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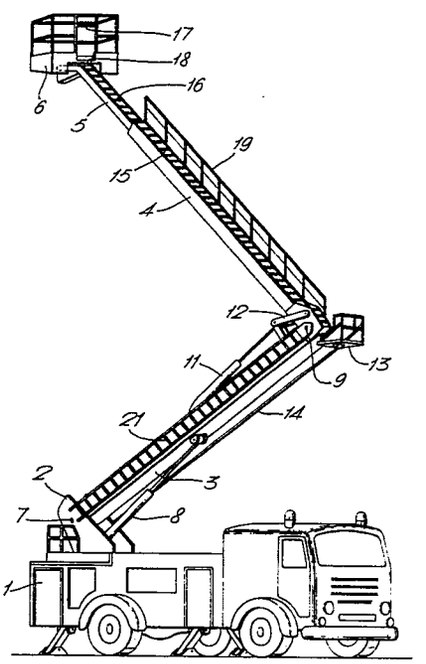
(54) Access apparatus having a plurality of booms.

(57) Access apparatus including an upper boom (4) (5) and a second boom (3) pivotally interconnected therewith, a platform (6) attached to the free end of the upper boom (4) (5) and first ladder means (15) (16) arranged on the upper surface of the upper boom (4) (5) to provide access from the platform (6) along at least a part of the upper surface of the upper boom (4) (5).



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"Access apparatus having a plurality of booms"

This invention relates to access apparatus having a plurality of booms, the booms being pivotally connected to one another in such a way that they can be folded down on top of one another for transport on a vehicle to which the lowermost of the booms is commonly pivotally and rotatably connected.

At the free end of the uppermost boom, there is commonly provided a platform which is maintained level during use and which is generally used to carry one or more persons.

In order to provide a means of descent from the platform in situations in which it is not possible to lower the platform in the normal way, it has been proposed in U.K. Patent Specification No. 1, 248,611 to provide a ladder which extends downwardly along side and parallel with at least the uppermost boom from the platform or cage adjacent the end thereof, the ladder being extensible from the said position into contact with the ground or other convenient surface which provides a landing area.

In U.K. Patent No. 1,347,301, it has been proposed to provide on such apparatus at least one ladder which is hingedly connected along one of its side edges to a lower side edge of an associated boom for movement between an operative position wherein it extends outwardly from the boom and a stowed position wherein it is

juxtaposed with a side wall of the b

Where there are two or more
arises in descending from the platfo
difficult to transfer from the ladde
one boom to the ladder associated wi
solution to this problem is proposed
Specification No. 1,337,154 in which
that ladders are arranged on opposit
of a pair of adjacent booms and that
at the joint between the booms, the
between the two ladders so as to pro
able means for a person to pass from
other.

The provision of ladders alor
booms is cumbersome and it is not eas
ladder associated with the upper boom .

The present invention provides
which the upper boom has a ladder mean
tread, along its upper surface from a
adjacent end thereof. Furthermore it
provide a handrail that is permanentl
course, if it is preferred, the handr
connected to the upper boom in such a
down on top of the boom when it is no

In arrangements having a tele
ible upper boom, it is possible to pr

extension with ladder means, for example a tread, and to provide a handrail which extends from the platform and moves with the extendible boom sliding alongside the handrail provided on the main part of the upper boom during the retraction of the extensible portion.

It will be appreciated that the tread can be formed in the upper surface of the upper boom or be applied to the upper boom and its extensible portion. It could be in the form of rungs, as in a ladder, and the rungs of the portion corresponding to the extensible boom could form a ladder extension portion.

Embodiments of the invention will now be described by way of example, with reference to the accompanying drawings in which:-

Figure 1 is a perspective view of a two boom access apparatus mounted upon a turntable on a vehicle,

Figure 2 is a diagrammatic perspective view of a further embodiment,

Figure 3 is a diagrammatic side view of the further embodiment,

Figure 4 is a plan view of a part of the said further embodiment,

Figure 5 is a diagrammatic perspective view of a third embodiment,

Figure 6 is a diagrammatic side view of the arrangement shown in Figure 5,

Figures 7, 8 and 9 are plan views of a part of the arrangement shown in Figure 6,

Figures 10 and 11 are diagrammatic perspective views of a part of the arrangement shown in Figure 6,

Figure 12 is a diagrammatic perspective view of a fourth embodiment, and

Figures 13 and 14 are enlarged perspective views of a part of the arrangement shown in Figure 11.

Referring to Figure 1, there is shown a vehicle 1 having a turntable 2 which pivotally supports a first boom 3, the boom 3 being pivotally connected to a second boom 4. The boom 4 includes a telescopically extensible portion 5 and a cage 6 is pivotally attached to the free end of the portion 5. The platform 6 is maintained horizontal by a linkage arrangement (not shown) in a well known manner.

The boom 3 is raised about the pivot point 7 on the turntable 2 by means of a piston and cylinder arrangement 8 and the boom 4 is raised about the pivot point 9 by means of a piston and cylinder arrangement 11 coupled through a linkage 12.

The upper surface of the boom 4 is provided with treads 15 which can, for example, be formed in the upper surface of the boom during manufacture or are applied subsequently either as moulded rubber or plastics treads or as rungs of a ladder. Similar treads 16 are

also applied to or formed in the upper surface of the extensible boom portion 5.

Access from the platform 6 to the tread 16 is obtained via a gate 17, in the rails around the platform 6, and steps 18.

It will be noted that at the side of the upper surface of the boom 4 there is a handrail 19 and a similar handrail (not shown) is provided between the platform 6 and the handrail 19 in such a way that it slides along the handrail 19 during use and moves with the extension and retraction of the extensible boom 5.

It will be appreciated that either or both of these handrails can be adapted to fold down onto the treads 15, 16 during the transport of the apparatus by the vehicle.

Alongside the boom 3 there is a ladder 21 which can be folded down easily from the platform surrounding the turntable and be used to obtain access to and from the platform 13.

