United States Patent

[11] 3,580,629

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[54] **INSTALLATION FOR CLOSING OR OPENING APERTURES IN VEHICLES**
35 Claims, 14 Drawing Figs.

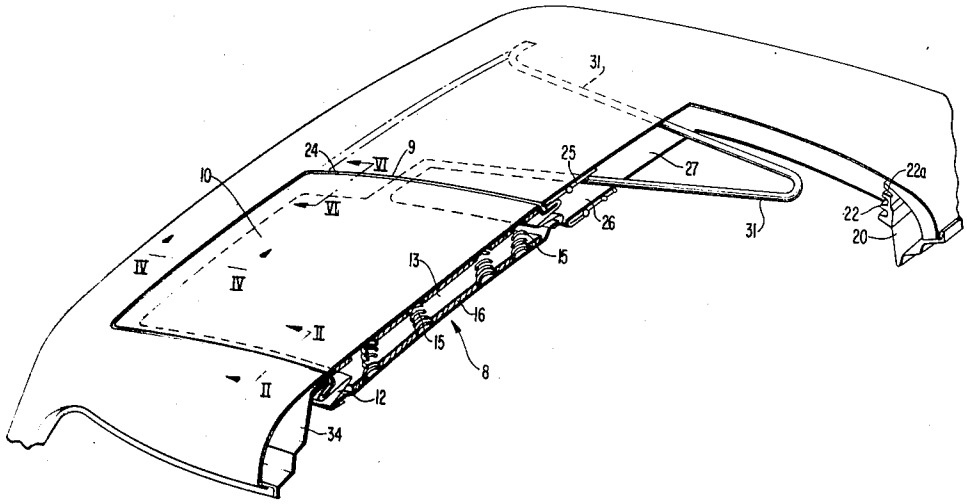
[52] **U.S. Cl.** **296/137,** 49/209, 49/477, 52/2
[51] **Int. Cl.** **B60j 7/04**
[50] **Field of Search** ..... 296/137; 52/2 (XR), 66; 49/209 (XR), 316, 477 (XR)

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ABSTRACT: An installation for the selective closing and opening of openings in vehicles by means of a closure part which is guided in appropriate guide means and which is actuated by an actuating mechanism; the closure part includes a chamber with variable volume while the forces acting in either the expansion or contraction direction of the chamber engage at the closure part and at a fixed place in the vehicle.



