Abstract: The invention concerns a system for rescuing occupants (10) from an elevated position in a structure (4), such as a high-rise building, and it characterized in that the system comprises position indicators (15, 15') for two lower anchor points (6, 7) arranged at a base level, said lower anchor points (6, 7) being positioned at a distance (D1) from each other, and two cable sections (3a, 3b) having their upper ends secured at an upper anchor point (8) positioned onto the structure (4) at an elevated position, said cable sections (3a, 3b) having a sufficient length to reach down to the position indicators (15, 15') for the lower anchor points (6, 7). The invention also concerns a method for rescuing occupants (10) from an elevated position in a structure (4), such as a high-rise building.
TITLE

System and method for rescuing occupants from an elevated position.

TECHNICAL FIELD

The invention concerns a system and method for rescuing occupants from an elevated position in a structure, such as a high-rise building.

BACKGROUND ART

The problem of rescuing trapped people from high-rise buildings in case of fire, explosions, etc. is well known. Fire fighting ladders normally reach up to around 50-70 meters and can be used in an efficient way if the building is not too high. In the absence of such high ladders, or if the building is higher, it is more difficult to rescue people. One option is to use helicopters but this is usually very risky if fire and smoke are present. Various alternative systems and methods, such as those disclosed in US6793038, US6895716, US2004/0060772 and WO03/037435, have been proposed in the past. Many of these systems/methods are ingenious but involve relatively complicated equipment and/or rely on energy sources that may not be available in an emergency situation. Other problems associated with many of these alternative systems/methods are that they are sensitive to fire, that they do not provide a sufficient evacuation rate and/or that they do not allow for access of rescuing personnel to assist in the evacuation. There is thus a need for improvements in the field of rescuing trapped people from high-rise buildings.

DISCLOSURE OF INVENTION

An object of this invention is to provide a system and a method for rescuing occupants from an elevated position that allow for a more rapid evacuation and that are more simple and reliable compared to conventional systems and methods. This object is achieved by the technical features contained in
claims 1 and 19, respectively. The dependent claims contain advantageous embodiments, further developments and variants of the invention.

The invention concerns a system for rescuing occupants from an elevated position in a structure, such as a high-rise building, and it is characterized in that the system comprises position indicators for two lower anchor points arranged at a base level, said lower anchor points being positioned at a distance from each other, and two cable sections having their upper ends secured at an upper anchor point positioned onto the structure at an elevated position, said cable sections having a sufficient length to reach down to the position indicators for the lower anchor points. An advantageous effect of these features is that they allow for an efficient evacuation of occupants by letting the occupants rapidly slide downwards along the cable sections using only gravitational forces and by reducing their speed by frictional forces arising from a downwardly increasing distance between the cable sections.

The inventive system can be applied in various situations and most types of buildings, and it is not dependent on any complex equipment or particular power source. Only the mentioned features are required when the system is in a non-active, or stand-by, mode.

When the system is activated various known mobile or stationary devices can be used to hold the cable sections in place at the lower anchor points such that the cable sections substantially form an inverse V-shape, to control a tension of at least one cable section, and to connect an occupant to the cable sections at an elevated position and to disconnect the occupant from the cable sections at the base level.

In a first advantageous embodiment of the invention the system, when activated, comprises means for holding the cable sections in place at the lower anchor points such that the cable sections substantially form an inverse V-shape, means for controlling a tension of at least one cable section, and means for connecting an occupant to the cable sections at an elevated position.
position and disconnecting the occupant from the cable sections at the base level.

The invention also concerns a method for rescuing occupants from an elevated position in a structure, such as a high-rise building, using a system comprising position indicators for two lower anchor points marked out at a base level, said lower anchor points being positioned at a distance from each other, and two cable sections having their upper ends secured at an upper anchor point positioned onto the structure at an elevated position, said cable sections having a sufficient length to reach down to the position indicators for the lower anchor points, means for holding the cable sections in place at the lower anchor points such that the cable sections substantially form an inverse V-shape, means for controlling a tension of at least one cable section, and means for connecting an occupant to the cable sections at an elevated position and disconnecting the occupant from the cable sections at the base level. The method is characterized in that it comprises the following steps: fastening the cable sections at the anchor points, applying a pre-stress onto the cable sections, connecting an occupant to the cable sections using the connecting means, starting the descent of the occupant, slackening the cable so that the occupant can be taken down the last part to the base level and detaching the occupant from the cable.

