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(54) **CANISTER PURGE VALVE WITH INTEGRATED VACUUM GENERATOR AND CHECK VALVES**

SPÜLVENTIL FÜR KRAFTSTOFFDAMPFSAMMELBEHÄLTER MIT INTEGRIERTEM UNTERDRUCKERZEUGER UND RÜCKSCHLAGVENTILEN

SOUPAPE DE PURGE D'UN RÉSERVOIR POUR VAPEUR DE CARBURANT POURVU D'UN GÉNÉRATEUR DE VIDE INTEGRÉ ET DES SOUPAPES ANTI-RETOUR

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(73) Proprietor: **Continental Automotive Systems, Inc.**
Auburn Hills, MI 48326 (US)

(72) Inventor: **WILLIAMS, Benjamin Dominick Manton**
Chatham, Ontario N7M 1K2 (CA)

(74) Representative: **Bonn, Roman Klemens et al**
Continental Automotive GmbH
Patente und Lizenzen
Postfach 22 16 39
80506 München (DE)

(56) References cited:
WO-A1-2012/174347
WO-A1-2013/023920
DE-A1-102009 024 697
JP-U- 63 162 965
US-A1- 2007 023 016
US-A1- 2012 318 244

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Description

[0001] This invention relates to a vehicle canister purge system for turbocharged engines and, more particularly, to a canister purge valve with integrated vacuum generator and check valves.

BACKGROUND OF THE INVENTION

[0002] With normally aspirated engines, fuel vapors are purged from a canister by utilizing the intake manifold's vacuum pressure to draw air through the canister. With turbocharged engines, there is often a positive manifold pressure generated during boost and thus there is no vacuum to draw air through the canister. Therefore, it is necessary to provide means to produce an air moving pressure differential with atmosphere so that air can be drawn from the canister to the intake manifold and be directed to the combustion chamber, thereby purging the fuel vapors by burning.

[0003] A venturi tube or nozzle is used to generate a vacuum on a turbocharged vehicle engine by scavenging from the pressure differential across the turbo (14 psi or more) to drive air through the a venturi nozzle from the turbocharger outlet and back into the turbocharger inlet. The high velocity airflow and sonic shock waves in the venturi nozzle generate a pressure lower than atmospheric (vacuum) which is used to draw purge air flow into the scavenged turbo loop.

[0004] Typically this conventional venturi and scavenging loop is an isolated loop of plumbing, requiring a tube from the vacuum port on the venturi nozzle to a port on the purge valve. The purge valve is protected from purge loss during naturally aspirated conditions and from turbo pressures by a check valve located between the venturi nozzle and the purge valve, and another check valve located between the intake manifold and the purge valve respectively. Thus, such an arrangement requires multiple plumbing connections and discrete components that increase cost.

[0005] There is a need to provide a compact canister purge valve for a turbocharged engine, with canister purge valve having an integrated vacuum generator and check valves.

[0006] JP 63 162 965 U discloses a system for purging of a canister, the system comprising a first check valve, a second check valve and a vacuum generator for defining a scavenging air flow loop from a turbocharger outlet through the vacuum generator to the turbocharger inlet. The system is constructed and arranged such that when the turbocharger is operating and the intake manifold is under positive pressure, the second check valve closes, while the first check valve opens upon the vacuum generator generating a first vacuum, to permit the purge flow to be drawn into a scavenging air flow loop, and in a naturally aspirated condition, the manifold vacuum closes the first check valve and opens the second check valve to divert all of the purge flow to the intake manifold.

[0007] DE102009024697 A1 discloses a device for supplying volatile fuel components into an intake system of an internal combustion engine of a motor vehicle. The device comprises a temporary storage for collecting the volatile fuel components, the storage being connected with an intake system of the internal combustion engine by means of a double check valve, based on a switching condition of the double check valve.

SUMMARY OF THE INVENTION

[0008] An object of the invention is to fulfill the need referred to above. In accordance with the present invention, this objective is achieved by providing an integrated canister purge valve for a turbocharged vehicle engine. The valve includes a valve member having a housing and is constructed and arranged to control vapor purge flow from a fuel tank and canister structure to an air intake manifold. A body is coupled to the housing. The body defines an interior space. Structure separates the interior space into a first chamber and a second chamber. The first chamber has an inlet port and an outlet port. A vacuum generator is provided in the first chamber and is in fluid communication with the inlet and outlet ports. The vacuum generator is constructed and arranged to receive air from a turbocharger outlet, via the inlet port, to create a first vacuum when the air passes through the vacuum generator, and to direct air to an inlet of the turbocharger, via the outlet port, to define a scavenging air flow loop. A first check valve is provided in the first chamber between the vacuum generator and the valve member, and a second check valve is provided in the second chamber between the valve member and an manifold outlet port. The manifold outlet port is constructed and arranged to be coupled to an intake manifold. The first and second check valves are constructed and arranged such that 1) when the turbocharger is operating and the intake manifold is under positive pressure, the second check valve closes, while the first check valve opens upon the vacuum generator generating the first vacuum, to permit the purge flow to be drawn into the scavenging air flow loop and 2) in a naturally aspirated condition, manifold vacuum closes the first check valve and opens the second check valve to divert all of the purge flow through the manifold outlet port and to the intake manifold.