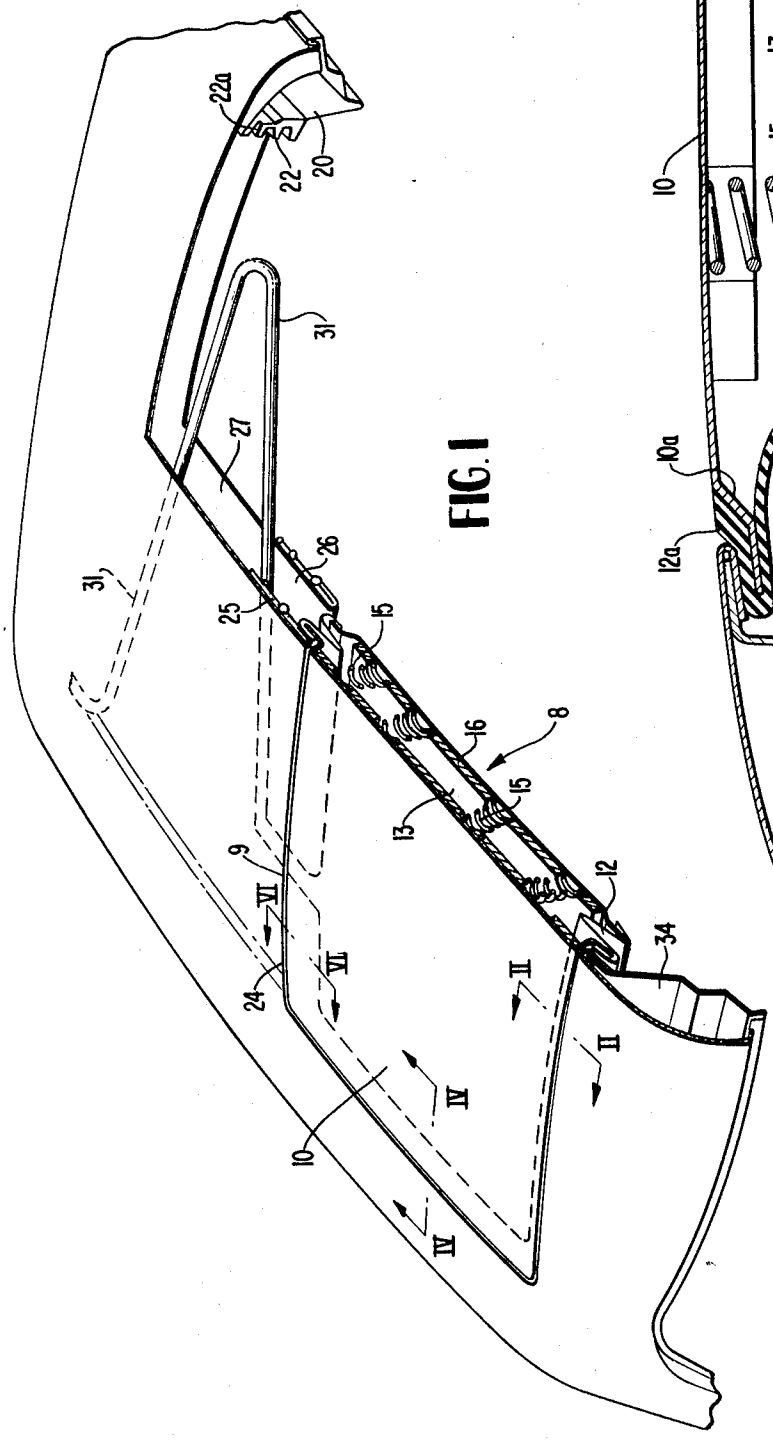


FIG. 1

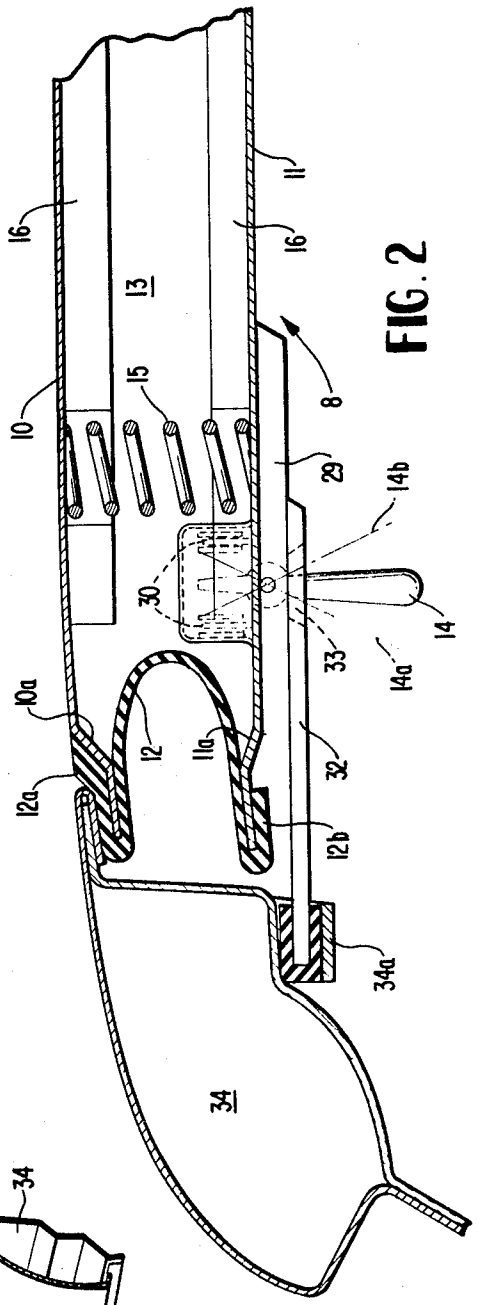
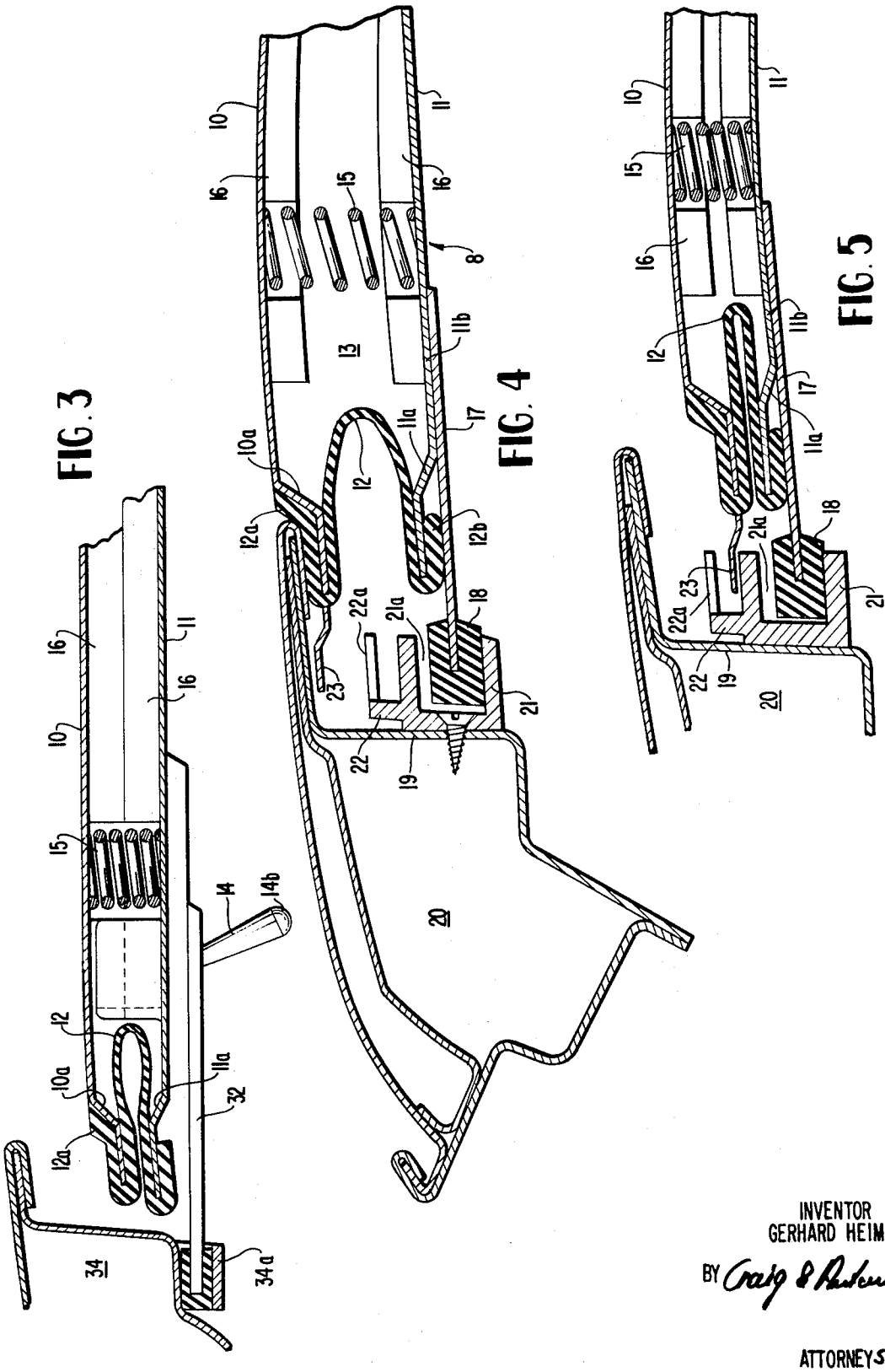


FIG. 2

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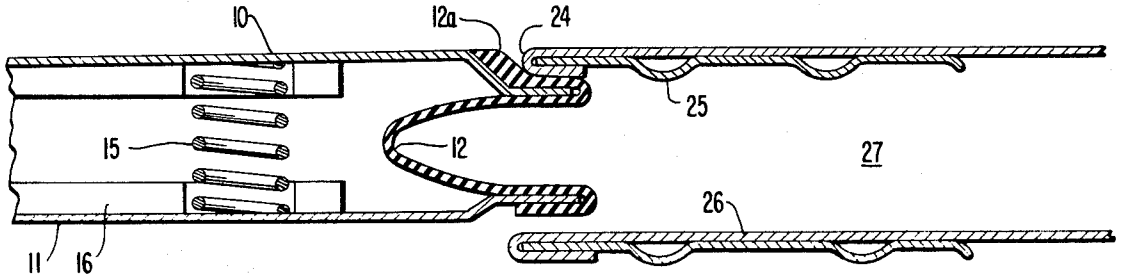


