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SLIDING ROOF FRAME STRUCTURE FOR MOTOR VEHICLES

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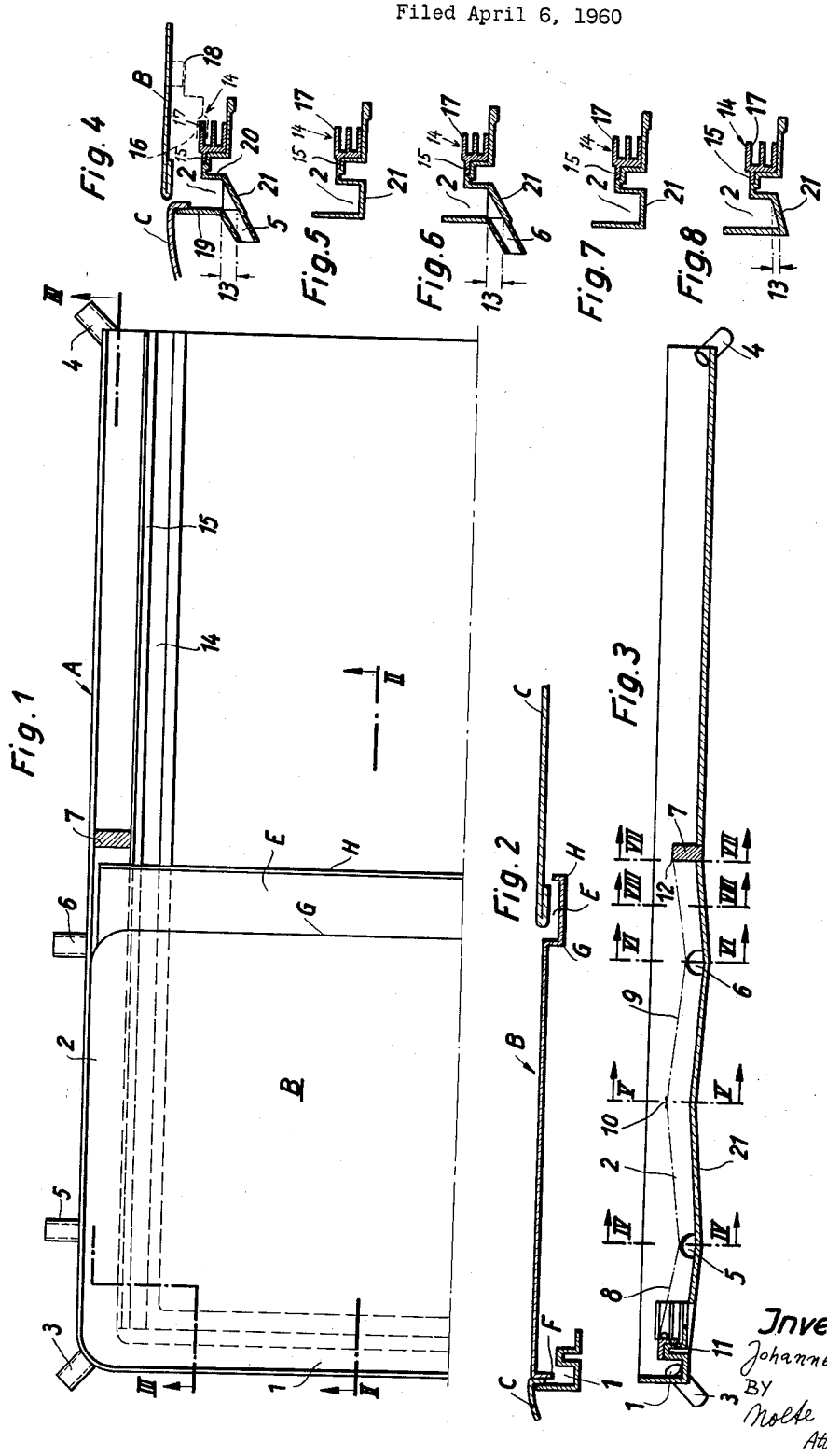

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SLIDING ROOF FRAME STRUCTURE FOR MOTOR VEHICLES

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This invention relates in general to automobile car top constructions and in particular to a new and useful car top construction including a rigid sliding panel and having a draining system including drains spaced on either side along the length of the car top.

