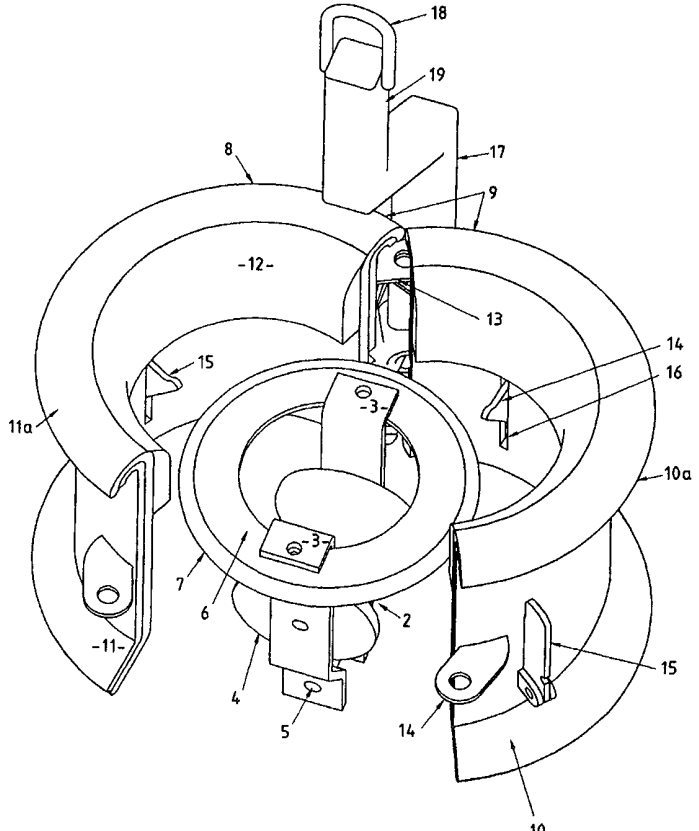


INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

| | | |
|--|-----------|--|
| (51) International Patent Classification ⁶ : A63G 31/00 | A1 | (11) International Publication Number: WO 00/06275 (43) International Publication Date: 10 February 2000 (10.02.00) |
| <p>(21) International Application Number: PCT/NZ99/00119</p> <p>(22) International Filing Date: 28 July 1999 (28.07.99)</p> <p>(30) Priority Data: 331200 28 July 1998 (28.07.98) NZ</p> <p>(71) Applicant (for all designated States except US): FUN INNOVATORS NZ LIMITED [NZ/NZ]; 2 Pompallier Terrace, Ponsonby, Auckland (NZ).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): VAN ASCH, Paul, Henry, Drury [NZ/NZ]; Fitzpatrick Road, RD, Queenstown (NZ). ALEXANDER, Keith, Vivian [NZ/NZ]; 55 Grogan Crescent, Christchurch (NZ).</p> <p>(74) Agent: BUCHANAN, Elspeth, Victoria; P.L. Berry & Associates, 61 Cambridge Terrace, P.O. Box 1250, Christchurch (NZ).</p> | | <p>(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DE (Utility model), DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i></p> |
| <p>(54) Title: RETRIEVAL EQUIPMENT FOR DEPLOYED BUNGY</p> <p>(57) Abstract</p> <p>Retrieval equipment for a deployed bungee comprises a retrieval/hauling member (8) and a terminal coupling unit (2) connectable to or integral with the free end of the bungee. The retrieval/hauling member (8) is attached to a retrieval cable via an extension arm (17) and is provided with an aperture for receipt of said bungee. The retrieval/hauling member (8) releasably engages the terminal coupling unit (2) by a split collar (9, 10, 11) provided with retractable spring retaining mechanisms (15, 16). After completion of a jump, the split collar (9) of the retrieval/hauling member (8) can be enclosed around the deployed bungee and lowered down the bungee to engage the terminal coupling unit (2). The bungee can then be hauled back up to the jump site using a retrieval cable.</p>  | | |

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

| | | | | | | | |
|----|--------------------------|----|--|----|--|----|--------------------------|
| AL | Albania | ES | Spain | LS | Lesotho | SI | Slovenia |
| AM | Armenia | FI | Finland | LT | Lithuania | SK | Slovakia |
| AT | Austria | FR | France | LU | Luxembourg | SN | Senegal |
| AU | Australia | GA | Gabon | LV | Latvia | SZ | Swaziland |
| AZ | Azerbaijan | GB | United Kingdom | MC | Monaco | TD | Chad |
| BA | Bosnia and Herzegovina | GE | Georgia | MD | Republic of Moldova | TG | Togo |
| BB | Barbados | GH | Ghana | MG | Madagascar | TJ | Tajikistan |
| BE | Belgium | GN | Guinea | MK | The former Yugoslav Republic of Macedonia | TM | Turkmenistan |
| BF | Burkina Faso | GR | Greece | | | TR | Turkey |
| BG | Bulgaria | HU | Hungary | ML | Mali | TT | Trinidad and Tobago |
| BJ | Benin | IE | Ireland | MN | Mongolia | UA | Ukraine |
| BR | Brazil | IL | Israel | MR | Mauritania | UG | Uganda |
| BY | Belarus | IS | Iceland | MW | Malawi | US | United States of America |
| CA | Canada | IT | Italy | MX | Mexico | UZ | Uzbekistan |
| CF | Central African Republic | JP | Japan | NE | Niger | VN | Viet Nam |
| CG | Congo | KE | Kenya | NL | Netherlands | YU | Yugoslavia |
| CH | Switzerland | KG | Kyrgyzstan | NO | Norway | ZW | Zimbabwe |
| CI | Côte d'Ivoire | KP | Democratic People's Republic of Korea | NZ | New Zealand | | |
| CM | Cameroon | KR | Republic of Korea | PL | Poland | | |
| CN | China | KZ | Kazakstan | PT | Portugal | | |
| CU | Cuba | LC | Saint Lucia | RO | Romania | | |
| CZ | Czech Republic | LI | Liechtenstein | RU | Russian Federation | | |
| DE | Germany | LK | Sri Lanka | SD | Sudan | | |
| DK | Denmark | LR | Liberia | SE | Sweden | | |
| EE | Estonia | | | SG | Singapore | | |

Title: RETRIEVAL EQUIPMENT FOR DEPLOYED BUNGY

Technical Field

The present invention relates to retrieval equipment for a deployed bungee and more
5 particularly to a novel retrieval/hauling unit which is inter-engageable with a bungee
terminal coupling unit and method of using same.

As used herein the term "bungee" means an elongated elastic member, such as a vine,
cord, rope or strap, more typically a multi-stranded latex cord.

10

Background Art

The pursuit of bungee jumping from a structure such as a cliff, bridge, jumping platform
or tower is known. One end of the bungee is releasably anchored to said structure and
the free end is releasably attached to a terminal connection means (e.g. a karabiner or
15 coupling unit) from which the harness or ankle-cuff secured to the jumper can be
releasably connected thereto. Typically, the bungee is releasably anchored to said
structure by means of a tethering cable secured to a crane arm located at the jump
site.

20 At present, upon completion of the jump, the jumper is lowered to a landing site
adjacent the base of the structure (for example, lowering the jumper into a gorge for
boat pickup) or operational crew secure the deployed bungee to a retrieval cable
connected to a winching system (e.g. a crane operated winch, windlass or vehicular
tow hauling) to return the suspended jumper to the structure and/or retrieve the bungee.
25 The free end of the retrieval cable is lowered from the jump site to operational crew at
the landing site, who then releasably secure the cable to the deployed bungee terminal

connection. On voice or hand signal command from the landing site crew, the jump site crew engage and control the winching system. Alternatively, the bungy may be manually hauled up to the jump site once the jumper has been released from the deployed bungy.

5

It can often be a long and arduous task, involving a number of crew members, to secure the retrieval cable to the deployed bungy and manipulate the retrieved bungy length, given the weight and elastic properties of the bungy. The deployed bungy can swing with exposure to air turbulence such as wind gusts or helicopter back-draughts.

10 The effect of air turbulence can be a major factor, particularly if the landing site is located in a gully or ravine. The retrieval cable may frequently become intertwined with the deployed bungy length during its descent to the landing site. Similarly, the weight and movement of the bungy during hauling can slow the operation of retrieval.

15 The strain and effort of a manual haul can be exhausting for the operators and may lead to back injury, particularly if the jump rate is high and/or the distance between the landing site and jump site is large. The hauling position becomes uncomfortable with time in view of the necessity to wear a safety harness.

20 Disclosure of invention

It is an object of the present invention to provide improved retrieval equipment for a deployed bungy, which is easy and rapid to operate, dismantle for transport to an alternative jumping site or store out of use.

It is a further object of one embodiment of the present invention to provide a retaining means to support the terminal coupling unit after disengagement from the retrieval means and to take the weight of the bungy. Advantageously, the retaining means can

25

also function as a safety device to prevent the bungy from being accidentally deployed prior to the scheduled jump, especially when the or each jumper is secured in the harness or ankle cuff.

5 The present invention provides retrieval equipment for a deployed bungy comprising a retrieval/hauling member provided with an aperture for receipt of said bungy, a terminal coupling unit connectable to or integral with the free end of the bungy, means to attach said retrieval/hauling member to a retrieval cable; said retrieval/hauling member being releasably engageable with said terminal coupling member.

10

It will be appreciated that the retrieval/hauling member may be directly or indirectly connected to the terminal coupling unit. For example, the retrieval/hauling unit may connect onto the securing means provided for the jumper (i.e. tethering rope or webbing sling, ankle cuff or harness) secured to the terminal coupling unit.

15

Preferably said aperture is a passage through the retrieval/hauling member. Preferably said retrieval/hauling member includes a releasable opening mechanism.

In two embodiments, said retrieval/hauling member is substantially symmetrical in
20 shape and said aperture is concentric relative to the central axis thereof. Alternatively, said aperture is offset. Preferably said opening mechanism is a lockable hinged opening. Alternatively said opening mechanism is effected by the dis-engagement of over-centre latches located on opposing sides of the retrieval/hauling member.

25 In another embodiment, said retrieval/hauling member is provided with a formable keyhole aperture. Preferably said opening means is a releasable securement such as

a screw sleeve or an overlap engagement of a free end of the retrieval/hauling member

In two preferred forms of the present invention, the invention provides a terminal
5 coupling unit having a continuous peripheral projection adapted to inter-engage with
said retrieval/hauling member and/or function as a guide member for the passage of
the retrieval/hauling member; wherein said retrieval/hauling member is a collar
comprising a body and an attachment to secure said retrieval/hauling member to a
retrieval cable. Preferably said body includes a retractable retaining means biased to
10 a locking position.

In a preferred embodiment, said attachment means is an extension arm. Preferably
the free end of said extension arm is adjacent but slightly offset from the central axis of
an engaged said terminal coupling unit without obstructing the top opening of same.
15 Preferably said extension arm is detachable from said body for maintenance, transport
or storage. Preferably said body is rotatably secured to said extension arm. More
preferably, said extension arm is biased to an upright position by a spring release
mechanism such that the engagement of said spring release means inverts the body
of said collar to assist an operator in removing an engaged terminal coupling unit from
20 said retrieval/hauling member. That is, it is easier and a more safe procedure to lift the
terminal coupling unit from the retrieval/hauling member when the free end of the
bungy is orientated above the retrieval/hauling member. Alternatively said attachment
is a plurality of equi-distantly-spaced lugs located on the periphery of said collar.

25 In one aspect of the present invention, said retrieval equipment further includes a
retaining device to support the terminal coupling unit prior to jump set-up or following

disengagement from said retrieval/hauling member; said retaining device being located adjacent a retrieval and/or jump point. Preferably said retaining means is a support anchored at one end thereof, and adapted to support said terminal coupling unit.

