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(54) Stretcher supporting assembly for an emergency unit

(57) A stretcher supporting assembly (8) housed inside an emergency unit (1) and presenting at least one stretcher supporting device (9) in turn presenting a fixed frame (11), and a guide and slide assembly (39) wherein the slide (41) supports a stretcher (38) and is movable axially along the guide (40) by a hydraulic linear actuator (45); the device (9) also presenting a hydraulic drive (49, 60) for moving the guide (40) between a first operating position wherein the stretcher (38) is positioned substantially horizontally and raised in relation to the fixed frame (11), and a second operating position for loading/unloading the stretcher (38) and wherein the stretcher (38) is inclined and lowered in relation to the first operating position; a control unit (48) being provided for sequentially controlling the drive (49, 60) and the linear actuator (45).

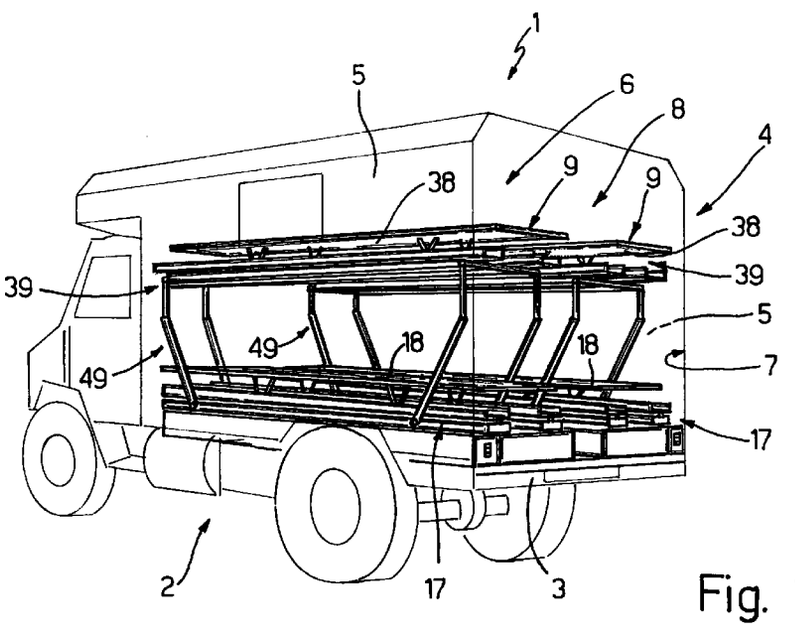

Fig. 1

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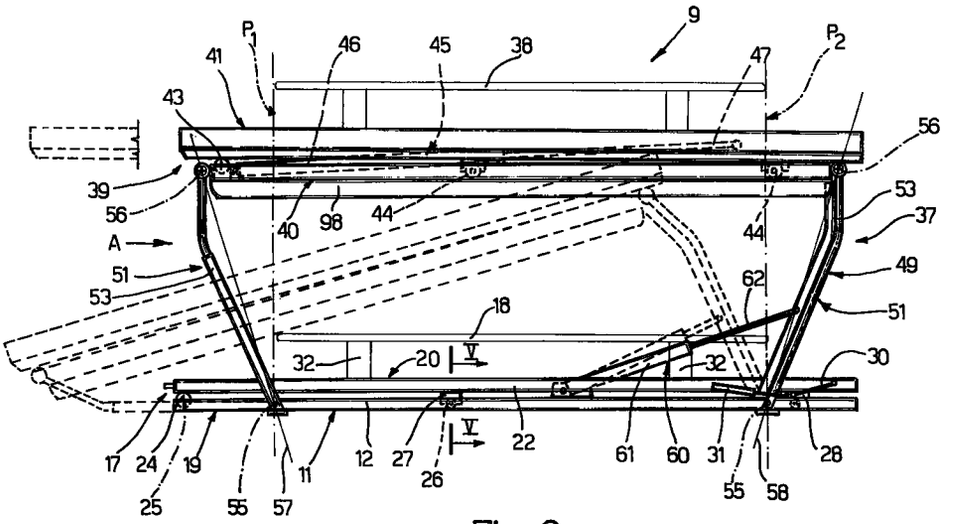
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Fig. 2

Description

The present invention relates to a stretcher supporting assembly for an emergency unit.

More specifically, the present invention relates to a stretcher supporting assembly for ambulances in general and for off-road ambulances in particular, to which the following description refers purely by way of example.

The stretchers of off-road ambulances are normally supported on fixed structures fitted to the ambulance, or on carriages, e.g. retractable carriages, which are loaded on to platforms inside the ambulance.

As is known, the loading platforms of off-road ambulances are located a good distance off the ground, so that in-service loading and unloading of the stretchers are extremely difficult and involve a certain amount of discomfort, mainly due to requiring a good deal of physical strength, which is not always forthcoming, on the part of the ambulance attendants.

It is an object of the present invention to provide a stretcher supporting assembly designed to overcome the above drawbacks, and which in particular provides for troublefree loading and unloading of the stretchers with a minimum amount of physical effort required on the part of the attendants.

According to the present invention, there is provided a stretcher supporting assembly for an emergency unit, the assembly being housed inside the emergency unit and connected to an anchoring portion forming part of the unit, and the assembly comprising at least one stretcher supporting device presenting first supporting means for at least one stretcher; characterized in that said device also comprises fastening means connectable integral with said anchoring portion; lever transmission means connected to said first supporting means and to said fastening means; and actuating means for moving said first supporting means in relation to the fastening means and between a first operating position wherein the stretcher is positioned substantially horizontally and raised in relation to said fastening means, and a second operating position for loading/unloading the stretcher and wherein the stretcher is inclined, lowered and translated in relation to said first operating position.

A non-limiting embodiment of the present invention will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows a schematic view in perspective of an emergency unit featuring a stretcher supporting assembly in accordance with the teachings of the present invention;

Figure 2 shows a larger-scale side view of a detail of the Figure 1 assembly;

Figure 3 shows a top plan view, with parts removed for clarity, of the Figure 2 detail;

Figure 4 shows a side view, with parts removed for clarity, in the direction of arrow A in Figure 2;

Figure 5 shows a larger-scale section along line V-V in Figure 2;

Figure 6 shows a schematic side view of the Figure 2 detail in eight different operating positions;

Figure 7 shows the Figure 2 detail in a further four different operating positions;

Figure 8 shows the electrohydraulic circuit controlling the Figure 1 assembly.

