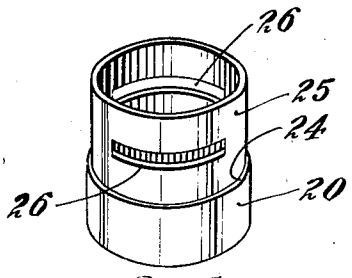


Fig. 6.

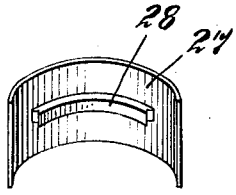


Fig. 7.

Alphonse A. Heinzelmann
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BY Marvin Pierce
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Patented Aug. 13, 1940

2,211,011

UNITED STATES PATENT OFFICE

2,211,011

VACUUM CONTROLLING DEVICE

Alphonse A. Heinzelmann, Rockville Centre, N. Y., assignor to Bludalk, Inc., New York, N. Y., a corporation of New York

Application March 28, 1938, Serial No. 198,615

1 Claim. (Cl. 137—153)

My invention relates to vacuum controlling devices and refers particularly to devices adapted for the control of gas mixtures introduced into internal combustion engines by means for automatically maintaining a practically constant vacuum in the intake manifold during deceleration irrespective of the speed of the engine.

When the speed of an internal combustion engine is decelerated, and especially when it is suddenly decelerated, by releasing the accelerator, the engine is rotating at a speed greater than its idling speed as it functions as a brake during this period of deceleration and hence, with the throttle closed, the vacuum in the intake manifold is greater than the vacuum at idling speed and this increased vacuum draws in a greater amount of gasoline than can be completely burned in the engine.

As a result of this over-feed of gasoline, the exhaust gases contain a large amount of unconsumed, or partially consumed, gases which have an irritating and obnoxious odor.

This undesirable effect is particularly noticeable in the case of large heavy vehicles such as trucks and busses.

The object of my invention is devices which will automatically control this vacuum during deceleration and maintain it at a practically uniform vacuum, thus preventing the feed of gasoline beyond the consuming capability of the engine during this period, and hence, obviating the production of obnoxious gases.

The novelty and effectiveness of my device will be evident upon a consideration of my specification and the accompanying drawings, in which similar parts are designated by similar numerals.

The accompanying drawings illustrate one form of the device of my invention.

Figure 1 is a side view of a device of my invention partly broken away for purposes of description.

Figure 2 is an enlarged section through the line 2—2 of Figure 1.

Figure 3 is a section through the line 3—3 of Figure 2.

Figure 4 is a section through the line 4—4 of Figure 2.

Figure 5 is a section through the line 5—5 of Figure 4.

Figure 6 is a perspective view of the piston valve.

Figure 7 is a perspective view of a floating valve.

The particular form of the device of my invention illustrated in the accompanying drawings comprises a cylindrical body portion 10 having a centrally positioned bore 11 therethrough. The upper portion 12 of the bore 11 is of concave formation, this portion of the bore having a greater diameter than the lower portion. The lower portion of the body 10 has an annular flange 13 carrying a plurality of openings 14, 14. The upper portion of the body 10 has a plurality of threaded recesses 15, 15 and an inwardly extended annular flange 16.

Positioned within the bore 11 of the body 10 and spaced from the side wall thereof is a cylindrical member 17 having an outwardly extended annular flange 18 adapted to abut upon the flange 16 of the body 10, the upper faces of the flanges 16 and 18 being in alignment. The cylinder 17 has a plurality of openings, or ports 19, 19 connecting the interior of the cylinder 17 with the space of the bore 11 between the cylinder 17 and the body 10.

Positioned within the cylinder 17 is an annular slidable piston valve 20, the closed end 21 of which has an inwardly extended flange 22 having an opening 23 therethrough. The valve 20 has an inwardly directed shoulder 24, the upper portion 25 of the valve thus having a less outside diameter than the outside diameter of the lower portion of the valve, this upper portion 25 having a plurality of elongated openings 26, 26 therethrough. Positioned around the upper portion 25 of the valve 20, are a plurality of annular floating valve members as 27, the vertical dimension of each of such floating member being slightly less than the dimension from the shoulder 24 to the top edge of the member 25. Each such valve member 27 has a projection 28 adapted to be inserted within an opening 26 of the valve member 25, the dimensions of the members 26 and 28 being such as to prevent the longitudinal and vertical movements of the valve member 27 with respect to the valve member 25, but allowing free inward and outward movement of the valve member 27.

The piston valve 20 and its accompanying elements are so positioned that the floating valves 27 are opposite the ports 19, 19 of the cylinder 17 and capable of opening and closing said ports during movements of the valve 20.

