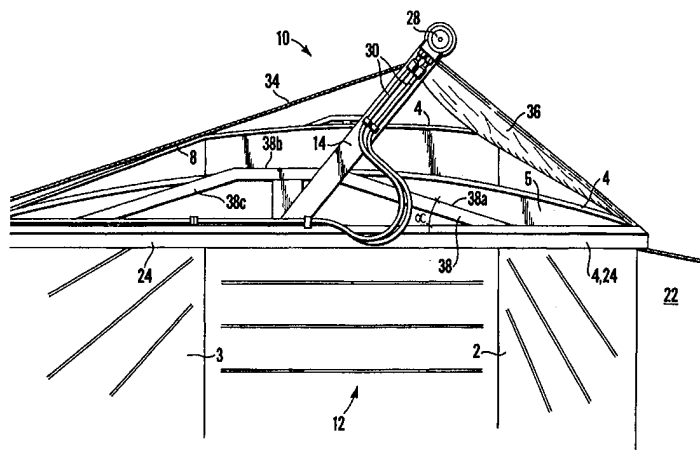




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/SE97/01974 (22) International Filing Date: 25 November 1997 (25.11.97) (30) Priority Data: 9604431-8 2 December 1996 (02.12.96) SE (71)(72) Applicants and Inventors: PETTERSSON, Magnus [SE/SE]; Frommesta 27, S-692 91 Kumla (SE). HANSSON, Stefan [SE/SE]; Frommesta 26, S-692 91 Kumla (SE). (74) Agent: HYNELL, Magnus; Hynell Patenttjänst AB, Patron Carls väg 2, S-683 40 Hagfors/Uddeholm (SE).</p>	<p>(81) Designated States: AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GE, GH, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i> <i>In English translation (filed in Swedish).</i></p>	

(54) Title: DEVICE FOR COVERING CARGO SPACES



(57) Abstract

The invention consists of a device (10) for covering a cargo space (12), referred to below as a container, with a cover which is to cover an upper opening of the container. The device consists of two lifting arms (14) of variable length, one end of each lifting arm being fixed pivotally by a turning link (6) to the upper part (4) of two first opposing limiting surfaces (1) of the container; a boom (26) between the lifting arms, affixed rotatably to the other end of the lifting arms; said cover (36) which has one edge fastened to the boom and an opposing edge fastened to the upper part of one of two second opposing limiting surfaces (2, 3); a first control device (20) on each of the lifting arms disposed to be able to interact with a second control device at a level above the respective turning link (6); and a driving means (28) for unrolling the cover, the lifting arms being lifted during rotation with the assistance of said first and second control devices and the boom with the cover thereby also being lifted in order to be lowered towards the upper part of the second (3) of said two second (2, 3) opposing limiting surfaces, which movement is repeated in a reverse movement when said driving means operates with the boom rotating in the opposite direction and the cover is rolled up on the boom.

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DEVICE FOR COVERING CARGO SPACES

TECHNICAL FIELD

- 5 The present invention relates to a device for covering a cargo space, referred to below as a container, with a cover which is to cover a top opening of the container.

BACKGROUND TO THE INVENTION

- There has long been a requirement for covering receptacles which are open upwards,
10 such as containers, lorry platforms and the like. The reason for having an open receptacle in many cases is that such a receptacle is much easier to load, but during transportation it is then often a disadvantage that the container is open. On the one hand it may rain or snow on the load, while on the other the load may blow off due to the wind when at speed. Many variations of covering have been developed, everything from
15 tarpaulins or the like, which are fastened by rubber straps, to motor- or hydraulically driven devices which unroll a cover over the container. For certain types of container the simpler variant is acceptable, but for containers intended for example for chippings and other loose goods, where the upper edge is often four metres from the ground, it is completely unmanageable and also dangerous for the driver to try and cover the
20 container by hand.