[0009] In accordance with the invention, a method of controlling vapor purge flow in turbocharged vehicle provides a canister purge valve having a valve member constructed and arranged to control vapor purge flow from a fuel tank and canister structure to an air intake manifold. The purge valve has an integral vacuum generator and first and second check valves that are integral with the canister purge valve. The first check valve is disposed between the vacuum generator and the valve member and the second check valve is disposed between the valve member and a manifold outlet port, the manifold outlet port being coupled to the intake manifold. The method defines a scavenging air flow loop from a turbo-

charger outlet through the vacuum generator and to an inlet of the turbocharger, with the vacuum generator generating a first vacuum due to the air flow there-trough, When the turbocharger is operating and the intake manifold is under positive pressure, the method ensures that the second check valve closes, while the first check valve opens upon the vacuum generator generating the first vacuum, to permit vapor purge flow to be drawn through the valve member into the scavenging air flow loop. During a naturally aspirated condition, the method ensures that vacuum created by the intake manifold closes the first check valve and opens the second check valve to divert all of the purge flow through the manifold outlet port and to the intake manifold.

[0010] Other objects, features and characteristics of the present invention, as well as the methods of operation and the functions of the related elements of the structure, the combination of parts and economics of manufacture will become more apparent upon consideration of the following detailed description and appended claims with reference to the accompanying drawings, all of which form a part of this specification.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The invention will be better understood from the following detailed description of the preferred embodiments thereof, taken in conjunction with the accompanying drawings wherein like numbers indicate like parts, in which:

FIG. 1 is a view of an integrated canister purge valve, shown partially in section, in a canister purge system of a turbocharged vehicle engine, in accordance with an embodiment.

FIG. 2 is a side view of the canister purge valve of FIG. 1.

FIG. 3 is a side view of a check valve in accordance with an embodiment.

DETAILED DESCRIPTION OF THE EXEMPLARY EMBODIMENTS

[0012] With reference to FIG. 1, an integrated canister purge valve for a turbocharged vehicle engine is shown, generally indicated at 10, in accordance with an embodiment. The integrated canister purge valve 10 incorporates both a vacuum generator 12 and two check valves 36, 38 in one small package, reducing the number of plumbing connections in the system from a possible twelve to just four connections. The integration is accomplished by including a venturi tube 12 (as the vacuum generator) in the lower body 14 of the canister purge valve 10. The lower body 14 defines an interior space 15. Structure, such as a wall 16 and welded middle cap member 18 separate the interior space 15 of the lower body 14 into two chambers 20, 22. The first chamber 20 has an inlet port 21 and an outlet port 23.

[0013] The vacuum generator or venturi tube 12 is in the first chamber 20 and is in fluid communication with the inlet port 21 and outlet port 23. The vacuum generator is constructed and arranged to receive air from the outlet 25 of the turbocharger 26, via the inlet port 21, to create a first vacuum when the air passes through the venturi tube 12, and to direct air to an inlet 27 of the turbocharger 26, via the outlet port 23, to define a scavenging flow loop A, so that venturi driven purge flow B can be drawn into the scavenging flow loop A, as explained more fully below. Main intake airflow is shown by arrow C.

[0014] Chamber 22 has a manifold outlet port 28 (see FIG. 2) that communicates with an inlet port 30 of an intake manifold 32 associated with an engine (not shown). Thus, chamber 20 is associated with vacuum generated by the venturi tube 12 and chamber 22 is associated with vacuum generated by the intake manifold 32. These two vacuum conditions are mutually exclusive, and isolated by means of the first and second check valves 36, 38, respectively, that are integral with the valve 10 and are disposed in the lower body 14. In particular, first check valve 36 is provided between valve member 34 of the canister purge valve 10 and the venturi tube 12, and second check valve 38 is provided between the valve member 34 and the intake manifold 32. The valve member 34 is disposed between the fuel tank and canister structure 35 and the intake manifold 32. The valve member 34 may be of any conventional configuration, such as the solenoid type disclosed in U.S. Patent Publication 20080000456 A1, the content of which is hereby incorporated by reference into this specification. As best shown in FIG. 2, the lower body 14 and a housing 33 of the valve member 34 are preferably joined in a removable manner by a snap-fit and arrangement 37, with an O-ring therebetween. Alternatively, the lower body 14 and housing 33 can be joined by a weld connection, which eliminates the O-ring.