Generally, in automobile car top constructions it is known to employ a rigid roof frame for supporting a sliding panel, which also includes means for collecting and draining water from the panel. The roof frame is provided with guide rails for the sliding panel; the rails are provided with water channels which run the full length of the automobile. In the known devices, drainage of water is effected through pipes which are arranged at each end of the water channels. Normally, these water collecting troughs, or channels extend over the entire length of the rooftop and this length is usually about twice the length of the sliding panel.

In such constructions, the slope of the car top and the corresponding slope of the roof frame has been used for effecting complete drainage of the roof in directions extending either to the front or to the rear, for drainage through pipes at these locations. In the present day car constructions, it is desirable to make tops as flat as possible in order to provide as much headroom within the car as is feasible. With such flat roof constructions the water does not have any tendency to drain to either one end of the car or to the other because the roof frame forming the water channels has to be adapted to the flat form of the car top. It is thus difficult to adequately drain the water collected in the water channels of the roof frame. Furthermore it is not usually feasible to provide for a greater height of the water channels in order to increase the slope to the front or the rear for drainage purposes, nor to enlarge the cross-section of the channels for the collecting of substantial quantities of water.

In accordance with the present invention, the aforementioned disadvantages are overcome by providing a plurality of drainage pipes located at strategic locations along the length of the drainage channels. The pipes are located so that maximum drainage is effected from the roof by providing more than a single path for the water to drain from the roof. By dividing the roof into at least two separate drainage paths from front to rear, it is possible to make the drainage paths much shorter and to provide them with sufficient slope even though the entire top construction is substantially flat, so that the drainage of the water will be positive in all cases.

Another important advantage of the present invention is that the drainage pipes are arranged in accordance with the amount of water which is normally present at each location in a rooftop construction. Investigations have shown that there is very little drainage required in the drainage channel which is attached to the front cross frame. With a roof construction having a sliding panel, when the panel is closed, it is pressed into the frame cross

piece and a complete seal is made by the panel with the roof structure. However, to make the panel easily maneuverable, it is desirable to have the lateral fit of the panel with the roof structure not too close so that an increase in water admission has to be counted on in these areas. It has been observed further that there are grooves in the zones of the edges of the cutout top where the panel fits into the roof and in these grooves a considerable amount of water will collect which will run off to both sides to cause the largest amount of accumulation of water at these locations. The present invention provides the possibility of adjustment of the drainage pipes to these particular conditions and therefore to shorten the path of discharge of the water in the channel drainage recesses.

In accordance with one embodiment of the invention, a front water drainage pipe is disposed along each side so as to be spaced by one-quarter the total length of the collecting channel from the front edge. The rear drainage pipe is advantageously disposed at about the spot where the water carrying channel of the sliding roof panel empties into the water collecting channel at the sides. The channels are designed so that the water is always directed downwardly into the drain at a large sloping angle. The inner upper edge of the water collecting channel, which is supporting the guide rail for the sliding panel, is preferably shaped so that it is flush with the upper edge of the guide rail profile. In this manner, the water channel profile will have the greatest possible height for free downward water flow without having to give up any of the free height available within the car. The attachment of the guide rail for the sliding panel may be made at the inner portion of a supporting ledge formed by the wall of each water collecting channel.

Accordingly, it is an object of this invention to provide an improved drainage system for a roof construction having a sliding panel.

A further object of the invention is to provide an improved roof drainage construction.