BRIEF DESCRIPTION OF DRAWINGS

In the description of the invention given below reference is made to the following figures, in which:

Figure 1 shows, in a schematic view, a first embodiment of the inventive rescuing system in a situation where the system is activated,

Figure 2 shows, in a schematic view, a first embodiment of the inventive rescuing system according to figure 1, wherein an occupant is on his way down,
Figure 3 shows, in an enlarged schematic view, a first lower anchor point according to figure 1,

Figure 4 shows, in an enlarged schematic view, a second lower anchor point according to figure 1,

Figure 5a shows, in a schematic view, an upper anchor point according to the invention, in a situation where the system is not activated, and

Figure 5b shows, in a schematic view, the upper anchor point according to figure 5a, in a situation where the system is in an early step of activation, and

Figure 6 shows, in a schematic view, the inventive system adapted to allow access of rescuing personnel to an elevated position.

EMBODIMENT(S) OF THE INVENTION

Figure 1 shows the inventive rescuing system in a situation where it has been activated. Two lower anchor points 6, 7 are arranged on the ground at the side of a high-rise building 4. The lower anchor points 6, 7 are positioned at a distance D1 from each other and at a similar distance D2 from the building 4. A cable 3 in the form of a steel wire is arranged with a first section 3a extending from a fixed position at a first lower anchor point 6 to an upper anchor point 8 arranged onto the building 4 at an elevated position. At the upper anchor point 8 the wire 3 is secured onto a pulley 5 allowing adjustment of the wire 3 in its longitudinal direction. A second wire section 3b extends from the pulley 5 down to the second anchor point 7 where it is adjustably attached so that it can be moved in its longitudinal direction if desired. An end portion of the second wire section 3b forms a third wire section 3c. With this arrangement it is possible to control pre-stress and slackening of the whole wire 3 with the third wire section 3c. As the wire sections 3a, 3b are attached to the anchor points 6, 7 and the pre-stress is
applied by pulling the third wire section 3c, the first and second wire sections 3a, 3b takes the shape of an inverted V.

As shown in figures 3 and 4 each position of the lower anchor points 6, 7 is marked out with paint 15 and a stainless stud 15' that is flush with the surrounding ground. The physical anchor points are in this case arranged by placing a vehicle 16, 26 at each anchor point 6, 7 with its tow hook 17 positioned above the marked out anchor point and use the tow hooks 17 as the physical anchor points. At the second anchor point 7 the wire section 3b is slidably attached to a pulley 18 in turn attached to the tow hook 17. This allows for varying the tension of the wire 3. The third wire section 3c is attached to a tow hook 17' of a further vehicle 36, which further vehicle 36 is used for controlling the tension of the wire 3. Of course, such an arrangement requires that the wire 3 is considerably longer than what is needed to just reach down to the lower anchor points 6, 7.

Depending on e.g. the required pre-stress and the weight of the wire 3, which in turn depends to a large deal on the vertical distance between the base level and the third anchor point 8, it may not be necessary to use a vehicle 36 for pulling and slackening the wire 3. It may be sufficient to control this manually, i.e. the vehicle 36 and its tow hook 17' may be replaced by one or two persons.

