

May 23, 1967

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3,321,233

VERTICALLY COLLAPSIBLE AND FOLDABLE CAMPER APPARATUS

Filed Feb. 17, 1965

3 Sheets-Sheet 1

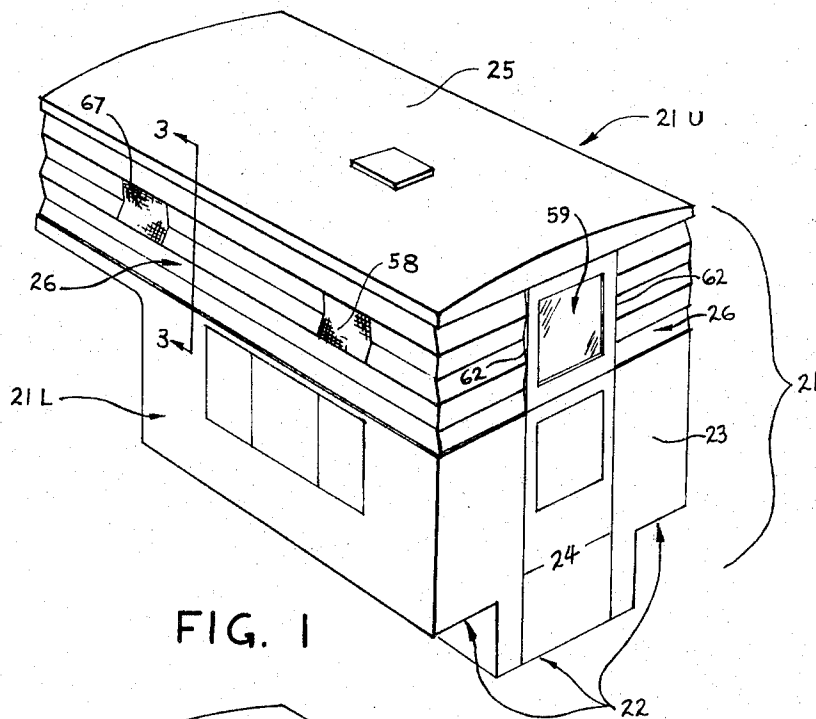


FIG. 1

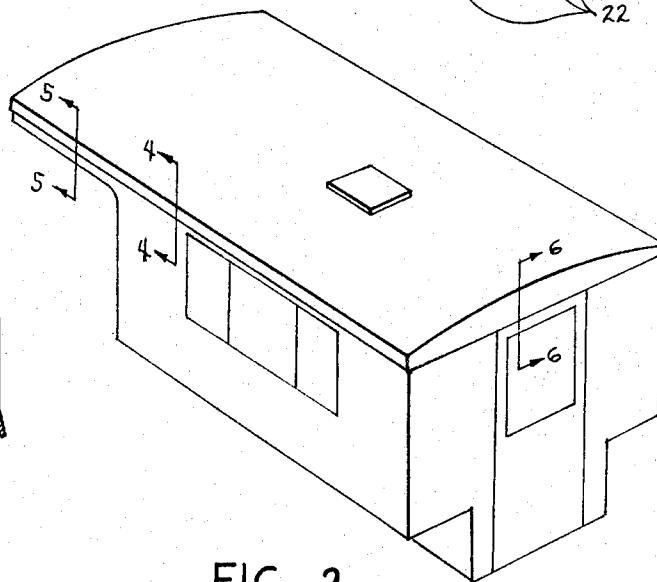


FIG. 2

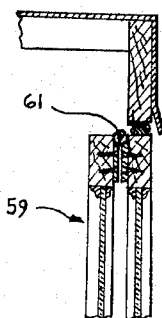


FIG. 6

INVENTOR.
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May 23, 1967

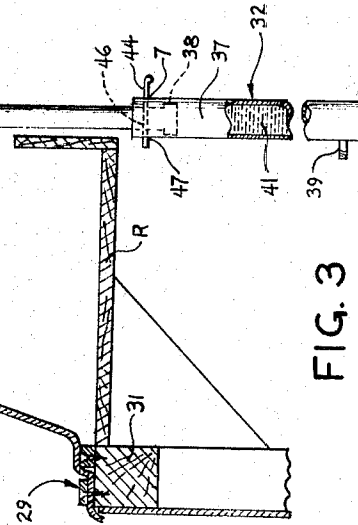
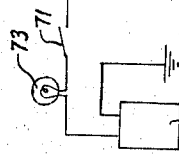
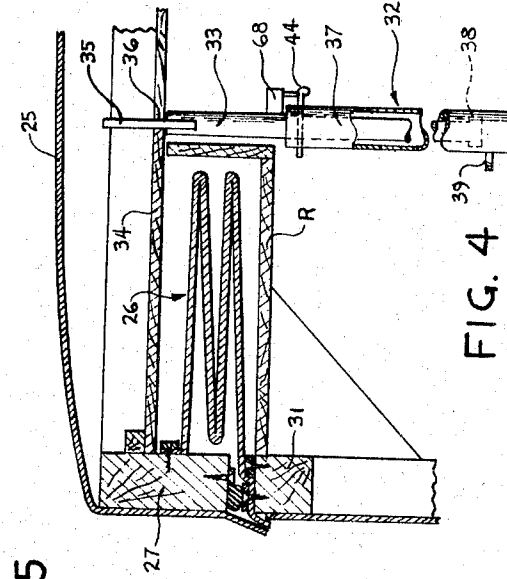
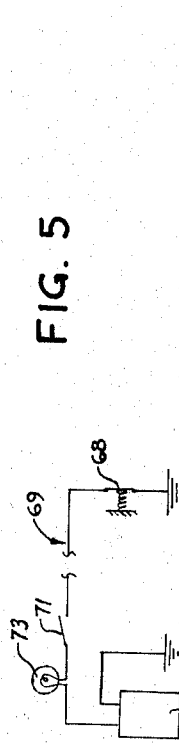
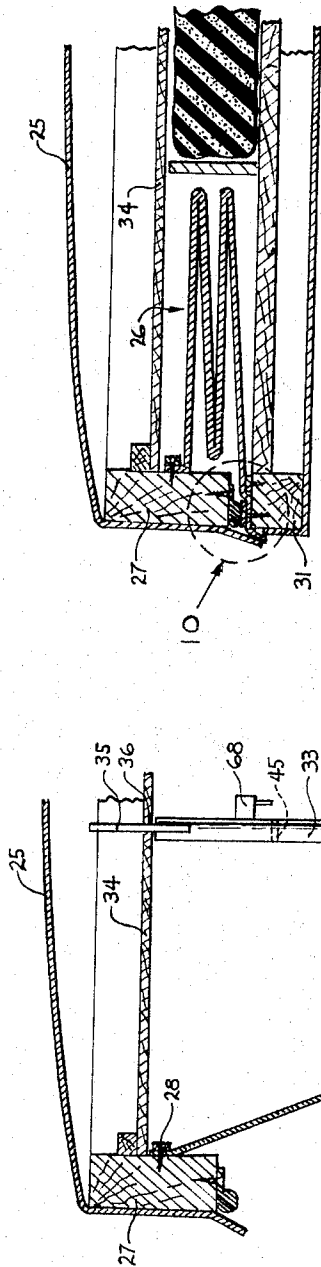
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3 Sheets-Sheet 2