- One example of hydraulically driven devices for covering is shown in the document SE 404 915. The device in the document comprises two lifting arms arranged pivotally on two opposing side walls of a container. Running between the lifting arms is an axle on
25 which a cover is rolled up. Two pulling belts are also coiled up to the axle. The lifting arms are made to turn by means of hydraulic cylinders, one for each lifting arm, affixed to the side walls. When the hydraulic cylinders are activated, the lifting arms make a circular movement over the container and the cover is unrolled at the same time as the pulling belts are reeled in and vice versa. The device described has several
30 disadvantages. The arrangement with hydraulic cylinders affixed to the side walls means that these are impossible to open, for example for tipping the goods. In addition, two cylinders are required, one for each lifting arm, for the device to function. This results in a relatively complicated and heavy device with double the hydraulic connections. This also leads to a risk of pulling the device askew if one of the lifting arms is prevented from
35 moving, for example by an object in the load. The other lifting arm, however, continues to be operated and pulls the axle and arms askew. The device may also get stuck if the load is higher than the highest level at which the lifting arms can position the axle, for

example if very large amounts have been loaded, resulting in the axle being pushed into the material and the device coming to a stop, or in the worst case breaking.

DESCRIPTION OF THE INVENTION

5 The object of the present invention is to remedy the aforementioned problems and provide a device for non-manual covering of a container.

This can be achieved according to a first aspect by the fact that this is characterized by what is stated in the characterizing part of the following patent claim 1. Further aspects
10 and advantages of the invention are evident from the dependent claims and from the detailed description of a preferred embodiment.

BRIEF DESCRIPTION OF DRAWINGS

In the following description of a preferred embodiment, reference will be made to the
15 enclosed drawings, of which

Fig. 1 shows a view in perspective of the device mounted on an elongated container with open end doors,

Fig. 2 shows a view obliquely from the side of a part of the device according to Fig. 1
20 and

Fig. 3 shows the movement pattern diagrammatically for a lifting arm forming part of the device and how this is changed in length during covering of the container.

DESCRIPTION OF A PREFERRED EMBODIMENT

25 The device which is shown in the drawings has the general reference number 10. It is intended to be fixed to a cargo space 12, henceforth referred to as a container, which is formed by two first opposing lateral limiting surfaces 1 and 22, which form the front end and consist of a pair of rear opening doors respectively, a pair of second opposing lateral limiting surfaces 2, 3, which form the long sides of the container, and a bottom, which is
30 not shown. A frame 4 running round on all sides is arranged in the upper part of the container and follows the upper edges of the container 12 and defines the opening 5 which is to be covered by the cover, which can consist of a covering canvas, net or similar. Included in the definition cargo space are both containers for loose goods, such as chippings, shavings, ash and the like, in particular vehicular containers for loose
35 goods, and more conventional platform bodies and the like.

The device comprises two arms 14, referred to below as lifting arms, one end of which is affixed by turning links 6, Fig. 2 and Fig. 3, pivotally to the upper part of the two first opposing lateral limiting surfaces 1, 22, more precisely to a horizontal cross-beam 24 which is included as a part of the said frame 4 and forms the upper edge at the front and rear ends. The lifting arms are formed so that they can be varied in length, in the embodiment shown as a telescopic arm with an inner beam 16, which is affixed pivotally by the turning link 6 to the container, and an outer extension beam 18, Fig. 2. A little way from the turning link 6 of the lifting arm is a first control device 20 in the form of a control shoulder or control pin attached to the outer extension beam 18 at right angles to the longitudinal direction of the lifting arm 14.

In the embodiment shown, the container is intended for loose goods for carriage by lorry and is openable via the doors 22 in the rear end of the container for tipping goods. For this the horizontal cross-beam 24 is fixed to the upper edge at the rear end, in which case the cross-beam 24, in addition to carrying the lifting arm 14, can also be provided with an element for locking the doors 22 in the closed position.

Arranged closely adjacent to the lifting arms 14 is a second control device 38. This has the form of a guide rail, referred to below as a ramp, mounted on a second transverse beam 7 a little way inside the frame 4, parallel to the rear transverse beam 24. More precisely, the guide rail/ramp 38 is mounted in a curve symmetrically over the turning link 6 and a somewhat ahead of this. The ramp 38 begins a way in from the longitudinal side walls 2, 3 of the container and extends at first as a first inclined plane 38a at a certain angle α in relation to the cross-beam 7. The ramp then changes to a horizontal part 38b, to be completed by a downward part 38c in the form of second inclined plane of an equally great but opposing inclination to the first part 38a. The beam 7, ramp 38 and lifting arm 14 are arranged in such a manner in relation to one another that the first control device/control pin 20 is in contact with the beam and ramp during a part of the covering movement, which will be described in greater detail below.