A further object of the invention is to provide an improved roof drainage construction which is simple in design, rugged in construction, and economical to manufacture.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this specification. For a better understanding of the invention, its operating advantages and specific objects obtained by its use, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated and described a preferred embodiment of the invention.

In the drawings:

FIG. 1 is a somewhat schematic top plan view of the left hand portion of a sliding roof frame structure (when viewed from the front of the vehicle) according to the present invention supporting a sliding panel on guide rails fixed to the frame structure the fixed roof portion having been removed from the roof frame structure;

FIG. 2 is a longitudinal section of the sliding panel taken along the line II—II of FIG. 1 showing also part of the fixed roof portion;

FIG. 3 is a longitudinal section of the roof frame structure shown in FIG. 1 but without the sliding panel, and taken along the line III—III as indicated in FIG. 1; and

FIGS. 4 to 8 are fragmentary vertical sections taken on the lines IV—IV, V—V, VI—VI, VII—VII and VIII—VIII, respectively, of FIG. 3.

Referring to the drawings in particular, the invention as embodied therein includes a roof frame structure generally designated A which includes a fixed roof portion generally designed C which, however, does not form an integral part of the present invention. The frame structure also includes a water channel **1** along the front portion of the vehicle and side water channels **2** for collecting water which drains from the center of the roof structure, and a sliding panel portion generally designated B. The front channel **1** connects to the side channels **2** and drainage pipes **3** are located at their junctures on both sides at the forward end of the vehicle. Drainage pipes **4** are located at the rear end of the vehicle. For the sake of clarity, the fixed roof portion C has been removed from the frame structure as shown in FIG. 1.

A supporting ledge for a substantially E-shaped guide rail generally designated **14** is formed by the inner upper rim portion of each side drainage channel **2**. The guide rail has an outwardly extending bearing flange portion **15** fitted in a recessed portion of the supporting ledge and thus flush wih the residual rim portion shown in FIGS. 4–8. The sliding connection between the guide rail **14** and the sliding panel B is indicated in dotted lines in FIG. 4 which also shows a portion of the fixed roof part C. The panel B includes a forked guide arm member **16** which extends around and is in sliding engagement with an upper outstanding portion **17** of the guide rail **14**. The guide arm member **16** is fastened to a bracket **18** which is secured to the sliding panel portion B. The panel portion B may be moved between open and closed positions by sliding the forked guide arm member back and forth along the guide rail **14**.

It will be observed that the elevation or height of the inner wall of the drainage channels **2** is increased in height by limiting the spacing between side walls **19** and **20** which define the channels.

According to the invention, in addition to the drainage pipes **3** and **4**, there are provided drainage pipes **5** and **6**. In order to permit advantageous use of these drainage pipes each channel **2** is closed off at the location **7** and bottom wall **21** of the channel is sloped outwardly and downwardly in several places to effect drainage from the closed off portion to the drain pipe **6** in the forward direction, and from the closed off portion to the drain pipe **4** in the rearward direction. Drainage pipes **5** and **6** are so disposed that the front pipe **5** is spaced from the front end by an amount equal to about a quarter of the length of the sliding panel B, whereas the rear pipe **6** is placed at about the spot where the rear edge G of the sliding panel B will be located when in a closed position.

The panel B includes a conventional channel-shaped portion E terminating in an upstanding edge H so that the drain pipe **6** is in the area of the channel portion E of the panel B when the panel is in a closed position with the rear edge G adjacent the front end of the fixed roof portion C, as shown in FIG. 2.

Drain pipe **5** is capable of collecting the water which will be received in the front part of the panel by the channel **2**, whereas the rear drainage pipe **6** picks up the water which collects in the rear portion of the sliding panel and enters the channel **2** from the channel portion E defined between the portions G and H. By such an arrangement the path of flow of the water which is to be drained will be very short and about half the usual length which might be expected. By such a construction, therefore, it is not necessary to slope the bottom portions of channel **2** as much as where the drainage must be along the complete length. Since the number of drain pipes is increased the flow rate of water drainage will also be increased and, hence, the risk of the water channels flowing over is avoided.