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VERTICALLY COLLAPSIBLE AND FOLDABLE CAMPER APPARATUS

Filed Feb. 17, 1965

3 Sheets-Sheet 3

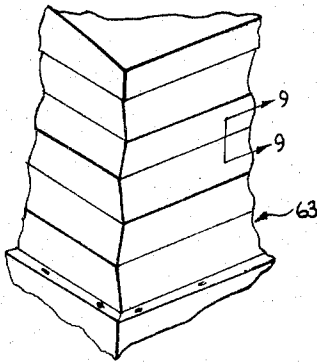


FIG. 8

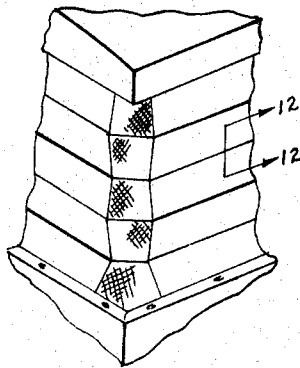


FIG. 11

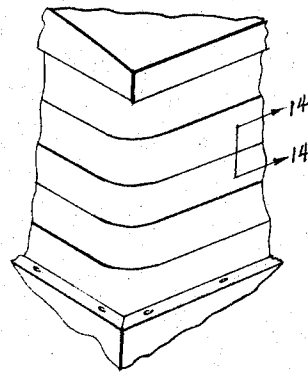


FIG. 13

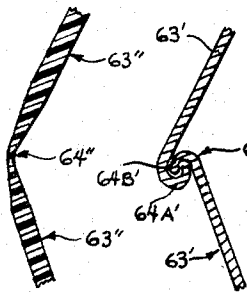


FIG. 14

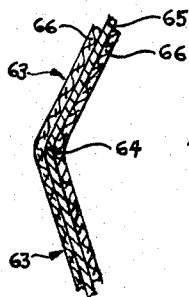


FIG. 12

FIG. 9

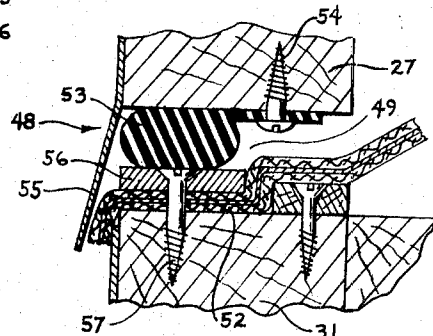


FIG. 10

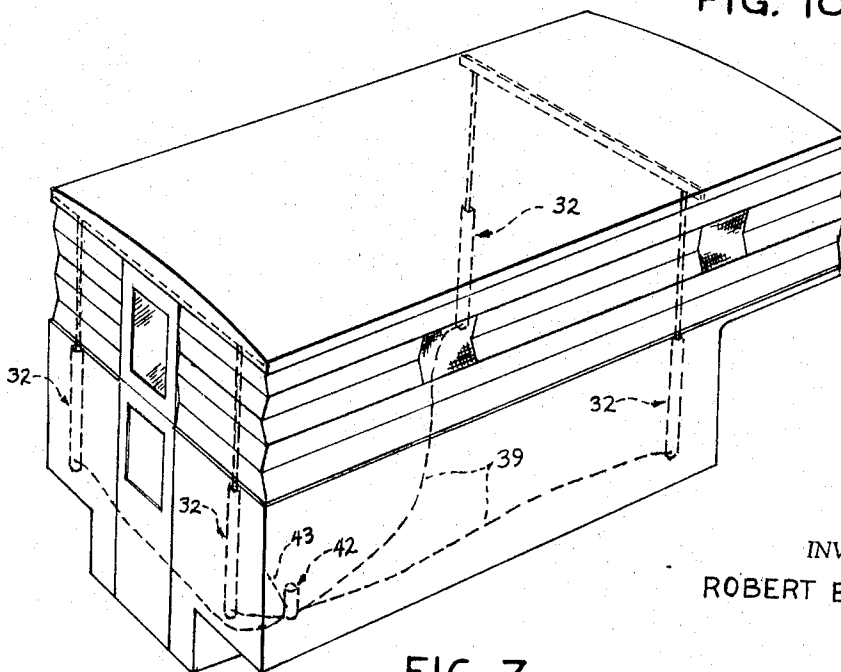


FIG. 7

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3,321,233 VERTICALLY COLLAPSIBLE AND FOLDABLE CAMPER APPARATUS

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12 Claims. (Cl. 296—23)

Generally speaking, the present invention relates to a vertically collapsible and foldable camper apparatus which may be vertically expanded into a maximum expansion position wherein it effectively defines a room structure of substantial height normally such that an adult person may stand erect therein, although not specifically so limited in all forms of the invention, and adapted to be vertically collapsed and folded into a minimum expansion position wherein its vertical height has been effectively compressed to a very substantial degree to facilitate transporting and moving the camper apparatus. Normally, said minimum expansion position will be such that the camper apparatus can be conveniently parked within a conventional garage for a private automobile, although the invention is not specifically so limited in all forms thereof.

It should also be noted that, normally, such a camper apparatus is intended to be effectively connected with respect to a motor vehicle and, in one preferred exemplary form thereof, is adapted to be effectively connected to, and mounted on, a rear portion of one specific type of motor vehicle comprising a pickup truck having a cab in the front and a horizontal bed in rear provided with up-standing side wall portions and a rear tailgate portion, and the invention will be described hereinafter, for exemplary purposes, in said specific exemplary form wherein it is adapted to be mounted and carried by a rear portion of a pickup truck. However, it should be specifically noted that the invention is not so limited in all forms thereof.