Figure 2 shows an occupant 10 on his way down the wire 3 from an elevated position to the base level. The occupant 10 is connected to the two wire sections 3a, 3b by carrying a harness 11 that in turn is connected via a part of a wire to a snap shackle 12 that is arranged around both the wire sections 3a, 3b. The shackle 12 is of a known type that can be opened also when the shackle 12 is under pressure. As soon as an occupant 10 is properly connected to the wire sections 3a, 3b, the occupant 10 may jump from the elevated position, provided that the wire 3 is properly fastened at the anchor points 6, 7, 8 and that a proper pre-stress is applied. Gravitational forces will accelerate the occupant 10 downwards until frictional forces between the
shackle 12 and the two wire sections 3a, 3b gradually will slow down the acceleration and the motion. At some point above the base level the occupant 10 will stop. By cautiously slackening the wire 3, so that the wire sections 3a, 3b are brought closer to each other, the occupant can safely be taken down the last part to the base level. After having detached the shackle 12 the wire 3 can be given a proper pre-stress again.

The upper anchor point 8 is preferably designed to withstand forces of at least 15 kN, in addition to what is needed to carry the weight of the wire 3 and the pre-tension. At the lower anchor points 6, 7 the forces are much smaller. A sufficient size/weight of the vehicles 16, 26, 36 is of course required in order to prevent undesired movement. The size/weight required depends to a large degree on the height to the upper anchor point 8 and the weight of the persons, or equipment, to be rescued. In most situations a suitable diameter of the wire 3 is 7 mm.

Where to position the lower anchor points 6, 7 depends on the height and design of the building 4, and the structure of the ground surrounding of the building 4. The distance $D_1$ between the lower anchor points 6, 7 affects the braking force acting on a downwardly moving occupant 10. As the required braking force increases with the height to the elevated position the distance $D_1$ varies from structure to structure. A suitable value of $D_1$ is around 30-40% of the vertical distance between the base level and the upper anchor point 8. By placing the upper anchor point 8 on a roof of a building one can simply use the height of the building to approximately determine a suitable value for the distance $D_1$. As an example, if the rescuing system is placed on the roof of a 100 m high building the distance $D_1$ should be within the range 30-40 m. The distance $D_2$ between the structure 4 and the anchor points 6, 7 should be sufficiently long to avoid that an occupant 10 bumps into the building 4 on his way down and to avoid, or at least decrease, the contact with flames of fire. Also the distance $D_2$ can be approximately related to the vertical distance between the base level and the upper anchor point 8.
suitable value of $D_2$ is around 20-30% of this vertical distance. As an example, if the upper anchor point 8 is placed on the roof of a 100 m high building the distance $D_2$ should be within the range 20-30 m. However, which distances $D_1$, $D_2$ to choose depends on the friction between the cable 3 and the snap shackle 12, applied pre-stress etc. In addition, $D_1$ depends on the value chosen for $D_2$ and vice versa. Therefore, the distances $D_1$, $D_2$ are preferably determined by tests carried out with the actual equipment to be used.

In normal, non-emergency situations the system is preferably kept in a non-active mode with the wire 3 stored at an elevated position in connection with the upper anchor point 8. Figure 5a shows the system according to the invention in such a non-active situation. A frame 19, supporting the upper anchor point 8, is secured onto the roof of the building 4. The pulley 5 is secured onto the frame 19 such that it is positioned outside the edge of the building. Each wire section 3a, 3b is rolled up onto a bobbin 20 and the center of the wire 3 is positioned onto the pulley 5. The bobbins 20 are attached to the frame 19, and thus to the building 4, with a first rope 21, which first rope 21 is provided with a first trigger device 22 adapted to cut off the first rope 21 when activated. A pilot cord 14 has one end attached to the frame 19 and the major part rolled up in a bag 25 attached to the frame 19 via a second rope 28. Also the bag 25 is positioned outside the edge of the building. The second rope 28 is provided with a second trigger device 23 adapted to cut off the second rope 28 when activated. Further, the pilot cord 14 is, at a point between the attachment to the frame 19 and the bag 25, attached to the bobbins 20 by a friction knot 24.