FIG. 6

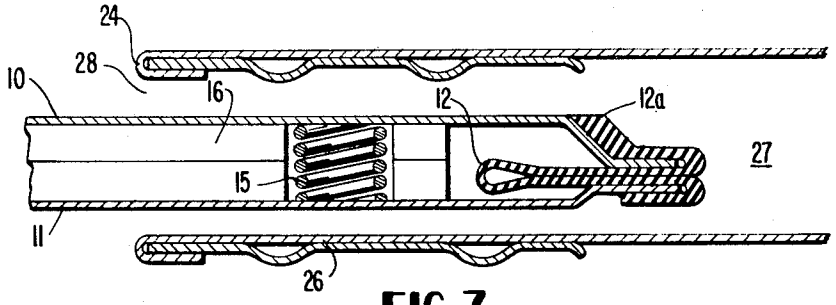


FIG. 7

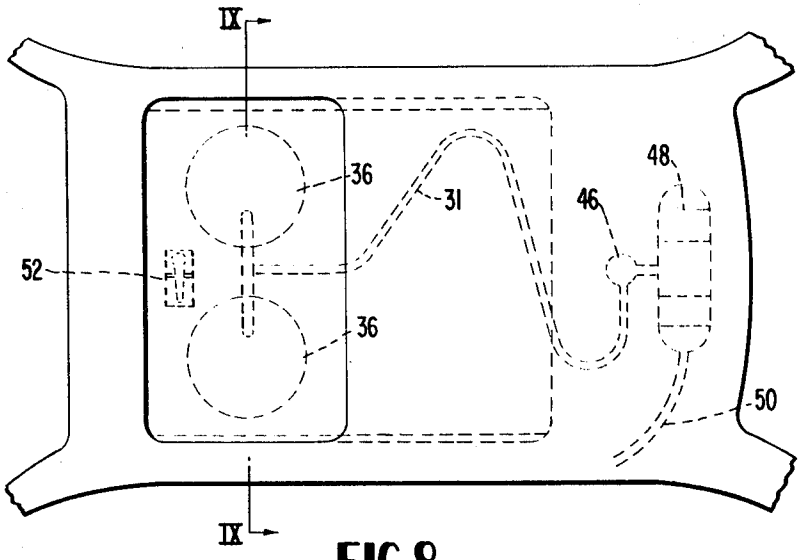


FIG. 8

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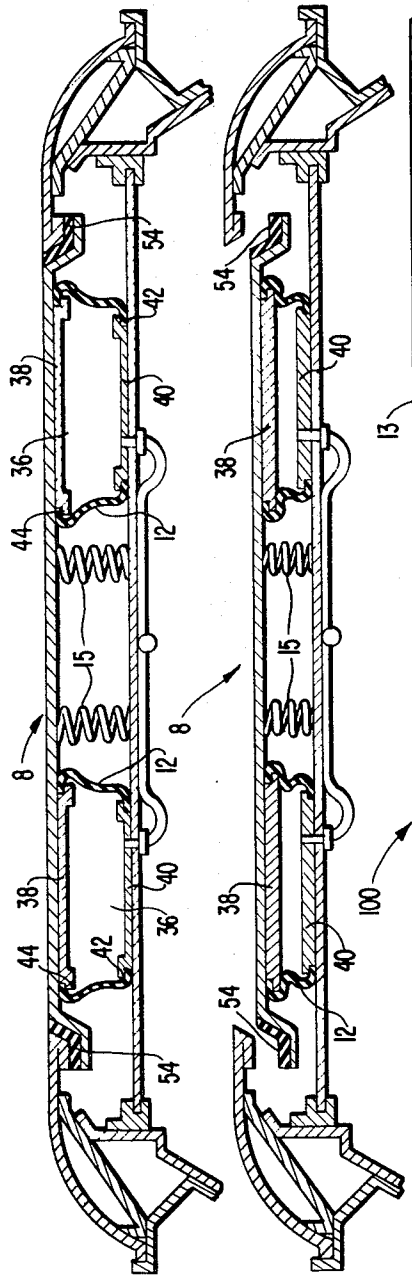