With the above points in mind, it is an object of the present invention to provide a vertically collapsible and foldable camper apparatus of the character referred to hereinabove which is adapted to be vertically expanded into a maximum vertical expansion position when it is to be occupied and interiorly used by one or more persons, and adapted to be controllably vertically downwardly retracted, collapsed and folded into a minimum expansion position when it is to be transported or stored and the minimized vertical height thereof is a decided advantage. While normally incapable of accommodating standing adults when collapsed, it may be occupied or used by sitting or reclining adults or by children if desired.

It is a further object to provide such camper apparatus which additionally includes controllably operable linear motor means (which is intended to be broadly construed as meaning any type of device which may be operated manually or otherwise for effectively increasing and decreasing the vertical space between the bottom and the top) for effectively vertically expanding and/or vertically retracting the camper when desired.

It is a further object of the present invention to provide apparatus of the character referred to in the preceding object wherein said linear motor means comprises a plurality of extension actuator means connected between upper and lower portions of the vertically expandable and collapsible camper and manually controllably operable means for controlled simultaneous vertical expansion and/or retraction of said plurality of extension actuator means.

It is a further object of the present invention to provide apparatus of the character referred to hereinabove, wherein the linear motor means, or extension actuator means, are provided with means for controllably locking them in either a maximum extension position or a minimum extension position (this latter position actually comprising the fully retracted position of the camper referred to here-

inbefore) so that the camper may be locked in either the fully expanded relationship or the fully collapsed or retracted relationship.

It is a further object of the present invention to provide indicator or warning apparatus or means effectively responsive to full vertical retraction or collapsing of the camper into the minimum expansion position referred to above for perceptibly indicating to an observer that the camper has been retracted into the fully collapsed or retracted position. In one preferred exemplary form, said warning apparatus may include a visibly perceptible red jewel light, or the like, adapted to be positioned on an instrument panel or dashboard within the interior of a cab of a pickup truck carrying the camper, or at some other convenient location for ready viewing by a driver of the pickup truck, and arranged to indicate the full retraction of the camper by de-energization of said red jewel indicator light, which is normally energized when the camper is not in said fully collapsed and retracted relationship and when the ignition switch (or any other suitable switch in the pickup truck) is turned on, such as would normally be the case when the motor of the pickup truck is about to be started and the truck is about to be driven from one location to another while carrying the camper on the back thereof in presumably fully collapsed and retracted relationship. It is obvious that, under such circumstances, when the driver of the pickup truck turns on the ignition switch to start the motor of the pickup truck, if the camper is not in the fully collapsed and retracted relationship the red jewel warning light on the instrument panel or dashboard of the truck will immediately become illuminated and warn the driver that such is the case so that he will normally stop the truck and see that the camper is collapsed into the fully retracted, collapsed and locked relationship which is desired before driving the pickup truck, and the camper carried on the rear thereof, at any substantial speed. This is desirable for safety purposes and the specific exemplary indicating and warning apparatus just referred to will warn the driver whenever the camper is not in condition to permit the safe driving of the pickup truck.

It is a further object of the present invention to provide apparatus of the character referred to herein having any of the advantages referred to herein and including any of the features referred to herein, generically and/or specifically, and individually or in combination, and which is of relatively inexpensive, simple construction adapted for large scale mass manufacture at relatively low cost whereby to be conducive to widespread use thereof.

Further objects are implicit in the detailed description which follows hereinafter (which is to be considered as exemplary of, but not specifically limiting, the present invention), and said objects will be apparent to persons skilled in the art after a careful study of the detailed description which follows hereinafter.

For the purpose of clarifying the nature of the present invention, several exemplary embodiments of the invention are illustrated in the hereinbelow-described figures of the accompanying drawings and are described in detail hereinafter.

FIG. 1 is a reduced-size, three dimensional view with certain portions removed for reasons of drawing simplification and clarity, showing one exemplary form of the invention which is of a type adapted to be effectively connected to, mounted on, and carried by the rear bed portion of a pickup truck, which is not shown for reasons of drawing simplification and clarity and since it comprises no part of the present invention. It should be noted that this view shows the room-defining structure of the camper apparatus in fully vertically expanded relationship or in a position which might be termed a maximum vertical

expansion position or relationship suitable for interior occupancy and use by one or more persons.

FIG. 2 is a reduced-size, three dimensional view generally similar to FIG. 1, but illustrates the room-defining room structure comprising the camper of FIG. 1 in fully vertically retracted or collapsed relationship or in a position which might be termed a minimum vertical expansion or full retraction position or relationship not intended for interior occupancy and use by persons in the manner of the camper when in the fully expanded relationship shown in FIG. 1. In other words, the fully collapsed or minimum expansion position and relationship of the camper of FIG. 2 is intended primarily to facilitate transport and/or storage of same by reason of the minimization of the vertical height thereof.

FIG. 3 is an enlarged fragmentary sectional view taken substantially along the plane indicated by the arrows 3—3 of FIG. 1 with the horizontal central plane of said section, and with the right portion and the bottom portion of the apparatus on said plane 3—3 all being broken away and removed for drawing space saving reasons and for reasons of drawing simplification and clarity.

FIG. 4 is an enlarged, fragmentary, partially broken away sectional view similar to and on substantially the same plane as FIG. 3, but shows the fully collapsed or fully retracted position thereof taken substantially along the plane indicated by the arrows 4—4 of FIG. 2.

FIG. 5 is an enlarged, fragmentary, sectional view quite similar to FIG. 4, but is taken a little farther forward on the left side of the camper apparatus, substantially along the plane indicated by the arrows 5—5 of FIG. 2.

FIG. 6 is an enlarged, fragmentary, vertical, sectional view taken substantially along the plane indicated by the arrows 6—6 of FIG. 2.