Number 1 in Figure 1 indicates a predominantly off-road ambulance comprising a tractor 2 in turn comprising a loading platform 3, and a van body 4 presenting two opposite longitudinal lateral walls 5, and defining a chamber 6 communicating externally via a rear opening 7.

Chamber 6 houses a stretcher supporting assembly 8 comprising two identical stretcher supporting devices 9 supported on platform 3 and each adjacent to a respective longitudinal lateral wall 5 of body 4.

As shown in Figures 2 and 3, each device 9 comprises a fixed frame 11 fitted integrally to platform 3 and in turn comprising two transversely spaced channel sections 12 (Figures 2 and 4) parallel to each other and to walls 5.

With reference to Figure 5, each channel section 12 presents its concavity facing away from platform 3, and comprises a bottom wall 13 fitted integrally to platform 3; two lateral walls 14 extending upwards from wall 13; and two tabs 15 extending towards each other, facing and parallel to bottom wall 13, and defining an opening 16.

Channel sections 12 form part of a guide and slide assembly 17 for supporting a first lower stretcher 18 (Figure 2) and which comprises a guide 19 defined by the two channel sections 12, and a slide 20 fitted to guide 19 so as to slide axially between a withdrawn position (Figures 6a, 6d) and an extracted position (Figures 6b, 6c) wherein slide 20 projects beyond guide 19 and through opening 7.

More specifically, slide 20 comprises two upwardly concave U sections 22 extending parallel to and over respective channel sections 12, and connected to each other by a pair of cross members 23 (Figure 3). Each U section 22 is connected in sliding manner to respective channel section 12 by a respective end roller 24 (Figure 2) fitted to the end portion of channel section 12 facing opening 7, and rotating about a respective axis 25 perpendicular to sections 12 and 22. Each section 22 is also connected to respective channel section 12 by a pair of wheels 26 (Figure 5) housed inside section 12, and which roll along respective tracks inside section 12, and are connected to U section 22 by a connecting plate 27 extending through respective opening 16.

Finally, each U section 22 is connected to respective channel section 12 by an intermediate carriage 28 (Figure 2) which runs along channel section 12, is connected to carriage 28 of the other section 22 by a cross member (not shown), and is connected to U section 22 by a connecting rod 30 and a counterbalancing gas cylinder 31 (Figures 2, 6c). Connecting rod 30 and cylinder 31 present respective ends hinged to carriage 28, and respective opposite ends hinged respectively to the end

portion of section 22 opposite that facing opening 7, and to an intermediate portion of section 22.

U sections 22 in turn define two longitudinal guides inside which, in use, the feet 32 of stretcher 18 are housed and locked releasably by a releasable device 33 (Figures 3, 4).

With reference to Figures 3 and 4, device 33 comprises two cylindrical longitudinal rods 34, each presenting three spaced, integrally projecting appendixes 35, and each connected in rotary and longitudinally fixed manner to respective section 22 so as to rotate appendixes 35 between an operating or locked position (to the right in Figure 4) wherein appendixes 35 extend inside respective section 22, and an idle position (to the left in Figure 4) wherein appendixes 35 extend outside respective section 22 to free respective feet 32.

Each device 9 also comprises an assembly 37 for supporting and handling an upper stretcher 38 (Figure 2), and which comprises a guide and slide assembly 39 extending over assembly 17 and in turn comprising a longitudinal guide 40, and a slide 41 fitted in sliding manner to guide 40.

Slide 41 is the same as slide 20; stretcher 38 is connected releasably to slide 41 by a releasable lock device 42 (Figures 3, 4) identical to device 33; guide 40 is identical to guide 19; and slide 41 is connected to guide 40 by rollers 43 (Figure 2) fitted to guide 40 close to opening 7, and by two pairs of spaced wheels 44 identical to wheels 26.

By means of a differential hydraulic cylinder 45 (Figures 2, 3), slide 41 is moved both ways along guide 40 between a withdrawn position (Figures 2, 6a, 6e) wherein it extends completely over guide 40, and an extracted position (Figure 6f) wherein it projects beyond guide 40 and through opening 7.

In the example described, cylinder 45 presents a body 46 (Figures 2, 3) hinged to a cross member of guide 40 close to one of rollers 43; and a rod 47, the free end of which is hinged to an intermediate portion of slide 41; and cylinder 45 is controlled by an electrohydraulic control unit 48 (Figure 8) described in detail later on.

With reference to Figure 2, guide 40, and hence the whole of assembly 37, is moved by a lever transmission 49 in relation to fixed frame 11 and between a first operating position (shown by the continuous line in Figure 2) wherein stretcher 38 is substantially horizontal and raised in relation to platform 3 and stretcher 18, and a second operating position (shown by the dotted line in Figure 2) for loading/unloading stretcher 38 and wherein stretcher 38 is inclined, lowered and translated longitudinally in relation to the first operating position and in no way interferes with stretcher 18.

With reference to Figures 2 and 4, lever transmission 49 is interposed between guide 40 and fixed frame 11, and comprises two levers 51, each in turn comprising two parallel arms 52 and 53 on either side of guide 40 and fixed frame 11, and of which arm 52 is located adjacent to respective wall 5.

Arms 52, 53 of each lever 51 present respective end portions hinged to respective opposite end portions of channel sections 12, so as to rotate about respective hinge axes 55 parallel to each other and to axis 25 and perpendicular to the Figure 2 plane; and the end portions of arms 52, 53 opposite the portions hinged to sections 12 are hinged to respective end portions of guide 40, so as to rotate about respective hinge axes 56 parallel to each other and to axes 55. More specifically, arms 52 and 53 are so hinged to fixed frame 11 that, when guide 40 is set to said first operating position, axes 56 extend outside the space defined by two vertical planes P1, P2 through respective axes 55, and, for any position of guide 40, lines 57 and 58 joining and extending perpendicularly through axes 55 and 56 of respective levers 51 converge towards each other and towards fixed frame 11.

As shown in Figure 2, assembly 37 also comprises a differential hydraulic cylinder 60 for operating transmission 49, and which presents a body 61 hinged to an intermediate portion of one of sections 12 of fixed frame 11 within said space defined by planes P1 and P2, and an output rod 62 hinged to an intermediate portion of a corresponding arm 52.