[0015] If the turbocharger 26 is functioning, the manifold 32 is under positive pressure and the check valve 38, associated with the manifold port 30, closes. The vacuum generated by the scavenging flow loop A pulls the check valve 36 open, permitting flow through the scavenging flow loop A that draws in vapor purge flow B that passes the valve member 34. The purge flow is then directed to the manifold 32 and thus to the engine to be consumed. In the naturally aspirated condition (flow indicated by arrow D), the vacuum created at the manifold 32 pulls the check valve 38 open, thus permitting flow to pass from the valve member 34 to the manifold 32. In addition, the manifold vacuum pulls the check valve 36 shut, diverting all purge flow directly to the manifold 32 to be consumed in the engine.

[0016] With reference to FIG. 3, each one-way check valve 36, 38 has a valve member 40 mounted in a free-floating manner to an opening 41 housing 42. In the embodiment, two openings 44 are provided in the housing

42 under the valve member 40. It can be appreciated that openings 44 need not be provided if opening 41 is sufficient to provide proper flow through the valve. The valve member 40 is movable due to pressure differences thereon. The valve member 40 is shown in a closed position in FIG. 3, sealed against the housing 42 and preventing air from flowing past the openings 41 and 44. Vacuum pressure, as mentioned above can pull the valve member 40 open (in the direction of arrow D), permitting air flow through the openings 41, 44.

[0017] It can be seen that the integrated canister purge valve 10 provides inline connections in a compact device. Since the venturi tube and check valves are integrated in the purge valve, fewer plumbing connections are required, which also simplifies assembly.

Claims

1. An integrated canister purge valve (10) for a turbocharged vehicle engine, the valve comprising: a first check valve (36), a second check valve (38) and a vacuum generator (12), the first (36) and second check valves (38) being constructed and arranged such that 1) when a turbocharger (26) is operating and an air intake manifold (32) is under positive pressure, the second check valve (38) closes, while the first check valve (36) opens upon the vacuum generator (12) generating a first vacuum, to permit the purge flow to be drawn into a scavenging air flow loop (A), and 2) in a naturally aspirated condition, manifold vacuum closes the first check valve (36) and opens the second check valve (38) to divert all of the purge flow to the intake manifold (32) through a manifold outlet port (28), **characterized by**,
a valve member (34) having a housing (33) and being constructed and arranged to control vapor purge flow from a fuel tank and canister structure (35) to the air intake manifold (32),
a body (14) coupled to the housing (33), the body (14) defining an interior space (15),
structure separating the interior space (15) into a first chamber (20) and a second chamber (22) isolated from the first chamber (20), the first chamber (20) having an inlet port (21) and an outlet port (23),
the vacuum generator (12) in the first chamber (20) and in fluid communication with the inlet (21) and outlet ports (23), the vacuum generator (12) being constructed and arranged to receive air from a turbocharger outlet (25), via the inlet port (21), to create a first vacuum when the air passes through the vacuum generator (12), and to direct air to an inlet (27) of the turbocharger (26), via the outlet port (23), to define a scavenging air flow loop (A),
the first check valve (36) in the first chamber (20) between the vacuum generator (12) and the valve member (34), and
the second check valve (38) in the second chamber (22) between the valve member (34) and an manifold outlet port (28), the manifold outlet port (28) being constructed and arranged to be coupled to the intake manifold (32).

2. The valve of claim 1, wherein the vacuum generator (12) is a venturi tube (12).

3. The valve of claim 1, in combination with the fuel tank and canister structure (35), the turbocharger (26), and the intake manifold (32).

4. The valve of claim 1, wherein the structure separating the interior space (15) includes a wall (16) and a cap member (18).

5. The valve of claim 1, wherein each of the check valves (36,38) is a one way valve having an elastomer valve member (40) constructed and arranged to move between open and closed positions based on pressure differences thereon.

6. The valve of claim 1, wherein the housing (33) and the body (14) are coupled together in a removable manner.

7. A method of controlling vapor purge flow in a turbocharged vehicle, the method comprising:

providing a canister purge valve (10) having a valve member (34) constructed and arranged to control vapor purge flow from a fuel tank and canister structure (35) to an air intake manifold (32), the canister purge valve (10) comprising a first check valve (36), a second check valve (38) and a vacuum generator (12),
defining a scavenging air flow loop (A) from a turbocharger outlet (25) through the vacuum generator (12) and to an inlet (27) of the turbocharger (26), with the vacuum generator (12) generating a first vacuum due to the air flow there-trough, when the turbocharger (26) is operating and the intake manifold (32) is under positive pressure, ensuring that the second check valve (38) closes, while the first check valve (36) opens upon the vacuum generator (12) generating the first vacuum, to permit vapor purge flow to be drawn through the valve member (34) into the scavenging air flow loop (A), and during a naturally aspirated condition, ensuring that vacuum created by the intake manifold (32) closes the first check valve (36) and opens the second check valve (38) to divert all of the purge flow through the manifold outlet port (28) and to the intake manifold (32).
characterized in that
the purge valve (10) has an integral vacuum generator (12) and that the first and second

check valves (36,38) are integral with the canister purge valve (10), the first check valve (36) being disposed between the vacuum generator (12) and the valve member (34), the second check valve (38) being disposed between the valve member (34) and a manifold outlet port (28), the manifold outlet port (28) being coupled to the intake manifold (32),