FIG. 10

FIG. 9

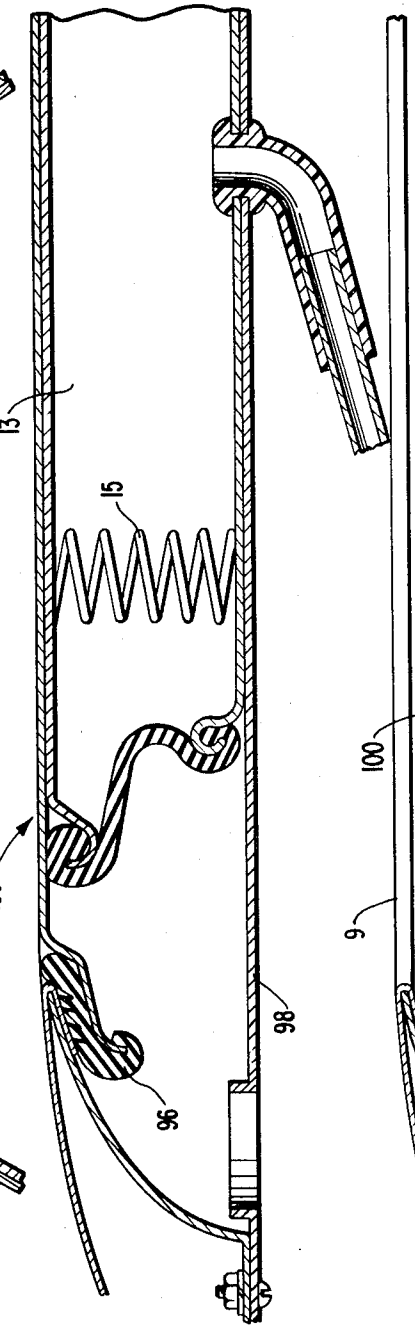


FIG. 13

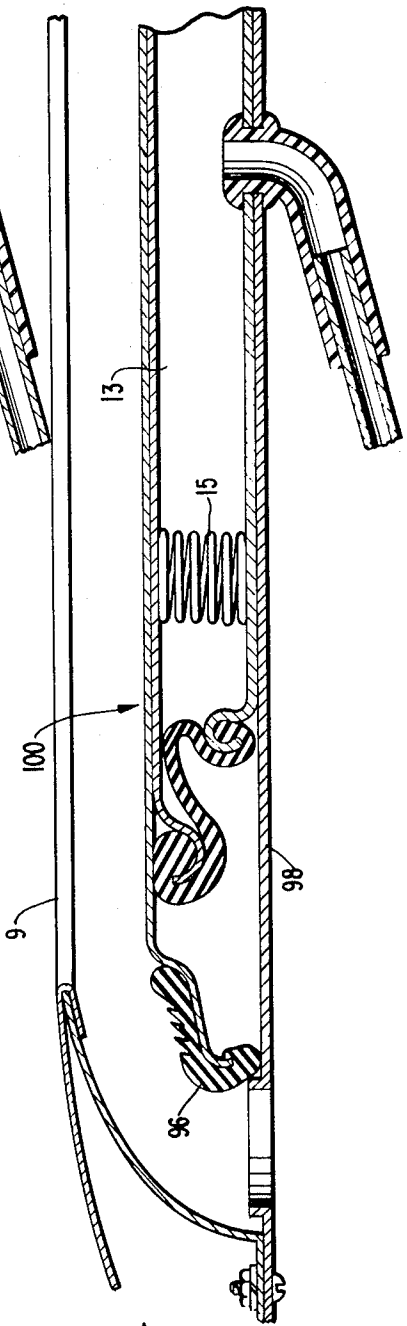


FIG. 14

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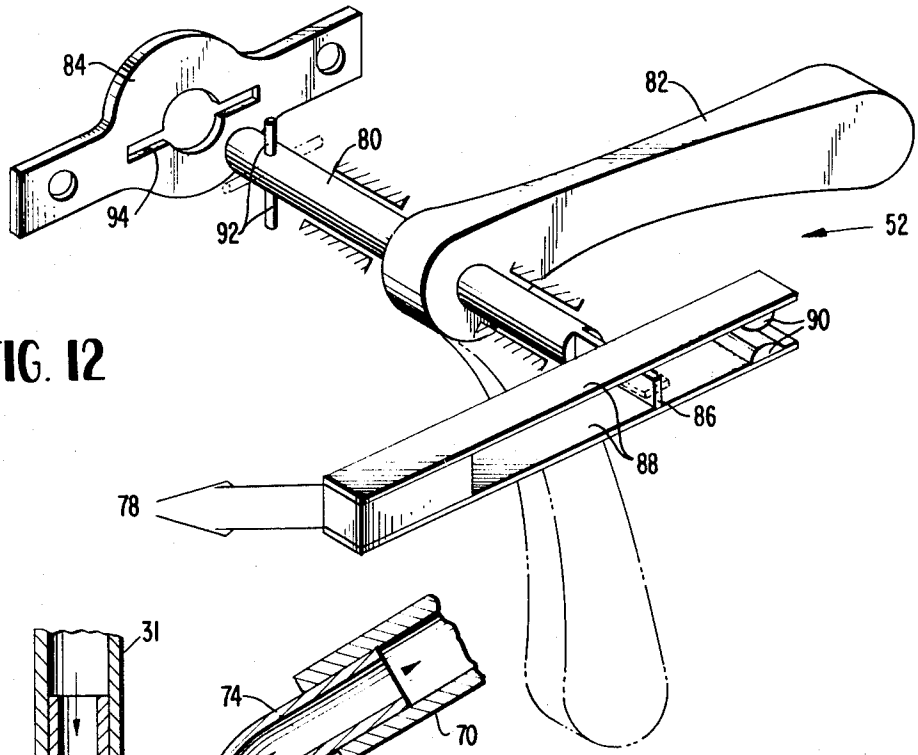


FIG. 12

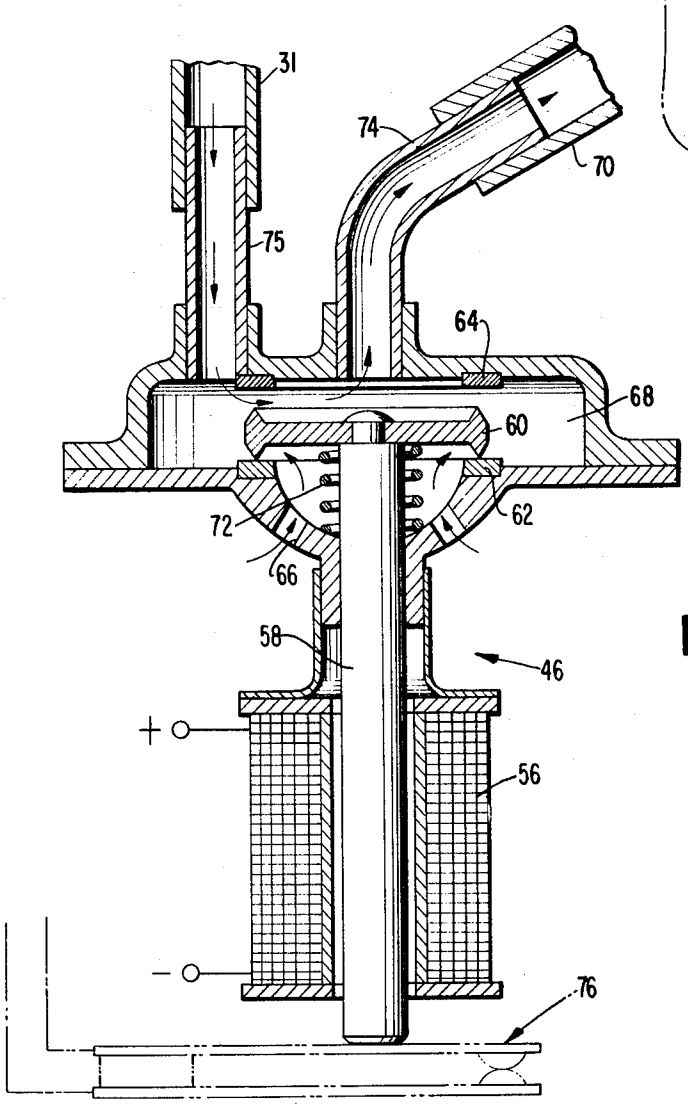


FIG. 11

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INSTALLATION FOR CLOSING OR OPENING APERTURES IN VEHICLES

The present invention relates to an installation for the closing or opening of apertures in vehicles by means of a closure part, with a guidance for the closure part and with an actuating mechanism by means of which the closure part can be urged with its edge areas against the edge areas of the aperture and by means of which the closure part is adapted to be moved away from the aperture.

Installations of the aforementioned type are essentially sliding roofs and ventilating flaps. The steel sliding roofs used for the most part at present have a considerable number of significant and important disadvantages. Insofar as they are actuated manually, a large force has to be applied at their actuating handle, especially if the sliding roof is to be closed. To apply this force is particularly difficult for female and older persons. Furthermore, even this large force does not suffice to render the sliding roof completely watertight because the abutment pressures adapted to be produced in the edge areas are too small. One has to use therefore wide water-drainage channels at the edges of the opening or aperture in order to insure that no water enters into the vehicle interior. However, the wide channels entail that the opening remains relatively narrow or small.

A further disadvantage of the customary sliding roofs is the fact that the head freedom is impaired and becomes considerably smaller on the back seats as a result of the sliding roofs, and more particularly because the sliding roof, during the opening thereof, is not lowered and then moved rearwardly parallel to the roof panel. Instead, during opening, the rear edge of the sliding roof drops off by an amount of the order of 1 cm. whereas the height position of the forward edge of the sliding roof remains the same. The siding roof is then pushed toward the rear in this inclined position. The guidance and the covering of the guidance for the sliding roof, therefore, reach their lowest place just over the rear seats and thus take away head freedom. The same is true for sliding roofs actuated by electric motors. With the latter type of installations there arises additionally the problem to apply the necessary thrust force or pushing force by way of flexible cables in order to lift the sliding roof during the closing, during the last centimeters of its movements and then to produce the abutment pressure.

Therebeyond, the vehicles with sliding roofs are also slightly heavier than those without sliding roofs. Also the price differential between the vehicles with and without sliding roofs is considerable. With each actuating operation of the prior art sliding roofs, a large number of parts have to be moved, and in all intermediate positions, one has to fix the sliding roof by a separate actuation in order that it remain in this position and does not rattle.