Cylinders 45 and 60 of devices 9 are controlled by electrohydraulic unit 48 which, as shown in Figure 8, comprises a known central electronic control unit 63 with two pushbutton panels 64, one for each device 9 and each presenting two buttons 65a, 65b, one for controlling slide 41 and levers 51 in one direction, and the other for controlling slide 41 and levers 51 in the opposite direction.

Unit 48 also comprises a hydraulic circuit 66 in turn comprising a power block 67, and a control block 68 interposed between power block 67 and cylinders 45, 60, and to which cylinders 45, 60 of one device 9 are connected parallel to each other and parallel to the corresponding cylinders 45, 60 of the other device 9.

Power block 67 comprises a first hydraulic pump 69; a motor 70 for powering first pump 69; and a known hand-operated second pump 71 parallel to first pump 69. Pump 69 draws oil from a tank 72 through a filter 73, and feeds it to a delivery conduit 74 fitted with a pressure limiter 75; and pump 71 is located between two one-way valves 76, and is connected to tank 72 by an intake conduit, and to the delivery branch of pump 69 by a respective delivery conduit 77.

Control block 68 comprises a two-way, two-position, slide type solenoid valve 78 which is switchable manually in the absence of electrical control, is connected electrically to central unit 63, and presents the inlet connected hydraulically to delivery conduits 74, 77 of pumps 69, 71, and the outlet or drain connected hydraulically to tank 72 by a conduit 79 presenting an adjustable throttle 80.

As shown in Figure 8, for each cylinder 45, 60, control block 68 comprises two identical one-way, two-position, slide type solenoid valves 81 and 82, each of which is connected electrically to central unit 63, and is switchable manually in the absence of electrical control by the central unit. More specifically, solenoid valves 81 present

respective inlets connected to the delivery of solenoid valve 78 by respective conduits 83; and respective outlets connected hydraulically to a first chamber 84 of respective cylinders 45, 60 by respective conduits 85 fitted with respective adjustable throttles 86a, 86b for determining the activating sequence of cylinders 45, 60 and, hence, the operating sequence of slide 41 and levers 51.

Solenoid valves 82, on the other hand, are connected to solenoid valve 78 by respective conduits 87, and to a second chamber 88 of respective cylinders 45, 60 by respective conduits 89.

As shown in Figure 4 and particularly in Figure 7, the ends of arms 52 are also connected to guide 40 by respective further hinges 92 enabling guide 40 to rotate, in relation to fixed frame 11 and about a substantially horizontal axis 93 perpendicular to axes 55 and 56, between the first operating position (Figures 4, 7c) wherein guide 40 extends parallel to platform 3, and an upturned idle position (Figure 7d) wherein guide 40 extends substantially contacting respective wall 5 to clear a space on one side of a substantially vertical plane through the hinge axis 93.

As shown in Figures 4 and 7, each device 9 also comprises a cushion body 95 extending over guide and slide assembly 17, and hinged to the inner surface of respective longitudinal wall 5 so as to rotate, about a horizontal axis 96 parallel to axis 93, between an open position wherein it projects parallel to platform 3 from wall 5 into chamber 6 to define the seat portion of a seat 97, and a closed position wherein it extends contacting the inner surface of wall 5.

Each seat 97 also comprises a further cushion body 98 acting as a backrest/headrest, and which is fitted integrally to guide 40 on the opposite side to slide 41, and is positioned for use when guide 40 is set to the upturned position.

Operation of assembly 8 will now be described with reference to Figure 6 and, for the sake of simplicity, with reference to only one device 9, and commencing as of the Figure 6a condition wherein both slides 20 and 41 are withdrawn, guide 40 is in the first operating position, and throttles 80, 86a, 86b are so set as to operate cylinders 60 in advance of cylinders 45 when unloading stretcher 38, and after cylinders 45 when loading stretcher 38.

As of the above condition, slide 20 is shifted manually along guide 19 into the extracted position (Figure 6b) in which wheels 26 at least partially release their respective rolling tracks; at which point, by pushing the free end of slide 20 downwards, connecting rod 30 is rotated anticlockwise (in Figure 6c) about its hinge axes and, consequently, slide 20 is rotated in relation to guide 19 and in contact with rollers 24 into the inclined loading position shown in Figure 6c.

As of this position, stretcher 18 is released by manually rotating rods 34 to shift respective appendixes 35 into the raised idle position; the patient is loaded on to stretcher 18; stretcher 18 is again positioned and locked to slide 20 by again rotating rods 34; and slide 20 and stretcher 18 are restored to the withdrawn position by repeating the above operations in reverse order.

At this point, operation of one of buttons 65a, 65b on panel 64 of the device 9 in question first activates pump 69 and then switches valves 81, 82. As already stated, by virtue of throttles 80, 86a, 86b, cylinder 60 is operated first so as to gradually rotate levers 51 and move guide 40 into the second operating position (Figure 6e); at which point, with button 65a, 65b still pressed, and upon levers 51 being locked against respective stops (not shown), cylinder 45 is also activated, and slide 41 moved into the extracted loading position (Figure 6f).

At this point, stretcher 38 is released in the same way as for stretcher 18; the patient is loaded on to the stretcher; stretcher 38 is again positioned and locked as described previously; and, by pressing the other button 65a, 65b on panel 64, slide 41 is moved gradually into the withdrawn position, and cylinder 60 is then activated to move guide 40 into the first operating position.

The same operations may also be performed manually using pump 71 and by manually switching solenoid valves 78, 81, 82.

When stretchers 18 and 38 are not needed, arms 53 are released from fixed frame 11 (Figure 7a) and bent towards each other into the closed position shown in Figure 7b; guide 40 and respective slide 41 are rotated about the axis 93 defined by hinges 92 into the upturned position (Figure 7d) in which they are locked in known manner; and cushion body 95 is released and positioned horizontally to define seat 97 together with cushion body 98 (Figure 7d). When the device 9 in question is set to this last configuration, unit 48 is disabled by means of one or more sensors (not shown) for detecting the upturned position of guide 40.

As compared with known solutions, stretcher supporting assembly 8 therefore provides for greatly simplifying loading and unloading of stretchers 18, 38, mainly due to the possibility of positioning slides 20, 41 supporting stretchers 18, 38 not only in an inclined and hence easily accessible position, but also at a much lower height off the ground as compared with platform 3 of ambulance 1.

As such, assembly 8 also provides for greatly reducing the physical effort required of the attendants for loading and unloading the upper stretchers 38, which are mounted on slides operated by hydraulic actuators controllable both electrically by means of central unit 63 and control panels 64, and manually by means of pump 71 and by manually switching valves 78, 81, 82 in the event of power failure or a fault on the electric circuit.

