United States Patent

[11] 3,595,520

[72] Inventor Goerge A. Soberski
Des Plaines, Ill.

[21] Appl. No. 717,737
[22] Filed Apr. 1, 1968
[45] Patented July 27, 1971

[73] Assignee Eaton Yale & Towne Inc.

[54] **CARBURETOR AIR INTAKE ACCELERATION CONTROL**
5 Claims, 2 Drawing Figs.

[52] U.S. Cl. 251/61.2, 261/64
[51] Int. Cl. F16k 31/365
[50] Field of Search 137/267; 251/144, 61.3, 61.4, 61.5; 261/64

[56] References Cited

UNITED STATES PATENTS

862,867	8/1907	Eggleston	251/61.1 UX
1,115,676	11/1914	Johnson	251/61.5 X
2,672,085	3/1954	Fischer	251/25 X
2,725,988	12/1955	Miller	251/144 X
2,731,803	1/1956	Reed	251/144 X
2,925,987	2/1960	Priesmeyer	251/61.4

Primary Examiner—M. Cary Nelson
Assistant Examiner—Michael O. Sturm
Attorney—Hill, Sherman, Meroni, Gross & Simpson

ABSTRACT: A pneumatically operated control valve for use in a carburetor air intake acceleration control. The pneumatically operated valve includes a housing having inlet and outlet ports and a hollow stationary shaft secured to the housing and extending toward one of the ports to receive at the end of the shaft a valve member. The valve member is movably secured to the shaft so as to slide on the shaft and overlie the port thereby controlling the flow of fluid through the valve. A pneumatic control chamber is formed within the valve member and in fluid communication with an air supply through the hollow portion of the stationary shaft. The control chamber has a movable wall therein formed by a diaphragm connected between the valve member and the end of the shaft. Applying air pressure to the control chamber of the valve member causes the valve member and the control chamber to be actuated.