FIG. 7 is another three-dimensional view of the first exemplary form of the camper apparatus of the present invention, as viewed from a different position than the three-dimensional views comprising FIGS. 1 and 2. It should be noted that, in this view, the camper is in the fully vertically expanded or maximum expansion position and relationship shown in FIGS. 1 and 3. This view also shows in broken lines in a somewhat diagrammatic form the linear motor means in one specific form wherein said linear motor means comprises four extension actuator means, each of a hydraulic type interconnected by hydraulic lines to a source of pressurized hydraulic liquid, which is shown as comprising a manually operable pumping jack means, which in response to manual pumping action thereof will apply the pressurized hydraulic liquid to each of the four extension actuators and vertically extend the camper apparatus into the maximum vertical expansion position clearly shown in FIGS. 1, 3, and 7, and which may be operated to return the pressurized hydraulic liquid from each of the four extension actuators to the pumping jack means, which will, of course, allow each of the four extension jacks to vertically collapse under the action of gravity whereby to allow the camper apparatus to vertically collapse into the fully retracted or minimum expansion relationship best shown in FIGS. 2, 4, 5 and 6.

FIG. 8 is a fragmentary, three-dimensional view of one exemplary corner portion of one exemplary form of the vertically collapsible and foldable side wall means comprising the vertically collapsible and foldable upper room portion of the complete room-defining room structure of the camper apparatus and which makes it possible for the vertical folding action between the maximum expansion position shown in FIGS. 1, 3, and 7 and the minimum expansion position shown in FIG. 2, to occur.

FIG. 9 is an enlarged, fragmentary, cross-sectional view, taken substantially along the plane 9—9 of FIG. 8, and clearly illustrates one exemplary type of the foldable vertically collapsible side wall means of FIG. 8.

FIG. 10 is an enlarged, fragmentary, detailed view of the portion of FIG. 5 enclosed within the broken line circle designated at 10 in FIG. 5, and clearly illustrates

one exemplary form of the sealing and effective weather-stripping means adapted to effectively seal the horizontal junction region between vertically adjacent surfaces of the top edge parts of the upper and lower room portions of the complete room-defining room structure comprising the camper apparatus of the exemplary first form of the invention illustrated. It will be noted that this sealing and weather-stripping means only comes into play when the upper room portion of the camper apparatus is in the fully retracted or fully collapsed relationship best shown in FIGS. 2, 4, 5, and 6.

FIG. 11 is a view similar to FIG. 8, but illustrates a modified form of the vertically foldable and collapsible side wall means from that illustrated in the first form of the invention and shown in detail in FIGS. 8 and 9.

FIG. 12 is an enlarged, fragmentary, cross-sectional view, taken substantially along the plane 12—12 of FIG. 11 and clearly illustrates the modified exemplary type of the foldable vertically collapsible side wall means of FIG. 11.

FIG. 13 is a view similar to FIGS. 8 and 9, but illustrates another modified form of the vertically foldable and collapsible side wall means from that illustrated in the first form of the invention, and shown in detail in FIGS. 8 and 9 and from that shown in the second form of the invention illustrated in detail in FIGS. 11 and 12.

FIG. 14 is an enlarged, fragmentary, cross-sectional view, taken substantially along the plane 14—14 of FIG. 13, and clearly illustrates the second modified exemplary type of the foldable vertically collapsible side wall means of FIG. 13.

FIG. 15 is a diagrammatic, electrical schematic view illustrating one exemplary form of the indicator or warning apparatus or means adapted to perceptibly warn a would-be driver of the pickup truck that the camper apparatus has not been fully collapsed into the fully retracted relationship shown in FIG. 2, which is supposed to be done before the pickup truck and the camper adapted to be carried thereby is driven from one location to another—particularly, at relatively high speeds.

Generally speaking, the exemplary form of the vertically collapsible, foldable, and collapsible camper apparatus of the present invention illustrated may be said to comprise a room-defining room structure, generally designated by the reference numeral 21, which includes a lower room portion 21L and an upper room portion 21U. In the exemplary form illustrated, said lower room portion 21L is of substantially rigid, substantially non-collapsible construction similar to conventional rigid camper construction and has a bottom part 22 which is substantially T-shaped as seen in end elevation and which is cooperable to be received within a substantially similarly shaped bed and upstanding side wall portions of a pickup truck (not shown) and normally adapted to be fastened thereto by appropriate fastener means (also not shown since such are well known in the art and comprise no part of the present invention).

It will be noted that the rear wall 23 of the lower room portion 21L is provided with a door, as indicated at 24, which normally is positioned in a rearwardly facing direction at the rear end of the pickup truck (not shown) so that entry and exit may be provided into and out of the interior of the room-defining structure 21 by way of said door 24.

It will be noted that the previously mentioned upper room portion 21U has a roof 25 across the top thereof and depending therefrom has vertically collapsible and foldable side wall means, indicated generally at 26, around the four sides of the upper room portion 21U and effectively connected at the bottom thereof with respect to a top edge of the rigid lower room portion 21L, thus effectively providing an arrangement such as to make the upper room portion 21U vertically collapsible and foldable from the fully expanded or maximum expansion position best shown in FIGS. 1, 3 and 7 into the minimum

5

6

expansion or fully retracted position best shown in FIGS. 2, 4, 5, and 6.

In the exemplary form of the invention illustrated, it will be noted that the vertically collapsible and foldable upper room portion 21U has what might be termed a top edge portion therearound, as indicated at 27, which is rigid and which carries the roof 25 thereover and which effectively has the upper end of said vertically foldable wall means 26 connected thereto, as indicated at 28. This type of connection of the vertically foldable wall means 28 to said top edge portion 27 extends completely around the upper edge of the upper room portion 21U.

Also in the exemplary first form of the invention illustrated, it will be noted that said upper room portion 21U is provided with what might be termed an effective base edge portion to which the lower edge of said vertically collapsible and foldable side wall means 26 is also firmly attached, such as by fastening means 29. Careful examination of FIGS. 3-5 makes it apparent that said effective base edge portion also comprises a top edge part of the lower room portion 21L and said composite member is designated by the reference numeral 31, and it should be clearly understood that it does not move vertically when the remainder of the upper room portion 21U is vertically expanded or vertically collapsed.

It should be noted that the vertically collapsible and foldable side wall means 26 may assume a variety of forms and constructions and may be of a variety of different types of materials as long as it is capable of being effectively folded and unfolded in the manner most clearly illustrated in FIGS. 3-5. Details of certain preferred exemplary forms of said side wall means 26 will be particularly described hereinafter.