Assembly 8 is also extremely straightforward in design and highly reliable by featuring straightforward components of proven reliability and efficiency.

Clearly, changes may be made to assembly 8 as described and illustrated herein without, however, departing from the scope of the present invention.

In particular, provision may be made for one or more hydraulic actuators for operating bottom slide 20.

Slides 20 and 41 may be formed differently from those described, e.g. in such a manner as to support two or more stretches 18, 38.

Levers 51 may also be formed differently from those described, and hydraulic cylinder 60 may be replaced with one or more different actuators.

Finally, cylinder 45 may be dispensed with or replaced with a different, e.g. mechanical, actuator; and guide and slide assemblies 17, 39 may be formed differently from those described.

Claims

1. A stretcher supporting assembly (8) for an emergency unit (1), the assembly (8) being housed inside the emergency unit (1) and connected to an anchoring portion (3) forming part of the unit (1), and the assembly comprising at least one stretcher supporting device (9) presenting first supporting means (39) for at least one stretcher (38); characterized in that said device (9) also comprises fastening means (11) connectable integral with said anchoring portion (3); lever transmission means (49) connected to said first supporting means (39) and to said fastening means (11); and actuating means (60) for moving said first supporting means (39) in relation to the fastening means (11) and between a first operating position wherein the stretcher (38) is positioned substantially horizontally and raised in relation to said fastening means (11), and a second operating position for loading/unloading the stretcher (38) and wherein the stretcher (38) is inclined, lowered and translated in relation to said first operating position.

2. An assembly as claimed in Claim 1, characterized in that said lever transmission means (49) comprise a pair of levers (51); said levers (51) presenting respective end portions hinged to said fastening means (11) so as to rotate, in relation to the fastening means (11), about respective first hinge axes (55) parallel to each other, and respective opposite end portions hinged to said first supporting means (39) so as to rotate about respective second hinge axes (56) parallel to each other and to the first hinge axes (55); the lines (57)(58) joining and extending perpendicularly through the first (55) and second (56) hinge axes of respective said levers (51) converging towards each other and towards said fastening means (11).

3. An assembly as claimed in Claim 2, characterized in that said second hinge axes (56) are located outside the space defined by two parallel, substantially vertical planes (P1)(P2), each extending through a respective said first hinge axis (55) when said first supporting means (39) are in said first operating position.

4. An assembly as claimed in Claim 2 or 3, characterized in that said first supporting means comprise a guide and slide assembly (39) in turn comprising a guide (40) to which the ends of said levers (51) are hinged so as to rotate about said second hinge axes (56), and a slide (41) fitted in sliding manner to said guide (40) and in turn supporting said stretcher (38).

5. An assembly as claimed in Claim 4, characterized in that said first supporting means (39) also comprise releasable lock means (42) for releasably connecting said stretcher (38) to said slide (41).

6. An assembly as claimed in Claim 4 or 5, characterized in that said first supporting means (39) also comprise actuating means (45) for moving said slide (41) along said guide (40) in both directions.

7. An assembly as claimed in Claim 6, characterized in that said actuating means comprise a first hydraulic linear actuator (45).

8. An assembly as claimed in any one of the foregoing Claims, characterized in that said first supporting means (39) rotate, in relation to said fastening means (11) and about a further substantially horizontal hinge axis (93), between said first operating position and an upturned idle position wherein said first supporting means (39) clear a space to one side of a substantially vertical plane through said further hinge axis (93).

9. An assembly as claimed in any one of the foregoing Claims, characterized in that said device (9) also comprises second supporting means (17) for at least a further stretcher (18).

10. An assembly as claimed in Claim 9, characterized in that said second supporting means comprise a further guide and slide assembly (17) in turn comprising a further guide (19) integral with said fastening means (11), and a further slide (20) fitted to said further guide (19) in sliding manner and supporting said further stretcher (18).

11. An assembly as claimed in Claim 10, characterized in that said second supporting means (17) also comprise further releasable lock means (33) for releasably connecting said further stretcher (18) to said further slide (20).

12. An assembly as claimed in one of the foregoing Claims from 9 to 11, characterized in that said second supporting means (17) extend beneath said first supporting means (39) at least when the first supporting means (39) are in said first operating position.

13. An assembly as claimed in any one of the foregoing Claims, characterized in that said actuating means comprise at least a second linear actuator (60).

14. An assembly as claimed in Claim 13, characterized in that said second actuator (60) is a hydraulic linear actuator.

15. An assembly as claimed in Claims 7 and 14, characterized in that said device (9) comprises a control unit (48) for controlling the first (45) and second (60) hydraulic linear actuators; said control unit (48) comprising a hydraulic circuit (66) in turn comprising a power block (67), and a control block (68) interposed between the power block (67) and said linear actuators (45)(60).

16. An assembly as claimed in Claim 15, characterized in that said first (45) and second (60) linear actuators are parallel connected to said control block (68); and sequencing means (80)(86a)(86b) are provided for activating the linear actuators (45)(60) one after the other.

17. An assembly as claimed in Claim 15 or 16, characterized in that said power block (67) comprises a pump (69), and a motor (70) for driving the pump (69); and the control block (68) comprises, for each said linear actuator (45)(60), a pair of one-way, two-position, slide type solenoid valves (81)(82).

18. An assembly as claimed in Claim 17, characterized in that said control block (68) also comprises a further two-way, two-position, slide type solenoid valve (78) interposed between said pump (69) and said slide type solenoid valves (81)(82).

19. An assembly as claimed in Claim 18, characterized in that said control unit (48) also comprises an electronic central control unit (63) for controlling said solenoid valves (78)(81)(82).

20. An assembly as claimed in one of the foregoing Claims from 15 to 19, characterized in that said power block (67) also comprises a hand-operated pump (71); and said control block (68) comprises, for each said linear actuator (45)(60), a pair of hand-operated, one-way, two-position, slide valves (81)(82).

21. An assembly as claimed in any one of the foregoing Claims, characterized in that it comprises a further stretcher supporting device (9).

22. An assembly as claimed in Claims 15 and 21, characterized in that said two stretcher supporting devices (9) are identical; and said control unit (48) comprises a said power block (67) and a said control block (68) common to both the linear actuators (45)(60) of the assembly (8); the linear actuators (45)(60) of said two devices (9) being parallel in relation to said control block (68).