When activating the second trigger device 23 the bag 25, containing the free end of the pilot cord 14, is released which allows it to drop down to the base level where the pilot cord 14 can be taken care of by the rescue personnel. After smoothly pulling the pilot cord 14 to tighten up at the friction knot 24 the first trigger device 22 may be activated as to release the bobbins 20, which
then will hang outside the edge of the building 4 prevented from falling down
only by the pilot cord 14 and its friction knot 24. Figure 5b shows the system
in this early stage of activation. The bobbins 20, and thus the wire 3, can now
be descended in a safe and rapid manner using the pilot cord 14. The
tension of the pilot cord 14 affects the friction of the friction knot 24 which in
turn affects the downward speed of the bobbins 20. Friction knots are well
known in e.g. mountaineering. A suitable friction knot to use in this case is
the so-called Italian Hitch. However, other types of friction knots may be
used.

The pilot cord may have a diameter of around 7 mm and is preferably as
resistant as possible to fire. The length of the pilot cord 14 must of course be
sufficient to reach down to the base level. Preferably, it is sufficiently long to
allow it to form a significant angle relative to the building 4 as to avoid being
unnecessarily close to possible flames in the building 4. To form a 45° angle
relative to the building 4 at the start of the descendant of the bobbins 20 the
length of the pilot cord 14 must be more than 140% of the distance between
the base level and the upper anchor point 8.

Each trigger device 22, 23 is provided with a receiver allowing activation by a
remote control. Thereby the pilot cord 14 and the cable sections 3a, 3b can
be released and lowered by rescue specialists located on the ground. If
several buildings are provided with the inventive system one may still use the
same remote control by allocating a certain code for a certain building, and a
certain sub-code for a certain trigger device. Various types of trigger devices
may be used, for instance such of the type used for releasing life rafts from
ships.

A method for rescuing occupants 10 from an elevated position in the building
4 preferably includes the following steps, wherein steps a) - e) could be
grouped under the heading "Access" and the remaining steps under the
heading "Evacuation":

1. a)
- a) releasing the pilot cord 14, preferably by using a remote control operated from the ground or base level,
- b) lowering the wire sections 3a, 3b using the pilot cord 14
- c) fastening the wire sections 3a, 3b at the lower anchor points 6, 7,
- d) applying a pre-stress onto the wire sections 3a, 3b,
- e) winching an evacuation group up to the elevated position, which group is to assist in the evacuation of occupants 10 from the elevated position,
- f) organizing equipment and occupants 10 at the elevated position and establishing communication between the elevated position and the base level,
- g) preparing occupants 10 for descent by e.g. arranging connecting means, such as the harness 11 and the snap shackle 12, onto the occupants 10
- h) connecting an occupant 10 to the wire sections 3a, 3b by arranging the snap shackle 12 around both the wire sections 3a, 3b,
- i) starting the descent of the occupant 10,
- j) slackening the wire 3 so that the occupant 10 safely can be taken down the last part to the base level and detaching the snap shackle 12 from the wire 3,
- k) applying a pre-stress onto the wire sections 3a, 3b,
- l) repeating steps g) - k) until evacuation is completed.

Various measures could be taken to speed up the evacuation. For instance, step g), and perhaps also step h), could be carried out simultaneously as step j). However, it is important that step i) is not carried out until step k) is complete. Therefore it is important that a well-functioning communication is established between the rescue corps at the elevated position and the base level.

Figure 6 shows an example on how to use the system for carrying out step e), i.e. winching up of an evacuation group. The second wire section 3b is connected to a winch 31 that in turn is attached to the second lower anchor point 7 provided by the vehicle 26. If the winch 31 is not capable of operating
in both directions it is preferably attached to the second lower anchor point 7 in such a way that the wire 3 can be slackened if necessary. A wire pulley 32 is arranged onto the second wire section 3b. The first wire section 3a is connected to an upper side of the wire pulley 32 via a first shackle 37. A second shackle 38 connects an evacuation group 33 to the wire pulley 32 via a connecting member 40 and harnesses carried by the evacuation group 33. At a lower side of the wire pulley 32 a hold-back wire 30 is connected via a third shackle 39. The hold-back wire 30 is arranged at a lower anchor point 6'. One rescue worker operates the winch 31 and one handles the hold-back wire 30 with the purpose to ensure that his colleagues in the evacuation group 33 do not reach any dangerous or hazardous areas during their transport upwards. As the winch 31 is started it pulls the second wire section 3b which has the effect that the wire pulley 32, and thus the evacuation group 33, starts ascending towards the upper anchor point 8. When the evacuation group has reached the upper anchor point 8 they detach their selves. At that stage the winch 31 can be disconnected and the first wire section 3a be pulled back down using the hold-back wire 30.