The vertical expansion and retraction of the upper room portion 21U is effectively accomplished through the use of linear motor means effectively vertically interconnecting said upper and lower room portions 21U and 21L and controllably operable for forcible vertical extension of said linear motor means whereby to cause vertical expansion and unfolding of said vertically collapsible and foldable side wall means 26 of said upper room portion 21U between the lower vertically collapsed position shown in FIGS. 2, 4, 5, and 6, and the vertically fully expanded or maximum expansion position best shown in FIGS. 1, 3, and 7. Of course, effectively vertical retraction and shortening of said linear motor means will allow the upper room portion 21U to collapse into the minimum expansion or fully retracted position best shown in FIGS. 2, 4, 5, and 6, under the action of gravity.

In the exemplary first form of the invention illustrated, said linear motor means are generally designated by the reference numeral 32 and take a specific exemplary form comprising four hydraulic extension actuator means of the type frequently known as single action cylinders vertically interconnected between said upper and lower room portions 21U and 21L at four rectangularly spaced locations within the interior of the room-defining room structure 21, as is best shown fragmentarily and somewhat diagrammatically and schematically in phantom in FIG. 7.

It will be noted that each of said extension actuator means has a connecting rod portion 33 which has its upper end in effective abutment with respect to the upper room portion 21U by way of the abutment thereof with a cross member 34 underlying the roof 25 and connected to the top edge portion 27 of said upper room portion 21U, as is best shown fragmentarily in FIGS. 3 and 4. The upper end of each of said connecting rods 33 is provided with a projection element 35 which extends through an aperture 36 in said cross member 34 for maintaining the proper position of the connecting rod 33. However, various other connection means may be employed in lieu of the arrangement best illustrated in FIGS. 3 and 4 and just described in detail.

The lower portion of each of said extension actuators

32 includes a cylinder 37, one of which is shown fragmentarily and partially broken away in FIGS. 3 and 4, which is adapted to carry a conventional piston therein, such as is shown in broken lines at 38 in FIGS. 3 and 4, and which may be of any suitable type and which is adapted to be vertically upwardly slidably forcibly moved with respect to the cylinder 37 when pressurized fluid (which also means liquid) is introduced into the lower end of the cylinder 37 by an inflow duct 39, shown fragmentarily in FIGS. 3 and 4 and shown schematically in FIG. 7. In other words, each of the four extension actuator means 32 comprises a conventional single action hydraulic cylinder which may have a coiled compression spring positioned above the piston 38 and within the cylinder 37 for forcibly returning the actuator 32 to its fully retracted position whenever the pressurized liquid or fluid is removed from the lower portion of the cylinder 37. However, such a conventional type return biasing spring is not actually required since the entire weight of the upper room portion 21U is supported by the four connecting rods 33, and, thus, said weight will normally cause each of the actuators 32 to return to the fully retracted position, under the action of gravity, and without the necessity of any return biasing spring means whenever the pressurized liquid or fluid is removed from the lower portion of each of the four cylinders 37.

It will be noted that, for purposes of illustration only, such a pressurized liquid is shown at 41 in the fragmentary sectional view of the cylinder 37 shown in FIG. 3.

In the exemplary arrangement illustrated fragmentarily in FIGS. 3 and 4 and in diagrammatic schematic form in FIG. 7, each of said plurality of extension actuator means 32 has its input pressure tubing or line 39, which effectively comprises hydraulic circuit means, extending to a common reservoir or supply of hydraulic liquid which can be controllably pressurized for simultaneously operating each of said extension actuators 32 in either a forcible vertical extension manner or a vertical retraction manner under the action of gravity as described above. In FIG. 7, such a common reservoir or supply of hydraulic liquid is generally indicated at 42 and takes a specific form wherein it comprises a pumping jack means of a conventional type which carries such a supply of hydraulic liquid and which has a manually operable handle 43 which can be controllably pumped for pressurizing said hydraulic liquid whereby to force same outwardly through the four supply lines 39 of the hydraulic circuit means to the bottom end of each of the four cylinders 37 of the four extension actuator means 32 for causing simultaneous forcible vertical extension thereof in the manner previously described.

The conventional hydraulic jack means 42 is normally provided with means (not shown since such are well known in the art) for controllably relieving the pressure on the hydraulic fluid and allowing same to return from the lower cylinder portions 37 of each of the extension actuators 32 through the corresponding hydraulic circuit lines 39 back to the jack 42 so that each of the extension actuators 32 will be effectively retracted or shortened at a controlled rate, either by reason of return biasing springs as previously mentioned carried within each of the extension actuators 32 in the conventional manner, or because of the weight of the upper room portion 21U, effectively bearing upon each of said extension actuators 32 and causing same to shorten under the action of gravity as permitted by the return flow of the pressurized liquid 41 from the lower actuator cylinder portions 37 back to the common source of supply or reservoir of pressurized hydraulic fluid comprising the pumping jack 42.

It will be noted that, in the preferred exemplary first form of the invention illustrated, each of said linear motor extension actuator means 32 (or, in certain forms of the invention if desired, one or more of said actuator

means 32) is effectively provided with controllably disengageable and inactivatable locking means cooperable for locking said extension actuator means in either the fully extended relationship referred to hereinbefore, or the fully retracted relationship referred to hereinbefore. In the exemplary first form illustrated, each of said locking means takes the form of a locking pin 44 and a pair of transverse locking apertures 45 and 46 in the corresponding connecting rod 33 of the corresponding extension actuator means 32. It will be noted that said apertures 45 and 46 are vertically spaced apart by exactly the distance between the maximum fully expanded position of the upper room portion 21U shown in FIGS. 1, 3, and 7 and the minimum expansion position thereof shown in FIGS. 2, 4, 5, and 6, and that when the upper room portion 21U is fully expanded in the manner shown in FIGS. 1, 3, and 7, the corresponding pin 44, which is adapted to be received within corresponding apertures 47 at the upper end of the corresponding cylinder 37, is caused to pass through the corresponding aperture 46 in the corresponding connecting rod 33, which locks same in the fully extended relationship. However, when the device is to be retracted, each such locking pin 44 is withdrawn from the locking relationship shown in FIG. 3 and the pumping jack 42 is operated in a retraction manner is previously described so that the upper room portion 21U can fully collapse under the action of gravity into the fully retracted position shown in FIGS. 2, 4, 5, and 6, and within the retainer R, after which said locking pin 44 is reinserted through the aligned apertures 47 in the cylinder 37 and is caused to pass through the other aperture 45 in the corresponding connecting rods 33, whereby to positively lock each of the extension actuators 32 in fully retracted relationship and also to correspondingly lock the entire upper room portion 21U in the fully collapsed and retracted relationship shown in FIGS. 2, 4, 5, and 6. When this occurs, the sealing and effective weather-stripping means, generally designated at 48 as best shown in FIG. 10, comes into play and effectively seals the otherwise open junction region 49 between the vertically adjacent surfaces 51 and 52 of the top edge portions or parts 27 and 31 of the upper room portion 21U and lower room portion 21L, respectively.