Positioned above the body portion 10 is a U-shaped bracket 29, the upper portion of which has a centrally positioned opening 30. The lower extremities of the bracket are extended outwardly forming feet 31, 31 which abut upon the upper face of the body 10, the upper edge of the

cylinder 17 and the upper edge of the valve piston 20. Each bracket foot 31 has an opening therethrough in alignment with a threaded recess 15 of the body 10, and hence a bolt 32 in each foot 31 fixedly attaches together the body 10, the bracket 29, and the cylinder 17 and limits the upper movement of the valve 20. One of the feet 31 has an inwardly extended lug 33 having an opening therethrough and a pin 34 passing through this hole and entering a recess in the bottom 21 of the piston valve 20 prevents a rotary movement of the valve 20 with respect to the cylinder 17.

A threaded rod 35 is passed through the opening 30 of the upper portion of the bracket 29 and is maintained in a predetermined position by the nuts 36. A coiled spring 38 is connected to the lower end of the rod 35, the other end of the spring 38 being attached to the threaded rod 39 threaded within the opening of the bottom 21 of the piston valve 20, the rod 39 being maintained in position by the nut 40.

Surrounding the device, as described, is a casing comprising two semi-annular segments each having a lower portion 41 and an upper portion 42, the latter having a plurality of openings 43, 43 therein, and I prefer to place a screen 44 around both portions 41 and 42 adapted to prevent the entrance of dust and other particles into the device. The two parts of the casing are affixed to each other by a plurality of threaded bolts 45, 45 and nuts 46, 46 passed through holes in a plurality of aligned lugs 47, 47 carried by the casing. A pin 48 is passed through an opening in the casing 41 and the flange 13 of the body 10, thus preventing the rotation of the casing around the other elements of the device.

A conical shaped adapter 49 having an annular flange 50 is fixedly attached to the body 10 by means of threaded bolts 51, 51. The constricted end of the adapter 49 enters the intake manifold 52, the portion 53 of which is the vacuum intake manifold and the portion 54 of which is the carburettor intake manifold, the latter having a usual throttle valve 55.

It will thus be seen that the vacuum from the vacuum intake manifold 53 will operate within the bore 11 of the body 10 and have a tendency to draw the piston valve 20 downwardly, the downward movement of this valve being governed against said vacuum pull by the tension of the spring 38.

In operation the tension of the spring is controlled by the rod 35 so that the upper edges of the floating valves 27, 27 will register with the upper edge of the cylinder ports 19, 19 of the cylinder 17 when the vacuum in the intake manifold is at engine idling speed. When in this position no air can pass through the cylinder ports 19, 19 as these ports are completely covered by the floating valves 27, 27 and the vacuum acting upon these valves holds them tightly against the face of the cylinder 17 insuring positive closure of the ports.

When the vacuum in the vacuum intake manifold becomes greater than that at engine idling speed, the vacuum will overcome the set tension of the spring and will draw the piston valve 20 downwardly, uncovering the ports 19, 19 and allowing air to pass therethrough, thus reducing the vacuum to engine idling vacuum, whereupon the piston moves upwardly again closing the ports 19, 19 and recovering the vacuum of idling speed.

It will thus be seen that if the vacuum increases slowly the device immediately moves with corresponding slow speed to admit the proper amount of air to maintain the set vacuum, and that if the vacuum increases rapidly the device immediately moves with corresponding rapid speed to maintain the set vacuum, and, hence, irrespective of the speed of increased vacuum the device will act automatically to immediately overcome this increase and maintain the vacuum at its predetermined and desired amount.

In order to further insure the rapidity and accuracy of the movements of the valve, I prefer to have the upper portion of the interior face of the body of concave shape as shown in the drawings, as I have found that the sudden inflow of air against a vertical face due to a rapid increase of vacuum is liable to cause a slight back eddy of air against the ports whereas in the formation as shown this is avoided, as the air is not reflected backwardly against the valve but is immediately caused to spread and flow downwardly into the vacuum chamber.

While a piston valve without a floating member can be employed, I prefer to employ a piston having a floating valve member as shown and described, as such floating valve is the only portion of the piston abutting upon the inner face of the cylindrical member, while the entire side walls of the piston valve without such floating member abuts upon said cylinder face. It is evident, therefore, that a floating valve member can be replaced, if necessary, more readily than an entire piston, and further a floating valve operated by vacuum makes a closer seat than a sliding piston valve.

I do not limit myself to the particular size, shape, number or arrangement of parts as shown and described, as these are given solely for the purpose of clearly describing the devices of my invention.

What I claim is:

A vacuum controlling device comprising a body member having a passage therethrough, a hollow open ended cylindrical member mounted in said passage and spaced from the walls thereof, said cylindrical member having ports through its walls providing communication between the cylinder and body member, a spring-controlled piston reciprocally mounted within the walls of said cylindrical member, means adapted to set the tension of said spring at a predetermined strength, freely floating valve elements carried by said piston slidably engaging the walls of said cylinder to control the ports and adapted to be held against said ports by a vacuum in said body member, said piston being adapted to be moved against the tension of said spring to open said valve elements by a vacuum greater than the tension of said spring.

ALPHONSE A. HEINZELMANN.