In order to winch up an evacuation group 33 the lower anchor point 7 is preferably designed to withstand forces of at least 15 kN, in addition to what is needed to carry the weight of the wire 3 and the winch 31. The lower anchor point 6' used for winching up the evacuation group 33 may be the same as the first anchor point 6 or may be another anchor point arranged close to the second anchor point 7 on the vehicle 26.

In order to have a good emergency preparedness the position of the lower anchor points 6, 7 should be predetermined and marked out. These positions may be located at a place unsuitable for being provided with any protruding parts, such as a street. This can in particular be expected if the rescuing system is to be applied to an already existing building located in a city center. In such a situation the positions of the anchor points 6, 7 is preferably marked with non-protruding means, such as a stainless stud 15' in a centre
of a painted area 15 as described above. If exposed to wear the position indicator preferably is frequently re-painted. Of course, many other types of position indicators could be used.

Naturally, there are many ways of fastening or attaching the wire sections 3a, 3b at the lower anchor points 6, 7. For instance, other vehicle parts than the tow hooks 17 may be used for holding the wire sections 3a, 3b in place. Further, other mobile means than vehicles may of course be used as long as they can carry the relevant loads. As an alternative one may use stationary anchor points, e.g. pins with an inverse U-shape, that are firmly mounted to the ground. Such stationary anchor points should of course also be regarded as position indicators for the lower anchor points.

The invention is not limited by the embodiments described above but can be modified in various ways within the scope of the claims. For instance, two, or even more, cables may be used, wherein each cable forms one cable section positioned between a lower and the upper anchor points. However, the use of one single cable or wire that forms both cable sections 3a, 3b as described above makes the system as a whole more simple and makes it relatively easy to achieve a symmetric pre-stress of the two cable sections 3a, 3b.

Further, it is not necessary that the cable 3 is a steel wire, but this is an advantageous feature since such wires are durable, have a high strength and are resistant to fire.

Regarding the detachable connecting member, above exemplified with a snap shackle 12, one may use various types of detachable hooks etc. provided that the occupant 10 can be properly connected to, and disconnected from, the cable sections 3a, 3b and that it has a sufficient strength.

Naturally, one may provide a building with more than one inventive rescuing system. Further, the base level does not have to be horizontal which means that the lower anchor points 6, 7 may be positioned at somewhat different
levels. The important thing is that the velocity of the occupant 10 can be decreased and that the occupant 10 can be safely taken down. Further, the lower anchor points 6, 7 do not have to be placed on the ground but could for instance be positioned on a roof of a neighbouring building.

As an alternative to the non-active mode of the system described above, such a stand-by mode of the system may be similar to its active mode, i.e. with the cable sections 3a, 3b already descended and appropriately fastened to stationary lower anchor points 6, 7. Also a proper pre-stress may be applied onto the cable sections 3a, 3b. This can be seen as carrying out some of the method steps long in beforehand.

To be able to use the system it is sufficient that the length of the cable sections 3a, 3b is such that they just reach down to its particular lower anchor point 6, 7. By loosening one of the cable sections 3a, 3b from its lower anchor point the particular cable section can be moved towards the other allowing the occupant 10 to be taken down. However, the system becomes faster and gets more convenient to use if at least one cable section 3a, 3b has such a length that it can be pulled out a certain distance to the side forming the section 3c, as described above.