As is best shown in FIG. 10, said sealing and weather-stripping means comprises a compressible elastomeric gasket means 53 fastened by suitable fastening screw means 54 to said bottom surface 51 of said top edge part 27 of said upper room portion 21U and additionally includes a depending weather strip or flap 55 carried by the outside surface of said top edge part 27 of said upper room portion 21U and effectively comprising a downward extension of the roof 25.

It will be noted that when the upper and lower room portions 21U and 21L are effectively locked together as previously described, the gasket 53 is forced against a clamping plate or strip 56 which is fastened by screw means 57 to the top edge 31 carried at the top of the lower room portion 21L whereby to make a very effective seal therebetween. Incidentally, it should be noted that said clamping plate or strip 56 and screw means 57 actually comprise the fastening means indicated generally at 29 in FIGS. 3-5 and previously referred to as fastening the bottom edge of the vertically collapsible and foldable wall means 26 to said composite base edge and top edge part 31.

It should be noted that the foldable side wall means 26 may have a plurality of flexible and foldable windows 58 therein which may be made of a flexible mesh-like material similar to nylon net or the like and, therefore, are fully capable of folding along with the folding of the side wall means 26, and, if desired, they may be provided with weatherproof cover means which can be rolled up to allow ventilation through the flexible net material 58 of said windows or which can be rolled down and

fastened thereacross to effectively seal same against inclement weather. Such weather covers are not shown for reasons of drawing simplification and clarity and since they do not comprise any part of the present invention.

It should also be noted that the rear portion of said vertically collapsible and foldable side wall means 26 may be provided with a window of a transparent and substantially non-flexible type such as is generally indicated at 59. In order to allow folding of the adjacent portions of the foldable side wall means 26, said window 59 may be effectively hinged as indicated at 61 in FIG. 6, and may be provided with effective edge fastening or junction means along the edges, as indicated at 62, to allow the window 59 to be in the normal uppermost use position as shown in FIG. 1, or to be released along the side junctions 62 and hingedly swung downwardly by the hinge means 61 into a position immediately inside of the corresponding rear part of the rigid lower room portion 21L in the manner clearly shown in FIG. 6 so that the upper room portion 21U can be collapsed downwardly into the fully retracted position best shown in FIG. 2. However, any of the previously mentioned windows may be modified or eliminated entirely in certain forms of the invention.

While the vertically collapsible and foldable wall means, indicated generally at 26, may take a number of different forms, several exemplary ones will be described and illustrated herein, and one such is illustrated in FIGS. 8 and 9 and takes the form of a plurality of vertically interconnected thin-sheet, non-folding, slat portions 63 vertically interconnected by effectively foldable and bendable hinge portions, such as indicated at 64 and best shown in FIG. 9. In the form illustrated in FIGS. 8 and 9 (as best shown in FIG. 9) it will be noted that the foldable wall means 26 is of a laminated construction which may comprise a metal foil 65 carrying covering fabric, foam plastic or rubber, or other suitable thermal insulation material 66 cemented or otherwise bonded or suitably affixed on each side thereof and initially bent and/or effectively weakened to provide the plurality of initially bent and alternatively offset hinge portions 64. It will readily be understood that since the composite laminated wall means 26, comprising the slat portions 63 and hinge portions 64 are initially prebent, which may be said to effectively weaken the structure at each of the hinge lines 64, the application of vertical force upwardly by the previously mentioned extension actuator means 32 will merely effectively straighten out each of the hinge means 64 somewhat but not completely and will, thus, allow the vertical length of the foldable wall means 26 to elongate to the necessary degree to permit vertical expansion of the upper room portion 21U from the fully collapsed relationship shown in FIG. 2 into the fully extended or expanded relationship shown in FIG. 1. Each of the hinge means 64 effectively goes around each of the four corner parts of the upper room portion 21U and the direction of outward and inward bending thereof effectively changes at each of said corner parts in the manner of an accordion fold as is clearly shown in FIG. 8.

It will also be understood that when the extension actuator means 32 are retracted, the still pre-bent and effectively weakened hinge means 64 will merely become bent to a greater degree, again thus effectively allowing the foldable and collapsible wall means 26 to become vertically shortened to a degree such as to bring about the collapsing of the upper room portion 21U into the fully collapsed and retracted relationship shown in FIG. 2—and this will occur entirely by reason of bending of said wall means 26 at the plurality of horizontal vertically spaced hinge lines 64.

Incidentally, it should be noted that the laminated construction of the exemplary first form of the wall means 26 is shown only in FIG. 9 and elsewhere is shown in a

manner which appears to comprise a single thickness of material rather than a laminated structure. This is done in the views other than FIG. 9 for reasons of drawing simplification and clarity.

FIGS. 11 and 12 illustrate a slight modification of the foldable wall means 26 of the first form of the invention, and similar parts thereof are indicated by similar reference numerals, primed, however. It will be noted that in this slight modification, the vertically adjacent, horizontally directed slot portions 63' are interconnected by horizontal hinge means 64', each of which is somewhat different from the hinge means 64 best shown in FIG. 9 and comprises a pair of physically non-integrally, and relatively movably, connected curved hinge elements 64A' and 64B' which are so looped and curvedly interconnected as to comprise an effective rotative interconnection thereof capable of rotation about a substantially common longitudinal hinge axis substantially concentric therewith. In other words, in this slight modification of the invention, each of the plurality of vertically spaced horizontally directed hinges 64' need not be of a type involving material deformation as was the case in connection with the hinge means 64 best shown in FIG. 9. Therefore, this type of wall means 26' may be made of any suitable material not necessarily of a readily deformable type. However, it will be noted that the construction of each of the modified hinge means 64' of FIG. 12 is such that it is difficult to effectively join them together at each of the four corners of the vertically collapsible wall means 26' in an effectively sealed manner without the provision of additional corner sealing means and such is provided, as is best shown in FIG. 11, and takes the form of a flexible corner sealing strip 67 which is joined at the side edges thereof to end edges of the slats 63' and hinges 64' and which is capable of freely folding at planes coincident with each of the hinges 64' while retaining an effective corner seal. The corner sealing material 67 may be a flexible plastic material, a waterproofed fabric material, or any other suitable flexible material capable of functioning in the manner just described.