A boom 26 is arranged rotatably between the free ends of the extension parts 18 of the lifting arms 14 parallel to the long sides 2, 3. Assigned to the boom 26 is a driving means 28, in the embodiment shown a hydraulic motor on the extension part 18 of the rear lifting arm and connected via conduits 30 to a suitable hydraulic pump, which is not shown. Line drums 32 are arranged fixedly at both ends of the boom. The line drums 32 have on the whole/substantially the same circumference as the boom 26. Steel lines 34 are arranged between the line drums 32 and the corner 8 with the long side of the frame

4 which forms the upper part for the long side 3. The lines 34 are suitably attached to the container 12 via some elastic means such as rubber straps, springs or similar to reduce variations in the tension of the lines. Other pulling devices capable of winding on the drums 32 are also conceivable instead of steel lines, for example very strong belts,
5 cables, chains etc.

A cover 36 in the form of a covering canvas, net or similar, henceforth referred to as covering canvas, is arranged between the container 12 and the boom 26. More precisely, the covering canvas 36 is fastened with one long side on the container's first long side 2,
10 more specifically on the frame 4 in the upper part of the long side 2, while the other long side of the covering canvas 36, i.e. the opposing longitudinal edge, is fastened on the boom 26. The covering canvas 36 is suitably attached to the container via elastic fixing devices.

15 The device functions as follows, reference being made to Fig. 3 in which the movement pattern of the lifting arms and the position of the control pin 20 and the boom 26 during the movement are shown diagrammatically. When the container is open upwards, the covering canvas 36 is rolled up on the boom 26, the lines 34 are maximally uncoiled and the lifting arms 14 like the lines 34 are aligned essentially parallel to the upper edge of
20 the container, which is defined by the frame 4. The control pins 20 rest on the respective beam 7, and the lifting arms are nearly horizontal and parallel to the beam 7. The positions of the control pin and boom when the covering canvas is completely rolled up on the boom have been marked by 20° and 26° in Fig. 3.

25 When the container 12 is to be covered, the hydraulic motor 28 is activated, which begins to rotate, so that the boom 26, which is connected to the motor, rotates in an anti-clockwise direction with reference to Fig. 1. The lines 34 then start to be coiled on the line drums 32 at the same time as the covering canvas 36 is unrolled. Coiling of the lines 34 on the line drums leads to the lines pulling in the telescopic lifting arms 14, which in
30 the initial phase are shortened without being turned substantially in the turning link 6, due to the fact that the outer extension beam, with the control pins 20 sliding on the beam 7, is pulled inwards over the inner beam 16 in the direction of the turning link 6, on account of the fact that the lines in this phase run essentially parallel to the lifting arms, part I in Fig. 3. The positions of the control pins and the boom following this initial
35 movement have been designated $20'$ and $26'$ in Fig. 3.

Once the shortening of the lifting arms has thus been accomplished, the control pin 20 arranged on the outer extension beam 18 comes into contact with the first inclined part 38a of the ramp 38. During continued contraction of the telescopic arms 14, the respective control pin 20 will slide on the first inclined part 38a of the guide rail/ramp, part II in Fig. 3, due to which the lifting arm is raised up under the joint influence of the lines 34, the first inclined part 38a of the ramp and the control pin 20 in the course of rotation of the lifting arms in the turning link 6. When the telescopic lifting arm has been contracted as far as it will go, which occurs a short way before the transition between the first inclined part 38a of the ramp and the horizontal part 38b, the lifting arms 14 have been rotated to such a large angle of inclination relative to the horizontal plane that the continued rotation of the hydraulic arms can take place entirely through the pull in the lines 34 when these are coiled on the line drums 32 through rotation of the boom 26 and the line drums 32 by means of the motor 28. The control pin 20 hereby loses contact with the ramp. This position has been designated 20'', 26'' in Fig. 3.

The lifting arm 14 thereafter continues its turning movement, the control pin 20 and boom 26 moving in an arc III in Fig. 3, until its control pin comes into contact with the other inclined part 38c of the ramp, position 20''', or 26''' for the boom. During the concluding movement, part IV and V in Fig. 3, the lifting arm is extended due to the fact that the lines pull out the extension beams 18 at the same time as the control pin 20 slides against the sloping plane 38c and in the final phase against the beam 7, until the boom 26 has come out to the frame 4 over the long side 3, when the hydraulic motor 28 is stopped. The position of the control pin when it meets the ramp again following its free circular movement has been designated 20'''' and when it leaves the ramp has been designated 20^{IV} in Fig. 3, and the final position has been designated 20^V. Corresponding positions for the boom have been designated 26''', 26^{IV} and 26^V. As is evident from Fig. 3, the movement pattern is symmetrical with the movement pattern during the lifting beam's upward movement.