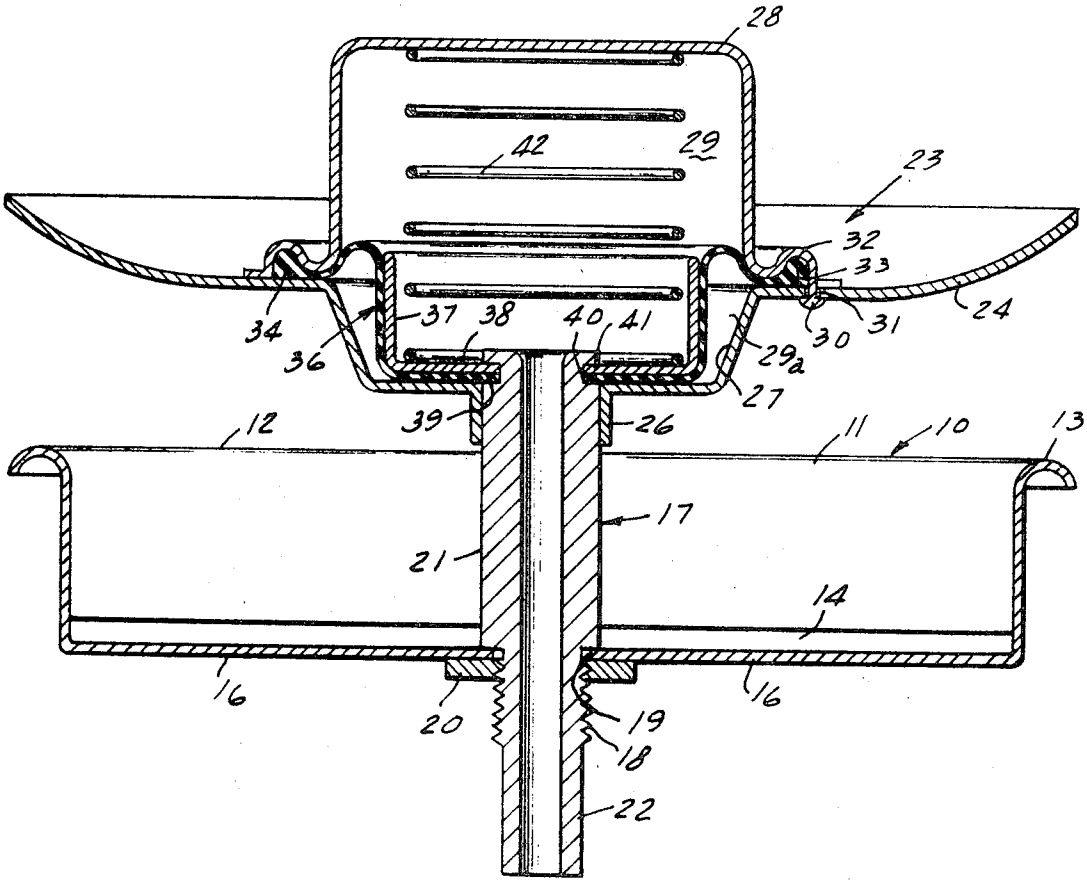


Fig. 1

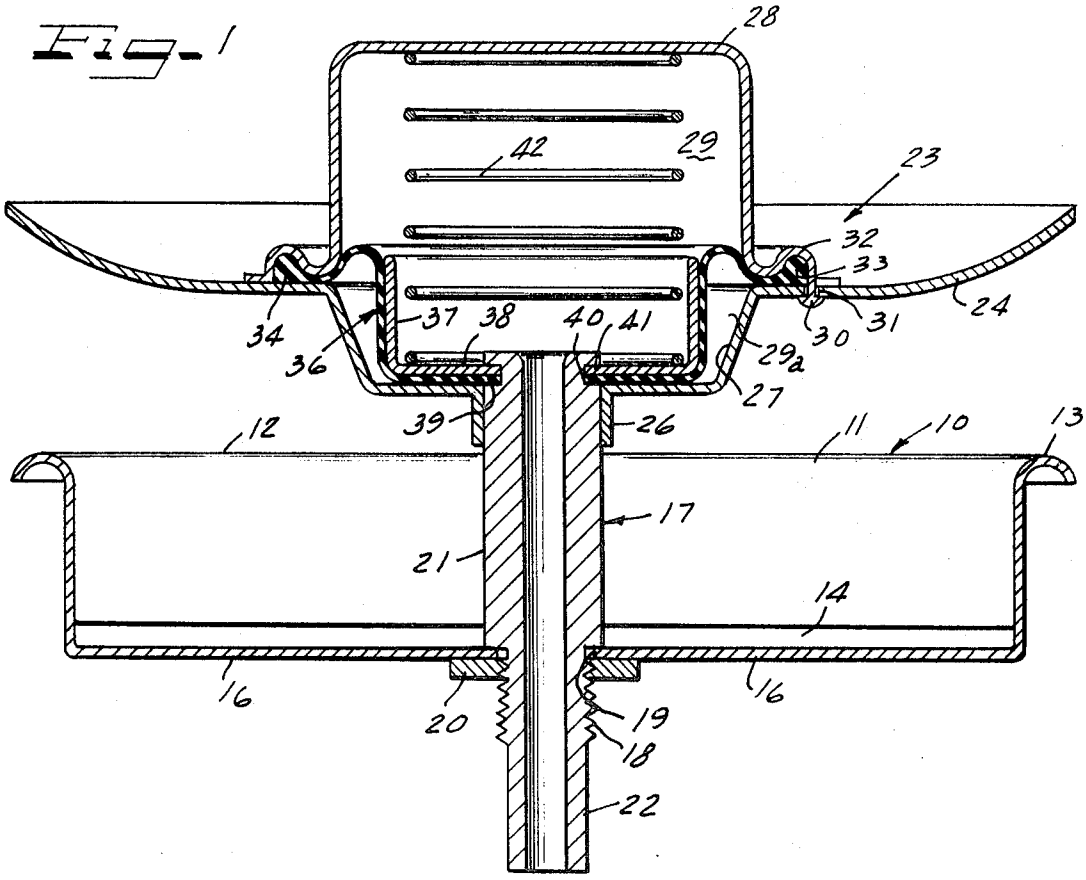
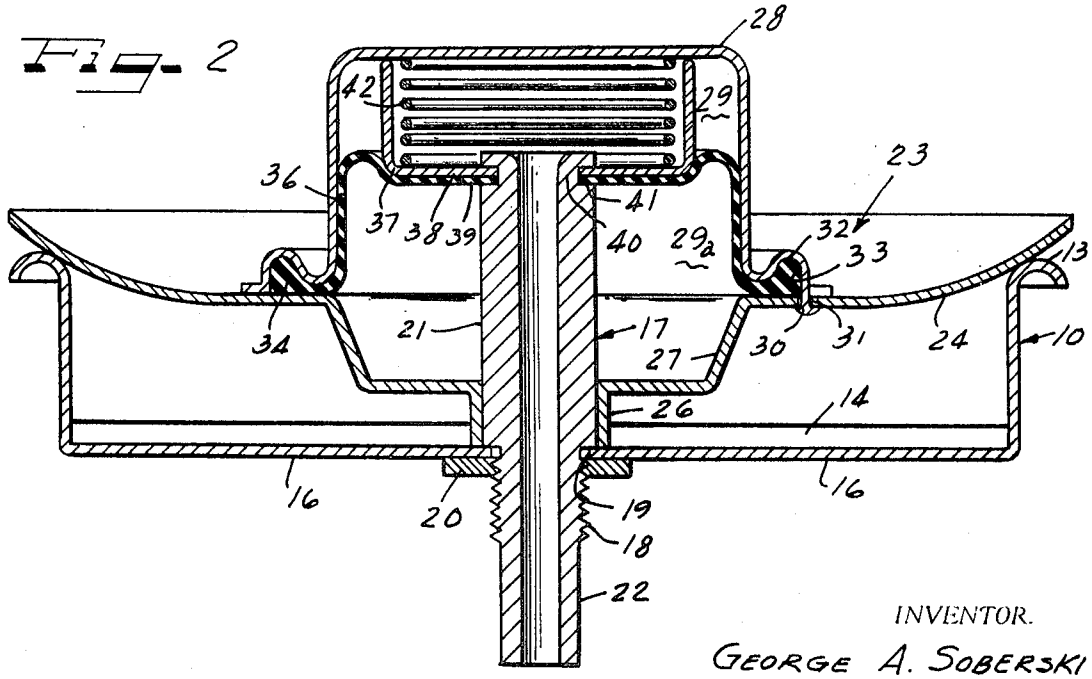