23. An emergency unit (1), characterized in that it comprises a stretcher supporting assembly (8) in turn comprising at least one stretcher supporting device (9) as claimed in any one of the foregoing Claims from 1 to 20.

24. An emergency unit as claimed in Claim 23, characterized in that said assembly comprises two identical said stretcher supporting devices (9) adjacent to each other.

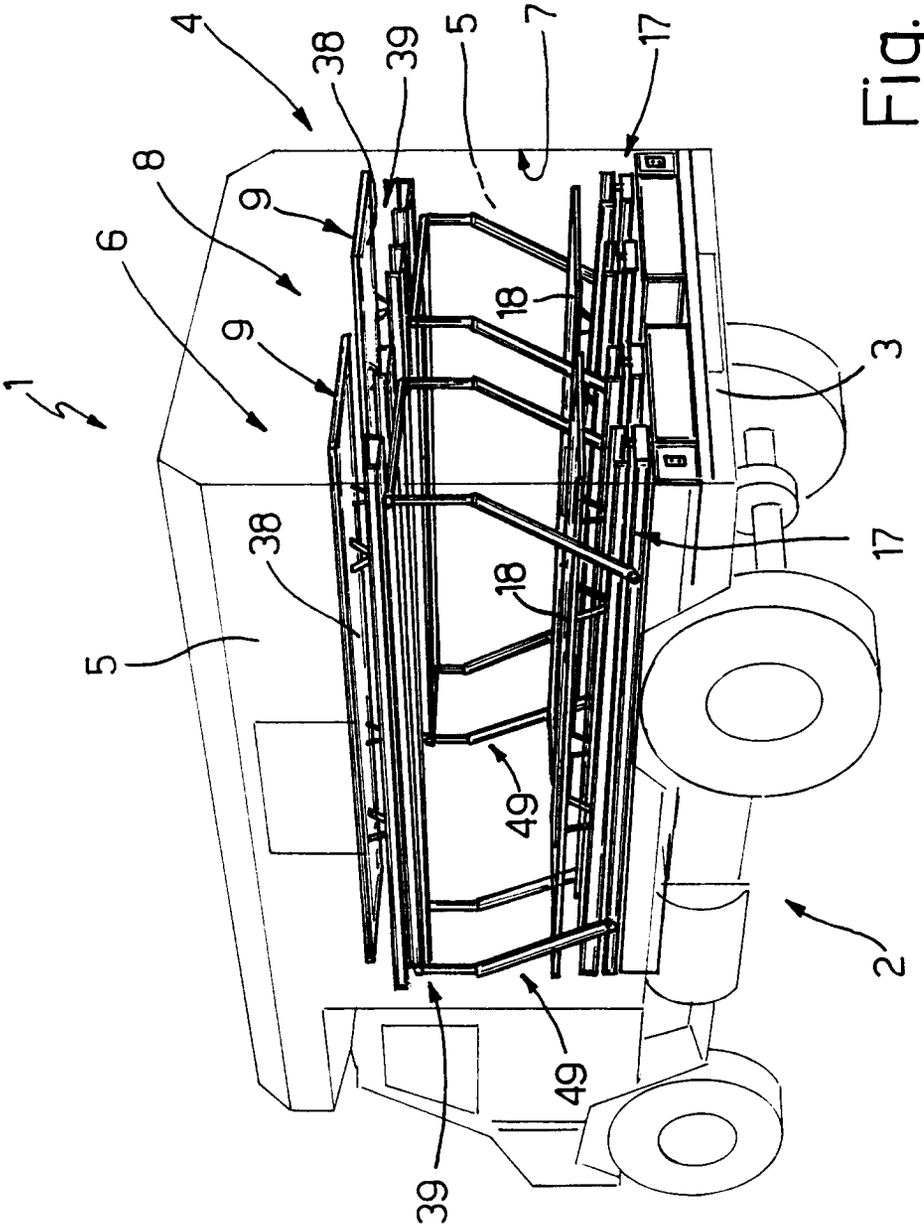

Fig. 1

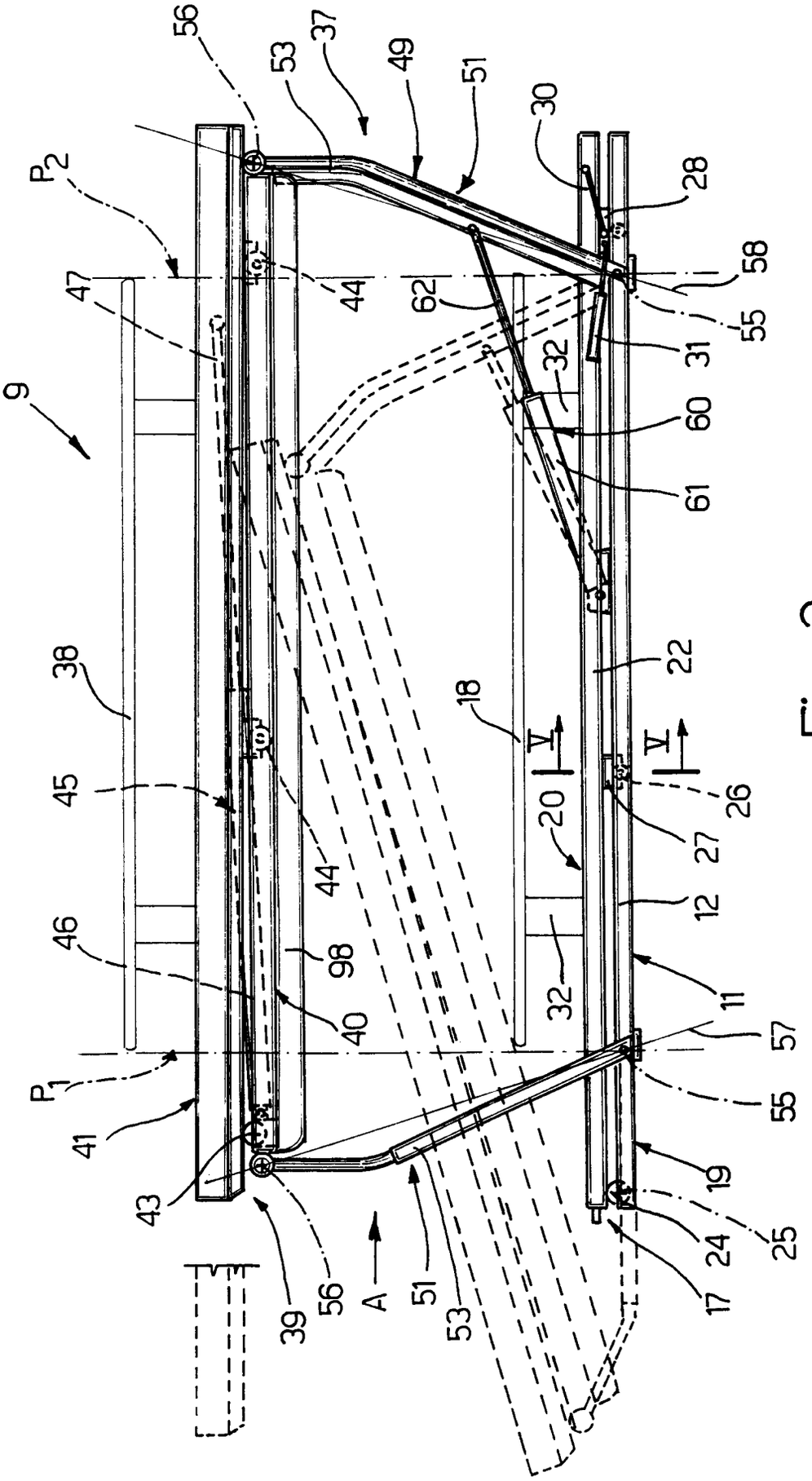
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Fig. 2