The covering canvas 36 is rolled up on the boom 26 in an analogous manner to unrolling, the hydraulic motor 28 being rotated in the opposite direction, at which the covering canvas 36 functions as the pulling device instead of the lines 34.

The advantages of the present invention are many. Thanks to the telescopic design of the lifting arms 14 and due to the arrangement of the interacting control devices, i.e. the control pin 20 and ramp 38 and to a certain extent also the beam 7, the device 10 as a whole, and above all the turning link 6 of the lifting arms, can be confined to the upper

part of the container and do not need to encroach on the lateral surfaces of the container, which also means inter alia that the part of the device 10 which is located in the area in front of the rear part of the container can in all respects be arranged above the doors 22. For this to be able to be achieved it is essential that the control pin 20 and the ramp 38, and in part also the beam 7, through interaction with the pulling devices, i.e. the motor 28 and lines 34 on unrolling or the covering canvas 36 on rolling up, provide initiation of the angle of inclination α , which is required for the arm to be able to be turned. If the angle of inclination α is not sufficiently large, very great forces are required in the motor to be capable of lifting the arm. It would otherwise be necessary as in said SE 404 915 to move the turning point of the lifting arms down and/or move up the point of action of the turning means to bring about rotation of the arms. The telescopic function results in further advantages. If the load has a height which exceeds the highest point of the boom during rotation, the boom will come into contact with the load and will "climb" on the load during rotation while the arms are being extended, in contrast to conventional devices with fixed arms. In addition, driving of the boom and not the lifting arms means that a more controlled movement is obtained, at the same time as pulling askew of the device is avoided if a lifting arm is obstructed.

It is to be understood that the invention is not restricted to the embodiment described above and shown in the drawings, but can be modified within the context of the following claims. Thus the driving can also be effected for example by an electric motor. Nor is the device limited to containers which open backwards, but can be adapted to a large number of different containers which are open upwards.

CLAIMS

1. Device (10) for covering a cargo space (12), referred to below as a container, with a cover which is to cover an upper opening of the container, characterized by two lifting arms (14) of variable length, one end of each lifting arm being fixed pivotally by a turning link (6) to the upper part (4) of two first opposing limiting surfaces (1) of the container; a boom (26) between the lifting arms, affixed rotatably to the other end of the lifting arms; said cover (36) which has one edge fastened on the boom and an opposing edge fastened on the upper part of one of two second opposing limiting surfaces (2, 3); a first control device (20) on each of the lifting arms disposed to be able to interact with a second control device at a level above the respective turning link (6); and a driving means (28) for unrolling the cover, the lifting arms being lifted during rotation with the assistance of said first and second control device and the boom with the cover thereby also being lifted in order to be lowered towards the upper part of the second (3) of said two second (2, 3) opposing limiting surfaces, which movement is repeated in a reverse movement when said driving means operates with the boom rotating in the opposite direction and the cover is rolled up on the boom.
2. Device according to claim 1, characterized in that the lifting arms comprise an outer extension part (18) and that said first control device (20) is arranged on the outer extension part.
3. Device according to claim 1 or 2, characterized in that said second control device, which comprises a guide rail (38), is mounted in a curve on a level above the turning link (6).
4. Device according to any of claims 1-3, characterized in that the turning links are mounted in the centre of the upper part of said first limiting surfaces and that said second control device is arranged symmetrically above the level of the turning links.
5. Device according to any of claims 1-4, characterized in that the lifting arms are disposed to be turned almost 180°.
6. Device according to any of claims 1-5, characterized in that the boom is disposed to be rotated by a motor.
7. Device according to any of claims 1-6, characterized in that the boom also has a winding drum at each end with generally the same circumference on the whole as the

boom, which facilitates uncoiling and coiling of a windable pulling device (34) running along each of said first limiting surfaces, which pulling devices extend towards the limiting surface which is opposite, i.e. runs parallel to the limiting surface in which one edge of the cover is fastened, in such a manner that the cover is unrolled at essentially the same speed as said windable pulling devices are coiled on the boom.