FIGS. 13 and 14 illustrate a further modification of the wall means 26 of the first form of the invention as illustrated in detail in FIGS. 8 and 9, and, because of the similarity, corresponding parts of this modification are indicated by similar reference numerals, doubly primed, however. It will be noted that, in this modification, the vertically adjacent slat members or portions 63'' are interconnected by an integral type of hinge means 64'', each of which is very similar to the integral type of deformable hinge means 64 of the form of the invention illustrated in FIGS. 8 and 9. However, in this modification the foldable wall means 26'' is made of a relatively elastic plastic and, to increase the ready deformability of the material at the location of the hinge means 64'', the material is effectively made substantially thinner along a horizontal line whereby to define the hinge means 64'' as a portion which has been effectively rendered more readily deformable than adjacent slat portions 63'' by reason of said thinning of the material. This is in contrast to the increased deformability of the material comprising the first hinge means 64 of the form of the invention shown in FIGS. 8 and 9, which was produced primarily by reason of the pre-bent or pre-deformed physical configuration of the foldable wall means 26 at each of said hinge means 64 which, of course, produced a stress concentration at the location of said hinge means 64 for effectively increasing the deformability thereof under vertical tension or vertical compression loading of the foldable wall means 26.

The apparatus of the present invention, in one preferred exemplary form, may also include indicator or warning apparatus or means adapted to clearly indicate in a perceptible manner to a would-be driver of a pickup truck, or other observer, whether or not the camper has been fully collapsed into the fully retracted relationship shown in FIG. 2. This is important because, normally

speaking, it is desirable to have the camper in the fully collapsed relationship shown in FIG. 2 before driving the pickup truck carrying the camper from one location to another. This is especially important if relatively high speed driving is likely since the vertical height minimization of the camper provided by collapsing same into the position shown in FIG. 2 greatly minimizes wind resistance and any chance of damage occurring to the camper as a result thereof or as a result of striking some object overlying the load.

Therefore, one exemplary such indicator and warning arrangement is illustrated in part in FIGS. 3 and 4 and is illustrated in electrical schematic form in FIG. 15, and it will be noted that it comprises a normally closed electrical switch means 68 physically carried by at least one of the connecting rods 33 of at least one of the extension actuator means 32 and electrically connected by electric circuit means 69 through the ignition switch 71 (or any other desired electrical switch means positioned in the cab of the pickup truck) and through an electrical power supply means 72 (usually the battery of the pickup truck, although not specifically so limited in all forms of the invention) to a perceptible warning signal-producing means 73 which, in one preferred form of the invention, comprises a red jewel indicator light which may be mounted on the dashboard or instrument panel of the truck within the cab thereof (or at any other convenient visibly perceptible location).

It will be noted that this arrangement is such that the switch 68 is normally closed so that the battery 72 normally energizes the red jewel warning light 73 whenever the ignition switch 71 is closed whereby to warn a would-be driver of the pickup truck that the camper is in the fully expanded relationship shown in FIG. 1. He will, thus, know that it is necessary for him to vertically retract the camper apparatus into the fully collapsed and retracted relationship shown in FIG. 1 before he drives the pickup truck, carrying the camper, from one location to another. As soon as he does this by allowing retraction of the four extension actuator means 32 in the manner previously described, the switch 68, which is carried by at least one of the connecting rods 33 of at least one of the extension actuators 32, moves downwardly into a position such that insertion of the locking pin 44 through the locking pin aperture 45 will bring about operation of the switch 68 in a manner which opens same and holds same open, thus making it impossible for the warning signal light 73 to be energized when a would-be driver of the pickup truck turns the ignition switch 71 on. This merely illustrates one possible arrangement for such an indicator and warning apparatus or means which may take any of a variety of forms within the broad scope of the present invention.

It should be noted that any of the various types of foldable wall means, such as the exemplary one generally designated at 26 in the first form of the invention and the corresponding slight modification thereof shown in FIGS. 11-14, may be provided with suitable thermal insulation means cemented, bounded or otherwise suitably attached thereto to very effectively insulate the interior of the room-defining room structure 21 of the camper. Said insulation means may comprise polystyrene foam, polyurethane foam, polyvinyl foam, foam rubber, or the like, preferably of the closed-cell type for maximum thermal insulation effect, although not specifically so limited in all forms of the invention, or various other suitable thermal insulation materials may be employed in lieu thereof.

It should also be noted that the controllably operable linear motor means referred to herein may comprise extension actuator means adapted to apply compressive extension force between the bottom and the top thereof as a result of a great variety of different kinds or types of energy conversion motor means, such as electric motor means operating lead screws or the like, hydraulic or

pneumatic motor means operating pistons or the like, or manually operated extension means such as scissor jacks, rotary screw jacks, or merely an effectively extendable support element adapted to be positioned between the lower room portion 21L and the upper part of the upper room portion 21U after they have been manually vertically extended with respect to each other. In this latter case, the so-called linear motor means may actually effectively comprise such support means, whether used directly for lifting the upper room portion 21U or for merely supporting it after it has been manually lifted, with the composite thereof effectively comprising said linear motor means. It should also be noted that, in addition to the compressive-force-exerting type of linear motor means just referred to, said expression, "linear motor means," is also intended to include and comprehend tension type arrangements for effectively applying tension from above to the upper room portion 21U whereby to effectively vertically extend it with respect to the non-moving lower room portion 21L. For example, this might comprise a pulley arrangement attached to some overhead fixed support member carried by the truck or automobile or adapted to be temporarily placed in an overhead operative position with respect to the collapsed upper room portion 21U whenever such upward tension is to be applied to the upper room portion 21U for lifting same. This may be accomplished by using a winch or any other means for applying tension to such a pulley arrangement. In other words, the expression, "linear motor means," is intended to be broadly construed and to include and comprehend all of the general types of arrangements just referred to, which are not to be taken as limiting the invention thereto but as generally indicating the broad scope of the linear motor means.