It is thus possible for a person using the platform 6 to pass from the platform down the treads 16 and 15 to the platform 13 and thence via the ladder 21 to the platform surrounding the turntable 2.

The treads on the upper boom are permanently in position and the handrails associated with these treads can also be left permanently in the erected position.

A much simpler and less cumbersome arrangement than any that has previously been proposed is thus provided.

It will be appreciated that variations and modifications can be made. For example, where the tread 15 is provided by a ladder either attached to or forming the upper face of the boom 4, effective tread 16 can be provided by an extension portion of the ladder which is attached to the platform 6. Furthermore, instead of the ladder 21 folding down from the travelling position against the side of the boom 5, the ladder 21 can be hinged near to the adjacent edge of the upper face of the boom 3 and be folded upwards into the operational position, a handrail (not shown) hinging upwards from the outer rail of the ladder in the working position and being folded flat against the ladder in the travelling position. The platform 13 is arranged at a slightly higher position from that shown in the drawing in this alternative arrangement.

Referring to Figures 2, 3 and 4, there is shown a vehicle 25, from which there extends a boom 26. The boom 26 is pivotally connected at 27 to an upper boom 28, which has an extensible portion 29 to the outer end of which there is attached a platform 30. Adjacent the pivot connection 27, there is a second platform 31. The platforms 30 and 31 are maintained horizontal during the operation of the apparatus by linkage mechanisms in a

well-known way. A ladder 32, or other form of access means, reaches from the platform 31 downwards for a part of the distance towards a landing area on the vehicle. A second ladder 33 extends downwards alongside the boom 26 for the remainder of the distance from the ladder 32 to the landing area. The ladder 32 is pivotally connected to the platform 31 and to the extent required it is telescopic or otherwise movable longitudinally. The ladder 33 is fixed relative to longitudinal movement, but it is hinged along its length so that it can be folded up against the side of the boom 26. Extending from the platform 31 is a first section 34 of a ladder 35 which extends along the upper face of the upper boom 28. A second section 36 of the ladder 35, which extends to the platform 30, is arranged to telescope with movement of the boom portion 34. The section 36 of the ladder is hinged at 37 and is able to move in accordance with the levelling movement of the platform 30.

It will thus be seen that access from the platform 30 can be obtained to the landing area via the ladder 35, the platform 31 and the ladders 32 and 33.

In a further embodiment to be described with reference to Figures 5-11, there is shown an upper boom 40, having an extensible boom portion 41, pivotally connected to a lower boom 42. A self-levelling platform 43 is arranged at the end of the boom portion 41 remote

from the pivot point between the two booms.

At the side of the lower boom 42 there are arranged ladders 44 and 45 extending from the pivot point between the booms to the landing area. The relation between the ladders 44 and 45 can be well seen in Figure 9, which is a plan view taken at B in Figure 6.

From the pivot point there extends alongside the boom 40 a ladder 46. The arrangement of these ladders is more clearly seen in Figure 7, which is a plan view taken at A in Figure 6.

A further ladder 47 extends from the platform 43 along the top of the boom portion 41 to the main portion of the upper boom 40. It will be seen that it is possible to transfer from the platform 43 to the ladder 47 and thence via the ladders 46, 45 and 44 to the landing area.

As in the previous embodiment, the ladder 44 is capable of being folded up against the side of the boom 42 by means of hinges as indicated at 48 in Figure 9.

In order to improve security, it is possible to provide handrails associated with the ladders and an end member at the lower end of any of the ladders.

Such an arrangement is shown with reference to Figures 6, 8, 10 and 11, by way of example. In Figures 6 and 8, which is a plan view taken at C in Figure 6,

there is shown a handrail 50 which is able to fold down along the length of the ladder 46 when not in use and to be raised and latched into position for use, the rail being pivoted at its joints with the supporting posts.

Figures 6, 10 and 11 show the application to the end of the ladder 47 of an end member 51 which has handrails and which is coupled to a handrail 52 so that as the member 51 is folded down from the position shown in Figure 10 to the position shown in Figure 11, the handrail 52 also folds down on to the ladder 47.

Referring to Figures 12-14, there is shown an embodiment having a lower boom 55 alongside which there is a ladder 56, an intermediate platform 57, an upper boom 58 having an extensible boom portion 59 and a platform 60 at the end of the extensible portion 59. On top of the boom portion 59 is a channel section member 61 having cut-outs 62 providing footholds. A similar channel-section member 63 having cut-outs 64 is arranged on the top of the boom 58 in such a way that it can easily be pivoted, as indicated at 65 from the position shown in Figure 13 to an operative position in which it is raised above the top surface of the boom 58 and thereby provides footholds in a simple way. It will be seen that access from the platform 60 can easily be made via the members 61, and 63, the platform 57 and the ladder 56 to the landing area.

It will be appreciated that features from one embodiment can be employed in another. For example, the embodiment of Figures 12-14 could be provided with handrails or the embodiment of Figures 5-11 could be provided with an intermediate landing platform at the region of the pivot between the booms.

It is also possible to employ variations. For example, instead of the handrail 52 being folded down through a plane on to the ladder means 47 when it is not in use, it could be hinged to fold down in an arc to rest on the ladder means 47. It will also be appreciated that the end member 51 could have either a solid or a wired base and be of sufficient strength to enable it to be used as a platform.

Claims:

1. Access apparatus including an upper boom (4), (5), a platform (6) attached to one end of the upper boom, a pivotal connection (9) between the upper boom (4) (5) and a second boom (3) to enable relative angular movement to take place between the booms in the vertical plane and first ladder means (21) extending from the region of the pivotal connection (9) to a landing area, the apparatus further including second ladder means (15) (16) extending along at least a part of the upper face of upper boom (4) (5) from the platform-adjacent end thereof.

2. Access apparatus as claimed in claim 1 wherein the upper boom is constituted by a boom portion (5) which is extensible relative to the main boom portion (4) and the second ladder means includes a first ladder section (16) which is movable longitudinally with the boom portion (5).