8. Device according to claim 7, characterized in that said windable pulling devices are formed by lines (34).

9. Device according to any of claims 1-8, characterized in that the lifting arms consist of telescopically extensible arms, and that said first control device (20) is arranged on an outer extension part (18) of the telescopic lifting arm.

10. Device according to any of claims 1-9, characterized in that the container (12) is elongated, said first opposing limiting surfaces (1) being formed by the container's ends or short sides and said second opposing limiting surfaces being formed by the container's long sides.

11. Device according to any of the preceding claims, characterized in that the upper part of the container consists of a frame (4), which follows the upper edge of the container which is to be capable of being covered by the cover rolled up on the boom.

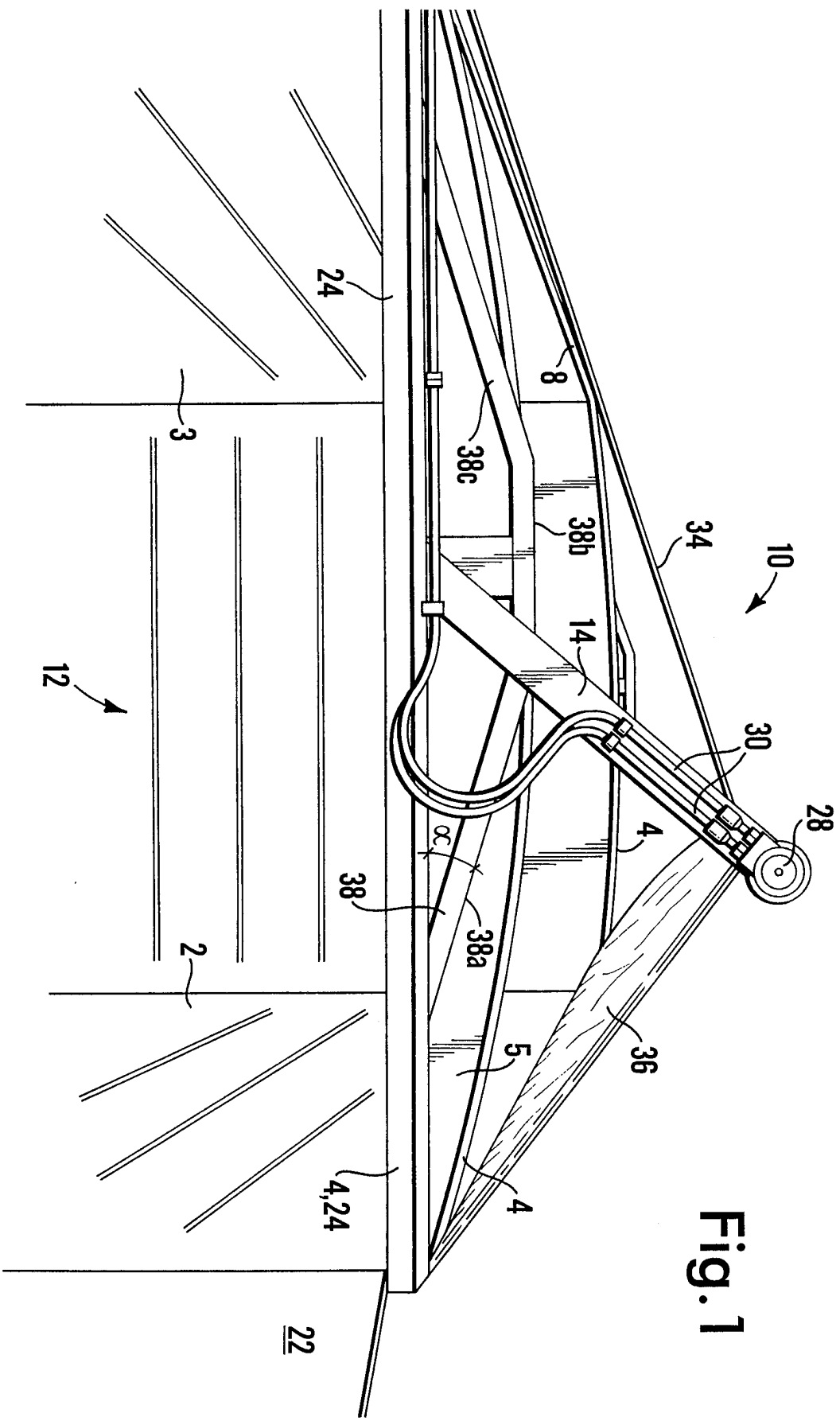
12. Device according to claim 11, characterized in that said coilable pulling devices are fastened at the corner (8) with the long side of the frame (4) which runs parallel to the opposing long side (2) in which one edge of the covering cover is fixed.