5

Brief description of the drawings

By way of example only, preferred embodiments of the present invention are described in detail, with reference to the accompanying drawings in which:-

10 Fig. 1 is a perspective view of a terminal coupling unit of a first preferred embodiment of the present invention,

Fig. 2 is a cross-sectional view of the terminal coupling unit of Fig. 1 inter-engaged with a retrieval/hauling member of the present invention,

15

Fig. 3 is a perspective view of Fig. 2 showing the retrieval/hauling member in an open position wherein the terminal coupling unit is disengaged therefrom,

Fig. 4 is a perspective view of a modified retrieval/hauling member of Figs 2 & 3
20 wherein the collar is rotatably secured to the extension arm,

Fig. 5 is a plan view of a second preferred embodiment retrieval/hauling member in accordance with the present invention,

25 Fig. 6 is side view of the retrieval/hauling member of Fig. 5,

Fig.s 7i-iii are a schematic sequence showing the retrieval/hauling member of Fig.s 5 and 6 in use,

Fig. 8 is an isometric view of a retainer in accordance with the present invention,

5

Fig. 9 is a plan view from above of a third preferred retrieval/hauling member shown in the open position,

Fig. 10 is a side view of another preferred terminal coupling unit in accordance with the present invention,

10

Fig. 11 is a side view showing the terminal coupling unit of Fig. 10 inter-engaged with the retrieval/hauling member of Fig. 9,

Fig. 12 is a side view of the main component of the retaining mechanism of the retrieval/hauling member of Fig.s 9 & 11,

15

Fig. 13 is a plan view of the retaining mechanism component of Fig. 12,

Fig. 14 is a cross sectional view showing the inter-engagement of a modified retrieval/hauling member of Fig.s 9 & 11 with a modified terminal coupling unit of Fig.s 10 & 11 wherein the terminal coupling unit is provided with the retractable retaining mechanism, and the retrieval/hauling collar is provided with a nose projection,

20

Fig. 15 is a plan view from above showing a modified retrieval/hauling member of Figs 2 & 3 or 4 wherein the collar aperture is off-set, and

25

Fig. 16 is a plan view from above showing a modified retrieval/hauling member of Fig.s 9 & 10 wherein the collar aperture is offset.

5 Best Modes For Carrying Out The Invention

Referring to Fig.s 1-3 in general, a first preferred embodiment of the two essential components of the retrieval equipment for a deployed bungy, a terminal coupling unit 2 and retrieval/hauling member (8, Fig.s 2 and 3) are thereshown.

10 With particular reference to Fig. 1, the terminal coupling unit 2 comprises a bracket 3 supporting a reel 4, tethering bar 5 and ring 6. In use, the free end of a bungy is secured around the spool of the reel 4, and the harness or ankle-cuff is releasably connected to the tethering bar 5 usually via means of a karabiner and tethering rope. The rim of the ring 6 is formed as a continuous peripheral projection 7. The peripheral
15 projection 7 provides a flange as a contact point for inter-engagement with the retrieval/hauling member to initiate retrieval of the deployed bungy as hereinafter described. Preferably, the ring 6 is removable for maintenance or replacement.

With reference to Fig.s 2 and 3, the retrieval/hauling member 8 comprises a releasable
20 split collar 9 and an extension arm 17. The collar 9 consists of two mirror image substantially crescent shaped sections 10, 11, secured to each other at one end thereof by means of a hinge 13. The sections 10, 11 are releasably secured at the opposing end by an external latch mechanism comprising a pair of lugs 14, and latch or locking pin (not shown). The rim of each section (10a, 11a) is rounded or beveled
25 to provide a smooth surface for resting and drapage of the bungy length during hauling and after retrieval. Advantageously, the rim (10a, 11a) further functions as a guide

means for the passage of the retrieval/hauling member 8 from the anchoring tether cable (not shown) onto the bungy length at retrieval set-up.

In the open position as depicted in Fig. 3, the latch or locking pin (not shown) is
5 disengaged and the lugs 14 are separated via the articulation of the sections 10, 11
about the hinge 13. To close the collar 9, the free ends of sections 10 and 11 are
pulled adjacent each other, so that the apertures of the lugs 14 are aligned and the
latch engaged therewith. It will be appreciated that the split collar 9 may be releasably
10 secured by alternate known mechanisms such as bolts or over-centre latches and/or
these mechanisms may also be used in place of the hinge 13 and/or latch mechanism
to split open the collar 9. In the closed position as depicted in Fig. 2, the secured
collar 9 is formed with a central passage, having a throat guide 12 adjacent the top
opening thereof. Preferably the throat guide 12 is composed of a low friction material
to reduce abrasive damage of the bungy resulting from repetitive retrieval.

15 Each section 10, 11 has a plurality of retractable spring retaining mechanisms (15, 16).
Each mechanism (15, 16) comprises a catch 15 capable of moving between an
extended locking position as shown in Figs 2 and 3 and a retracted position (shown in
dotted outline in Fig. 2) wherein the catch 15 recedes within a slot 16. Each catch 15 is
20 biased by spring means (not visible) to the extended position wherein the hook shaped
portion protrudes from the slot 16.

The collar 9 is supported on an extension arm 17. One end of the extension arm is
secured adjacent the hinge 13 and the free end 19 is provided with a lug fitting 18 for
25 attachment to the retrieval cable (not shown). Preferably said extension arm 17 is
detachably secured to the collar 9 such that the arm 17 may be removed for

maintenance, transport or storage. In use, the lug 18 and free end 19 are positioned adjacent but slightly offset from the central axis of the terminal coupling unit 2 whereby the extension arm 17 does not obstruct the top opening of the terminal coupling unit 2 provided for receipt of the free end of the bungy. Alternatively, the means to attach the retrieval/hauling member 8 to the retrieval cable is a plurality of equi-distantly spaced lugs located on the periphery of the collar 9, as illustrated in respect of the third preferred embodiment (51, 52, Fig.s 9 & 11).

In use, the free end of the bungy is attached to the terminal coupling unit 2 in advance of deployment as hereinbefore described and the retrieval/hauling member 8 is secured by the lug 18 to a retrieval cable connected to a winching system such as a crane operated winch, vehicular winch or windlass (not shown). Alternatively, the retrieval cable is secured for subsequent manual or vehicular tow hauling.

Upon completion of the jump, the jumper may be lowered to a landing site and released from the harness or ankle cuff or remain suspended secured therein for retrieval with the deployed bungy. Jump site crew thread the deployed bungy through the aperture of the collar 9 by opening the collar 9, enclosing the sections 10, 11 around the bungy and closing the collar 9 as hereinbefore described. It will be appreciated that where the retrieval cable is securely tied off or controlled by a winching system, the retrieval/hauling member 8 may be placed on the bungy length adjacent the top at jump set-up and returned to that position after the bungy has been deployed and subsequently retrieved (i.e. between consecutive jumps). The throat guide 12 restricts the degree of movement of the bungy length within the aperture of the collar 9.

To retrieve the bungy, the retrieval/hauling member 8 is run down the deployed bungy length by gravity feed of the retrieval cable or under winch control until the ring 6 of the terminal coupling unit 2 contacts and docks with the spring locking mechanisms 15, 16. The throat guide 12 prevents the deployed bungy length from being snared on the extended catches 15 or free end arm length 19, even if air turbulence effects swinging of the bungy. Docking is achieved by the inter-engagement of each catch 15 with the peripheral projection 7:- the projection 7 pivots the catches 15 in the direction of Arrow A (Fig. 2) as the retrieval/hauling member 8 slides down over the terminal coupling unit 2. As the retrieval/hauling member 8 slides into the position shown in Fig. 2, the catches 15 spring back into the extended locking position shown and the hooked portion of each catch 15 supports and releasably retains the peripheral projection 7. The weight of the bungy and spring bias means of the catches 15 maintain the docked inter-engagement position of the terminal coupling unit 2 within the retrieval/hauling member 8.

15

The winching system is then engaged, or alternatively, the vehicular tow hauling or manual hauling is commenced until the retrieval cable, deployed bungy length, retrieval/hauling member 8 and docked terminal coupling unit 2 are back above the jump site within arm's reach of the operator. Preferably, said retrieval cable is connected to a winching system via a friction-free eddy current coupling member (e.g. a TASC unit) which provides a slipping clutch control such that the operator can brake and/or control the rate of descent and ascent of the retrieval/hauling member 8 (not shown).

To release the terminal coupling unit 2 from the retrieval/hauling member 8, the collar 9 is opened and the sections 10, 11 are separated. To increase operational speed

and afford a more safe jump re-set procedure, the retrieval/hauling member (8, Fig. 4) can be modified whereby the collar 9 is rotatably bolt secured to the extension arm 17. The extension arm 17 is provided with a spring release mechanism (17a & b, Fig. 4) biased by a compression spring (not visible) to hold the extension arm in an upright position. Engagement of both spring release mechanism levers 17a inverts collar 9 approximately 180° such that upon rotation of the collar 9 about the pivot 17b, the bungy is orientated below the retrieval/hauling member 8. This orientation assists the operator in safety removing the terminal coupling unit 2 from the retrieval/hauling member 8, reducing the likelihood of dropping the bungy after disengagement. When the terminal coupling unit 2 is removed, the retrieval/hauling member 8 is returned to the upright position by depressing both levers 17a.

Whilst the terminal coupling unit 2 has been depicted and described as a substantially open structure, it will be appreciated that the body of the terminal coupling unit may be formed as an open ended substantially cylindrical structure (shown in broken lines in Fig. 1) incorporating a means to releasably secure the end of the bungy and means to connect the harness or ankle cuffs thereto. Similarly, the retrieval/hauling member 8 may be formed in any desired polygonal or substantially cylindrical shape wherein the aperture is concentric or offset as illustrated in Fig. 15. Further, it will be appreciated that the collar 9 need not be formed in two releasable sections (10, 11), but could be a closed cylinder, so that in use the bungy length would be manually fed through the aperture of the collar 9 (not shown). Similarly, it will be appreciated that the collar 50 need not split completely in half as depicted and described but may merely include a releasable section having a sufficient opening to allow egress of the bungy length. It will also be appreciated that either the terminal coupling unit or the retrieval/hauling member may be provided with the releasable retaining means biased to a locking

position as hereinafter described in a further aspect of the present invention with reference to Fig.14 and as described above with reference to Fig.s 2 & 3 or Fig. 4, respectively.

5 Referring to Fig.s 5 – 7iii, a second preferred embodiment of the two essential components of the retrieval equipment for a deployed bungy (20, Fig. 7i - iii), a retrieval/hauling member 21 and a terminal coupling unit (22, Fig. 7i - iii) with associated tethering cord (23, Fig. 7i -iii) are thereshown.

10 With particular reference to Fig.s 5 & 6, the retrieval/hauling member 21 is a releasable keyhole loop device comprising a suspension element 24 and a loop element 25. The free end of the suspension element 24 is formed as a hook for releasable securement to the retrieval cable 26. The free end of the loop element 25 is shaped to effect a releasable over-lap engagement with the neck of the loop
15 element 25 when the free end is moved by an operator in the direction of Arrows A₁ and A₂ (Fig. 5). Conversely, the loop element 25 is dis-engaged by moving the free end of the loop element 25 in the direction of Arrows B₁ and B₂ (Fig. 5).

Referring to Fig. 5, the line I-I defines a first portion 25a and a second portion 25b of
20 the formed loop element 25. In use, the first portion 25a permits free passage of the deployed bungy length (20, Fig. 7i - iii) and the second portion 25b engages the associated terminal coupling unit (27, Fig. 7i - iii) by snaring the secured tethering cord (23, Fig. 7i - iii) as hereinafter described.