3. Access apparatus as claimed in claim 2 wherein the first ladder section (36) has a first part pivoted (37) about a second part.

4. Access apparatus as claimed in any one of the preceding claims having second ladder means (63) (64) and

means (65) to raise the second ladder means (63) (64) from the upper face of the upper boom (58) when in use.

5. Access apparatus as claimed in any one of the preceding claims including a handrail (52) pivotally attached to a ladder means 47 whereby the handrail (52) can be folded down through a plane on to the ladder means (47) when it is not in use and raised to a latched position for use.

6. Access apparatus as claimed in any one of the preceding claims including an end member (51) terminating a ladder means and pivotable from a position in which it lies on the ladder means when not in use to an upstanding position when in use.

7. Access apparatus as claimed in claims 6 and 7 including means coupling the end member (51) and the handrail (52) during movement between the in use position and the not in use position.

8. Access apparatus as claimed in any one of the preceding claims including a platform (13) in the region of the pivot between the upper boom (4) (5) and the second boom (3) to facilitate transfer between the first (21) and second (15) (16) ladder means.

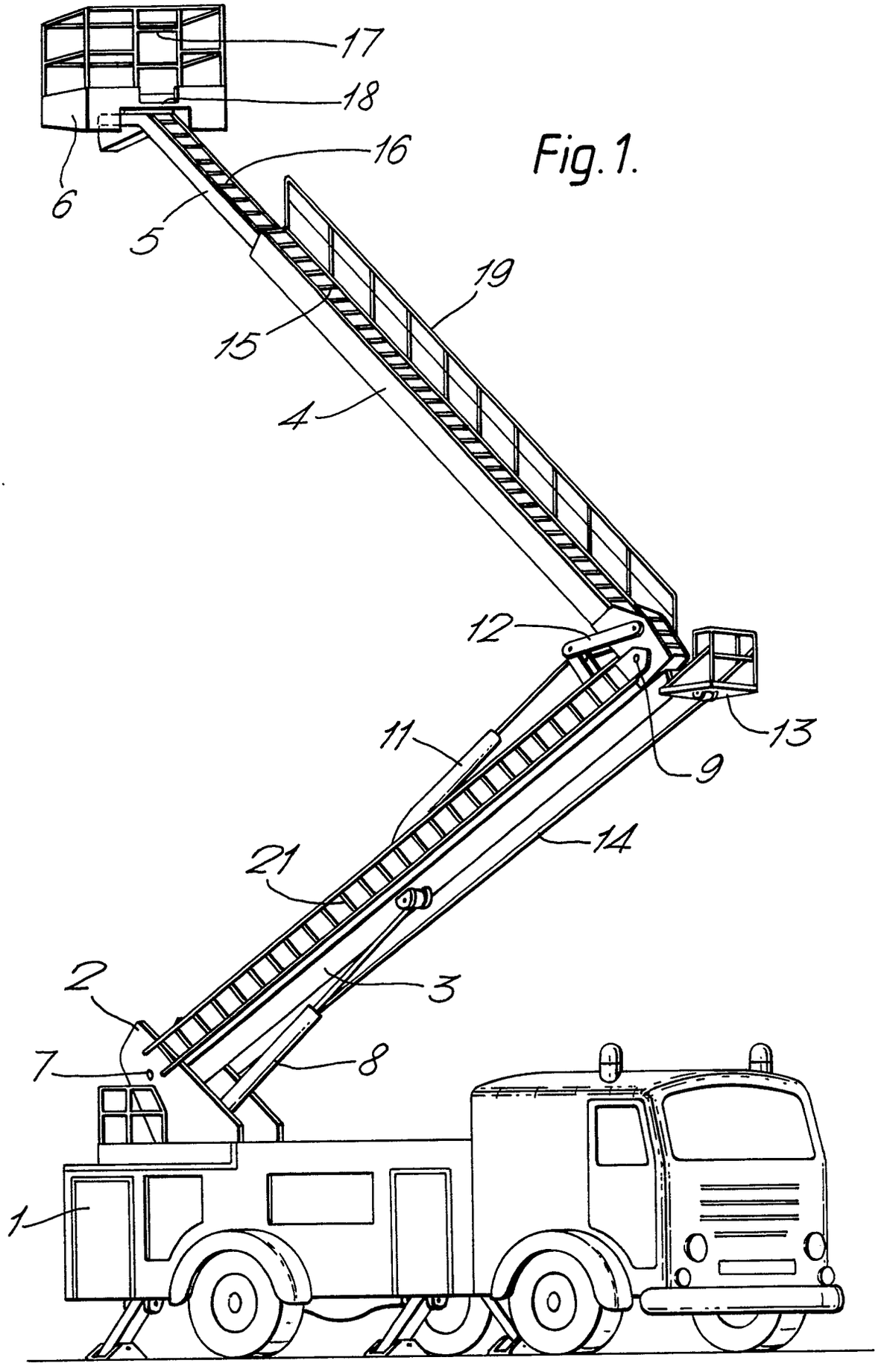


Fig. 1.

Fig. 2.