13. Device according to any of the preceding claims, characterized in that said first and second control devices are disposed to initiate lifting of the lifting arms at the beginning of the opening/closing movement, i.e. rolling and unrolling of the cover on/off the boom.

14. Device according to any of the preceding claims, characterized in that the motor is arranged on the extension part of one lifting arm and linked to the boom.

15. Device according to any of the preceding claims, characterized in that said first and second control devices are arranged such relative to one another that they come into contact with one another during at least an initial phase of the lifting and turning movement of the lifting arms.

Fig. 1



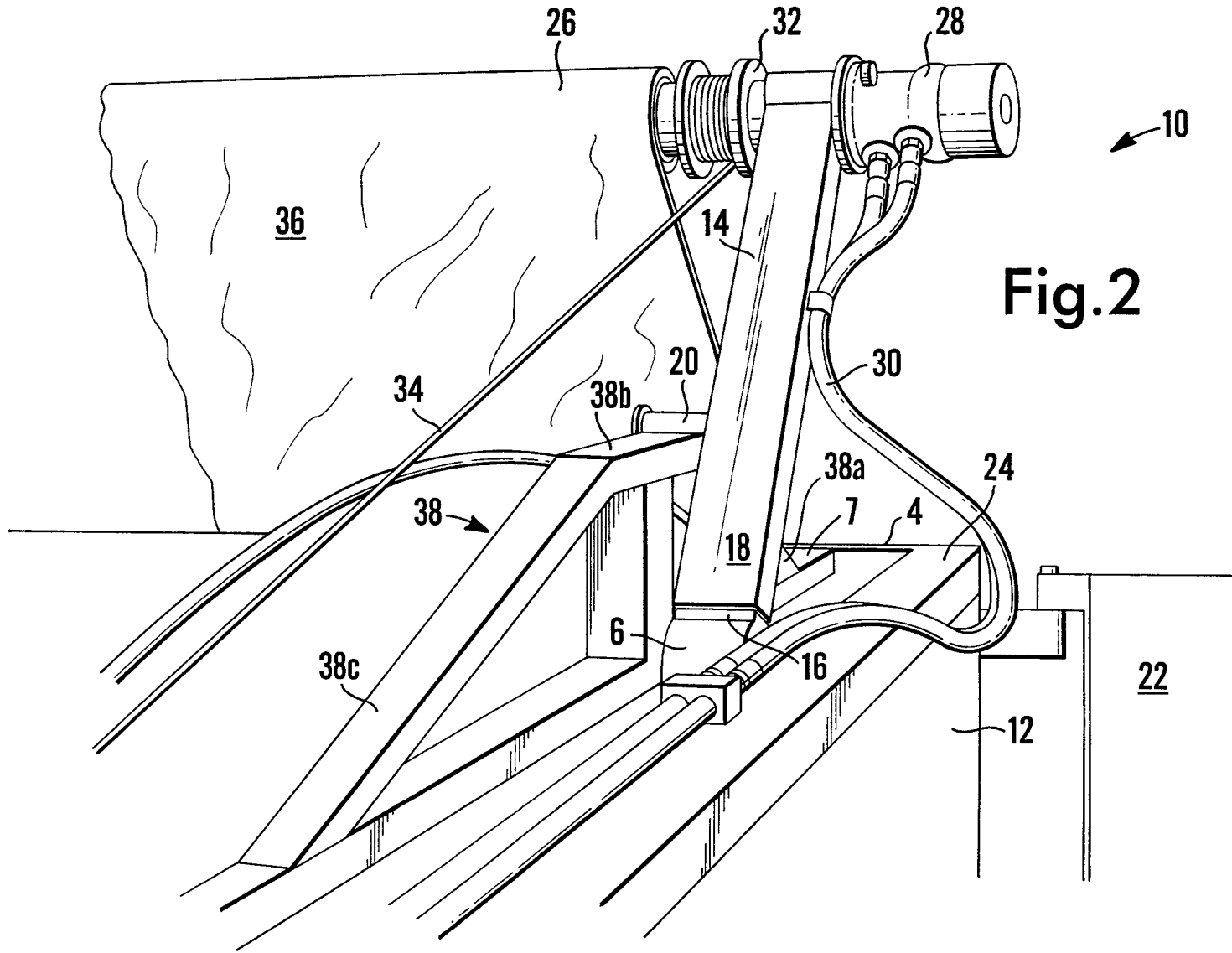
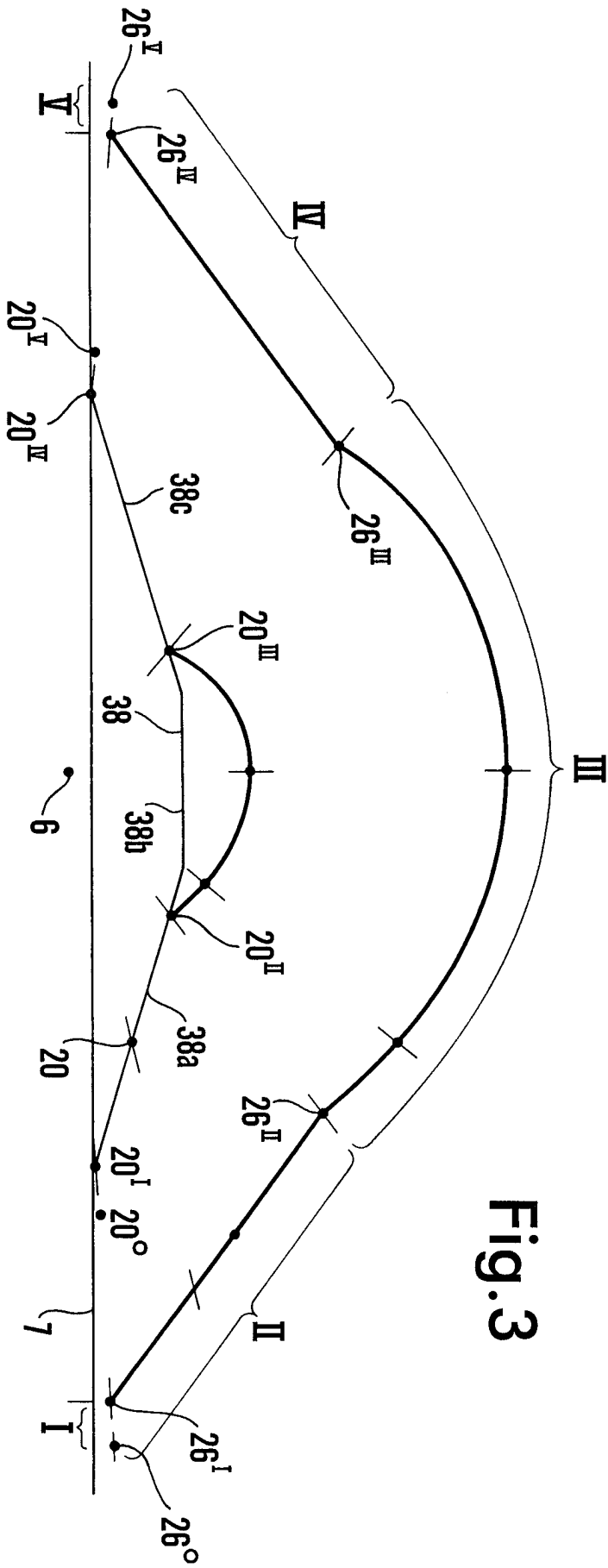


Fig. 2

Fig. 3



INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 97/01974

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B60P 7/04, B60J 7/06, B61D 39/00
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B60P, B61D, B60J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5002328 A (MICHEL), 26 March 1991 (26.03.91), column 2, line 51 - column 3, line 50, figure 2, abstract --	1-12, 14
A	US 4030780 A (PETRETTI), 21 June 1977 (21.06.77) --	1
A	SE 404915 B (S FREDIN), 6 November 1978 (06.11.78), abstract --	1
A	AU 3218193 B (BERND OSTERMEYER), 5 August 1993 (05.08.93) -- -----	1

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Date of the actual completion of the international search

18 February 1998

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INTERNATIONAL SEARCH REPORT

Information on patent family members

03/02/98

International application No.

PCT/SE 97/01974

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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