25 Preferably at least the inner surface of portion 25a of the loop element 25 is composed of or coated with a low friction material to reduce abrasive damage to the bungy

resulting from repetitive retrieval. Preferably the outer surface of the loop element 25 is rounded or beveled to provide a smooth surface for resting and drapage of the bungy length (20, Fig. 7 i -iii) during hauling and after retrieval, respectively.

- 5 Optionally, said retrieval/hauling member is formed from a single length of at least 12mm steel wire.

Referring to Fig. 7i - iii, the terminal coupling unit 27 is a commercially available coupling including: a neck 27a connectable to or integral with the free end of the bungy
10 length 20, and an attachment means 27b for the releasable securement of the tethering cord 23. The free end of the tethering cord 23 is provided with a karabiner 28 for connecting the ankle cuff or harness thereto (not shown). Alternatively the terminal coupling unit 27 may be formed integrally with the bungy 20 by splicing and then plaiting and/or sealing the splice in known manner to form the attachment means
15 27b.

In use, the tethering cord 23 and associated jumper securement means (not shown) are attached to the terminal coupling unit 27 in advance of deployment and the retrieval/hauling member 21 is secured to the retrieval cable 26. The retrieval cable 26
20 is connected to a winching system or alternatively secured for subsequent manual or vehicular tow hauling (not shown).

Upon completion of the jump, the jumper may be lowered to a landing site and released from the jumper securement means or remain suspended therein for retrieval
25 with the deployed bungy (20, Fig. 7i - iii).

Referring to Fig. 7i - iii, a schematic sequence of the mode of operation of the retrieval/hauling member 21 is depicted. To retrieve the deployed bungy length 20, the retrieval/hauling member 21 is attached to the deployed bungy length 20 by the operator such that the perimeter of the bungy is encompassed by the loop element portion 25a and the free end of the loop element 25 is engaged as hereinbefore described. As indicated by Arrow C, Fig. 7(ii), the retrieval/hauling member 21 is run down the deployed bungy length 20 by gravity feed of the retrieval cable 26 or under winch control. The loop element portion 25a is dimensioned to permit free passage of retrieval/hauling member 21 down the length of the bungy 20 and terminal coupling neck 27a, until the loop element portion 25a contacts and engages the terminal coupling attachment means 27b. On engagement, the orientation of the retrieval/hauling member 21 is affected by the docking of loop element portion 25a and terminal coupling attachment means 27b. The base of the terminal coupling attachment means 27b and subsequently the tethering cable 23 pass through the throat junction of the keyhole aperture so that the loop element portion 25b partially encloses tethering cable 23 as depicted in Fig. 7(ii). The karabiner 28 functions as a stop lug to prevent the loop element portion 25b from travelling further and can assist or effect snaring of the tethering cable 23 on the loop element portion 25b.

The winching system is then engaged, or alternatively, the vehicular tow hauling or manual hauling is commenced.

The hauling force indicated by Arrow D, Fig 7(iii), effects the snaring of the tethering cable 23 on the loop element portion 25b. The weight of the terminal coupling unit 27 and connected bungy length 20 ensures that the tethering cable 23 is retained at the base of the loop element portion 25b as shown in Fig. 7(iii) even in conditions of

moderate air turbulence which effect swinging of the bungy length 20 and/or tethering cable 26 hauling continues until the retrieval cable 26, retrieval/hauling member 21 and ensnared deployed bungy length 20 are back above the jump site.

- 5 Optionally, said retrieval cable 26 is connected to a winching system via a friction free eddy current coupling member (e.g. TASC unit) which provides a slipping clutch means for controlling the rate of descent and ascent and/or braking of the retrieval cable 26.
- 10 To release the terminal coupling unit 27 from the retrieval/hauling member 21, the free end of the loop element portion 25a is dis-engaged as hereinbefore described by the operator and the tethering cable 23 is released from the cavity of the loop element 25 in known manner.
- 15 The second loop element portion 25b need not be of a substantially 'U' shape but may be formed as a substantially 'V', 'W', 'C' or other suitable shape wherein the width of the cavity or portion thereof is relatively smaller than that of the first loop element portion. It will also be appreciated that the securement means of the suspension element 24 may be a catch mechanism biased to the locking position or a screw
- 20 sleeve engageable with the free end of the loop element 25 (not shown).

Referring to Fig.s 9-13 and Fig. 14, a third preferred embodiment of the two essential components of the retrieval equipment for deployed bungy, a retrieval/hauling member 49 and a terminal coupling unit 44 is thereshown.

With particular reference to Figs 11 & 14, the terminal coupling unit 44 comprises a bracket 45 supporting a tubular housing in the form of spool 46, and a ring 47. The bracket 45 is funnel-shaped in appearance. In use, a webbing sling or tethering rope (not shown) is connected to the terminal coupling unit 44 by feeding the webbing or rope length through the bracket aperture 45a, the central spool cavity 46a and bracket aperture 45b respectively and then securing the free ends in known manner. A coupling such as a karabiner is attached to the webbing sling or tethering rope for subsequent connection of the bungy and the harness or ankle cuff.

10 The wall defining the central aperture of the ring 47 is formed with a continuous beveled lower lip 47b which functions as a guide means for the passage of the retrieval/hauling member and/or provides a contact point for the inter-engagement with the retrieval/hauling member to initiate retrieval of the deployed bungy as hereinafter described in detail. Preferably, the ring 47 is removable for maintenance or
15 replacement.

With reference to Fig. 14, the modified terminal coupling unit 44 further carries a series of retractable spring mechanisms 63 and a manual override mechanism 64. Each retractable spring mechanism includes a catch 63a & b that is pivotably secured to the internal wall of the bracket 45. Each catch 63a & b is capable of moving between the
20 illustrated extended locking position and a retracted position wherein the catch head 63a moves towards the bracket 45 in the direction of Arrow B by compression of the tensioned spring 63c effected by the pivotal movement about the pivot pin 65. The spring 63c biases the catch 63a & b to the extended position.

25

The manual override mechanism 64 comprises a cable 66 and a pull-down over-centre

lever 67. The bracket 45 is fitted with a padded, open ended sleeve 68 which provides a surface for rigid securement of the lever 67 and advantageously acts as a shock absorber dampening the resultant engagement jolt being transmitted onto the jumper when the terminal coupling unit 44 docks with the retrieval/hauling member 49 as hereinafter described. The cable 66 is threaded through the apertures adjacent the tail portion of each catch 63b and the free ends are secured to the lever 67 in known manner. The cable 66 provides an interconnecting linkage between all the tail portions 63b. Whenever the lever 67 is depressed in the direction of Arrow B', the tension on the cable 66 increases effecting pivoting of the catches 63a & b and compression of the spring 63c such that the spring biased is overridden and the catches are all retained in the retracted position. The spring bias can be re-engaged upon release of the lever 67 as illustrated. It will be appreciated that a rotatable ring provided with a series of equi-distantly spaced peripheral projections aligned to abut and effect pivoting of the catches 63a & b when the lever 67 is depressed may be substituted for the tensioned cable 66.

With reference to Fig.s 9, 12, 13 & 14, the retrieval/hauling member 49 comprises a releasable split collar 50 and a set of suspension lugs 51, 52. The collar 50 consists of two mirror image substantially crescent shaped sections 53, 54, secured to each other at one end thereof by means of a set of spaced hinges 55. The sections 53, 54 are releasably secured at the opposing ends by a series of external over-centre latch mechanisms 56, 57. Each latch mechanism 56 or 57 comprises a pair of lugs 59, and a releasable latch 58. A lining composed of a low friction material is provided on the internal rim of each section 53a, 54a and walls defining the throat of the retrieval hauling member 49. The rim lining 53a, 54a provides a surface area for resting and drapage of the bungy length during hauling and after retrieval, respectively. The throat

lining reduces the incidence of abrasive damage to the bungy resulting from repetitive retrieval.

In the open position as depicted in Fig. 9, the latches 58 are disengaged from the lugs 59 and the collar 50 is opened via the articulation of the sections 53, 54 about the hinges 55. To close the collar 50, the free ends of the sections 53, 54 are pulled adjacent whereby the lugs 59 are aligned and the latches 58 are engaged therewith. It will be appreciated that the split collar 50 may be releasably secured by alternate known mechanisms such as bolts, locking pins or similar releasable couplings and/or these mechanisms or over-centre latches may also be used in place of the hinges 55 to split open the collar 50.

In the closed position as depicted in Fig.s 11 and 14, the secured collar 50 is formed with a central throat aperture having rim lining 53a, 54a adjacent the top opening. The external wall of the nose portion 50a is inwardly inclined to function as a contact guide for inter-engagement with the terminal coupling unit 44 to initiate retrieval of the deployed bungy as hereinafter described.

Referring specifically to Fig.s 9, 11, 12 & 13, each section 53, 54 has a plurality of retractable spring mechanisms 60, 61. With particular reference to Fig.s 11, 12 & 13, each mechanism comprises a catch 60 capable of moving between an extended locking position as shown in Fig 11 and as indicated by Arrow D, Fig 12, and a retracted position (indicated by Arrow E, Fig 12) wherein the catch 60 recedes within a dimensioned slot 61. Each catch 60 is pivotally secured within the base of the slot by bolt 61a (Fig. 11 only) and sprung biased by a compression spring 60a to the extended position wherein the catch arm 60b protrudes from the slot 61.

Referring specifically to Fig. 14, each section 53, 54 of the modified retrieval/hauling member 49 includes a nose step 50b on the external wall of the nose portion 50a in place of the retractable spring mechanisms (60, 61; Fig.s 9, 11, 12 & 13) as a contact
5 point for inter-engagement with the modified terminal coupling unit 44 to initiate retrieval of the deployed bungy as hereinafter described in detail.

Referring to Fig.s 9-13 & 14, in use, the retrieval/hauling member 49 is attached to the retrieval cable by securing a webbing sling through the apertures of the suspension
10 lugs 51, 52 and using a coupling device to connect the webbing sling to the retrieval cable (not shown). The free end of the bungy is attached to the terminal coupling unit 44 as hereinbefore described and the retrieval cable is connected to a winching system such as a crane operated winch, vehicular winch or windlass (not shown). Alternatively, the retrieval cable is secured for subsequent manual or vehicular tow
15 hauling.

Upon completion of the jump, the jumper may be lowered to a landing site and released from the harness or ankle cuff or remain suspended secured therein for retrieval with the deployed bungy. Jump site crew open the collar 50 and enclose the
20 collar around the bungy by closing the sections 53, 54 around the bungy as hereinbefore described. It will be appreciated that where the retrieval cable is securely tied off or controlled by the winching system, the retrieval/hauling member 49 may be placed on the bungy length adjacent the top at jump set-up and returned to that position after the bungy has been deployed and subsequently retrieved (i.e. between
25 consecutive jumps). The throat lining of the collar 50 prevents abrasive damage and restricts the degree of movement of the bungy length within the throat aperture.

To retrieve the bungy, the retrieval/hauling member 49 is run down the deployed bungy length by gravity feed of the retrieval cable or under winch control until the nose portion 50a contacts the ring 47 of the terminal coupling unit 44. The inclined shape of the nose portion 50a and lower beveled lip of the ring 47 guides the retrieval/hauling member 49 into the throat aperture of the terminal coupling unit 44.

Referring specifically to Fig.s 9-13, each catch 60 recedes into its respective slot 61 as a portion of the ring 47 contacts the catch arm 60b (i.e. said contact overrides the bias of the compression spring 60a). When the contact ceases as the retrieval/hauling member 49 continues to fall, the catch 60 returns to the extended position. The inclined sides of the bracket 44 restrict lateral movement of the nose portion 50a. The terminal coupling unit 44 contacts and docks with the spring locking mechanisms 60, 61 when the lower lip of the ring 47 becomes seated on and supported by the stop rest of each catch (60c, Fig.s 12 & 13). The weight of the bungy and the sprung bias of the catches 60 maintains the docked inter-engagement position of the retrieval/hauling member 49 within the throat of the terminal coupling unit 44.