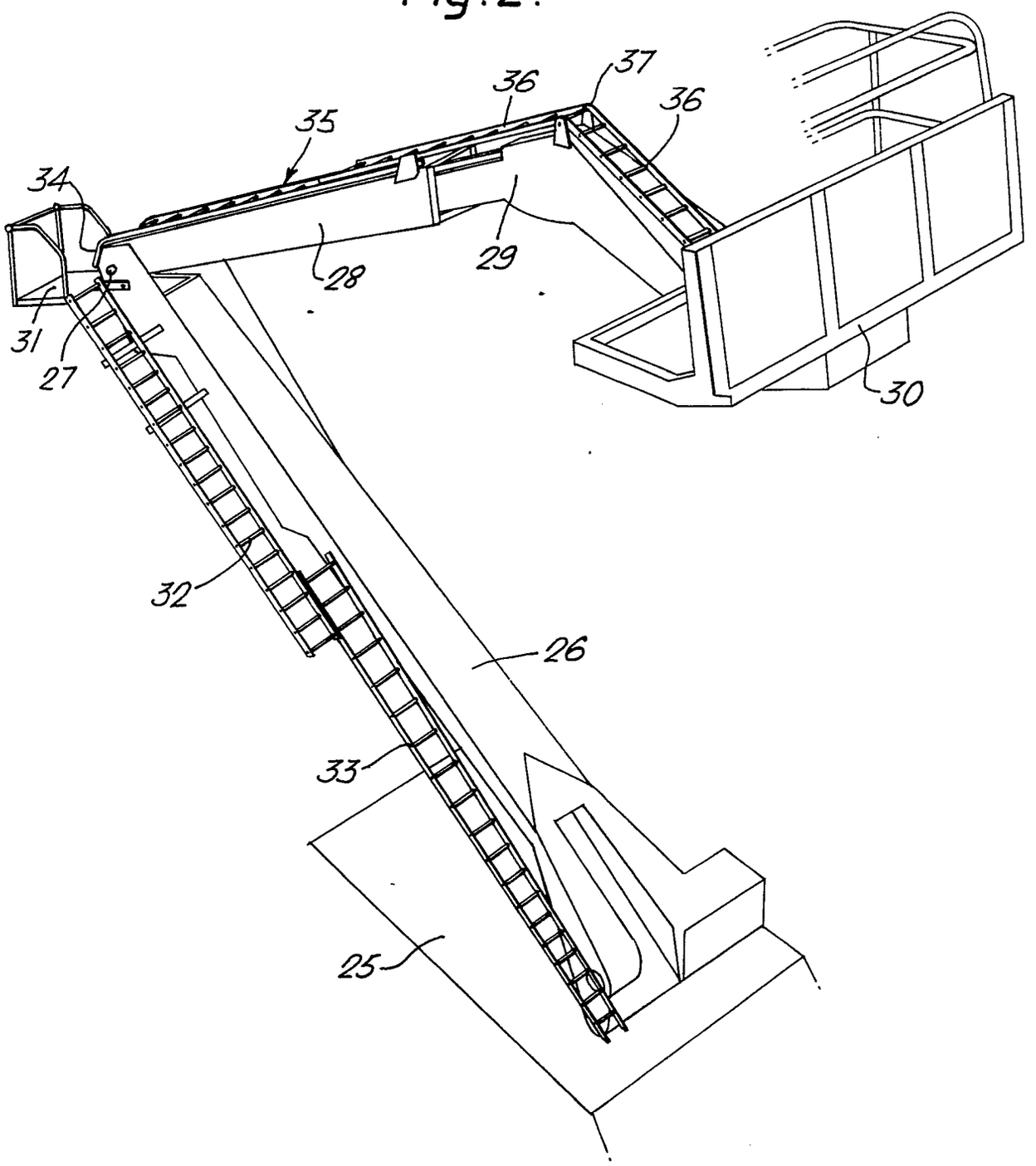


Fig.4.

Fig.3.

