

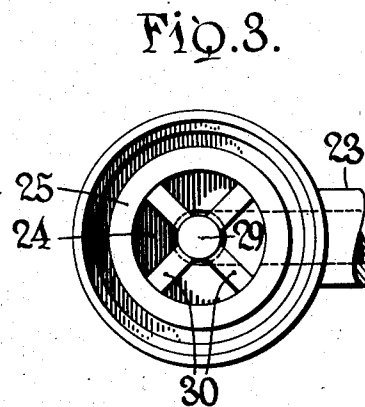
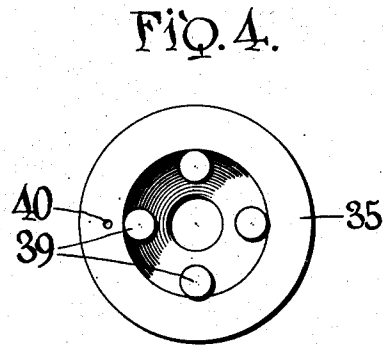
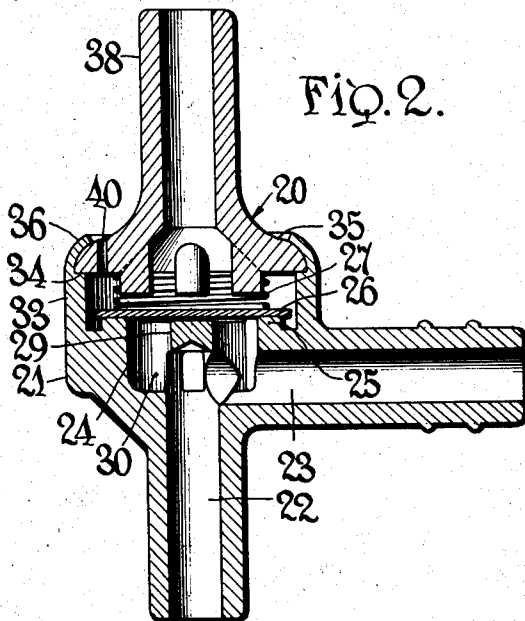
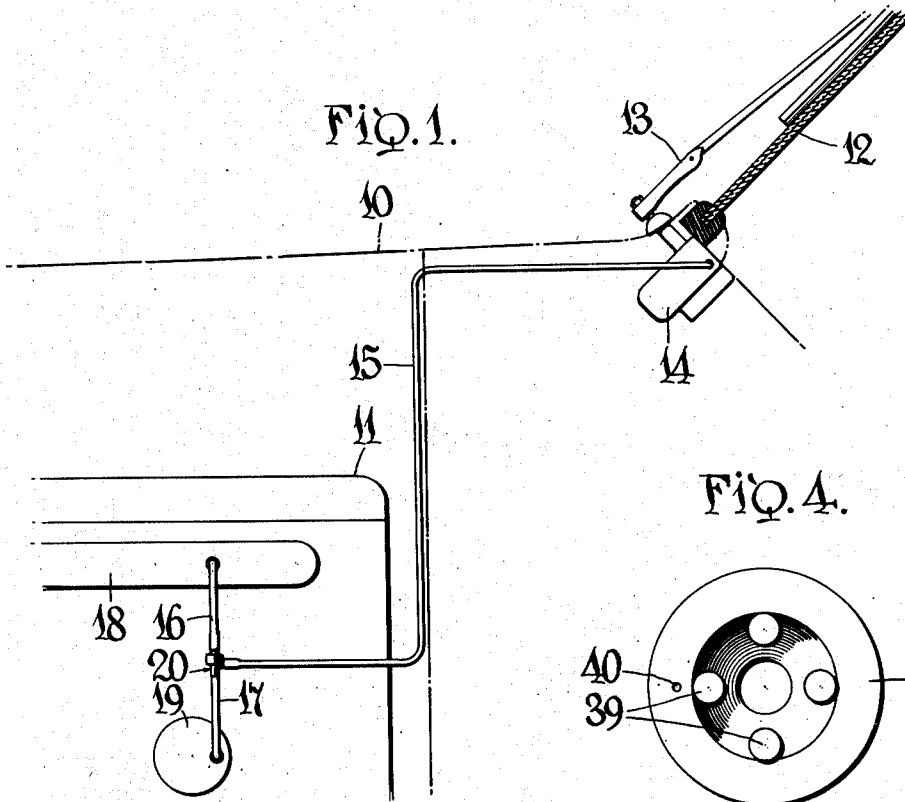
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ACCESSORY SYSTEM

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ACCESSORY SYSTEM

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2 Claims. (Cl. 60—60)

This invention relates to fluid pressure systems for operating automotive accessories.