It should be understood that the figures and the specific description thereof set forth in this application are for the purpose of illustrating the present invention and are not to be construed as limiting the present invention to the precise and detailed specific structure shown in the figures and specifically described hereinbefore. Rather, the real invention is intended to include substantially equivalent constructions embodying the basic teachings and inventive concept of the present invention.

I claim:

1. A vertically collapsible and foldable camper apparatus adapted for connection to a motor vehicle, comprising: a room-defining room structure having a lower room portion and an upper vertically collapsible and vertically foldable room portion carried over said lower room portion and effectively comprising an upper extension thereof, said vertically collapsible and foldable upper room portion having a base part therearound at the bottom thereof and having a top part therearound at the top thereof, said vertically collapsible and foldable upper room portion being provided with vertically collapsible and foldable side wall means connected vertically between said base part and said top part thereof; and linear motor means vertically interconnected between said lower room portion and said top part of said upper room portion for forcible vertical extension of said linear motor means and for corresponding vertical expansion and unfolding of said vertically collapsible and foldable side wall means of said upper room portion between a lower vertically collapsed position and an upper vertically extended and expanded position of said top part of said upper room portion with respect to said lower room portion; said linear motor means being provided with controllably disengageable and inactivatable locking means cooperable for effectively locking said linear motor means in fully vertically retracted relationship with said upper room portion in fully vertically collapsed and folded relationship with respect to said lower room portion; and indicator means cooperable with said linear motor means for perceptibly indicating to a driver of a motor vehicle, when an ignition switch thereof is in "on" position, that said linear motor

means has not been locked by said locking means in said fully vertically retracted relationship.

2. Apparatus as defined in claim 1, wherein said vertically collapsible and foldable side wall means of said upper room portion comprises a plurality of vertically interconnected thin-sheet non-foldable slat portions vertically interconnected by effectively foldable hinge portions, with each vertically adjacent set of non-foldable slat portions being in a different vertically spaced plane and with the plurality of interconnecting hinge portions being also in a plurality of intervening vertically spaced planes.

3. Apparatus as defined in claim 1, wherein said vertically collapsible and foldable side wall means of said upper room portion comprises a plurality of vertically interconnected thin-sheet non-foldable slat portions vertically interconnected by effectively foldable hinge portions, with each vertically adjacent set of non-foldable slat portions being in a different vertically spaced plane and with the plurality of interconnecting hinge portions being also in a plurality of intervening vertically spaced planes, each of said vertically spaced hinge portions comprising an integral bendable hinge portion adapted to be forcibly deformed when vertically adjacent slat portions are forcibly moved toward and away from each other without substantial deformation.

4. Apparatus as defined in claim 1, wherein said vertically collapsible and foldable side wall means of said upper room portion comprises a plurality of vertically interconnected thin-sheet non-foldable slat portions vertically interconnected by effectively foldable hinge portions, with each vertically adjacent set of non-foldable slat portions being in a different vertically spaced plane and with the plurality of interconnecting hinge portions being also in a plurality of intervening vertically spaced planes, each of said vertically spaced hinge portions comprising a pair of physically non-integrally and relatively movably connected hinge elements effectively rotatively interconnected with respect to each other for rotation about a substantially common longitudinal hinge axis.

5. Apparatus as defined in claim 1, wherein said vertically collapsible and foldable side wall means of said upper room portion comprises a plurality of vertically interconnected thin-sheet non-foldable slat portions vertically interconnected by effectively foldable hinge portions, with each vertically adjacent set of non-foldable slat portions being in a different vertically spaced plane and with the plurality of interconnecting hinge portions being also in a plurality of intervening vertically spaced planes, each of said vertically spaced hinge portions comprising a pair of physically non-integrally and relatively movably connected hinge elements effectively rotatively interconnected with respect to each other for rotation about a substantially common longitudinal hinge axis, and including flexible corner sealing means effectively sealingly connected with respect to said vertically collapsible and foldable side wall means at effective corner portions thereof.

6. Apparatus as defined in claim 1, wherein said base part of said upper vertically collapsible and foldable room portion is attached to and comprises a top part of said lower room portion and extending therearound.

7. Apparatus as defined in claim 1, wherein said linear motor means comprises a plurality of extension actuator means, each taking the form of a hydraulic cylinder and piston type of actuator effectively provided with hydraulic circuit means, a common supply of hydraulic fluid and controllably operable pumping jack means connected thereto for controllably pressurizing and pumping said hydraulic fluid to each of said extension actuator means for controllably vertically and simultaneously extending same and for controllably allowing the vertical retraction thereof under the action of gravity.

8. Apparatus as defined in claim 1, wherein said lower room portion is provided with a bottom part which is substantially T-shaped as seen in end elevation and which is

13

cooperable for received engagement with respect to the similarly shaped bed and upstanding side wall portions of a motor vehicle of the pick-up truck type.

9. Apparatus as defined in claim 1, wherein said base part of said upper vertically collapsible and foldable room portion is attached to and comprises a top part of said lower room portion and extending therearound, said top part of said upper room portion being provided with sealing and overlapping weather-stripping flap means cooperable with said top part of said lower room portion when said upper room portion is in said fully vertically collapsed and folded relationship for effectively sealing and weather-stripping the horizontal junction region between vertically adjacent surfaces of said top parts of said upper and lower room portions.

10. Apparatus as defined in claim 1, wherein said indicator means comprises normally closed electrical switch means positioned for opening actuation in response to full retraction of said linear motor means and the engagement of said locking means with respect thereto in said fully retracted relationship, electric circuit means interconnecting said switch means with the ignition switch of a motor vehicle and provided with a perceptible warning signal-producing means connected in circuit therewith for normal energization whereby to produce a perceptible warning signal whenever said linear motor means is not in said fully retracted and locked relationship.

11. Apparatus as defined in claim 1 wherein said controllable disengageable and inactivatable locking means

14

includes a portion thereof cooperable for effectively locking said linear motor means in fully extended relationship with said upper room portion in fully vertically expanded relationship.

12. Apparatus as defined in claim 11 wherein said indicator means comprises normally closed electrical switch means positioned for opening actuation in response to full retraction of said linear motor means and the engagement of said locking means with respect thereto in said fully retracted relationship, electric circuit means interconnecting said switch means with the ignition switch of a motor vehicle and provided with a perceptible warning signal-producing means connected in circuit therewith for normal energization whereby to produce a perceptible warning signal whenever said linear motor means is not in said fully retracted and locked relationship.

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