With ventilating flaps there exists primarily the problem of the actuation thereof—for the most part by way of cable tows—and of the pivotal connection thereof. The vacuum and excess pressure conditions at the driving vehicle dictate almost always the place of the accommodation of the ventilating flaps and ventilating apertures. Since ventilating apertures within the area of the back seats can hardly be actuated from the front seats, for example, by means of cable tows, one renounces any ventilating flaps at these places.

If a vehicle now drives through dusty air, then in general the forward ventilating flaps located in the excess pressure area are closed. The passenger space is now in communication with the atmospheric air exclusively by way of ventilating apertures within the area of the back seats. These ventilating openings are located within the vacuum area for reasons of a good air circulation. If one now closes the forward ventilating flaps, then dust-containing air is sucked into the vehicle interior through the rear ventilating openings and the opposite of the aimed-at purpose is achieved. Both with ventilating flaps as well as with ventilating openings, which cannot be closed, one has to provide complicated labyrinths in order that water can not penetrate into the vehicle interior. Ventilating flaps therebeyond have the basic disadvantage that they open up only three sides of those apertures, with which they cooperate because they are pivotally connected at the fourth side.

However, precisely this pivotal connection is very frequently the cause for difficulties because the hinge axes have to be aligned whereas the closure part of the ventilating flap has to be matched to the curved contours of the vehicle. In connection therewith one frequently arrives at acceptable solutions only with large expenditures and numerous deliberations. Finally, the closure parts may cant or tilt and then do not close any longer in a tight manner and have to be installed with small tolerances because they can not adjust themselves relative to the opening or aperture to be closed.

It is an object of the present invention to provide a closure installation which does not exhibit the aforementioned disadvantages, which permits uniform closure and opening systems both for sliding roofs as well as for ventilating flaps, and with the aid of which one can close also apertures with small expenditures where this was not feasible heretofore with reasonable expenditures.

As solution to the underlining problems, the present invention proposes that the closure part is provided with a chamber, variable in its volume, whose forces acting in the expansion direction or in the contraction direction engage, on the one hand, at the closure part and on the other, at a fixed place in the vehicle.

One can produce these forces in principle both by a vacuum as also by an excess pressure.

However, it is recommended in accordance with the present invention to connect the chamber with a vacuum source, preferably with an intake manifold of an engine because the vacuum in the intake manifold is available in a convenient manner and is completely adequate also with injection engines and diesel engines. Vacuum, in contradistinction to excess pressure, also offers the advantage that the chamber, especially when the latter is large, does not bulge or buckle out, which would be unacceptable, for example, with sliding roofs. Additionally, the vacuum can never become larger than 1 kg./cm.^{2} in case of disturbances or faults in the system. If no intake manifold is available the vacuum can be established readily by an uncomplicated pump.

If according to one feature of the present invention, the closure part includes the outer body panel of a sliding roof, then the appearance of the sliding roof in accordance with the present invention does not differ externally from the conventional roof.

According to another feature of the present invention, the chamber is disposed between the outer cover panel and a support part so that the chamber can be accommodated in a protected manner, and with an appropriate configuration and construction of the support part, the reaction forces of the outer cover panel can be readily absorbed by such support part without excessive deformations on the part of the support part or of the outer panel.

A compact structural element which can be readily and rapidly installed or removed can be achieved in accordance with the present invention, if the support part is movable together with the external panel and the support part is guided in guide means that are provided along the inner side of the edge of the aperture.

A particularly simple form of this structural element is achieved by the use of airtight or air-impervious plates as support part and outer panel whose edges are connected by a bellows so that the space defined thereby constitutes the chamber. The thus-constituted chamber is very large and the forces applied by the air-pressure difference become correspondingly large which again leads to the possibility that the abutment pressures of the closed sliding roof can be made large.

A good adaptation of the sliding roof to the configuration of the remaining roof can be achieved according to a still further feature of the present invention if the external panel is

adapted to be urged against the inner side of the edge area of the opening.

According to still another feature of the present invention, if springs are provided with a vacuum-operated chamber urging the external panel and the support part away from one another, the vacuum is needed only during the short period of time of the actual sliding roof actuation whereas during the entire remaining period of the time, for example, when the vacuum disappears with the engine standing still or when one has displaced the sliding roof in any desired position, a force can nonetheless be applied automatically which produces the necessary closing abutment pressure or the retaining or holding forces in intermediate positions of the sliding roof. Therebeyond, the vacuum entails quite generally the advantage that the line systems built-up with the same, are self-sealing, and one therefore does not necessitate any sleeves, and that a large selection of hose lines is available whose walls are quite capable, without any difficulties, to absorb or withstand the vacuum.

Additionally, the use of such springs between the outer panel and the support part entails the advantage that the abutment pressure remains constant at all times because the force of the springs is constant without regard to the operating condition of the engine.

If the springs are constructed as compression springs between the outer panel and the support part, then the compression springs can be secured directly at the outer panel and at the support part, thereby resulting also in a compact structural element.

By arranging the springs within the edge area of the closure part, the abutment pressure will be applied within those areas in which it is also actually needed. Additionally, such arrangement of the springs also avoids the danger that the outer panel may bulge out.

The number of the compression springs can be reduced or they can be completely dispensed with, if the bellows is constructed, at least in part, as a compression spring.

According to still another feature of the present invention, the bellows can be utilized at the same time to perform sealing functions if a seal profile mounted along the edge of the outer panel forms a part of a bellows made from elastic synthetic resinous material.

According to another feature of the present invention the parts of the guide means disposed in the sliding direction on both sides of the closure part may include two rails of which the lower rail guides the support part and the upper rail guides extensions provided at the outer panel whereas the edge of the opening or aperture extends over the rails, and the upper rail is provided with apertures which are aligned with the extensions when the sliding roof is disposed below the opening. Such an arrangement in accordance with the present invention offers the advantage that only two rails are needed on both sides of the closure part, thereby achieving the further advantage that the sliding roof in the pushed-back condition is very flat. Connected therewith is the advantage of the small chamber volume so that only small air quantities are necessary for the actuation.

According to another feature of the present invention, abutment bodies are provided between the external panel and the support part so that both the external panel and the support part find an abutment, when being sucked one against the other, and possible down-warping or buckling is avoided.

If the abutment bodies include one layer each that is mounted at the mutually opposite inner surfaces of the outer panel and of the support part, then the abutment can be constituted relatively large surfaced and the layer at the same time, mechanically reinforces as well as heat- and sound-insulates the external panel.

A relatively large spring stroke and possibly also a guidance for the compression springs can be achieved if the layers are provided with apertures or recesses for the compression springs.

It may also be desirable to provide several vacuum-pressure boxes or cells between the external panel and the support part because in most cases the vacuum does not need to act on the entire outer panel or on the entire support part. If several vacuum cells or boxes are used, then one arrives at smaller chambers which are actuatable more rapidly and with less air. This, in turn, means that a possibly present vacuum tank or reservoir may have a relatively small volume. With such a solution the extensions of the outer panel need not cross through the bellows which otherwise might lead to the occurrence of eventual leakages. Furthermore, no slots need to be punched into the bellows. If the springs can be installed outside of the vacuum-pressure boxes or cells, then they can be mounted more easily. One is then able to give to the bellows, for example when it consists of rubber, those properties which it must possess for the vacuum pressure cells and does not need to take into consideration the requirement that it is also weather resistant and has other properties which seal rubbers should possess. The bellows is protected against climatic occurrences at this place.