8. The method of claim 7, wherein the vacuum generator (12) is a venturi tube (12).

9. The method of claim 7, wherein the step of providing the canister purge valve (10) includes providing the canister purge valve (10) with a body (14), the body (14) being separated into two chambers (20,22), the first check valve (36) and vacuum generator (12) being in the first chamber (20) and the second check valve being in the second chamber (22).

10. The method of claim 9, wherein the step of providing the canister purge valve (10) includes coupling the body (14) to a housing (33) of the valve member (34) in a removable manner.

11. The method of claim 7, wherein each of the check valves (36, 38) is a one-way valve having an elastomer valve member (40) constructed and arranged to move between open and closed positions based on pressure differences thereon.

Patentansprüche

1. Integriertes Kraftstoffdampfsammelbehälter-Spülventil (10) für einen turboaufgeladenen Fahrzeugmotor, wobei das Ventil Folgendes aufweist: ein erstes Rückschlagventil (36), ein zweites Rückschlagventil (38) und einen Unterdruckerzeuger (12), wobei das erste (36) und das zweite (38) Rückschlagventil so ausgeführt und angeordnet sind, dass 1) wenn ein Turbolader (26) in Betrieb ist und ein Lufteinlasskrümmer (32) unter Überdruck steht, sich bei Erzeugung eines ersten Unterdrucks durch den Unterdruckerzeuger (12) das zweite Rückschlagventil (38) schließt, während sich das erste Rückschlagventil (36) öffnet, um das Ansaugen von Spülstrom in einen Spülluftkreislauf (A) zu gestatten, und 2) in einem selbstansaugenden Zustand, Krümmerunterdruck das erste Rückschlagventil (36) schließt und das zweite Rückschlagventil (38) öffnet, um sämtlichen Spülstrom durch einen Krümmerauslasskanal (28) zum Einlasskrümmer (32) umzuleiten, **gekennzeichnet**
dadurch, dass ein Ventilglied (34) ein Gehäuse (33) aufweist und dazu ausgeführt und angeordnet ist, Dampfspülstrom von einer Kraftstofftank- und -dampfsammelbehälterstruktur (35) zum Lufteinlasskrümmer (32) zu steuern,
durch einen an das Gehäuse (33) gekoppelten Körper (14), wobei der Körper (14) einen Innenraum (15) definiert,
durch eine Struktur, die den Innenraum (15) in eine erste Kammer (20) und eine zweite Kammer (22), die von der ersten Kammer (20) getrennt ist, unterteilt, wobei die erste Kammer (20) einen Einlasskanal (21) und einen Auslasskanal (23) aufweist,
durch den Unterdruckerzeuger (12) in der ersten Kammer (20), der mit dem Einlasskanal (21) und dem Auslasskanal (23) in fluidischer Verbindung steht, wobei der Unterdruckerzeuger (12) dazu ausgeführt und angeordnet ist, Luft über den Einlasskanal (21) von einem Turboladerauslass (25) zu empfangen, um einen ersten Unterdruck zu erzeugen, wenn die Luft den Unterdruckerzeuger (12) durchströmt, und Luft über den Auslasskanal (23) zu einem Einlass (27) des Turboladers (26) zu leiten, um einen Spülluftkreislauf (A) zu definieren,
durch das erste Rückschlagventil (36) in der ersten Kammer (20) zwischen dem Unterdruckerzeuger (12) und dem Ventilglied (34) und
durch das zweite Rückschlagventil (38) in der zweiten Kammer (22) zwischen dem Ventilglied (34) und einem Krümmerauslasskanal (28), wobei der Krümmerauslasskanal (28) dazu ausgeführt und angeordnet ist, an den Einlasskrümmer (32) gekoppelt zu werden.

2. Ventil nach Anspruch 1, wobei der Unterdruckerzeuger (12) ein Venturi-Rohr (12) ist.

3. Ventil nach Anspruch 1, in Kombination mit der Kraftstofftank- und -dampfsammelbehälterstruktur (35), dem Turbolader (26) und dem Einlasskrümmer (32).

4. Ventil nach Anspruch 1, wobei die den Innenraum (15) trennende Struktur eine Wand (16) und ein Kappenglied (18) umfasst.