In the automotive field wide use is made of differential fluid pressure in providing motive power for various accessories and the problem of providing an adequate yet simply and automatically controlled supply of such differential fluid pressure has been variously approached. In my present invention I contemplate the utilization of several sources of differential pressure, either of which may be relied upon separately or jointly with the other in varying proportions depending upon the adequacy of the available supply at one or the other or both of the sources.

In one form my improved accessory system comprehends the utilization of the sub-atmospheric pressure obtaining in the intake manifold of the internal combustion propelling engine of an automotive vehicle during periods of normal operation. While this source of sub-atmospheric pressure is almost universally employed in the operation of automotive accessories it is likewise well known that during certain periods of operation of an internal combustion engine, for instance during periods of abrupt acceleration, the partial vacuum existing in the intake manifold is not sufficient for satisfactory operation.

To compensate for this deficiency, I provide an auxiliary vacuum or suction pump and the automotive accessory has an operating conduit which connects with both the intake manifold and the vacuum pump. At the point where the conduit from the accessory branches out to lead to both the intake manifold and the vacuum pump special means are provided for exercising control over the condition of communication as between the accessory, the intake manifold and the vacuum pump.

If a condition be assumed wherein the vacuum pump is inoperative or nearly so and the intake manifold is doing all or nearly all of the work in withdrawing fluid from the accessory, satisfactory operation will ensue if the intake manifold suction is adequate. Under these conditions no special means need be provided for isolating the vacuum pump from communication with the conduit from the accessory to the intake manifold since the vane, piston, or like impelling member of the pump will prevent admission of fluid through the pump and into the conduit from the accessory to the intake manifold.

The converse is not entirely true, however. If the pressure within the intake be substantially atmospheric, that is, if no suction effect is available therefrom, and if the vacuum pump be de-

pended upon substantially entirely, then the intake manifold should, for best operation, be closed off from the passage which extends between the vacuum pump and the accessory, in order that the suction of the pump be not dissipated in reducing the pressure in the intake manifold or in drawing fluid into the manifold through the carburetor associated therewith.

The conduit controlling means which I provide in my accessory system insures against passage of fluid from the interior of the intake manifold into either the accessory or the vacuum pump, although in normal operation there is no tendency to flow into the accessory.

I have found that even though a check valve be provided in the system in an effort to prevent retrograde flow of fluid, which is in the form of gasoline vapor, from the intake manifold to either the accessory or the vacuum pump, some fluid flow occurs between the intake manifold and the vacuum pump under certain conditions. This may be attributed to faulty seating of the check valve or the fact that the differential existing between the intake manifold and the interior of the conduit between the vacuum pump and the accessory is at times insufficient to keep the check valve firmly seated. At any rate, after certain periods of use of the system, without certain precautions which will presently be referred to, it is found that substantial quantities of gasoline find their way into the pump chamber.

The presence of gasoline in the chamber of the pump exercises various deleterious influences, one of which resides in the fact that flexible diaphragms of rubber or the like are frequently used and such materials are attacked by gasoline and deteriorate rapidly. In vane and piston type pumps the packing elements are also subject to attack by gasoline so that in any event the prevention of access to the pump by gasoline is an important consideration.

In the accompanying drawing and the ensuing description I have disclosed a specific embodiment of my new accessory system but it is to be understood that this disclosure is by way of example and that my invention is not to be considered as limited otherwise than as defined in the appended claims.

In the drawing

Fig. 1 is a more or less schematic view of my novel accessory system shown in conjunction with a vehicle having an internal combustion propelling engine;

Fig. 2 is a vertical cross sectional view taken

centrally through the fluid flow control element of my invention;

Fig. 3 is a top plan view of the control element with the top or cover member removed; and

Fig. 4 is a bottom plan view of such top or cover member.