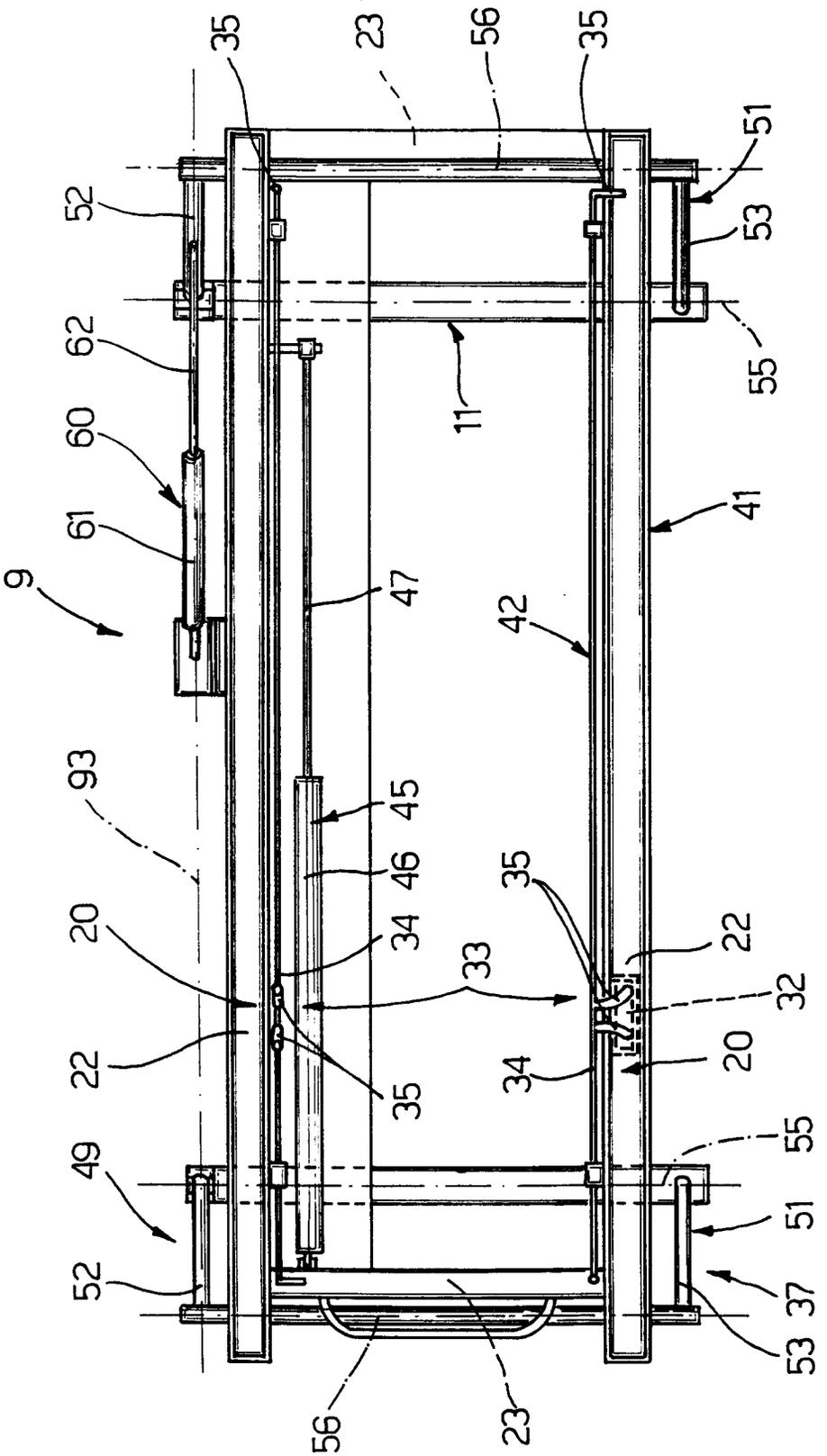
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Fig. 3