5. Ventil nach Anspruch 1, wobei jedes der Rückschlagventile (36, 38) ein Einwegventil mit einem elastomeren Ventilglied (40) ist, das dazu ausgeführt und angeordnet ist, sich basierend auf Druckdifferenzen daran zwischen der geöffneten und geschlossenen Stellung zu bewegen.

6. Ventil nach Anspruch 1, wobei das Gehäuse (33) und der Körper (14) lösbar aneinander gekoppelt sind.

7. Verfahren zum Steuern von Dampfspülstrom in einem turboaufgeladenen Fahrzeug, wobei das Verfahren Folgendes aufweist:

Bereitstellen eines Kraftstoffdampfsammelbehälter-Spülventils (10) mit einem Ventilglied

(34), das dazu ausgeführt und angeordnet ist, Dampfspülstrom von einer Kraftstofftank- und -dampfsammelbehälterstruktur (35) zu einem Lufteinlasskrümmer (32) zu steuern, wobei das Kraftstoffdampfsammelbehälter-Spülventil (10) ein erstes Rückschlagventil (36), ein zweites Rückschlagventil (38) und einen Unterdruckerzeuger (12) aufweist,

Definieren eines Spülluftkreislaufs (A) von einem Turboladerauslass (25) durch den Unterdruckerzeuger (12) und zu einem Einlass (27) des Turboladers (26), wobei der Unterdruckerzeuger (12) aufgrund des Luftstroms dort hindurch einen ersten Unterdruck erzeugt, wenn der Turbolader (26) in Betrieb ist und der Einlasskrümmer (32) unter Überdruck steht, wodurch gewährleistet wird, dass sich bei Erzeugung des ersten Unterdrucks durch den Unterdruckerzeuger (12) das zweite Rückschlagventil (38) schließt, während sich das erste Rückschlagventil (36) öffnet, um das Ansaugen von Dampfspülstrom durch das Ventilglied (34) in den Spülluftkreislauf (A) zu gestatten, und

während eines selbstansaugenden Zustands Gewährleisten, dass durch den Einlasskrümmer (32) erzeugter Unterdruck das erste Rückschlagventil (36) schließt und das zweite Rückschlagventil (38) öffnet, um sämtlichen Spülstrom durch den Krümmerauslasskanal (28) und zum Einlasskrümmer (32) umzuleiten,

dadurch gekennzeichnet, dass

das Spülventil (10) einen integralen Unterdruckerzeuger (12) aufweist und dass das erste und das zweite Rückschlagventil (36, 38) integral mit dem Kraftstoffdampfsammelbehälter-Spülventil (10) sind, wobei das erste Rückschlagventil (36) zwischen dem Unterdruckerzeuger (12) und dem Ventilglied (34) angeordnet sind, wobei das zweite Rückschlagventil (38) zwischen dem Ventilglied (34) und einem Krümmerauslasskanal (28) angeordnet ist und wobei der Krümmerauslasskanal (28) an den Einlasskrümmer (32) gekoppelt ist.

8. Verfahren nach Anspruch 7, wobei der Unterdruckerzeuger (12) ein Venturi-Rohr (12) ist.

9. Verfahren nach Anspruch 7, wobei der Schritt des Bereitstellens des Kraftstoffdampfsammelbehälter-Spülventils (10) Versehen des Kraftstoffdampfsammelbehälter-Spülventils (10) mit einem Körper (14) umfasst, wobei der Körper (14) in zwei Kammern (20, 22) unterteilt ist, wobei sich das erste Rückschlagventil (36) und der Unterdruckerzeuger (12) in der ersten Kammer (20) befinden und sich das zweite Rückschlagventil (38) in der zweiten Kammer (22) befindet.

10. Verfahren nach Anspruch 9, wobei der Schritt des Bereitstellens des Kraftstoffdampfsammelbehälter-Spülventils (10) lösbares Koppeln des Körpers (14) an ein Gehäuse (33) des Ventilglieds (34) umfasst.

11. Verfahren nach Anspruch 7, wobei jedes der Rückschlagventile (36, 38) ein Einwegventil mit einem elastomeren Ventilglied (40) ist, das dazu ausgeführt und angeordnet ist, sich basierend auf Druckdifferenzen daran zwischen der geöffneten und geschlossenen Stellung zu bewegen.