If the vacuum-pressure cells have at least one, preferably circular, cover, then the vacuum cells can be manufactured in a simple manner and provide a good seal at the transition from bellows to cover.

Additionally, by the use of rolled-on retaining edges for the bellows at the covers, one achieves that the edges of the covers do not cut into the bellows, yet nevertheless encounter a good retention at the cover.

Moreover, if the contours of one cover extend beyond the contours of the associated other cover, then the danger of squeezing the bellows during the evacuation of the vacuum cylinder is completely eliminated. Additionally, one attains a lower structural height, for example, with respect to the aforementioned embodiments in which the minimum height of the sliding roof is determined by four rubber layers and four sheet metal layers.

By the use of separate supply lines to each vacuum-pressure cell, one achieves a more rapid emptying of the pressure cell and one can also use thinner connecting hoses which are correspondingly more flexible and movable. Furthermore, such hoses are also more vacuum resistant.

According to another feature of the present invention the opening of the sliding roof from the outside can be prevented and the unlocking as well as the introduction of vacuum can be automatically coupled with one another, if a manually actuatable actuating member is provided, by means of which the sliding roof is adapted to be locked in its forward position with a disconnected chamber and by means of which the sliding roof is adapted to be unlocked with an actuated chamber.

A particularly convenient actuation of the sliding roof is achieved according to still another feature of the present invention, if the actuating member is a lever mounted at the sliding roof which includes a baring pin by means of which, a switch is actuable and by means of which also a form-locking latching with the edge of the opening is achievable.

Vacuum is introduced immediately upon actuation of the actuating member if the actuating pin is polygonal at its one end and if springs of contacts rest on this end.

The valve can be provided at those places where sufficient space is available therefor if the vacuum is controllably applied to the chambers by means of a magnetic valve controlled by the contacts.

In the event the closure part of the closure body is ventilating flap, the present invention also permits the realization of the advantages indicated above with such ventilation flaps insofar as they are of significance for the latter.

The sliding roof of the present invention can also be actuated if the motor is turned off or stands still, if a vacuum tank or reservoir is provided in the vehicle.

According to the present invention, the ventilating flaps, for example as used in buses, can also be automatically closed when the engine is turned off by any conventional means. Therebeyond, the driver could also control from his seat the

condition of the roof flaps in buses by the use of the present invention. This was not feasible heretofore by reason of the large forces to be applied. In some cases the vacuum can also be so adjusted that the ventilating flaps assume an intermediate position between the closed and open positions. One could thus operatively connect in a conventional manner the position of the ventilating flaps with the position of the heating system.

These and further objects, features, and advantages of the present invention will become obvious from the following description when taken in connection with the accompanying drawing which shows, for purposes of illustration only, several embodiments in accordance with the present invention, and wherein:

FIG. 1 is a perspective view of a vehicle roof provided with a sliding roof in accordance with the present invention, partly broken away for the sake of clarity.

FIG. 2 is a cross-sectional view on an enlarged scale and taken along line II–II, of FIG. 1, with the sliding roof in the closed position.

FIG. 3 is a cross-sectional view, similar to FIG. 2, illustrating the sliding roof in the lowered position for the purpose of opening.

FIG. 4 is a cross-sectional view on an enlarged scale and taken along line IV–IV of FIG. 1, illustrating the sliding roof in the closed condition.

FIG. 5 is a cross-sectional view, similar to FIG. 4 and illustrating the sliding roof in the lowered position.

FIG. 6 is a cross-sectional view, on an enlarged scale, through the sliding roof in the closed condition and taken along line numeral VI–VI of FIG. 1.

FIG. 7 is a cross-sectional view, similar to FIG. 6, illustrating the sliding roof in its position when retracted rearwardly.

FIG. 8 is a somewhat schematic partial plan view on a motor vehicle roof in accordance with the present invention.

FIG. 9 is a longitudinal cross-sectional view, on an enlarged scale, through the roof of FIG. 8, with an evacuated vacuum-pressure cell, taken along line IX–IX of FIG. 8.

FIG. 10 is a cross-sectional, similar to FIG. 9 and illustrating the vehicle roof with vented vacuum pressure cells.

FIG. 11 is a cross-sectional view through a magnetic valve in accordance with the present invention.

FIG. 12 is a perspective view of an actuating member in accordance with the present invention.

FIG. 13 is a cross-sectional view through a ventilating flap in accordance with the present invention in the vented condition of the chamber, and

FIG. 14 is a cross-sectional view, similar to FIG. 13, through the ventilating flap in the evacuated condition of the chamber.

Referring now to the drawing, wherein like reference numerals are used throughout the various views to designate like parts, the sliding roof generally designated by reference numeral 8 within the aperture or opening 9 of a motor vehicle, essentially consists according to FIG. 1 of two approximately flat or moderately convexly curved plates, namely of the outer plate 10 and of the inner plate 11, which have the edges 10*a* and 11*a* thereof (FIGS. 2 and 3) mutually offset toward one another. The plates 10 and 11 exceed in each case the size of the opening 9 of the vehicle roof. Together with a bellows 12 which is secured continuously in an airtight manner at the edges 10*a* and 11*a*, the plates 10 and 11 form a hollow chamber 13 having a variable volume and provided with a movable plate 10.

The bellows 12 serving as lateral walls of the chamber 13 surrounds according to FIGS. 2 nd 3 with its upper, slightly reinforced edge portion 12*a*, the approximately horizontally and outwardly offset, free edge portion 10*a* of the plate 10 of the sliding roof 8 and is secured thereat in any conventional manner, for example, by bonding or glueing. In a similar manner the lower edge portion 12*b* is rigidly connected with the approximately horizontally, outwardly extending free portion of the edge 11*a* of the plate 11. The bellows 12 is drawn in or curved inwardly toward the chamber interior between the two plates 10 and 11. The chamber 13 is connected by way of a line 31 (FIG. 1) with a vacuum source, for example, with the suction line of an engine. A magnetic valve, to be described more fully hereinafter, is arranged in this line 31. An adjusting lever 14 is pivotally secured for adjustment to three positions, in the forward portion of the chamber 13 at the plate 11, appropriately apertured thereat. In the two outer positions 14*a* and 14*b* of the lever 14, the magnetic valve is so controlled by means of the switch contacts with 30 that is connects line 31 with the vacuum source. As a result thereof, the air is nearly completely withdrawn out of the chamber 13, the plate 10 moves inwardly and the sliding roof 8 can be pushed forwardly or rearwardly. In the center position of the lever 14, the magnetic valve disconnects the vacuum and connects the chamber 13 with atmospheric air which is then able to flow into chamber 13.