With specific reference to Fig. 14, the nose step 50b contacts and docks with the spring mechanisms 63. Docking is achieved by the inter-engagement of each catch head 63a with a portion of the peripheral nose step 50b:- the nose portion 50a descends into the throat aperture of the modified terminal coupling unit 44; the nose step 50b contacts and pivots the catches 63a & b in the direction of Arrow B, overriding the bias of the spring 63c; the catches 63a & b spring back into the illustrated extended locking position wherein each catch head 63a supports and releasably retains the peripheral nose step 50b. The weight of the bungy and spring

bias of the catches 63a & b maintain the docked inter-engagement locking position of the modified retrieval/hauling member 49 within the throat of the modified terminal coupling unit 44.

5 With reference to Figs 9-13 & 14 in general, the winching system is then engaged, or alternatively, the vehicular tow hauling or manual hauling is commenced until the retrieval cable, deployed bungy length, and docked retrieval/hauling member 49 and terminal coupling unit 44 are back above the jump site within the arms reach of the operator. Preferably, said retrieval cable is connected to winching system via a
10 friction-free eddy current coupling member (e.g. a TASC unit) which provides a slipping clutch control such that the operator can brake and/or control the rate of descent and ascent of the retrieval/hauling member 49. To release the terminal coupling unit 44 from the retrieval/hauling member 49, the lever 67, (Fig.14) is depressed to simultaneously override the spring bias of the catches 63a & b, or the
15 collar 50, (Fig. 11) is opened and the sections 53, 54 are separated.

Whilst the terminal coupling unit (44, Figs 9-13 & 14) has been depicted in described as a substantially open structure, it will be appreciated that the body of the terminal coupling unit may be formed as an open ended substantially cylindrical structure
20 incorporating a means to releasably secure the face end of the bungy and means to connect the harness or ankle cuffs thereto. Similarly, the retrieval/hauling member 49 may be formed in any desired polygonal or substantially cylindrical shape wherein the aperture is concentric or offset as shown in Fig. 16. Further, it will be appreciated that the collar 50 need not be formed in two releasable sections (51, 52), it could be a
25 closed cylinder, so that in use the bungy length would be manually fed through the aperture of the collar 50 (not shown). Similarly, it will be appreciated that the collar 50

need not split completely in half as depicted but may merely include a releasable section having a sufficient opening to allow egress of the bungy length. It will further be appreciated that either the terminal coupling unit or the retrieval/hauling member may be provided with the releasable retaining means biased to a locking position as
5 illustrated in Fig. 14 and Figs 9-13 respectively.

In a fourth embodiment of the present invention, the retrieval equipment further includes a retaining device (29, Fig 8) to support a terminal coupling unit (2, Figs 1-3; 27, Fig. 7; 44, Fig.s 10 & 11 or 14) and to take the weight of the bungy prior to jump
10 set-up or following dis-engagement from the retrieval/hauling member (8, Fig.s 2 & 3 or 4; 21, Fig.s 5 –7iii; 49, Fig.s 10 & 11 or 14).

As shown in Fig. 8, a retaining device 29 comprises a fixed arm 30, which is secured to a strong point such as a hand rail 31 of the jump platform 32. A pivotable arm 33 is
15 pivoted to the fixed arm 30 at a pivot 34, and the two arms are biased towards each other (i.e. to the closed position shown in Fig. 8) by a spring (not visible).

The free end of each arm 30, 33 is cut away to form a shaped intake 35 terminating in a line 36 along which arm 33 closes tightly on arm 30. The opposing surfaces of the
20 arms between the pivot 34 and the contact line 36 are cut away somewhat to form a slot 37 for reception of a tethering loop as hereinafter described.

The pivotable arm 33 is formed with a cranked handle portion 38 at the end of the arm 33 furthest from the intake 35.

To support the terminal coupling unit 2, a tethering loop 39 is threaded around the tethering bar 5 (or in the case of the terminal coupling unit 44, the loop 39 is attached onto the webbing sling coupling or threaded around the spool 46) and part of the loop is slid into the intake 35 and pushed into the slot 37. The loop is retained in the slot 37 by the biasing force pressing the two arms together along the contact line 36. The loop 39 can be released from the slot 37 manually, by rotating the handle 38 in the direction of Arrow C. Alternatively, the pressure of the spring bias in the arms 33, 30 together may be adjusted so that the loop 39 is released automatically if the force on the loop exceeds a predetermined amount, for example, the force exerted by a jumper jumping.

Fig. 8 shows the retaining device 29 arranged to support the weight of a bungy 40 prior to jump setup. The terminal coupling unit 2 (only the inner part of which is shown) or 44 is directly or indirectly attached to the end of the bungy 40, and also is attached to a jumper's ankle cuffs 41 by a tethering rope 42 or webbing sling and a karabiner 43. This allows the weight of the bungy to be taken of the ankle cuffs during setup, and when the jumper jumps, either the loop 39 is released manually, is described above, or is automatically pulled from between the arms 30, 33.

Whilst the retaining means has been described as being capable of supporting the terminal coupling unit 2 or 44 when it is dis-engaged from the retrieval hauling member 8 or 49, it will be appreciated that the retaining means also may be adapted to support an engaged terminal coupling unit 2 or 44.

CLAIMS:

1. Retrieval equipment for a deployed bungy comprising: a retrieval/hauling member provided with an aperture for receipt of said bungy; a terminal coupling unit connectable to or integral with the free end of the bungy; and
5 means to attach said retrieval/hauling member to a retrieval cable; said retrieval/hauling member being releasably engageable with said terminal coupling unit.
2. Retrieval equipment as claimed in claim 1 wherein said aperture is a passage
10 through the retrieval/hauling member.
3. Retrieval equipment as claimed in claim 1 or claim 2 wherein said retrieval/hauling member includes a releasable opening.
- 15 4. Retrieval equipment as claimed in any one of claims 1-3 wherein said retrieval/hauling member is substantially symmetrical in cross section and said aperture is substantially concentric with the central axis thereof.
5. Retrieval equipment as claimed in any one of claims 1-3 wherein said aperture
20 is offset relative to the central axis of said retrieval/hauling member.
6. Retrieval equipment as claimed in any one of claims 1-5 wherein the rim of said aperture is rounded or beveled.
- 25 7. Retrieval equipment as claimed in claim 6 wherein at least the rim of said aperture is lined, coated or composed of a low friction material.

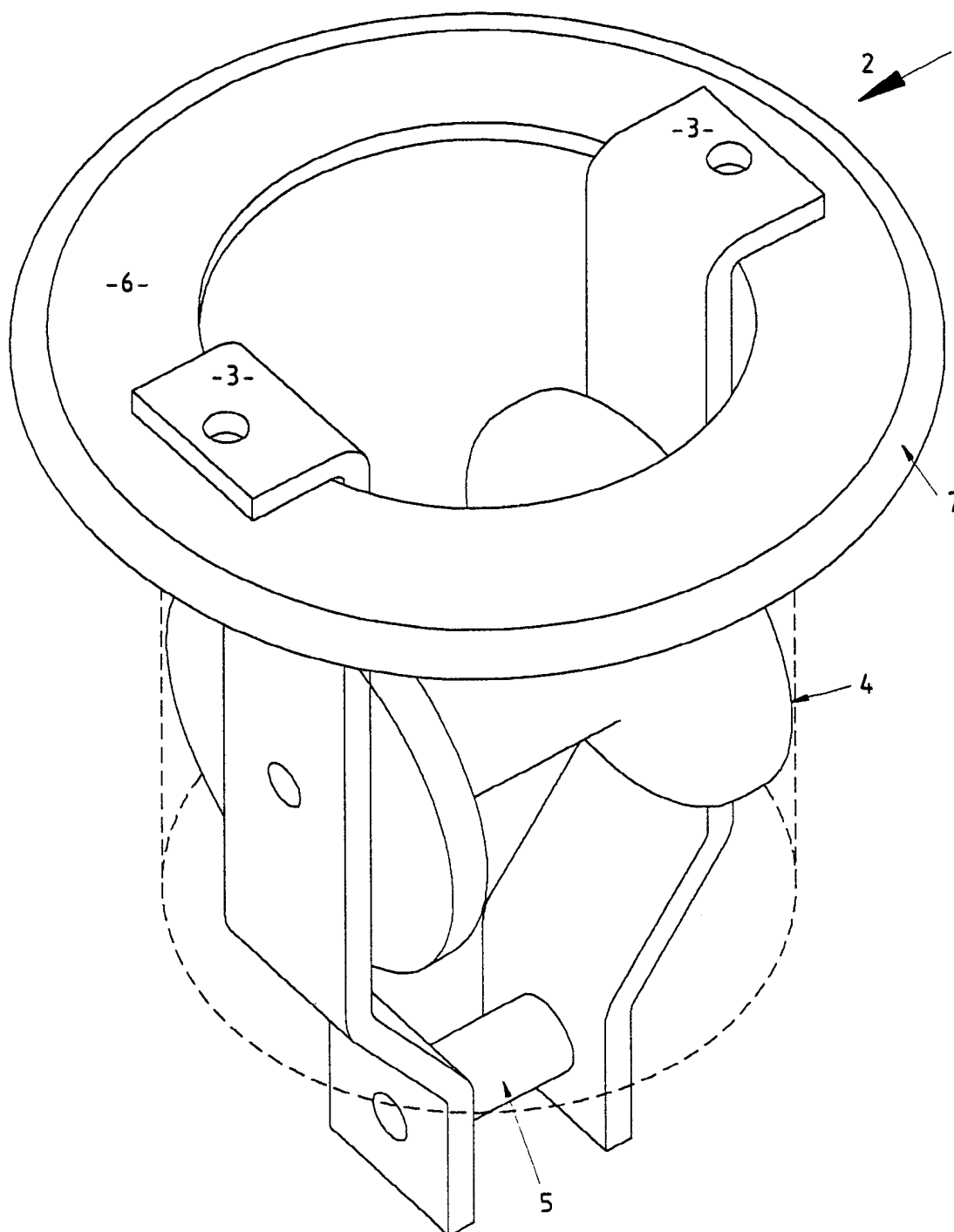
8. Retrieval equipment as claimed in any one of claims 1-7 wherein the retrieval/hauling member at least partially surrounds the terminal coupling unit when in releasable engagement therewith.
- 5 9. Retrieval equipment as claimed in any one of claims 1-7 wherein the retrieval/hauling member is at least partially surrounded by the terminal coupling unit when in releasable engagement therewith.
- 10 10. Retrieval equipment as claimed in any one of claims 1-9 wherein said terminal coupling unit is provided with a continuous peripheral projection adapted to inter-engage with said retrieval/hauling member and/or function as a guide member for the passage of the retrieval/hauling member; and wherein said retrieval/hauling member is a collar comprising a body and an attachment to secure said retrieval/hauling member to a retrieval cable.
- 15 11. Retrieval equipment as claimed in claim 10 wherein said body includes a retractable retaining mechanism biased to a locking position.
- 20 12. Retrieval equipment as claimed in claim 10 wherein said terminal coupling unit includes a retractable retaining mechanism biased to a locking position and said body is adapted to inter-engage with said retractable retaining mechanism.
- 25 13. Retrieval equipment as claimed in claim 11 or 12 wherein said retractable retaining mechanism is a series of retractable catches.