In the drawing like characters of reference denote like parts and the numeral 10 designates an automotive vehicle having an internal combustion propelling engine 11 and a windshield 12. An automatic windshield cleaner 13 is associated with the windshield and has a fluid operable motor 14. The windshield cleaner motor may be of the conventional type which is operated by withdrawal of fluid therefrom through a conduit 15 and in the system of my invention I have shown the conduit 15 as diverging into branches 16 and 17 which lead respectively to the intake manifold 18 of the internal combustion engine 11 and to a vacuum pump 19. The vacuum pump may be of any desired type and in the present form of my invention I contemplate the utilization of the diaphragm type adapted to be reciprocally driven from a moving part of the internal combustion engine.

At the point of divergence of the conduit 15 into the branch conduits 16 and 17 there is provided a control member designated generally 20 and such control member is designed to control automatically the condition of communication between intake manifold connecting branch 16 and the remainder of the conduit comprising the pump connecting branch 17 and the conduit 15.

The preferred construction of the control member 20 is illustrated in detail in Figs. 2, 3 and 4 and the numeral 21 denotes the casing element which forms a part of the control member 20 and has a pair of communicating passages 22 and 23. The passages 22 and 23 are in constant communication and in the illustrated embodiment extend away from each other at right angles. The passage 22 connects with the branch conduit portion 17 leading to the vacuum pump 19 and the passage 23 is connectible to the conduit 15 leading from the accessory motor 14.

At the point where the passages 22 and 23 converge the casing portion 21 is provided with a valved chamber 24 which terminates upwardly in a surrounding annular flat valve seat 25. The chamber 24 is normally sealed from the space thereabove by a light-weight, relatively flexible valve element 26 which is held in intimate contact with the valve seat 25 by the greater fluid pressure existing above the valve 26 during normal periods when the valve is seated. The valve is preferably biased to a seated position by a comparatively light coil spring 27 which acts against the upper face of the valve 26 and is held thereagainst in a manner which will presently appear.

It is desired to construct the thin discoidal valve element 26 in such manner that it will be extremely sensitive to prevailing pressure differentials as between the passage 22, 23 and the space above the valve 26 and to this end I prefer to use a valve element 26 which is fabricated from a relatively soft, impervious, non-metallic material. To permit the use of such relatively flexible material for the valve disc, special means are provided to give auxiliary support to the valve element 26 whenever the fluid pressures acting thereagainst are excessive and likely to cause undue flexure of the valve element. As is best shown in Figs. 2 and 3, such auxiliary supporting means may take the form of a hub

or boss 29 which is supported approximately centrally of the valved chamber 24 by means of radiating arms 30 which extend laterally to the wall of the chamber 24 and form a spider for supporting the hub 29.

It will be noted that the critical face of the hub 29, which is its upper surface, is spaced slightly below the level of the valve seat surface 25. This is done so as to insure firm seating of the valve 26 on the valve seat 25 at all points around its circumference without interference by the hub 29. Such spacing also insures that all of the available pressure on the upper surface of the valve 26 will be active to keep the valve 26 seated against the valve seat 25 whenever such available pressure is not of sufficient magnitude to cause some downward flexure of the central portion of the valve 26.

If the supporting face of the hub 29 were intended to be in horizontal alignment with the seating face of the valve any slight inaccuracy in manufacture, which resulted in the supporting face of the hub 29 being slightly above the valve face 25 or any part thereof, would result in interference with proper seating of the valve upon the seating face 25. In any event, even the absolutely accurate alignment of the valve supporting face of the hub 29 with the surface of the valve seat 25 would serve only to cause the hub 29 to bear a part of the atmospheric load acting upon the upper surface of the valve 26 and thereby reduce the force acting to hold the valve in properly seated relation on the valve seat 25 when the available pressure so acting on the valve is at a minimum.

The clearance which is provided is kept within such limits as to prevent undue downward flexure of the central portion of the valve 26. While the exact proportions of the control element 20 may be varied somewhat, the specific embodiment of the control element illustrated is shown three times its true size in Figs. 2, 3 and 4. In this exemplary form the clearance between the bottom of the valve 26 and the top face of the hub 29 when the valve 26 is seated but in an unflexed condition is .010".

As illustrated in Fig. 2, the casing 21 has an upwardly extending annular wall portion 33 which provides a housing for the valve 26 and permits limited vertical movement of the valve within such housing. The wall 33 is preferably formed with a vertically extending rim which is thinner than the remainder of the wall portion and provides a ledge 34 for receiving and seating a cover element 35. After the cover element is introduced into the opening at the upper side of the wall 33 and is seated against the ledge 34, the thinner portion of the rim is swaged or peened inwardly so as to engage and retain the cover member 35, all as indicated at 36 in Fig. 2.