Revendications

1. Soupape de purge de réservoir intégrée (10) pour un moteur de véhicule à suralimentation, la soupape comprenant : une première soupape antiretour (36), une deuxième soupape antiretour (38) et un générateur de vide (12), la première (36) et la deuxième (38) soupape antiretour étant construites et disposées de telle sorte que 1) lorsqu'un turbocompresseur (26) fonctionne et qu'un collecteur d'admission d'air (32) est soumis à une pression positive, la deuxième soupape antiretour (38) se ferme, tandis que la première soupape antiretour (36) s'ouvre lorsque le générateur de vide (12) génère un premier vide, pour permettre l'aspiration d'un écoulement de purge dans une boucle d'écoulement d'air de balayage (A), et 2) dans un état naturellement aspiré, le vide du collecteur ferme la première soupape antiretour (36) et ouvre la deuxième soupape antiretour (38) pour dévier la totalité de l'écoulement de purge vers le collecteur d'admission (32) à travers un orifice de sortie de collecteur (28), **caractérisée par**

un organe de soupape (34) ayant un boîtier (33) et étant construit et disposé de manière à réguler l'écoulement de purge de vapeur provenant d'un réservoir de carburant et d'une structure de réservoir (35) vers le collecteur d'admission d'air (32),

un corps (14) accouplé au boîtier (33), le corps (14) définissant un espace intérieur (15),

une structure séparant l'espace intérieur (15) en une première chambre (20) et une deuxième chambre (22) isolée de la première chambre (20), la première chambre (20) ayant un orifice d'entrée (21) et un orifice de sortie (23),

le générateur de vide (12) dans la première chambre (20) et en communication fluidique avec l'orifice d'entrée (21) et l'orifice de sortie (23), le générateur de vide (12) étant construit et disposé de manière à recevoir de l'air provenant d'une sortie du turbocompresseur (25), par le biais de l'orifice d'entrée (21), pour créer un premier vide lorsque l'air passe à travers le générateur de vide (12), et pour diriger l'air vers une entrée (27) du turbocompresseur (26), par le biais de l'orifice de sortie (23), pour définir une boucle d'écoulement d'air de balayage (A),

la première soupape antiretour (36) dans la première chambre (20) entre le générateur de vide (12) et l'organe de soupape (34), et
la deuxième soupape antiretour (38) dans la deuxième chambre (22) entre l'organe de soupape (34) et un orifice de sortie de collecteur (28), l'orifice de sortie de collecteur (28) étant construit et disposé de manière à être accouplé au collecteur d'admission (32).

2. Soupape selon la revendication 1, dans laquelle le générateur de vide (12) est un tube de Venturi (12).

3. Soupape selon la revendication 1, en combinaison avec le réservoir de carburant et la structure de réservoir (35), le turbocompresseur (26) et le collecteur d'admission (32).

4. Soupape selon la revendication 1, dans laquelle la structure séparant l'espace intérieur (15) comporte une paroi (16) et un organe de capuchon (18).

5. Soupape selon la revendication 1, dans laquelle chacune des soupapes antiretour (36, 38) est une soupape unidirectionnelle ayant un organe de soupape en élastomère (40) construit et disposé de manière à se déplacer entre des positions ouverte et fermée sur la base de différences de pression appliquées sur celui-ci.

6. Soupape selon la revendication 1, dans laquelle le boîtier (33) et le corps (14) sont accouplés l'un à l'autre de manière amovible.

7. Procédé de régulation de l'écoulement de purge de vapeur dans un véhicule à suralimentation, le procédé comprenant les étapes consistant à :

fournir une soupape de purge de réservoir (10) ayant un organe de soupape (34) construit et disposé de manière à réguler un écoulement de purge de vapeur provenant d'un réservoir de carburant et d'une structure de réservoir (35) vers un collecteur d'admission d'air (32), la soupape de purge de réservoir (10) comprenant une première soupape antiretour (36), une deuxième soupape antiretour (38) et un générateur de vide (12),
définir une boucle d'écoulement d'air de balayage (A) provenant d'une sortie de turbocompresseur (25) à travers le générateur de vide (12) et jusqu'à l'entrée (27) du turbocompresseur (26), le générateur de vide (12) générant un premier vide dû à l'écoulement d'air à travers lui, lorsque le turbocompresseur (26) fonctionne et que le collecteur d'admission (32) est soumis à une pression positive, pour garantir la fermeture de la deuxième soupape antiretour (38), tandis que la première soupape antiretour (36) s'ouvre lorsque le générateur de vide (12) génère le premier vide, pour permettre à l'écoulement de purge de vapeur d'être aspiré à travers l'organe de soupape (34) jusque dans la boucle d'écoulement d'air de balayage (A), et
au cours d'un état naturellement aspiré, garantir que le vide créé par le collecteur d'admission (32) ferme la première soupape antiretour (36) et ouvre la deuxième soupape antiretour (38) pour dévier la totalité de l'écoulement de purge à travers l'orifice de sortie de collecteur (28) et jusqu'au collecteur d'admission (32),
caractérisé en ce que
la soupape de purge (10) présente un générateur de vide intégré (12) et **en ce que** la première et la deuxième soupape antiretour (36, 38) sont intégrées à la soupape de purge de réservoir (10), la première soupape antiretour (36) étant disposée entre le générateur de vide (12) et l'organe de soupape (34), la deuxième soupape antiretour (38) étant disposée entre l'organe de soupape (34) et un orifice de sortie de collecteur (28), l'orifice de sortie de collecteur (28) étant accouplé au collecteur d'admission (32).