14. Retrieval equipment as claimed in claim 13 wherein the retractable retaining mechanism further includes a release mechanism to override and engage the said locking bias.
- 5 15. Retrieval equipment as claimed in any one of claims 10-14 wherein said retrieval/hauling member is moved into the open position by separation of a lockable hinged opening.
- 10 16. Retrieval equipment as claimed in any one of claims 10-15 wherein said attachment is an extension arm connectable to a retrieval cable.
17. Retrieval equipment as claimed in any one of claims 10-15 wherein said attachment is a series of suspension supports connectable to a retrieval cable.
- 15 18. Retrieval equipment as claimed in claim 16 or claim 17 wherein said collar is rotatably secured to said attachment; said collar being capable of orientation in either an upright or an inverted position by rotation through approximately 180 degrees wherein said collar is sprung biased to said upright position.
- 20 19. Retrieval equipment as claimed in any one of claims 1-7 wherein said retrieval/hauling member is provided with a keyhole aperture.
20. Retrieval equipment as claimed in claim 19 wherein said keyhole aperture is formable by releasable securement of a portion of the retrieval/hauling member defining said aperture.
- 25

21. Retrieval equipment as claimed in claim 19 or claim 20 wherein said retrieval/hauling member is formed integrally with said means to attach said retrieval/hauling member to a retrieval cable.
- 5 22. Retrieval equipment as claimed in claim 21 wherein said retrieval/hauling member is formed from a single length of wire.
23. Retrieval equipment as claimed in any one of claims 19-22 wherein said terminal coupling unit includes a length of flexible material.
- 10 24. Retrieval equipment as claimed in any one of claims 10-18 wherein said equipment further includes a retaining device to support the terminal coupling unit prior to jump set-up or following disengagement from said retrieval/hauling member; said retaining device being located adjacent a retrieval and/or jump
- 15 site.
25. Retrieval equipment as claimed in claim 24 wherein said retaining means is a support anchored at one end thereof, and adapted to support said terminal coupling unit.

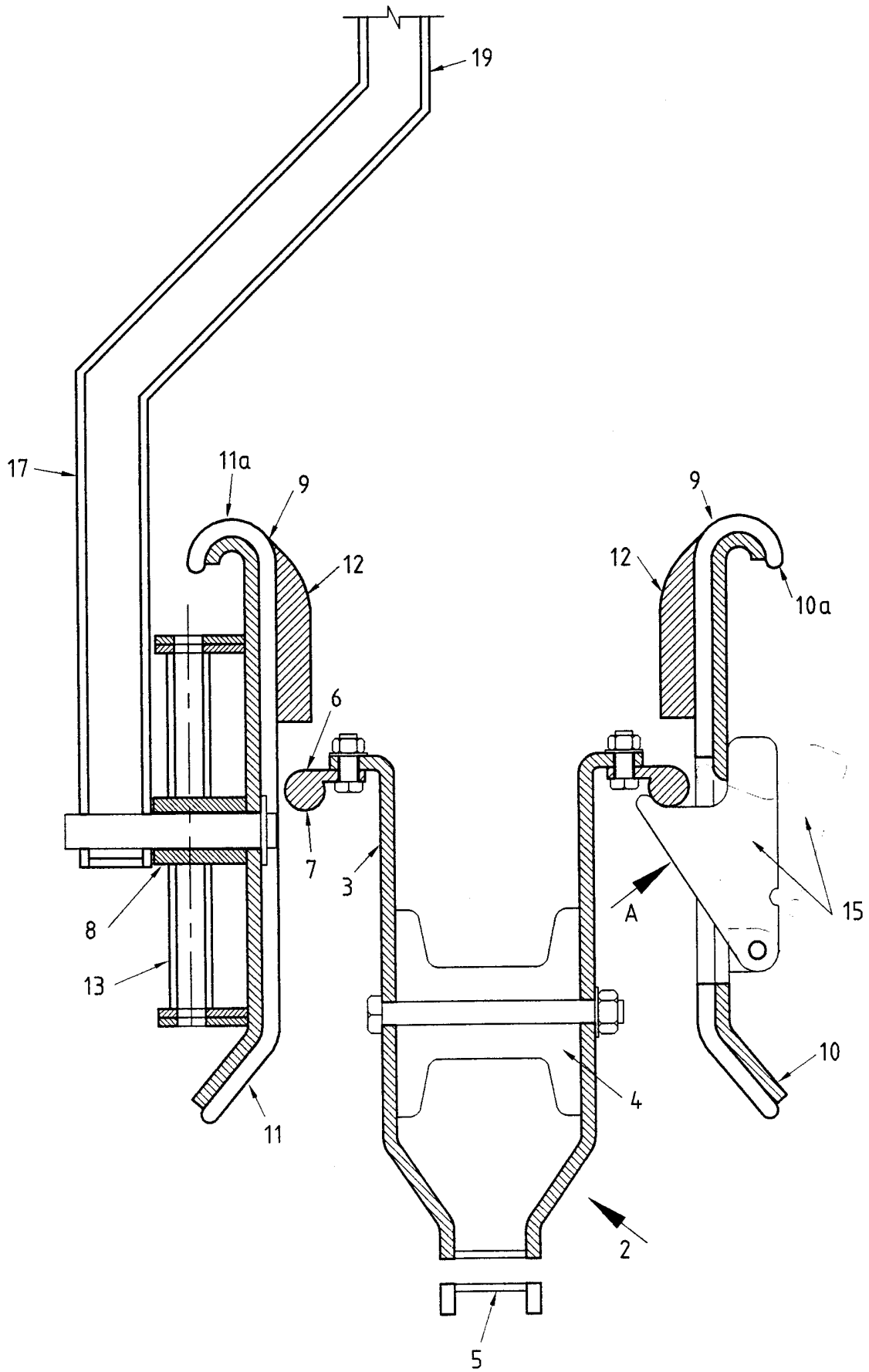
20

Fig 1



2/13

Fig 2



3/13
Fig 3

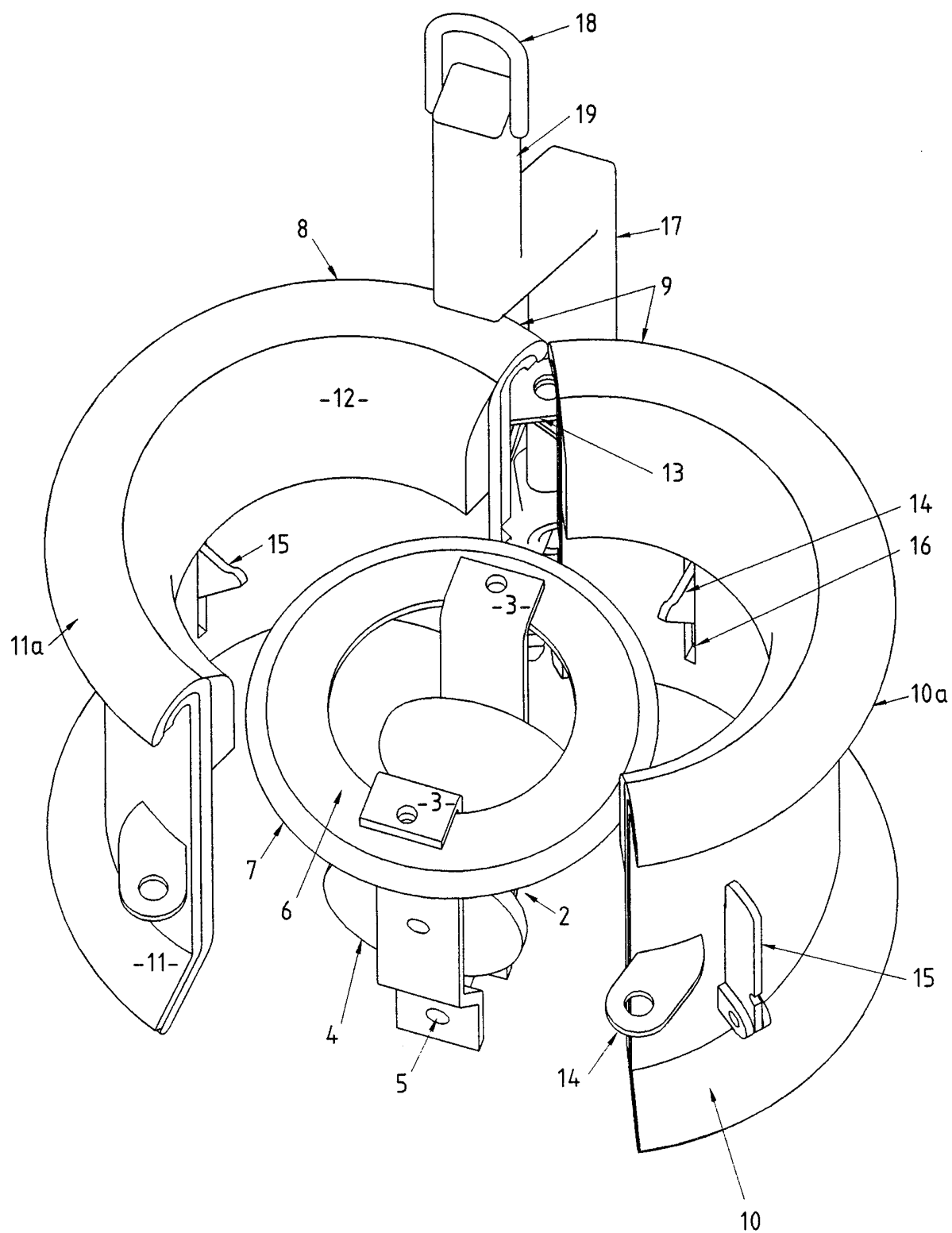
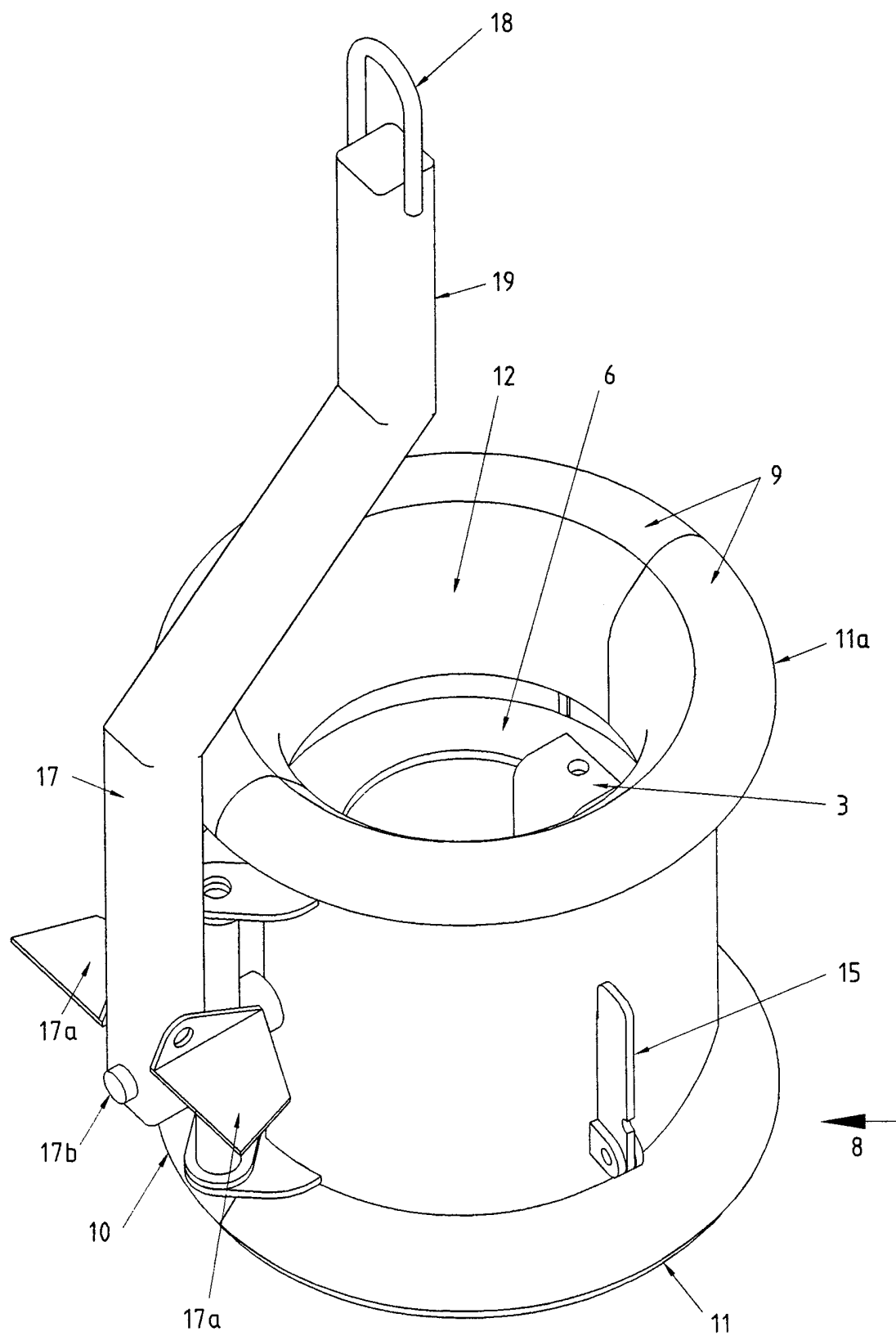