Fig. 2



INVENTOR.
GEORGE A. SOBERSKI

BY Hill, Sherman, Meroni, Gross & Simpson ATTORNEYS

CARBURETOR AIR INTAKE ACCELERATION CONTROL

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to a pneumatically operated control valve and more particularly to a pneumatically operated control valve which is actuated without the use of mechanical levers or push rods between a pneumatic control chamber and a valve member. Specifically, the present invention is directed to a pneumatically operated control valve which has particular utility when used in conjunction with carburetor air intake systems of automobiles to provide an acceleration control in the intake system of the automobile.

2. Description of the Prior Art

Heretofore, pneumatically operated control valves or devices were actuated by a mechanical linkage between the diaphragm portion of a control chamber and the device or valve member being moved. This method is found adequate in many instances but does require additional components for the proper operation of the device being actuated as well as being relatively more expensive due to the addition of components and time required to assemble a pneumatically operated system using this type of pneumatic actuator. Also, in places of limited access, it is difficult to find sufficient space to fasten the mechanical linkage between the device being actuated and the movable diaphragm of a pneumatic control chamber.

SUMMARY OF THE INVENTION

Accordingly, it is an object of this invention to provide a pneumatically controlled valve wherein the pneumatic control chamber is formed as an integral part of the valve member.

Another object of the present invention is to provide a pneumatically operated control valve having a minimum number of components and which valve is inexpensive to manufacture and simple to assemble.