8. Procédé selon la revendication 7, dans lequel le générateur de vide (12) est un tube de Venturi (12).

9. Procédé selon la revendication 7, dans lequel l'étape consistant à fournir la soupape de purge de réservoir (10) comprend la fourniture de la soupape de purge de réservoir (10) avec un corps (14), le corps (14) étant séparé en deux chambres (20, 22), la première soupape antiretour (36) et le générateur de vide (12) étant dans la première chambre (20) et la deuxième soupape antiretour étant dans la deuxième chambre (22).

10. Procédé selon la revendication 9, dans lequel l'étape consistant à fournir la soupape de purge de réservoir (10) inclut l'accouplement du corps (14) à un boîtier (33) de l'organe de soupape (34) de manière amovible.

11. Procédé selon la revendication 7, dans lequel chacune des soupapes antiretour (36, 38) est une soupape unidirectionnelle ayant un organe de soupape en élastomère (40) construit et disposé de manière à se déplacer entre des positions ouverte et fermée sur la base de différences de pression appliquées sur celui-ci.

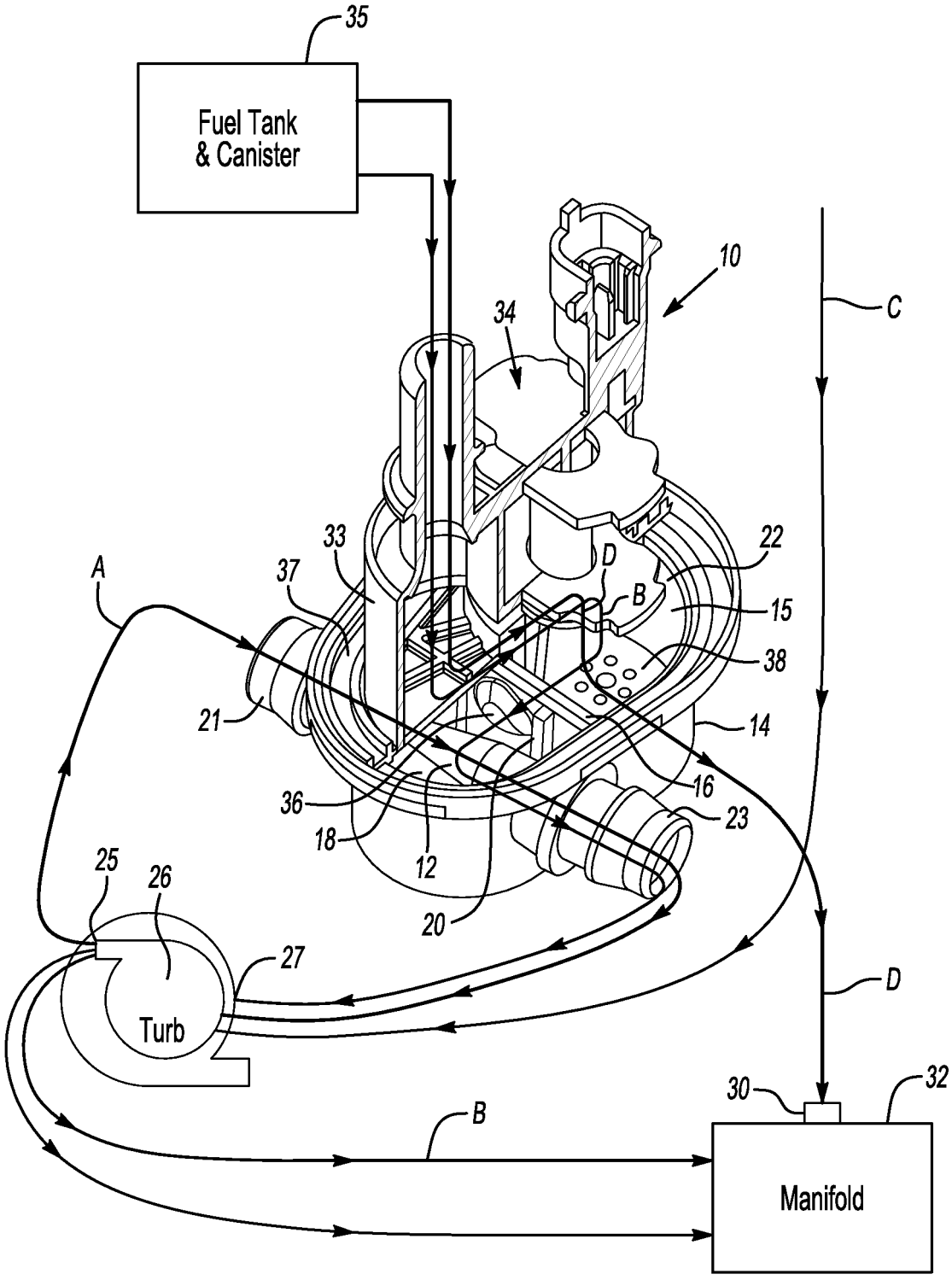

35
Fuel Tank
& Canister
10
34
C
33
22
D
37
B
15
A
38
21
14
16
36
23
18
12
25
26
20
27
D
Turb
30
32
B
Manifold

Fig-1

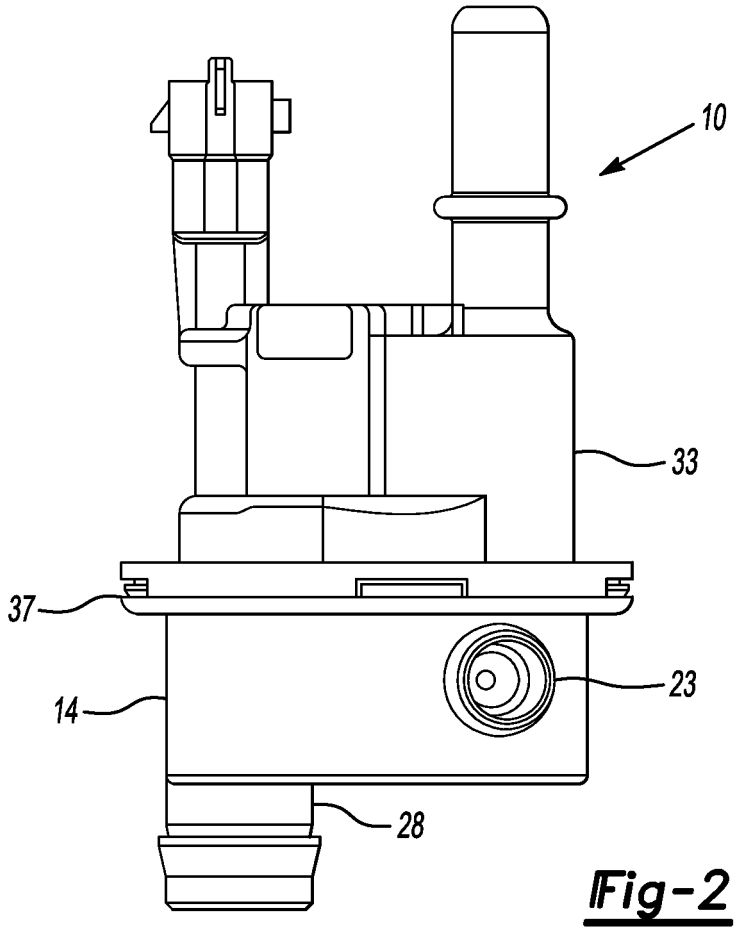


Fig-2

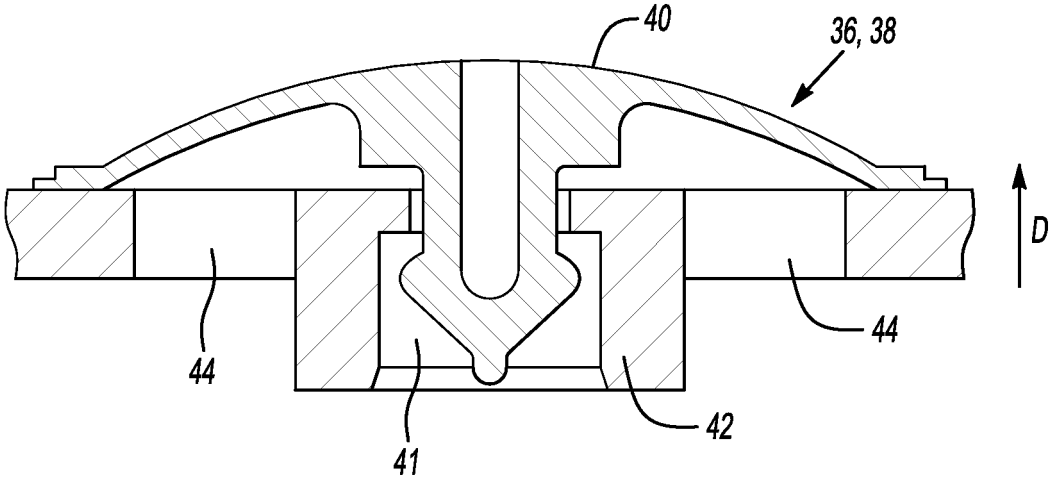


Fig-3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 63162965 U **[0006]**
- DE 102009024697 A1 **[0007]**
- US 20080000456 A1 **[0014]**