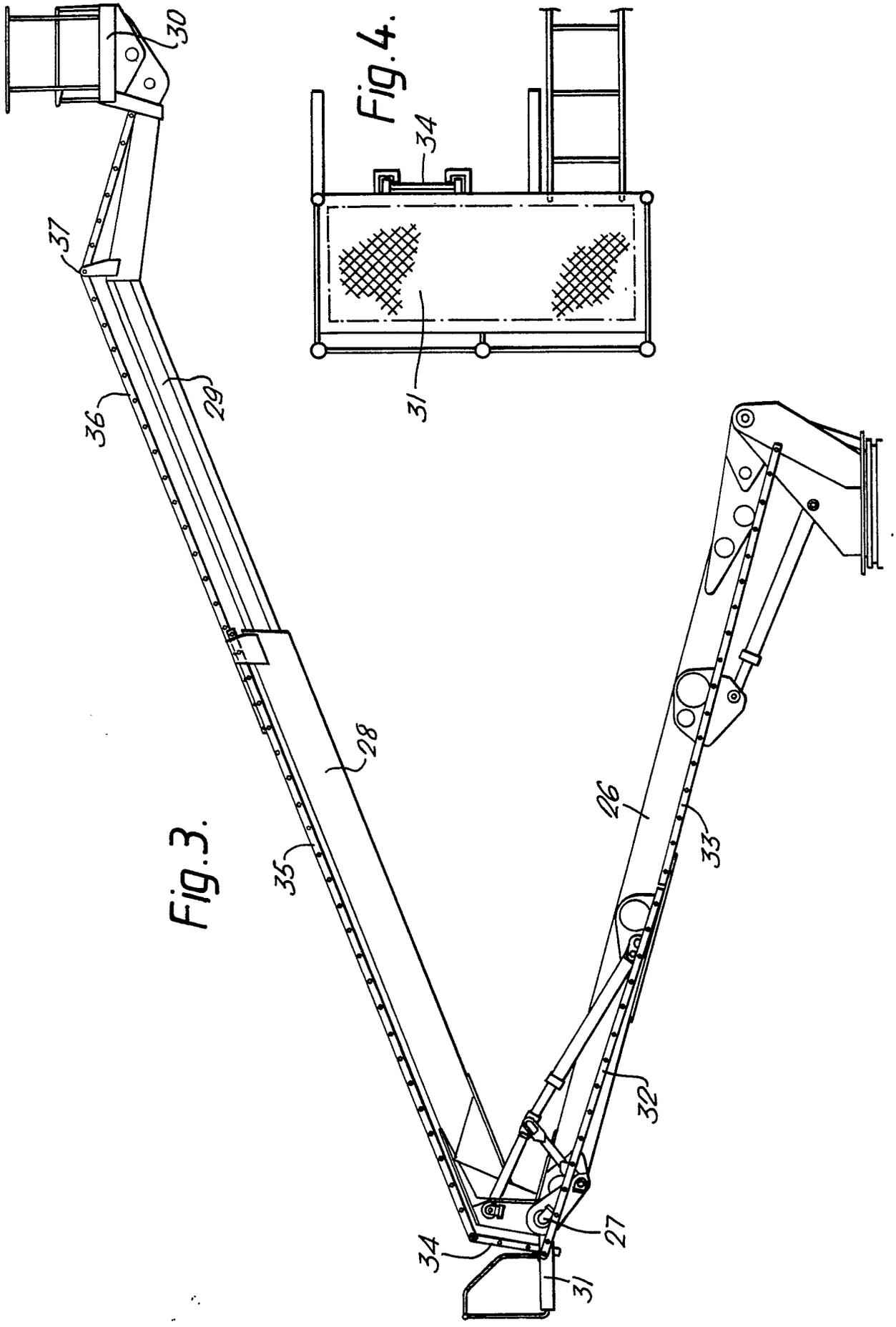
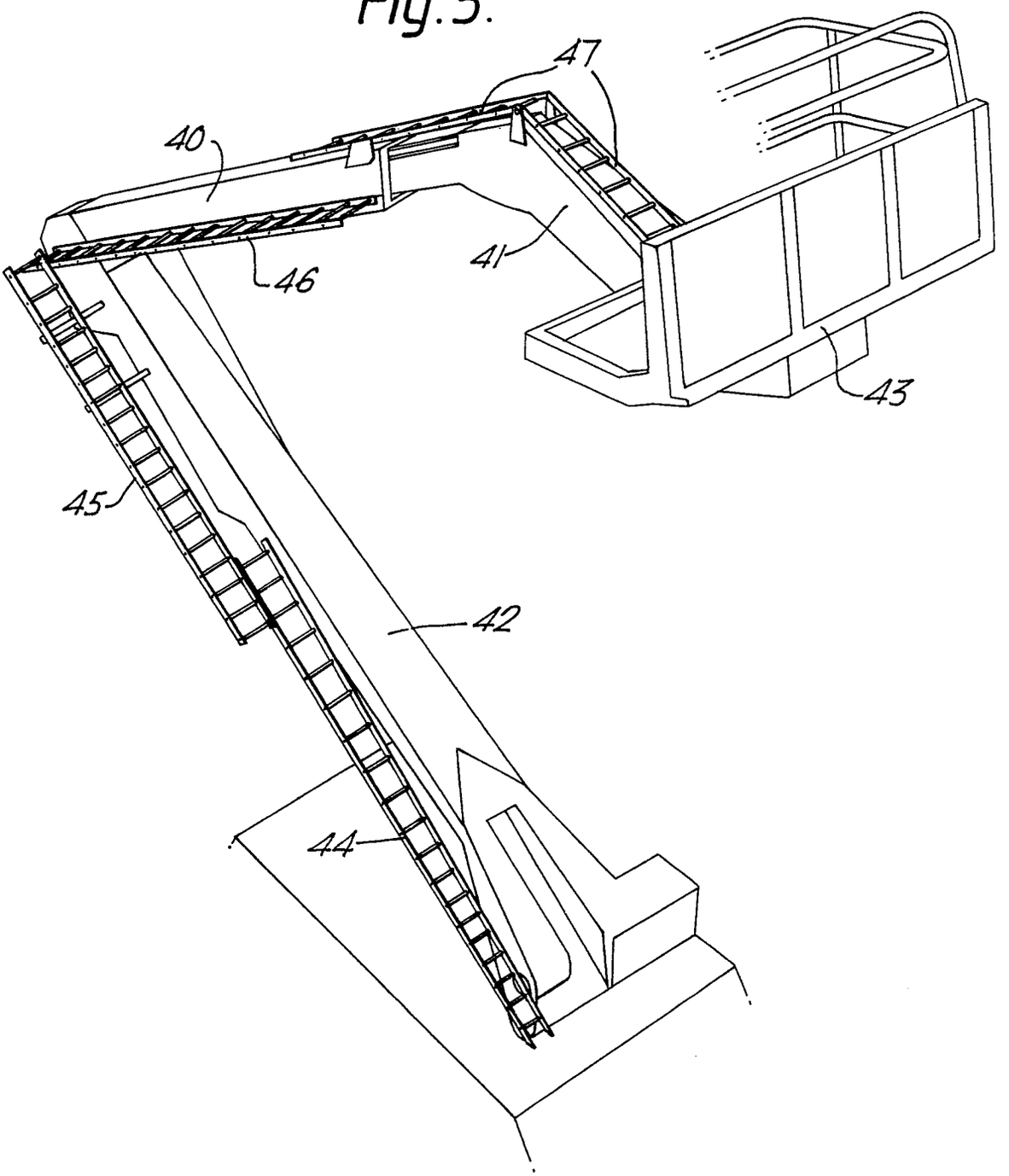


Fig.5.