Several springs 15 are securely arranged between the inner plate 11 and the outer plate 10, preferably near the side edges thereof, and more especially preferably along each longitudinal side of the sliding roof 8. All of the springs 15 together with the bellows 12 have a smaller spring force than the force exerted on the movable plates 10 and 11 by the vacuum. On the other hand, the spring force naturally exceeds the inherent weight of the plate 10 and the weight of a dampening layer 16 secured to its bottom side which dampens sound and heat. The dampening layers 16 terminate at a sufficient distance from the bellows 12, folded inwardly with an empty or evacuated chamber 13. Also sufficient space is provided for each spring 15 in each dampening layer 16.

In order to be able to move the sliding roof 8 completely satisfactorily into the aperture 9, rectangularly-shaped sheet metal strips 17 are secured at the lateral edge portions 11*b* of the plate 11 in front of the edge 11*a* (FIGS. 4 and 5) which engage slidingly with slide shoes 18 in U-shaped, inwardly open guide rails 21 that are secured at the inner sidewall 19 of roof edge bearers 20. The sheet metal strips 17 engage outwardly into sliding grooves 21*a* of the guide rails 21 below the lower edge 12*b* of the bellows 12 and carry thereby the sliding roof 8.

A further guide rail 22 adjoins the guide rail 21 which is provided with apertures 22*a* for several tongues 23 to project outwardly beyond the lateral edge portions 10*a* of the plate 10. If the sliding roof 8 is in its farthest forward position, then the apertures 22*a* are in alignment with the tongues 23 so that the tongues 23 are able to cross through the apertures 22*a* with a vented chamber 13. The upper edge 12*a* can then come into abutment at the roof bearer 20. However, as soon as the sliding roof 8 is in its position according to FIG. 5 and is pushed toward the rear, the tongue portions 23 can no longer come out of the apertures 22*a*. If the chamber 13 is now vented, then the tongue portions 23 abut from below against the upper leg of the guide rail 22 whereby the sliding roof 8 is stopped and held fast also in intermediate positions. The guide rail 22 protects the plate 10, which is pressed against the plate 11, with an evacuated chamber 13 against lateral canting during curve drives or during other driving movements of the vehicle.

The rear, flanged-over edge 24 of the aperture 9 (FIGS. 6 7) is appropriately reinforced by insertion of an embossed sheet metal strip 25. The reinforced upper edge 12*a* is pressed in between the edge 10*a* of the plate 10 and the edge 24 and forms thereby a completely satisfactory seal. The bottom 26 of the retraction or insertion compartment 27 is also reinforced within the area of the slide aperture 28 in a similar manner as described above. The same construction is analogously selected also at the other aperture or cutout edges.

In order to avoid damaging of the plate 10 in an intermediate position between a closed and a completely opened aperture 9, a slightly projecting, elastically yielding strip may be inserted into the rear edge 24 of the aperture or a rubber strip may form the edge 24.

The evacuation of the chamber 13 (FIG. 1, 2 and 3) takes place indirectly by movement of the actuating lever 14. The

actuating lever 14 supported at the plate 11 by means of a reinforcing plate 29 is constructed at the same time as an electric switch which energizes a magnetic valve in the two angular positions by way of a respective switch contact 30 each; the magnetic valve connects a line 31, which is connected itself with the rear end of the chamber 13, with a vacuum reservoir or tank dependent on the suction line of the engine. By reason of the thick damping layers 16, the prevailing air quantity in the chamber 13 is relatively small so that only a small air quantity is necessary for the lowering of the plate 10.

Appropriately the slide shoes 18 on the guide strips 17 consist of conventional self-lubricating synthetic resinous material so that a slight finger pressure at the adjusting lever 14 in the desired direction, displaces the sliding roof 8 into the intended position.

For the purpose a completely satisfactory securing of the closed position, the sliding roof 8 can be locked or latched from the inside. A locking rod 32 (FIG. 2) serves for this purpose which is secured below the reinforcing plate 29 and is provided with an aperture 33 for adjusting lever path. The forward end of the locking rod 32 is then secured in an appropriate manner against longitudinal displacement toward the rear at the forward roof-frame cross bearer 34 in an eyelet 34*a* or the like.

In lieu of a plurality of weak coils springs and in lieu of the bellows 12, a construction of the lateral walls of appropriately inwardly folded spring steel strips is possible and/or the chamber may be constituted laterally of individual, slightly S-shaped spring steel strips (not shown). Of these strips the ends directed toward the aperture center are connected with each other in an airtight manner and the outer ends thereof are secured in an airtight manner each on the sliding roof outer cover panel as well as at the bottom sheet metal plate of the sliding roof chamber projecting beyond the same in the outward direction.

In lieu of the coil springs and of the damping layers, bellows of correspondingly soft rubber may be arranged as spring means at the mutually opposite sides of the cover and bottom of the chamber. The spring force of these bellows inclusive the chamber walls, however, has to be smaller than the force applied by the vacuum.

In the embodiment according to FIG. 10, two similarly constructed vacuum boxes or cells 36 are provided whose bellows 12 connected with each other the covers 38 and 40. The covers 38 and 40 have rolled-on securing and retaining edges 42 and 44. As can be seen from the drawing, the cover 40 has a smaller diameter than the cover 38. If the vacuum pressure cells 36 are evacuated, then the bellows 12, as shown in FIG. 9, are not squeezed, because the diameter differences create space for the same. As shown in FIG. 8, the vacuum-pressure cells 36 are connected by way of a common line 31 and the magnetic valve 46 with a vacuum-pressure tank 48 which, in its turn, connected by way of a line 50 with the suction or intake manifold of the engine. Instead of the single line 31, also two lines may lead from the vacuum-pressure cells 36 to the magnetic valve 46.

From FIG. 8 may also be seen the position of an actuating member 52 to be described more fully hereinafter in connection with FIG. 12. In this embodiment the rubber strips 54 assume the function of the seal of the sliding roof 8.

The magnetic valve generally designates by reference numeral 46 is illustrated more clearly in FIG. 11. A coil or winding 56 cooperates with an armature 58 which on its upper end, as viewed in FIG. 11, carries a valve plate 60. The valve plate 60 may cooperate with a first valve seat 62 and with a second valve seat 64. Depending on the position of the valve plate 60, atmospheric air can enter by way of the apertures 66 into the interior of the magnetic valve 46 and therewith can reach the vacuum cells 36 by way of the line 31. Furthermore, as illustrated, air can be sucked off to the vacuum tank 48 by way of the line 31, the interior space 68 and a line 70. The valve plate 60 is urged against the valve seat 64 by a spring 72 when the coil 56 is deenergized so that the ambient pressure prevails in the line 31 whereas the vacuum tank 48 or the line 70 thereof is closed.

It can be seen from FIG. 11 that the lines 31 and/or 70 merely have to be placed over pipes 74 and 75 and that not clamps are necessary. The lower end of the armature 58 actuates a switch generally designated by reference numeral 76 when the winding 56 is energized. By means of this switch 76 one can actuate a sliding roof motor (not shown) of any conventional construction which automatically moves the sliding roof 8 when the vacuum cells 36 have been evacuated.