Briefly, the pneumatically operated control valve of the present invention includes a housing, which may be formed as part of the air intake system of an automobile. The housing has formed therein air inlet and outlet ports. The inlet port is formed as part of an air scope of an automobile and the outlet port is in fluid communication with the air horn of the carburetor of the automobile. A hollow shaft is fixedly secured to the valve housing and extends toward one of the ports such that the end of the shaft terminates a distance slightly beyond the port. A valve member is slidably secured on the shaft and overlies the port. The valve member includes a pneumatic control chamber formed as an integral part thereof. The control chamber is in fluid communication with an air supply through the hollow shaft which causes the valve member to move on the shaft due to variations in pressure within the control chamber.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, features and advantages will be more fully realized and understood from the following detailed description taken in conjunction with the accompanying drawings in which like reference numerals throughout the various views of the drawings are intended to designate similar elements or components and wherein:

FIG. 1 is an elevational sectional view of the pneumatically operated control valve of the present invention shown in the open position; and

FIG. 2 is an elevational sectional view of the control valve of FIG. 1 shown in the closed position.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Seen in FIG. 1 is a control valve which is constructed in accordance with the principles of this invention and includes a housing **10** having a port **11** formed therein and defined by an annular seat **12**. The annular seat **12** is formed by a rolled over portion **13** of the housing **10**. It will be understood that the port **11** may define either the inlet port or the outlet port, depending upon the manner in which the valve is installed in an air scope of an automobile. Also, the housing portion **10** may be formed as part of the air scope thereby reducing the number of components in the carburetor air intake accelerator control system.

A second port **14** is formed by an annular opening in the housing **10**. A plurality of support flanges **16** may extend from the center of the housing to the sidewalls thereof to provide sufficient rigidity as well as sufficient open area to allow air to pass through the valve.

A hollow shaft **17** has a threaded intermediate portion **18** extending through an aperture **19** of the housing **10**. The hollow shaft **17** is secured to the housing by means of a locknut **20** threadedly engaging the threaded portion **18**. An enlarged diameter portion **21**, of the shaft **17**, provides a stop to cause the shaft to be secured to the housing **10** between the stop, formed by the enlarged diameter portion **21**, and the locknut **20**. A nipple **22** is formed at the end of the shaft **17** opposite the enlarged diameter portion **21** and is adapted to receive a hose which, in turn, may be connected to an air supply. It will be understood that the air supply may be either positive pressure or negative pressure depending upon the configuration of the pneumatic control valve. When the pneumatic control valve of the present invention is used in carburetor air intake systems the air supply is source of negative pressure or vacuum developed by the air intake system of the engine of the automobile.

A valve member **23** is secured to the shaft **17** at the end of the enlarged diameter portion **21**. A dish-shaped flow control valve element **24** includes a downwardly turned cylindrical portion **28** which slidably engages the enlarged diameter portion **21** of the shaft **17**. The radially extending dish-shaped portion overlies the port **11** and engages the seat **12** to control the flow of air through the valve.

A recess portion **27** is formed between the dish-shaped portion **24** and the cylindrical wall portion **26**. The recess portion **27** serves to reduce the overall size of the pneumatic control chamber formed on the valve member as well as providing sufficient rigidity to the valve member for proper operation thereof.

A subhousing **28** is secured to the dish-shaped portion **24** and forms the enclosure for a pneumatic control chamber **29**. The annular periphery of the subhousing **28** is provided with a plurality of rivetlike portions **30** which extend into corresponding apertures **31** formed within the dish-shaped valve member **24**.

A rolled bead **32** is formed about the peripheral edge of the subhousing **28** to form a retainer cavity **33** between the subhousing **28** and the dish-shaped valve member **24**. An enlarged cross section portion **34** at the periphery of a diaphragm **36** is confined within the retainer cavity **33** to secure the diaphragm in position. The diaphragm **36** forms the movable wall portion of the control chamber **29**.