The arrangement on the roof of the building 4 described in relation to the non-active mode of the system (figure 5a) may be arranged in various ways as long as it has a sufficient strength and allows the pilot cord 14 and the wire 3 to be released and reach ground in a safe and efficient manner. Accordingly, the frame 19, pulley 5, ropes 21, 28, trigger devices 22, 23 etc. may have other appearances and be positioned in other ways.
CLAIMS

1. System for rescuing occupants (10) from an elevated position in a structure (4), such as a high-rise building, said system comprising
   - position indicators (15, 15') for two lower anchor points (6, 7) arranged at a base level, said lower anchor points (6, 7) being positioned at a distance (D1) from each other, and
   - two cable sections (3a, 3b) having their upper ends secured at an upper anchor point (8) positioned onto the structure (4) at an elevated position, said cable sections (3a, 3b) having a sufficient length to reach down to the position indicators (15, 15') for the lower anchor points (6, 7).

2. System according to claim 1, characterized in that the system, when activated, is adapted to
   - hold the cable sections (3a, 3b) in place at the lower anchor points (6, 7) such that the cable sections (3a, 3b) substantially form an inverse V-shape,
   - control a tension of at least one cable section (3a, 3b), and
   - connect an occupant (10) to the cable sections (3a, 3b) at an elevated position and to disconnect the occupant (10) from the cable sections (3a, 3b) at the base level.

3. System according to claim 1 or 2, characterized in that the system, when activated, comprises
   - means (16, 17, 18, 26) for holding the cable sections (3a, 3b) in place at the lower anchor points (6, 7) such that the cable sections (3a, 3b) substantially form an inverse V-shape,
   - means (3c, 17, 18, 36) for controlling a tension of at least one cable section (3a, 3b), and
- means (11, 12) for connecting an occupant (10) to the cable sections (3a, 3b) at an elevated position and disconnecting the occupant (10) from the cable sections (3a, 3b) at the base level,

4. System according to anyone of the above claims, characterized in
   that one single cable (3) forms both the two cable sections (3a, 3b).

5. System according to claim 4,
   characterized in
   that the upper anchor point (8) comprises a pulley (5) onto which the cable (3) is secured.

6. System according to claim 3,
   characterized in
   that the connecting means comprises a detachable connecting member (12) adapted to be slidably attached around the cable sections (3a, 3b).

7. System according to claim 3,
   characterized in
   that the connecting means comprises a harness (11) adapted to be arranged onto an occupant (10).

8. System according to anyone of the above claims,
   characterized in
   that the cable sections (3a, 3b) are steel wires.

9. System according to anyone of the above claims,
   characterized in
   that the cable sections (3a, 3b) are stored in connection with the upper anchor point (8) when the system is not activated and that the cable sections
10. System according to claim 9,
characterized in
that the system comprises a first connecting member (21) adapted to prevent the cable sections (3a, 3b) from being lowered when the system is not activated, said first connecting member (21) being provided with a first trigger device (22) adapted to disconnect the first connecting member (21) and thus release the cable sections (3a, 3b) when the first trigger device (23) is activated.

11. System according to claim 9,
characterized in
that the system comprises a pilot cord (14) secured onto the structure (4) in connection with the upper anchor point (8) when the system is not activated, said pilot cord (14) having a main part stored in a container (25) attached directly or indirectly to the structure (4) via a second connecting member (28) provided with a second trigger device (23) adapted to disconnect the second connecting member (28) and thus release the pilot cord (14) when the second trigger device (23) is activated, said pilot cord (14) further being slidably attached to the cable sections (3a, 3b) at a point between its point of attachment to the structure and the container (25) such that a downwards transport of the cable sections (3a, 3b) can be controlled by the pilot cord (14).

12. System according to anyone of the above claims,
characterized in
that the distance (D1) between the lower anchor points (6, 7) is around 5-100% of the vertical distance between the base level and the upper anchor point (8).
13. System according to claim 12, characterized in
that the distance (D1) between the lower anchor points (6, 7) is around 20-50% of the vertical distance between the base level and the upper anchor point (8).