The winding 56 is connected with two electric lines 78 (FIG. 12) which leads to the actuating member 52 that includes a bearing pin 80 with which is nonrotatably connected a lever 82. Apart from the fitting or hardware 84, all parts illustrated in FIG. 12 are secured at the sliding roof. The lever 82 can be pivoted into a handle recess. In the full-line-illustrated rest position, the bearing pin 80 spreads apart with its ends 86 constructed as flat iron two contact springs 88 so that no current can flow through the line 78 because the contacts 90 are lifted off. This means according to FIG. 11 that the spring 72 urges the valve plate 60 upwardly and the vacuum pressure cells 36 are vented or filled with atmospheric air. If one pivots the lever 82 into the position indicated in dash lines, then the contacts 90 close, the winding 56 energizes the vacuum can now reach the line 31. In this condition one can displace the sliding roof 8 and the nose portions 92 of the bearing pin 80 can be pulled out of the double key slot 94. As a result thereof, the sliding roof 8 moves toward the rear. If one now returns the lever 82 into the position indicated in full line, then the vacuum pressure cells 36 are vented and the sliding roof 8 is clamped fast.

In view of the foregoing description, a detailed explanation of FIG. 13 and 14 is believed unnecessary. Only for purposes of orientation and clarification, the chamber 13 has been designated therein as also the spring 15. The stroke movement with an evacuated chamber 13 is limited in this embodiment in that a seal profile 96 abuts at a support part 98. As can also be further seen readily, the ventilation flap generally designated by reference numeral 100 is able to follow the curvatures in an ideal manner and automatically centers itself in the opening 9.

While I have shown and described several embodiments in accordance with the present invention it is understood that the same is not limited thereto but is susceptible of numerous changes and modifications as known to a person skilled in the art, and I therefore do not wish to be limited to the details shown and described herein but intend to cover all such changes and modifications as are within the scope of those skilled in the art.

I claim:

1. An installation for the closing or opening of apertures in vehicles by means of a closure part, which includes guide means for the closure part and actuating means operable to force the closure part with its edge areas against the edge areas of the aperture and to move the closure part away from the aperture, characterized in that the closure part includes chamber means disposed between said closure part and a support means and consisting of several individual vacuum cells having a volume substantially smaller than the volume between the closure part and the support means wherein the volume of the chamber means is a variable volume connected with a vacuum source, spring means being provided for urging the closure part and the support means away from one another, wherein the chamber means create forces acting in the expansion or contraction direction between said closure part and said support means.

2. An installation according to claim 1, wherein said chamber means is operatively connected with an intake manifold of an engine.

3. An installation according to claim 1, wherein the closure part is a ventilation flap.

4. An installation according to claim 1, further comprising vacuum tank means in the vehicle.

5. An installation according to claim 1, wherein said closure part includes outer body panel means of a sliding roof.

6. An installation according to claim 5, further comprising manually actuable actuating means operable to lock the sliding roof in its forward position with disconnected chamber means and operable to unlock the sliding roof with actuated chamber means.

7. An installation according to claim 6, wherein the actuating means is a lever mounted at the sliding roof which include bearing shaft means, switch means, and form-locking lock means for locking said sliding roof with the edge of the aperture, said switch means as well as said form-locking lock means being actuatable by said bearing shaft means.

8. An installation according to claim 7, wherein said shaft means is polygonal, and spring means of contact means resting on said one end.

9. An installation according to claim 8, wherein the vacuum is applied to the chamber means by way of a magnetic valve means controlled by the contact means.

10. An installation according to claim 1, wherein said closure part includes outer body panel means of a sliding roof, and the chamber means is disposed between the outer body panel means and the support means.

11. An installation according to claim 10, wherein said support means is movable together with the outer panel means and wherein said support means is guided in guide means provided on the inner side of the edge of the aperture.

12. An installation according to claim 11, wherein the outer panel means is operable to be forced against the inner side of the edge area of the aperture.

13. An installation according to claim 12, wherein said spring means are connected as compression springs between the outer panel means and the support means.

14. An installation according to claim 13, wherein a seal means mounted at the edge of the outer panel means forms a part of a bellows means essentially consisting of elastic synthetic resinous material.

15. An installation according to claim 13, wherein the parts of the guide means disposed in the sliding direction on both sides of the closure part each include two rail means, of which the lower rail means guides the support means and the upper rail means guides extensions provided at the outer panel means, the edge of the aperture extending over the rail means, and the upper rail means being provided with aperture means that are in alignment with said extensions when the sliding roof is below the aperture.

16. An installation according to claim 15, wherein abutment means are provided between the outer panel means and the support means.

17. An installation according to claim 16, wherein the abutment means includes a layer that is mounted at the mutually opposite surfaces of the panel means and of the support means.

18. An installation according to claim 17, wherein the layers are provided at least with recesses for the compression springs.

19. An installation according to claim 1, wherein the chamber means is disposed between an outer body panel means and a support means.

20. An installation according to claim 19, wherein said spring means are connected as compression springs between the outer panel means and the support means.

21. An installation according to claim 19, wherein said spring means are provided within the edge area of the closure part.

22. An installation according to claim 19, wherein a seal means mounted at the edge of the outer panel means forms a part of a bellows means essentially consisting of elastic synthetic resinous material.

23. An installation according to claim 19, wherein each vacuum cell means is provided with its own supply line.

24. An installation according to claim 19, wherein the closure part is a ventilation flap.

25. An installation according to claim 19, wherein said support means is movable together with the outer panel means and wherein said support means is guided in guide means provided on the inner side of the edge of the aperture.

26. An installation according to claim 25, wherein the outer panel means is operable to be forced against the inner side of the edge area of the aperture.

27. An installation according to claim 25, wherein said support means and said outer panel means are air-impervious plates whose edges are connected by bellows means, the space defined thereby forming said chamber means.

28. An installation according to claim 25, wherein the parts of the guide means disposed in the sliding direction on both sides of the closure part each include two rail means, of which the lower rail means guides the support means and the upper rail means guides extensions provided at the outer panel means, the edge of the aperture extending over the rail means, and the upper rail means being provided with aperture means that are in alignment with said extensions when the sliding roof is below the aperture.

29. An installation according to claim 19, wherein abutment means are provided between the outer panel means and the support means.

30. An installation according to claim 29, wherein the abutment means includes a layer that is mounted at the mutually opposite surfaces of the panel means and of the support means.

31. An installation according to claim 29, wherein the layers are provided at least with recesses for compression springs.

32. An installation according to claim 19, wherein each vacuum cell means includes at least one cover.

33. An installation according to claim 32, wherein said cover is substantially circular.

34. An installation according to claim 32, wherein said covers have rolled-on securing edges for the bellows means.

35. An installation according to claim 34, wherein the contours of one cover project beyond the contours of the associated other cover of a respective cell means.