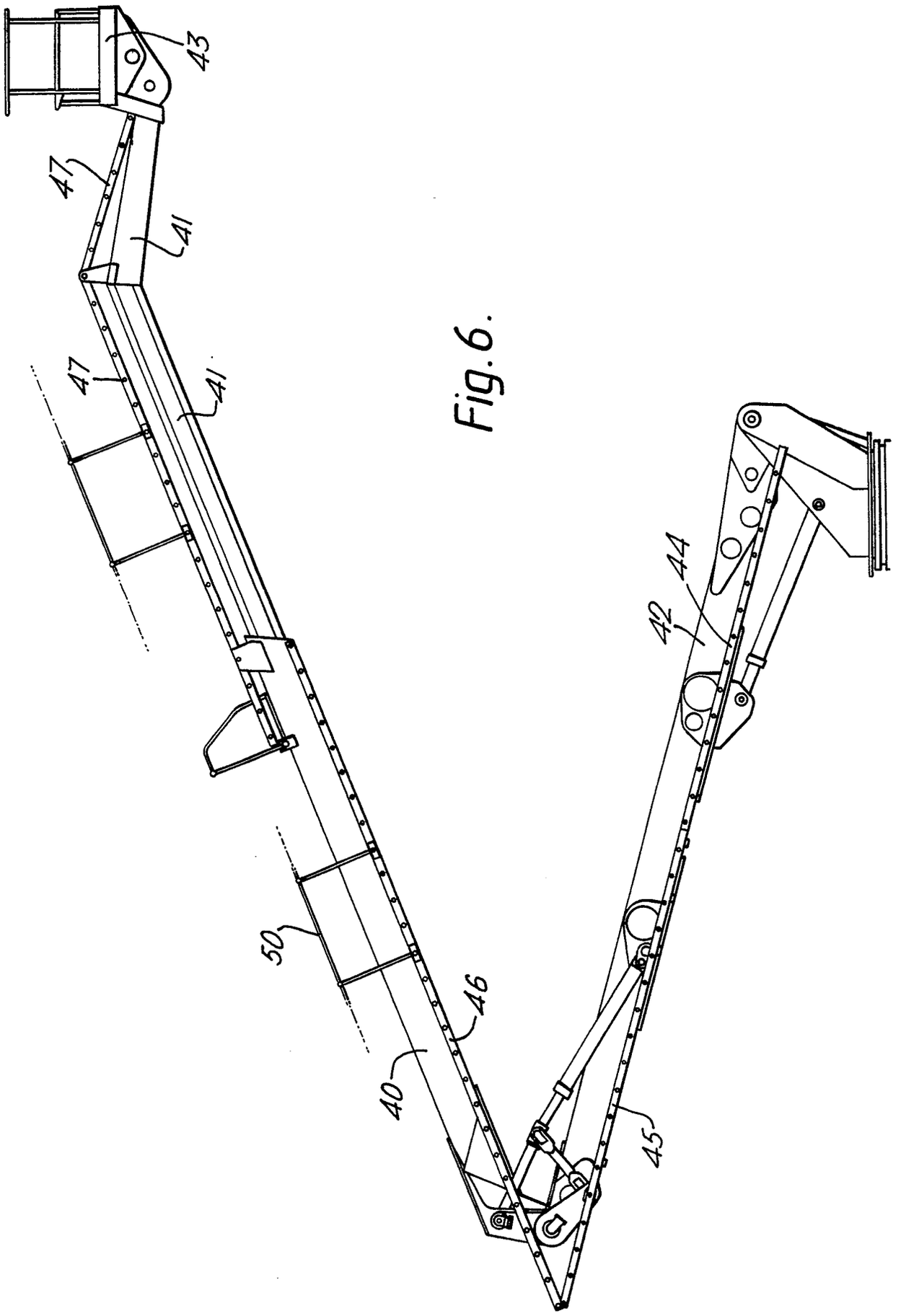
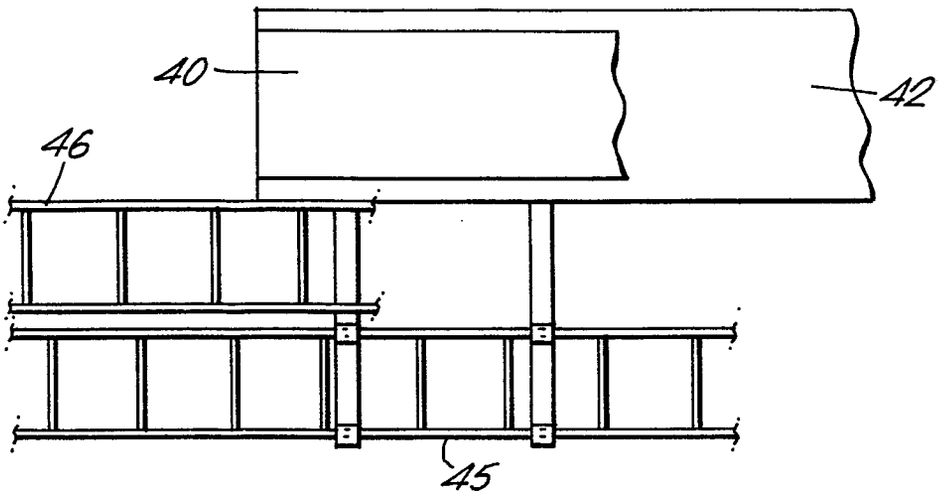


Fig. 6.

Fig. 7.



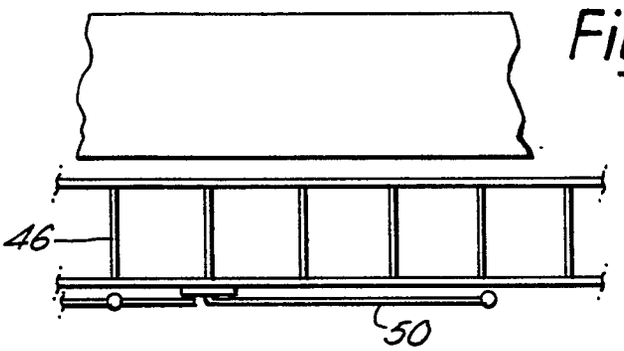


Fig. 8.