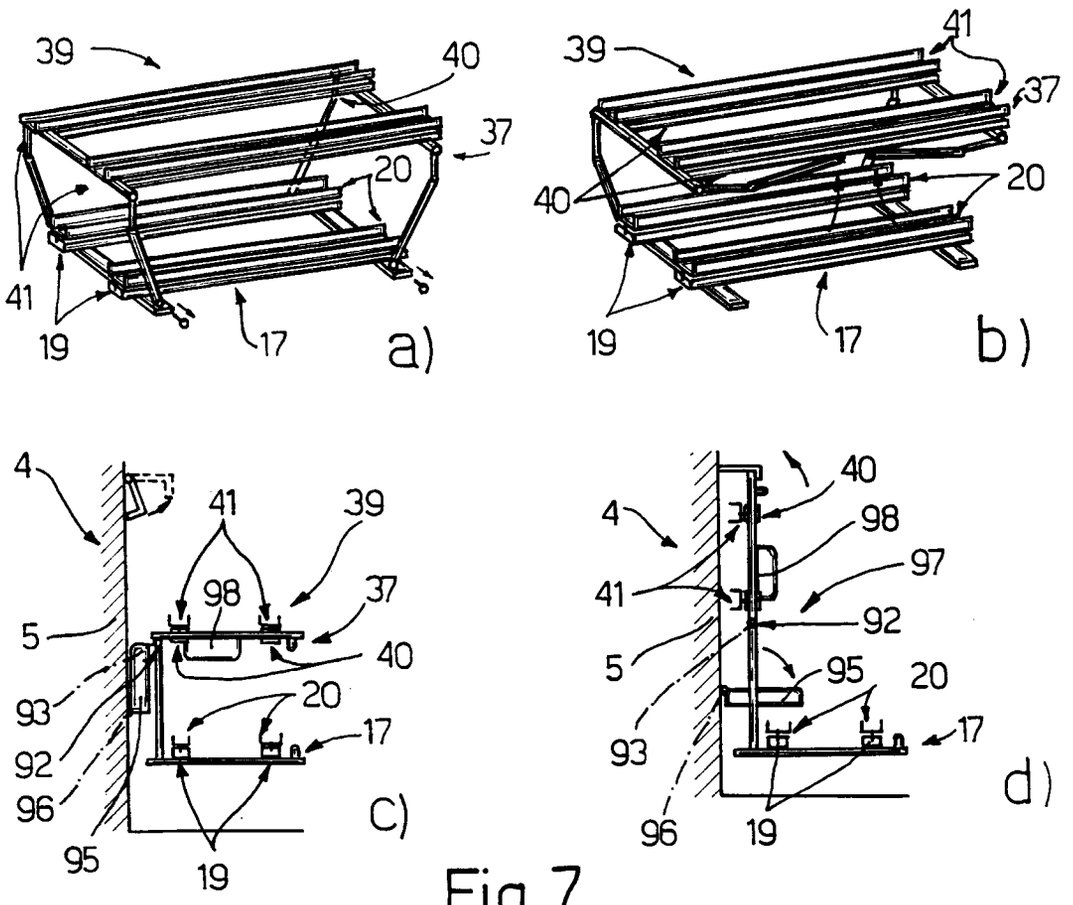

Fig. 7

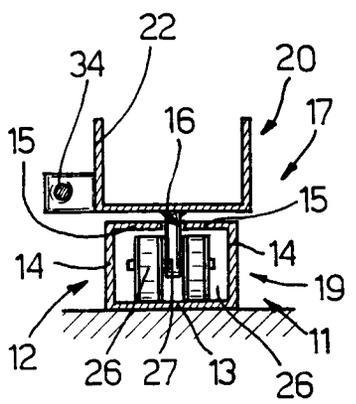

Fig. 5

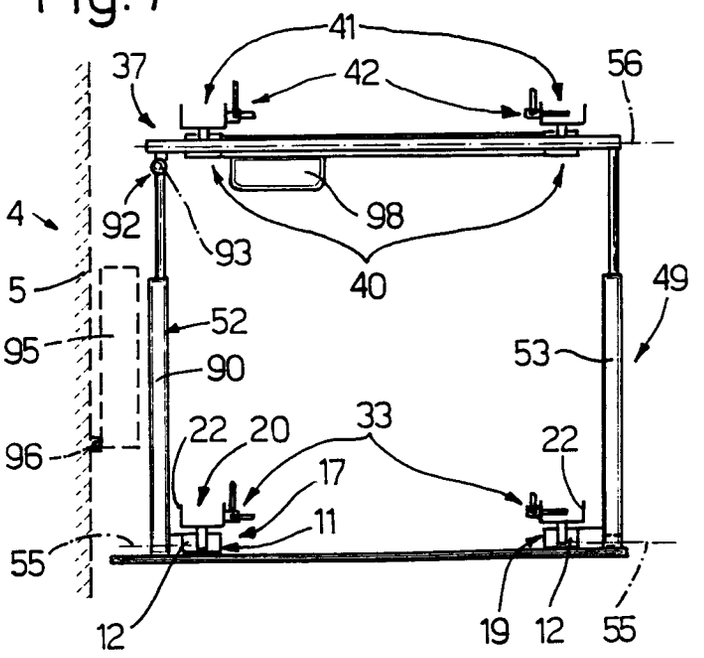

Fig. 4

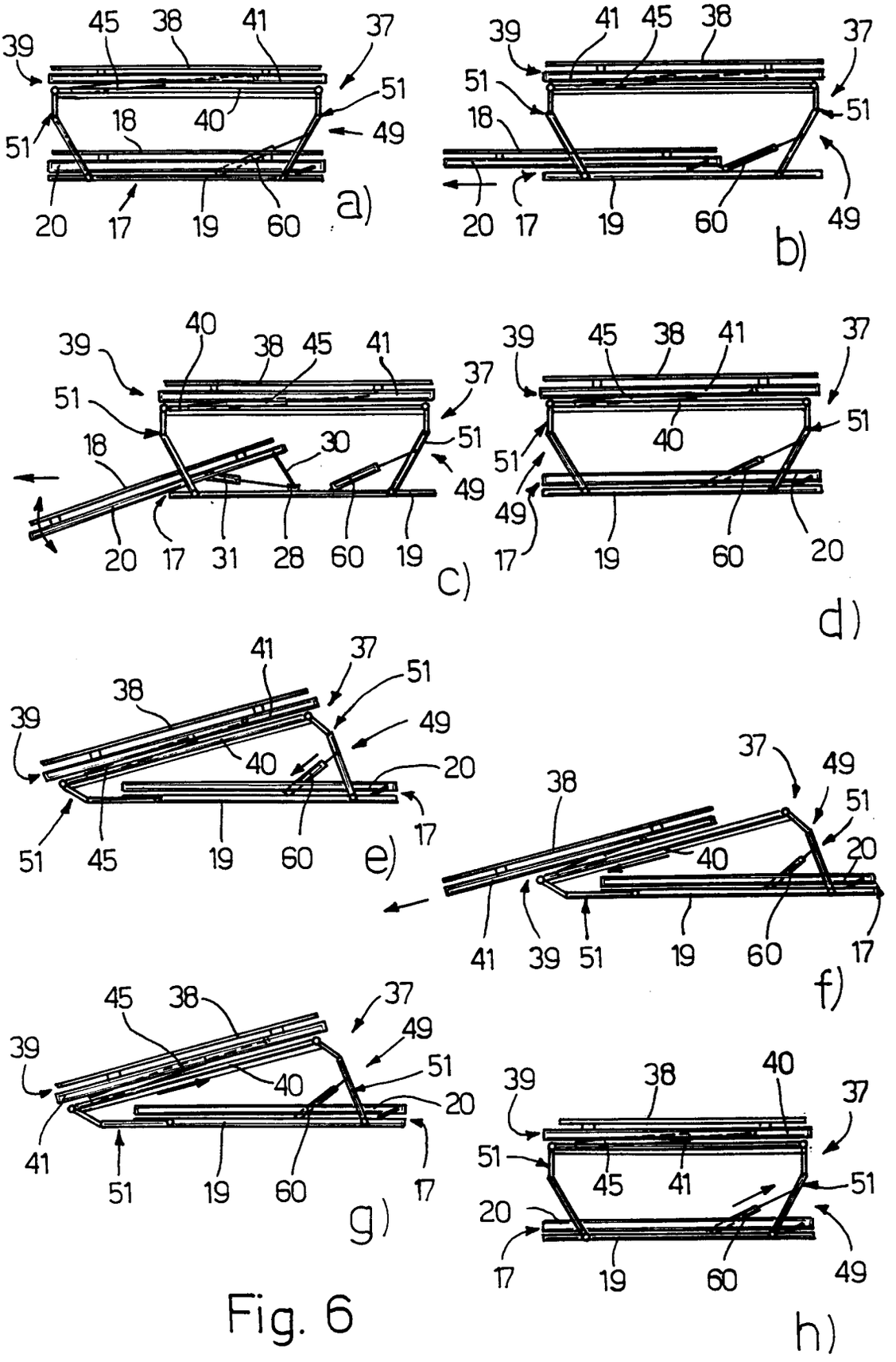

Fig. 6

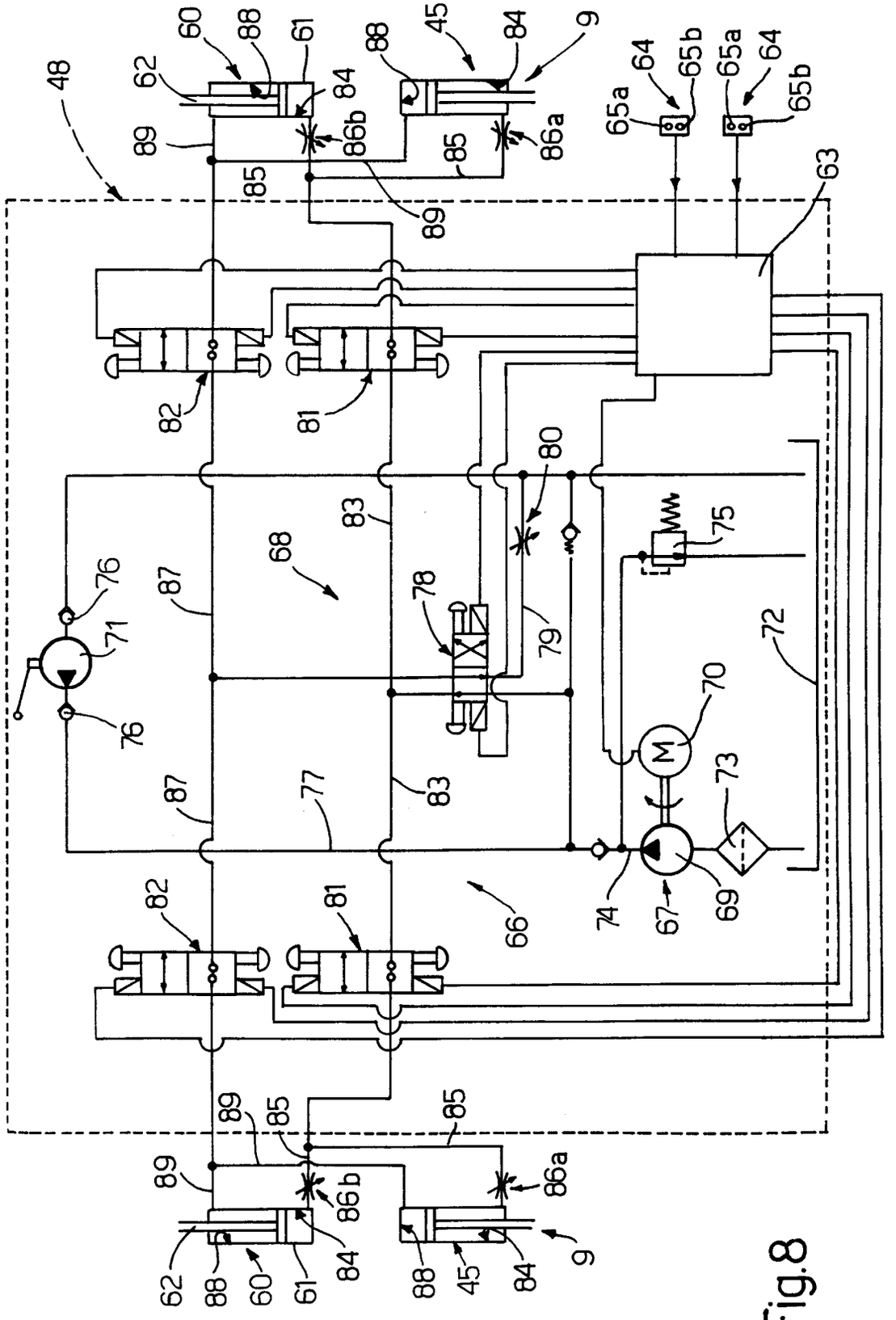
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Fig.8

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 95 11 8078

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	GB-A-213 797 (MARTIN & HORSLEY) * page 2, line 57 - line 114; figures * ---	1,9,23	A61G1/06 A61G3/00
X A	FR-A-2 649 008 (BABOULIN) * the whole document * ---	1,13,23 2	
X	GB-A-220 916 (PAYNE) * page 1, line 66 - page 2, line 3; figures * ---	1,9,23	
A	DE-B-12 48 859 (BINZ & CO) * the whole document * ---	1,2,8,9, 12,21-24	
A	DE-B-10 42 836 (LORCHER KAROSSERIEFABRIK BINZ & CO) * the whole document * ---	1	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 January 1996	Baert, F

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