Fig 4



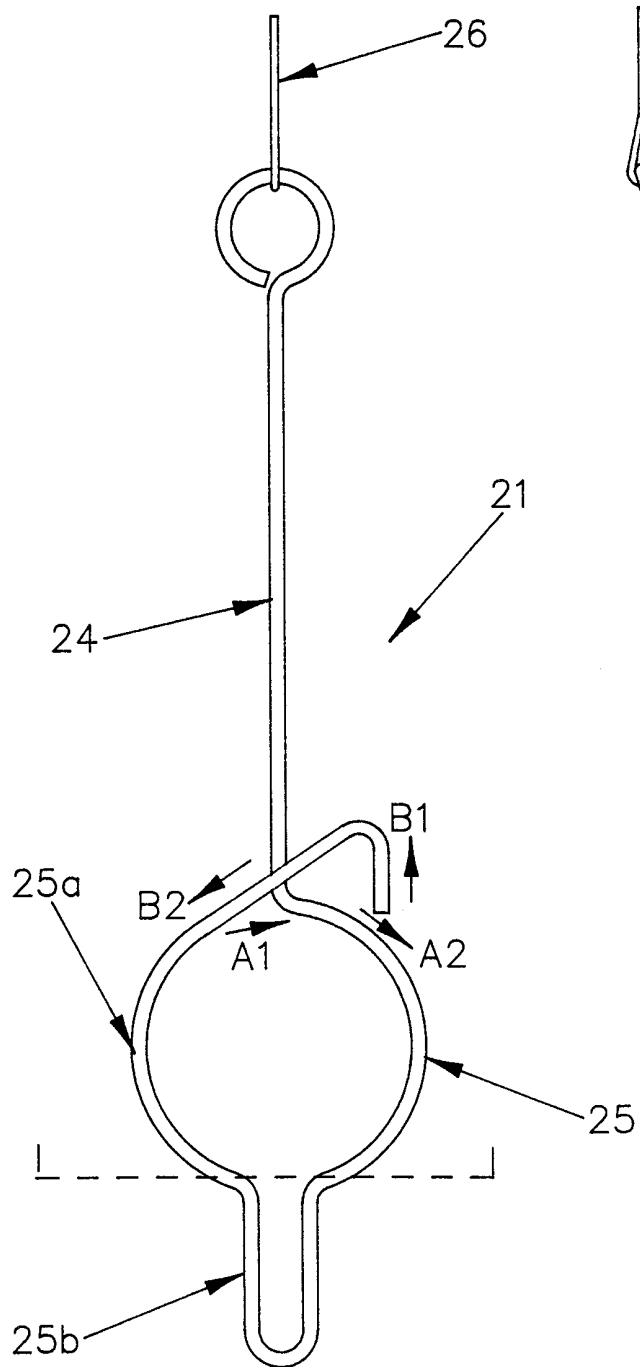


Fig. 5

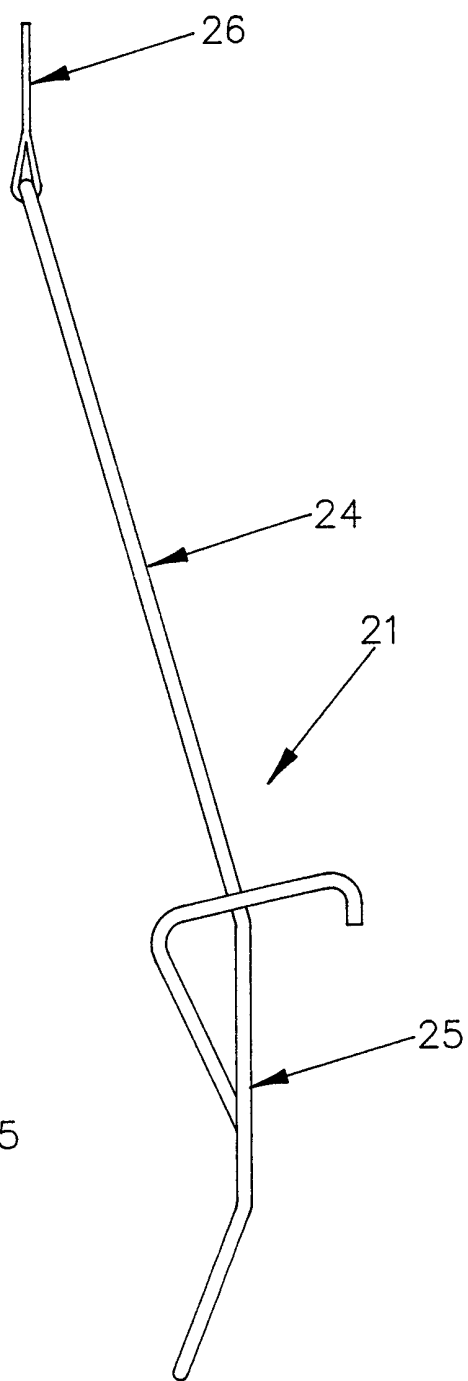


Fig. 6

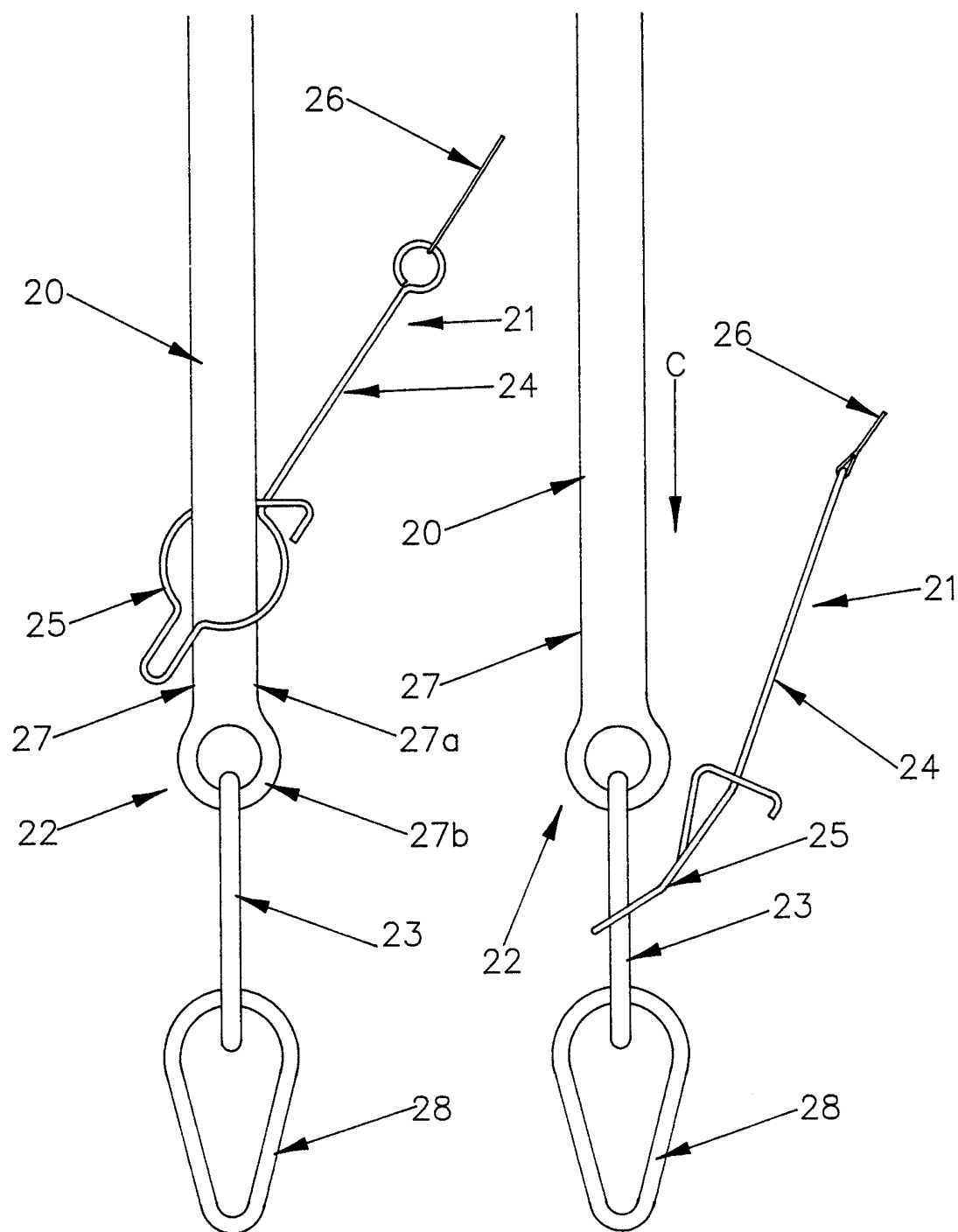


Fig. 7(i)

Fig. 7(ii)