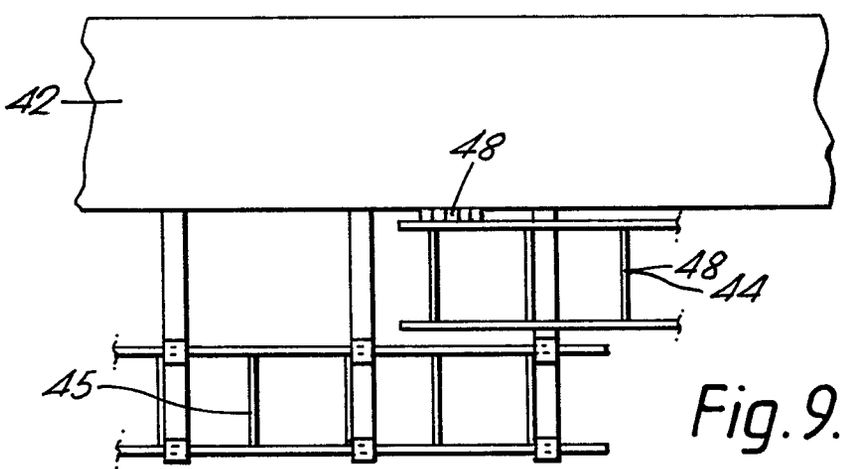
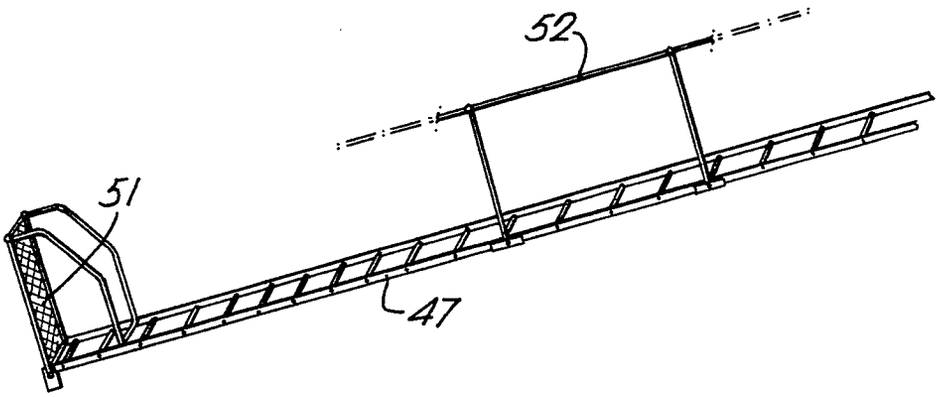


Fig. 9.

Fig.10.



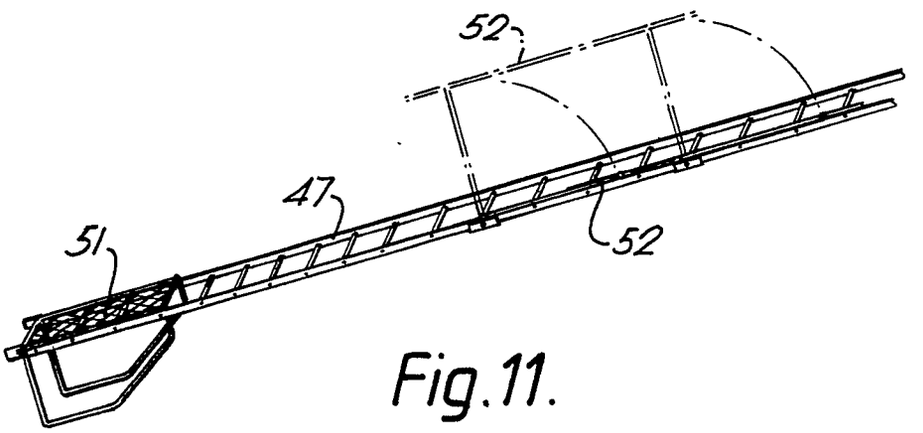


Fig.11.

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Fig.12.