In FIG. 3 there is indicated the water channel 2 and

the flow conditions prevailing therein. The dotted lines **8** and **9** show the maximum water level which would be reached at the highest point **10**. The front end **11** and the rear **12** of the channel **2** are likewise points of highest water level because there is no exit opening at **12** and exit opening of pipe **3** is at a higher level than that of pipes **5** and **6**. From the points **10**, **11** and **12**, the water level drops to the exit opening for pipes **5** and **6**.

The sections IV—IV to VIII—VIII of FIG. 3, which are shown in FIGS. 4 to 8, show the cross section of channel **2** but at different points along the length of the roof. The bottom wall **21** of the channel **2** is bent downwardly and outwardly in a manner to provide an increasing outward slope for the water in the vicinity of the drain openings as indicated in FIGS. 4 to 8. By such a construction it is possible to achieve a greater drop in height, such as indicated at **13**, even when for reasons of construction it is necessary to arrange the water collecting channel **2** substantially horizontally.

The stepped portion E between G and H of the panel B underlying the fixed roof portion C under certain circumstances carries a large amount of water. The drainage pipe **6** is thus arranged to branch off at about this point from the water channel **2** in order to cover any large quantities of water which will be discharged from the channel-shaped portion E.

In the embodiment shown in the drawings, only two additional drain pipes **5** and **6** have been provided on each side of the vehicle but it should be appreciated that additional drainage pipes branching off from the water collecting channel **2** may be provided. In this manner, the length of the path of drainage is further shortened so that the conditions of drainage are further improved. However, each drainage pipe involves an additional expense, and if possible, an attempt should therefore be made to use the arrangement with only two additional drainage pipes to best advantage. In some instances it may be desirable to dispense with the drainage pipes **3** and **4** which are located in the conventional front and rear positions along the channels **2**.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the invention principles, it will be understood that the invention may be embodied otherwise without departing from such principles.

What is claimed is:

1. A vehicle roof frame construction comprising wall means on each side of said frame defining longitudinally extending side drainage channels and guide rail portions protruding inwardly from each of said side drainage channels, said wall means comprising a substantially horizontal ledge portion and a longitudinally extending guide rail member including an outstanding flange portion disposed flush with the upper wall of said guide rail portions on said ledge portion, a longitudinally reciprocable roof panel slidable in said guide rail portions, a portion of said wall means defining a cross channel at the front of said frame connecting said side drainage channels, and a plurality of drainage pipes connected to said side drainage channels at spaced locations along the length thereof.

2. A vehicle roof frame construction according to claim 1, wherein said side drainage channels are defined on their inner sides by substantially vertical walls and said ledge portion is arranged below the top edge of said walls.

3. A vehicle roof frame construction comprising gutter means on each side of said frame including a substantially vertical outer wall portion and a substantially parallel inner wall portion defining therebetween a longitudinal channel of substantially rectangular cross section, each of said inner wall portions having secured thereto an inwardly protruding, substantially horizontal guide rail portion below the upper edge of said outer wall portion, and a longitudinally reciprocable roof panel slidable in said guide rail portions between an open and a closed position, the bottom walls of said channels being formed

with at least two depressions in the region of said closed position of the roof panel, said depressions having longitudinal cross sections defining downwardly directed obtuse angles, and drainage means connected to said channels substantially at the nadir of said angles.

4. A vehicle roof frame construction according to claim 3, wherein said bottom walls of the channels are formed with slopes transversely increasing towards said drainage means of said depressions so that portions of said channel have a trapezoidal cross section.

5. A vehicle roof construction according to claim 3, wherein parts of said gutter means define at the front of said frame a cross channel connected to said drainage channels, and further including additional drainage means at the junction points of said cross channel with said first-named channels and at the rear ends of said channels.

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