The cover member 35 has an upwardly extending reduced conduit portion 38 which, in the form of system being described, is connectible with the branch conduit 16 which leads to the intake manifold 18 of the engine 11. The under surface of the cover member 35 has a plurality of protuberances 39 which extend downwardly toward the valve seat 25 and positively limit the upward movement of the valve 26 away from the valve seat 25, while at the same time permitting, when the valve is in an upward position, free egress of air from the valved chamber 24 around the valve and between the protuberances 39, then through the conduit portion 38. This construction is shown in detail in Figs. 2 and 4 and it will be

noted from an inspection of Fig. 2 that the coil spring 27 is disposed against the under side of the cover member 35 and about the protuberances 39 in such manner as to be axially guided thereby.

Whenever the pressure prevailing in the passage 22, 23 is less than that prevailing within the conduit portion 38, fluid pressure plus the urge of the coil spring 27 will retain the valve disc 26 in seated position as shown in Fig. 2. In such position the connection of the accessory to the intake manifold of the internal combustion engine by means of the conduit 38 is interrupted by the valve and plays no part in the operation of the system. The vacuum pump 19 withdraws air from the suction operated motor 14 of the automotive accessory.

Whenever the pressure in the passage 22, 23 exceeds the pressure in the conduit 38 plus the bias of the spring 27, either because of failure of the pump 19 to withdraw a sufficient flow of air from the accessory motor or because of an increasing vacuum in the intake manifold of the internal combustion engine, the valve 26 is lifted from its seat and fluid flow from the accessory motor 14 to the intake manifold 18 by way of the conduits 15 and 16 is established. At such time as the pressure in the intake manifold and, therefore, in the conduit 18 plus the bias of the spring 27 again exceeds the pressure below the valve element 26, the valve automatically closes.

I have found that, either because the seating of the valve 26 is normally such as not to provide a perfect seal as between the passage 38 and the passages 22 and 23, which may be occasioned by the presence of dirt or dust on the face of the valve seat; or because of some unexplainable condition arising during operation, perhaps when pressure differentials between the passage 38 and the passages 22 and 23 are small, a certain amount of gasoline vapor from the intake manifold 18 passes the valve 26 and reaches the valved chamber 24. This is evidenced by the fact that gasoline collects in the operating chamber of the vacuum pump 19. I have further found that the provision of a small bleed hole or atmospheric vent 40 adequately prevents such collection of gasoline past the valve 26. The theories herein stated may not be an accurate and exact analysis but the results achieved are definite and positive and the passage of gasoline into the chamber 24 is definitely eliminated by

the provision of the vent 40. In the form illustrated a vent hole of approximately .040" in diameter is found to result in highly satisfactory operation of the system.

I claim:

1. In a fluid operated automotive vehicle accessory system, an accessory and a fluid motor for actuating the same, an internal combustion vehicle-propelling engine having an intake manifold, a mechanical vacuum pump and a conduit connecting said pump with said fluid motor for operating the latter, control means interposed in said conduit, and a second conduit connecting said control means with the intake manifold of the engine, said control means comprising a passage leading from said first conduit and arranged to communicate with said second conduit and a check valve in said passage for normally preventing communication from said first to said second conduit, said check valve being movable to closed position by a preponderance of absolute fluid pressure in said second conduit over the absolute pressure obtaining in said first conduit, and a relatively small orifice in said control means adjacent said check valve and on the intake manifold conduit side thereof whereby constant but limited communication between said passage and the atmosphere is effected.

2. For use in a fluid pressure system for operating a vacuum operated device from an internal combustion engine, a control means having two passages, one of said passages being connectible at its opposite ends to the vacuum operated device and a vacuum producing pump respectively, the other passage being connectible at one end to the intake manifold of the internal combustion engine and communicating at its other end with the first passage, a check valve in said other passage for normally preventing communication between the engine intake manifold and said first passage, said check valve being movable to closed position by a preponderance of absolute fluid pressure in the engine intake manifold over the absolute pressure obtaining in said first passage, and a relatively small orifice in said control means adjacent said check valve and on the intake manifold side thereof whereby constant but limited communication between said other passage and the atmosphere is effected on the intake manifold side of said check valve.

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