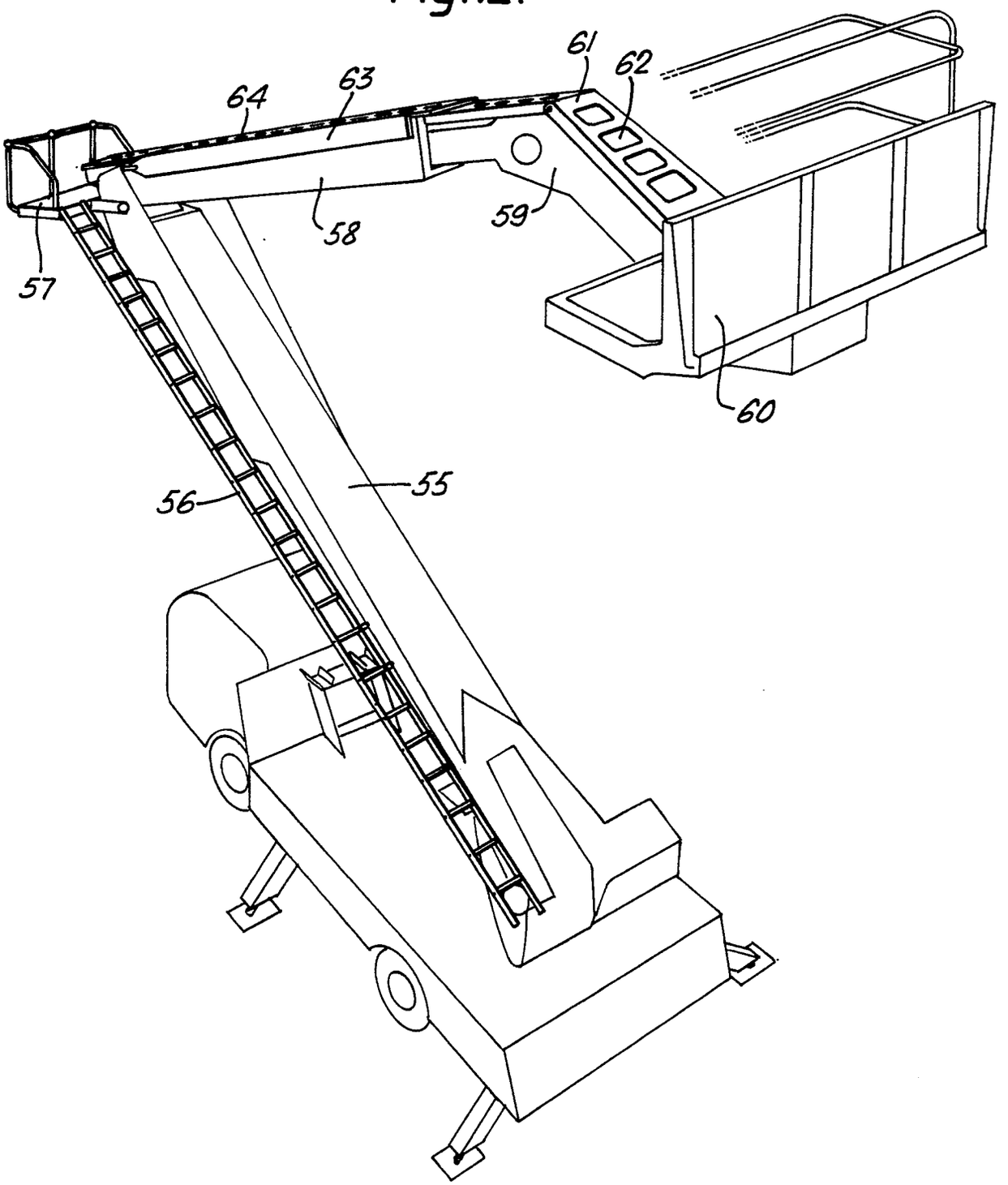

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Fig.13.

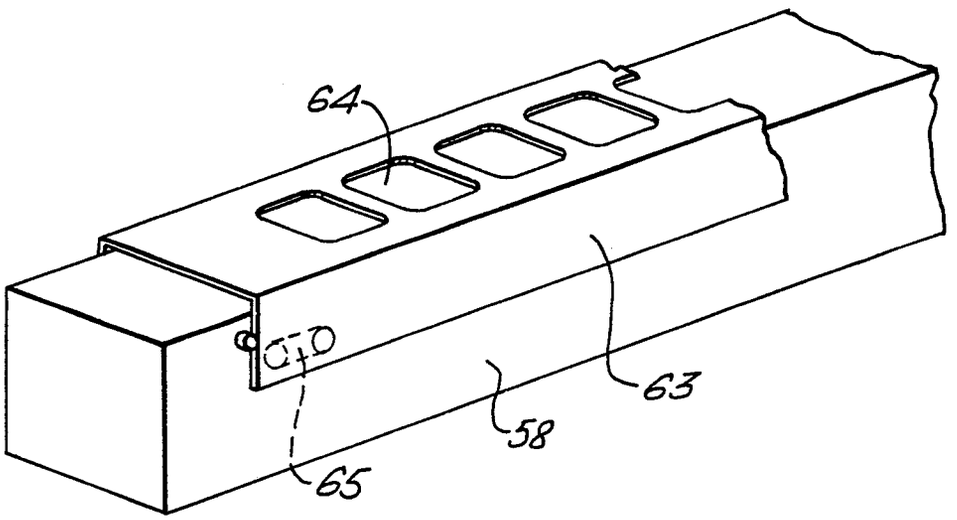
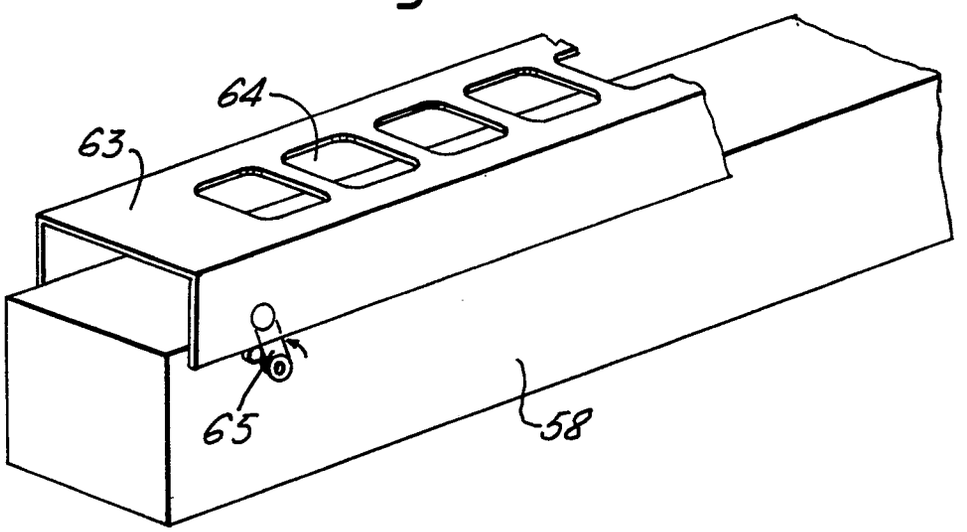


Fig.14.



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EUROPEAN SEARCH REPORT

0012602
Application number
EP 79 30 2869

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
X	DE - A - 2 239 868 (SIMON ENGINEERING) * Page 5, paragraph 2; page 6, paragraphs 2,3; page 7, paragraph 1 *	1,8
D	& GB - A - 1 337 154	
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X	FR - A - 2 235 261 (SIMON ENGINEERING) * Page 2, lines 12-39 *	1
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	US - A - 3 262 517 (MALEC) * Column 3, lines 24-69 *	1,2
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	US - A - 3 710 893 (HIPPACH) * Column 3, lines 1-31, 48-53; column 4, lines 1-15 *	1-3
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	US - A - 3 072 215 (RUSH) * Column 6, lines 2-32 *	5
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A	US - A - 3 610 367 (ATCHEY)	
A	US - A - 3 396 814 (GARNETT)	
A	US - A - 3 097 721 (THYM)	
A	FR - A - 2 379 693 (CAMIVA)	
A	US - A - 2 777 737 (BALOGH)	
A	US - A - 2 500 815 (GERLI)	

CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)

B 60 P 3/14
B 66 F 11/04

TECHNICAL FIELDS SEARCHED (Int.Cl. 3)

B 66 F
E 06 C
B 60 P

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20-03-1980	VAN DEN BERGHE

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