14. System according to claim 13, characterized in
that the distance (D1) between the lower anchor points (6, 7) is around 30-40% of the vertical distance between the base level and the upper anchor point (8).

15. System according to anyone of the above claims, characterized in
that the lower anchor points (6, 7) are positioned at an approximately similar distance (D2) from the structure (4).

16. System according to claim 15, characterized in
that the distance (D2) between the lower anchor points (6, 7) and the structure (4) is around 5-80% of the vertical distance between the base level and the upper anchor point (8).

17. System according to claim 16, characterized in
that the distance (D2) between the lower anchor points (6, 7) and the structure (4) is around 10-60% of the vertical distance between the base level and the upper anchor point (8).

18. System according to claim 17, characterized in
that the distance (D2) between the lower anchor points (6, 7) and the structure (4) is around 20-30% of the vertical distance between the base level and the upper anchor point (8).

19. Method for rescuing occupants from an elevated position in a structure, such as a high-rise building, using a system comprising
- position indicators (15, 15') for two lower anchor points (6, 7) arranged at a base level, said lower anchor points (6, 7) being positioned at a distance (D1) from each other, and
- two cable sections (3a, 3b) having their upper ends secured at an upper anchor point (8) positioned onto the structure (4) at an elevated position, said cable sections (3a, 3b) having a sufficient length to reach down to the position indicators (15, 15') for the lower anchor points (6, 7),
- means (16, 17, 18, 26) for holding the cable sections (3a, 3b) in place at the lower anchor points (6, 7) such that the cable sections (3a, 3b) substantially form an inverse V-shape,
- means (3c, 17, 18, 36) for controlling a tension of at least one cable section (3a, 3b), and
- means (11, 12) for connecting an occupant (10) to the cable sections (3a, 3b) at an elevated position and disconnecting the occupant (10) from the cable sections (3a, 3b) at the base level,
said method comprising the following steps:

- fastening the cable sections (3a, 3b) at the anchor points (6, 7),
- applying a pre-stress onto the cable sections (3a, 3b),
- connecting an occupant (10) to the cable sections (3a, 3b) using the connecting means (11, 12),
- starting the descent of the occupant (10),
- slackening the cable (3) so that the occupant (10) can be taken down the last part to the base level, and
- detaching the occupant (10) from the cable (3).
20. Method according to claim 19, characterized in that it comprises a previous step of:
- descending the cable sections (3a, 3b) to the base level.

21. Method according to claim 20, characterized in that it comprises a previous step of:
- releasing a pilot rope (14) attached to the cable (3), preferably by using a remote control operated from the ground or base level,

22. Method according to anyone of claims 19 to 21, characterized in that it comprises the steps of:
- winching an evacuation group (33) up to the elevated position, which group is intended to assist in the evacuation of occupants (10) from the elevated position,
- organizing equipment and occupants (10) at the elevated position and establishing communication between the elevated position and the base level,
- preparing occupants (10) for descent by e.g. arranging connecting means, such as a harness (11) and a snap shackle (12), onto the occupants (10).
INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE 2005/001089

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet
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)

IPC: A62B

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

SE, DK, FI, NO classes as above

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

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>US 4591021 A (LEW WT AL), 27 May 1986 (27.05.1986), column 2, line 1 - column 6, line 12, figures 1,3, abstract</td>
<td>1-3,6-10, 12-22</td>
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<td>1,4,5,13-18</td>
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<tr>
<td>X</td>
<td>US 346406 A (A HUTCHINGS), 27 July 1886 (27.07.1886), page 1, line 43 - page 2, line 50</td>
<td>1-3,6-10, 12-22</td>
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<tr>
<td>X</td>
<td>US 4597387 A (LEW ET AL), 10 June 1986 (10.06.1986), column 2, line 3 - column 3, line 30</td>
<td>1-22</td>
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<tr>
<td>A</td>
<td>WO 03037435 A1 (EVACBLITZ ENGINEERING GMBH), 8 May 2003 (08.05.2003)</td>
<td></td>
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</tbody>
</table>

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:
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