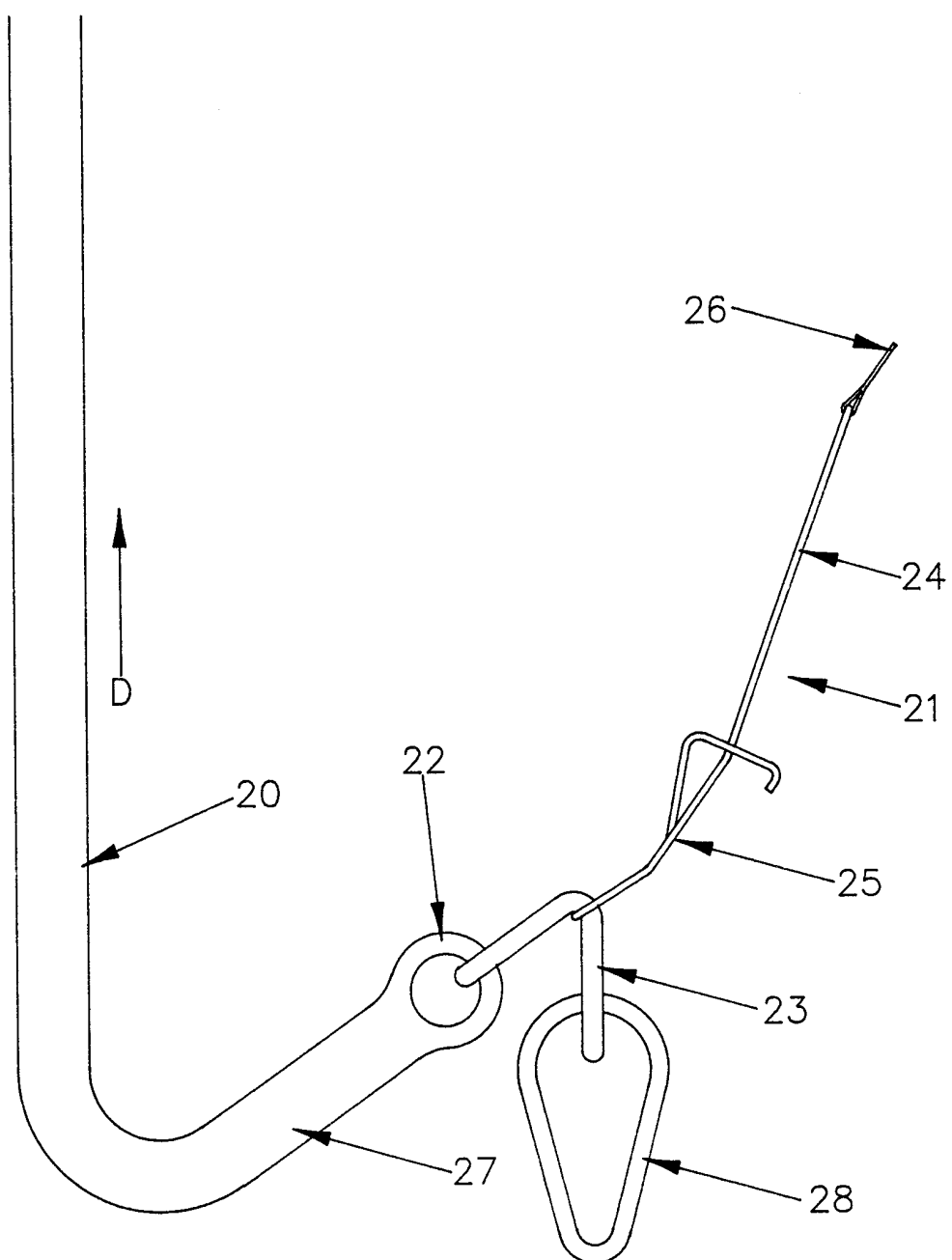
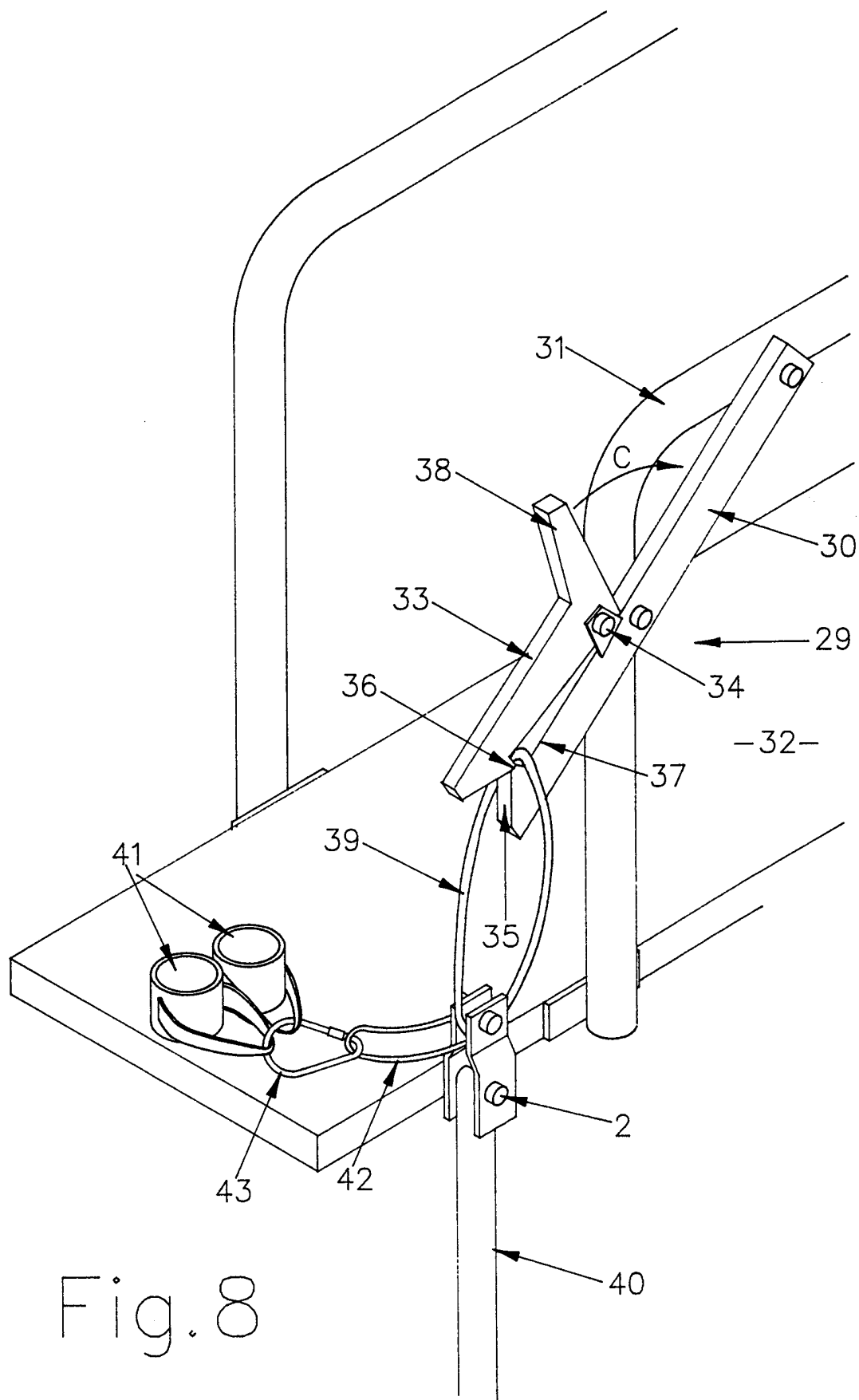
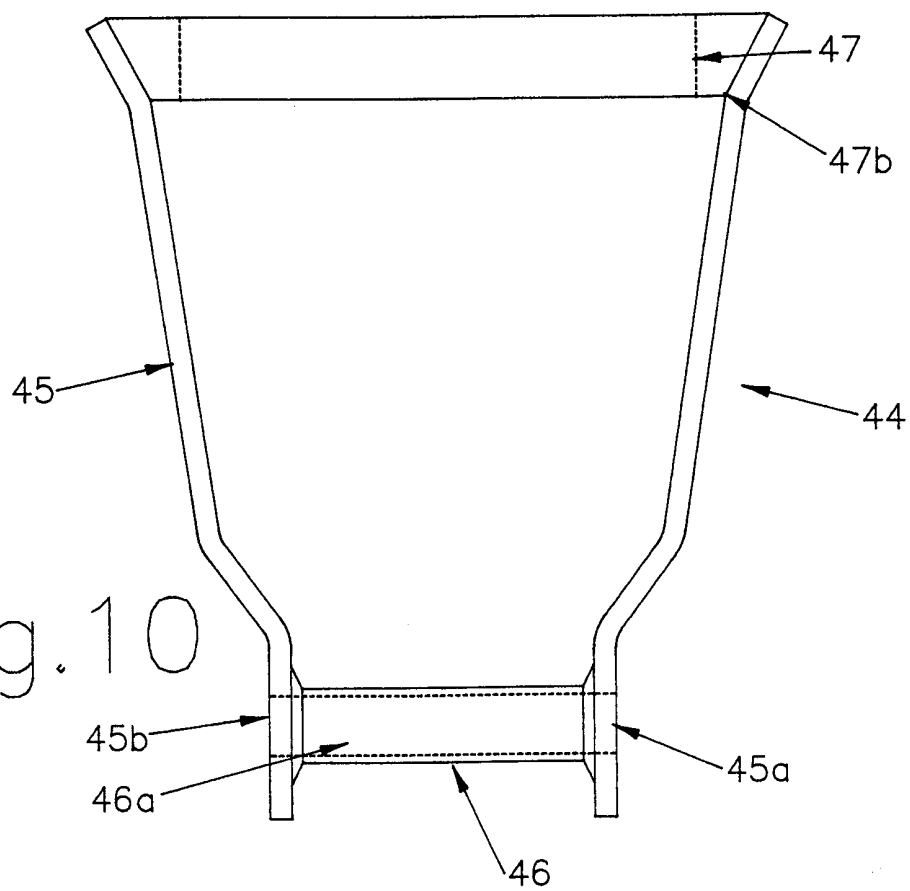
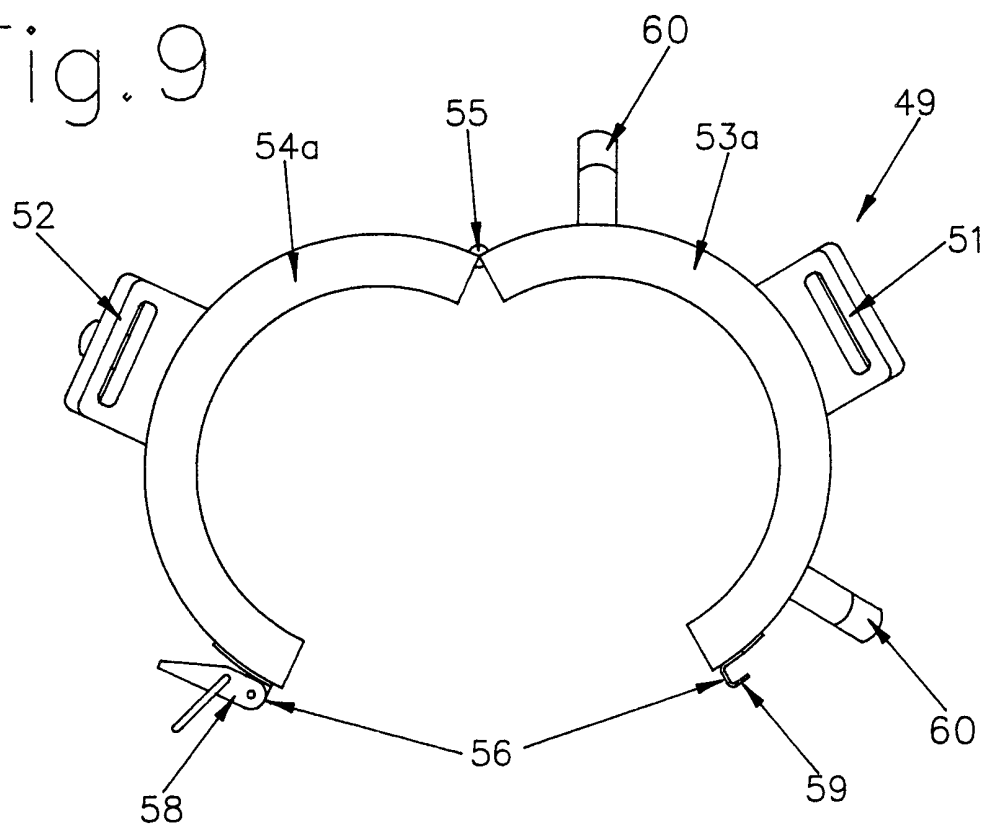


Fig. 7(iii)