The diaphragm **36** is formed about a cup-shaped backup plate **37**. The central portion **39** of the diaphragm are positioned in a reduced diameter portion or groove **40** of the stationary shaft **17**. The groove **40** is preferably formed by a rolled over portion **41** to cause the central portion of the backup plate and of the diaphragm to be fixedly secured to the end of the shaft **17**. A spring **42** is positioned within the control chamber **29** between the subhousing **28** and the backup plate **37**. The spring **42** biases the subhousing **28**, as well as the dish-shaped valve member **24**, away from the backup plate **37** and the shaft **17** to maintain the valve in the open position, as shown in FIG. 1.

When the nipple **22** of the shaft **17** is connected to a source of vacuum, the chamber **29** is evacuated sufficient to cause the atmospheric pressure about the chamber to collapse the spring **42** and cause the valve member **24** to slide down the shaft **17** and close the valve. It will be understood that the lower portion **29*a*** of the control chamber **29** is vented to at-

mosphere either through apertures formed within the recessed portion **27** or through suitable currents between the cylindrical portion **26** and the shaft **17**.

Also, it will be noted that the axial extent of the cylindrical portion **26** is such that the cylindrical portion engages the base of the housing at the same time as the valve member engages the annular seat **12**. This feature reduces the flexure of the valve member thereby allowing the valve member to be constructed of relatively light weight sheet metal.

In operation, the nipple **22** is connected to the source of vacuum of the engine of an automobile. When the vacuum is equivalent to eight inches of mercury (Hg) the valve will be in the closed position, as shown in FIG. **2**. As the automobile accelerates, causing a drop in vacuum in the carburetor system of the engine, the valve member will be urged upward by the spring **42** to open the valve. For example, a vacuum of five inches of mercury (Hg) or less is sufficient to cause the valve to open.

Therefore, the pneumatically operated control valve of the present invention provides means for controlling the flow of air through an air scope without the necessity of mechanical linkages between the pneumatic actuator and the valve member. Accordingly, it will be understood that variations and modifications may be effected without departing from the spirit and scope of the novel concepts of this invention.

I claim:

1. A pneumatic control comprising:

a sheet-form, cylindrical housing having an open end forming a controlled airflow port and means forming a second port in said housing communicating with said controlled port;

an axially extending support shaft fixedly secured to said housing;

sheet-form means forming a circular valve member overlying said housing open end and having peripheral edge portions cooperable with said housing to control airflow through said controlled airflow port,

said sheet-form means having a centrally disposed clearance aperture formed therein and slidingly received on said support shaft for guiding movement of said valve member axially of said shaft between an open position for admitting air through said housing and a close position for preventing air flow through said housing;

means sealingly secured to said valve member and forming an air chamber;

passageway means forming an air passage into said air chamber;

a flexible diaphragm extending across said air chamber and having peripheral edge portions attached to said valve member and a central portion attached to said post in a manner to form a movable wall for said air chamber; and

resilient biasing means urging said valve member toward one of its positions on said support shaft,

whereby the pneumatic forces within said air chamber opposing the bias of said resilient means is varied to control movement of said valve member for controlling the flow of air through said control airflow port.

2. A pneumatic control as defined in claim **1**,

said sheet-form, cylindrical housing having a rolled-over edge portion forming an annular valve seat for said control airflow port; and

said sheet-form valve member having a dished configuration for cooperation with said rolled-over edge of said housing to provide a self-aligning valve.

3. A pneumatic control as defined in claim **1**,

said sheet-form valve member having a centrally disposed, recess portion offset inwardly of said cylindrical housing for increasing the rigidity of said valve member.

4. A pneumatic control as defined in claim **1**,

said valve member having a stop portion formed thereon for cooperation with a portion of said housing to limit the movement of said valve member toward the close position so that excessive forces are not applied to the peripheral edge portions of said circular valve member as the same engages said housing, thereby permitting the valve member to be constructed of relatively lightweight sheet material.

5. A pneumatic control as defined in claim **1** wherein said passageway means include, in part, a passage formed within said support shaft and opening to said air chamber.