9/13

Fig. 9



10/13

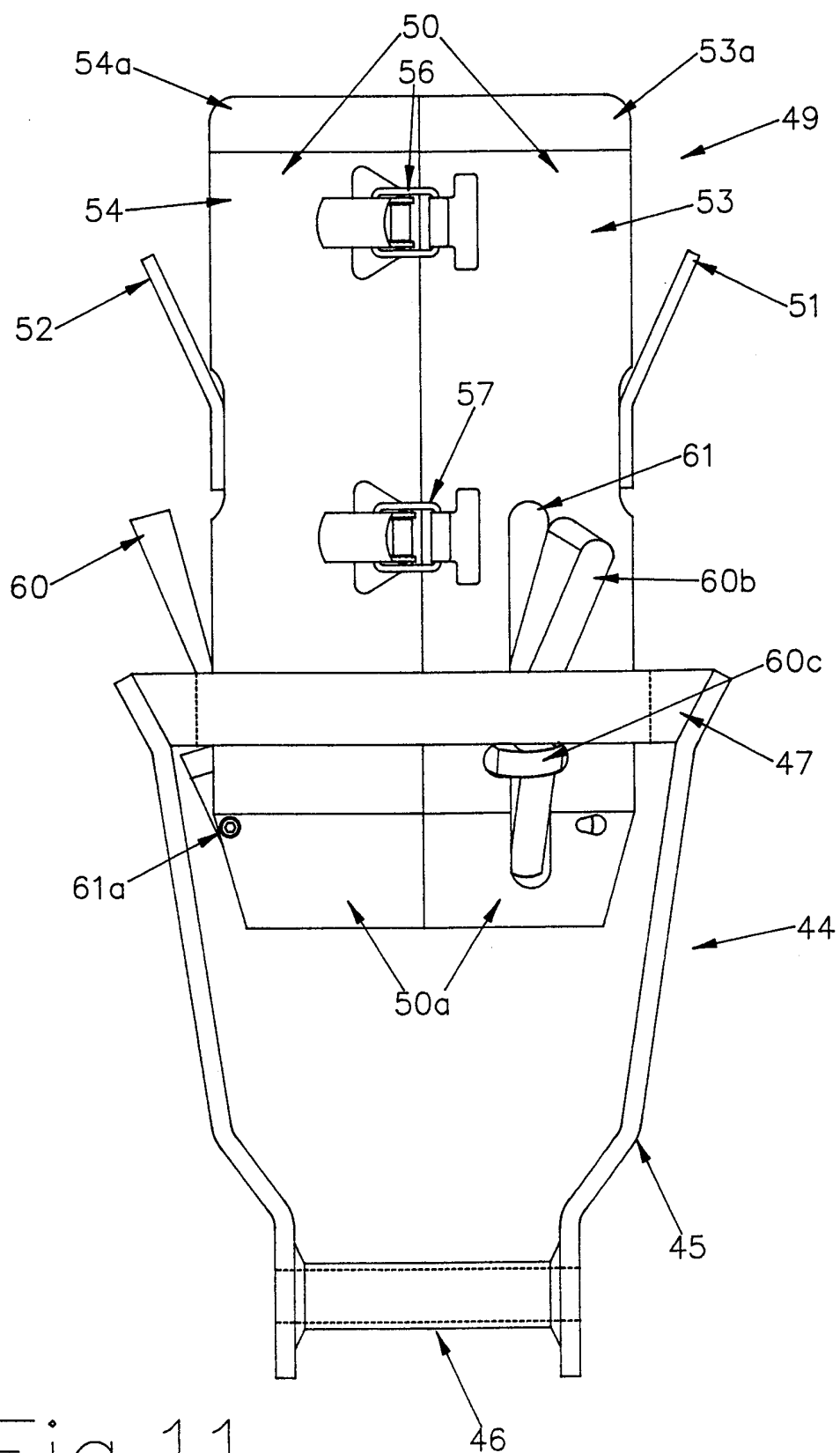


Fig.11

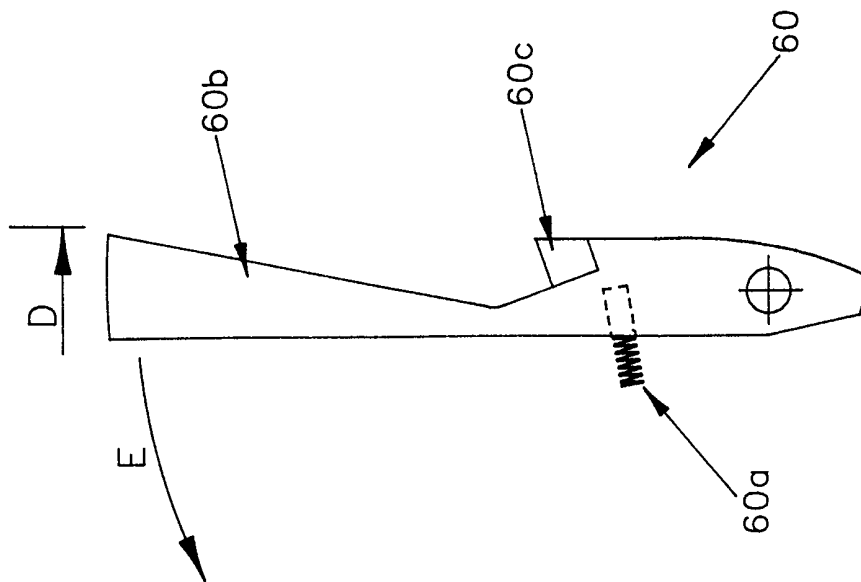


Fig. 12

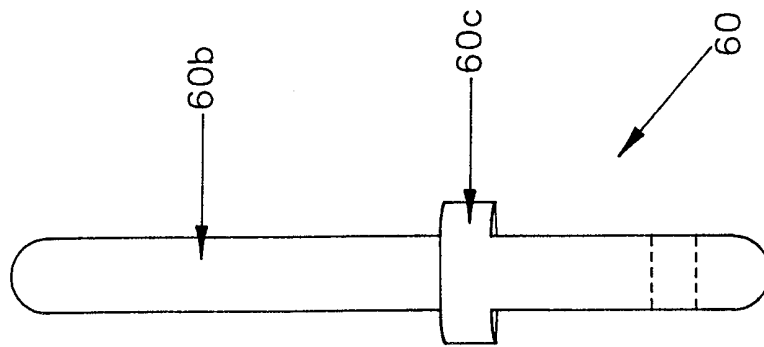
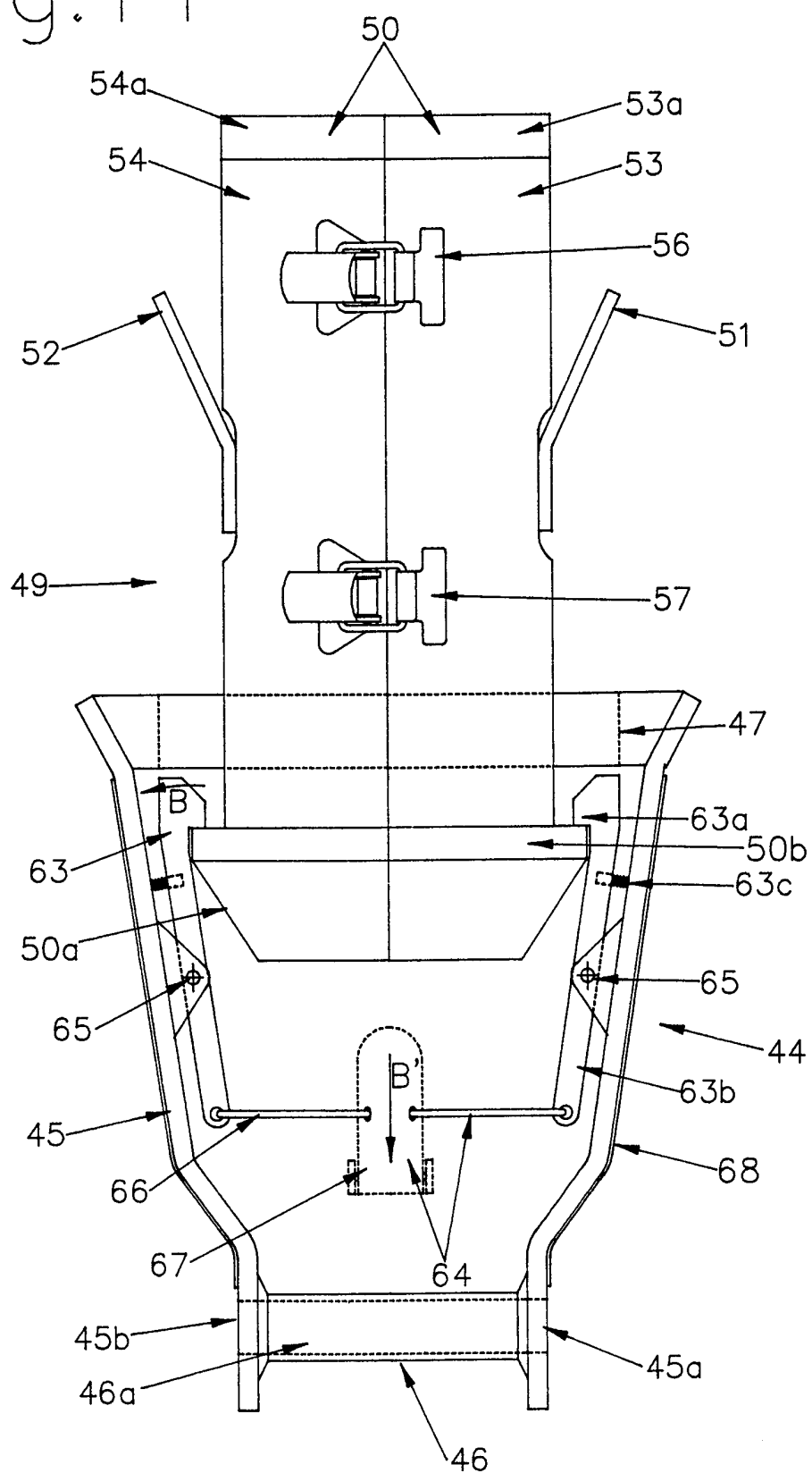


Fig. 13

Fig.14



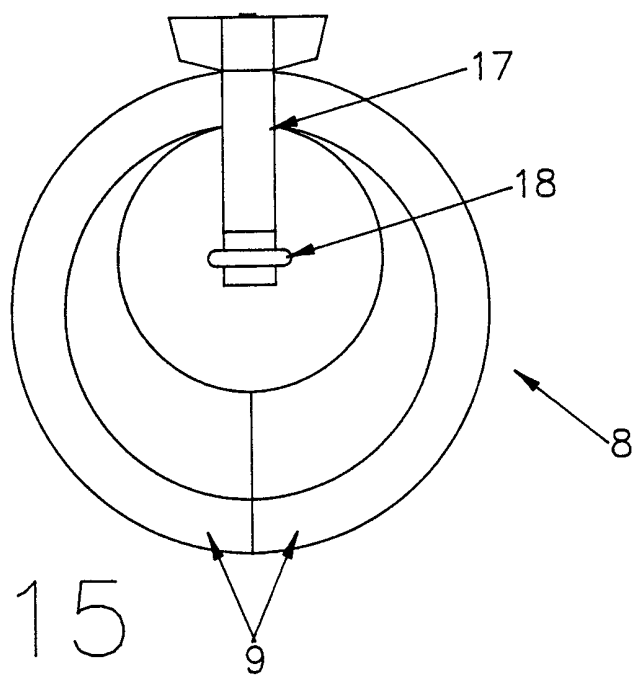


Fig. 15

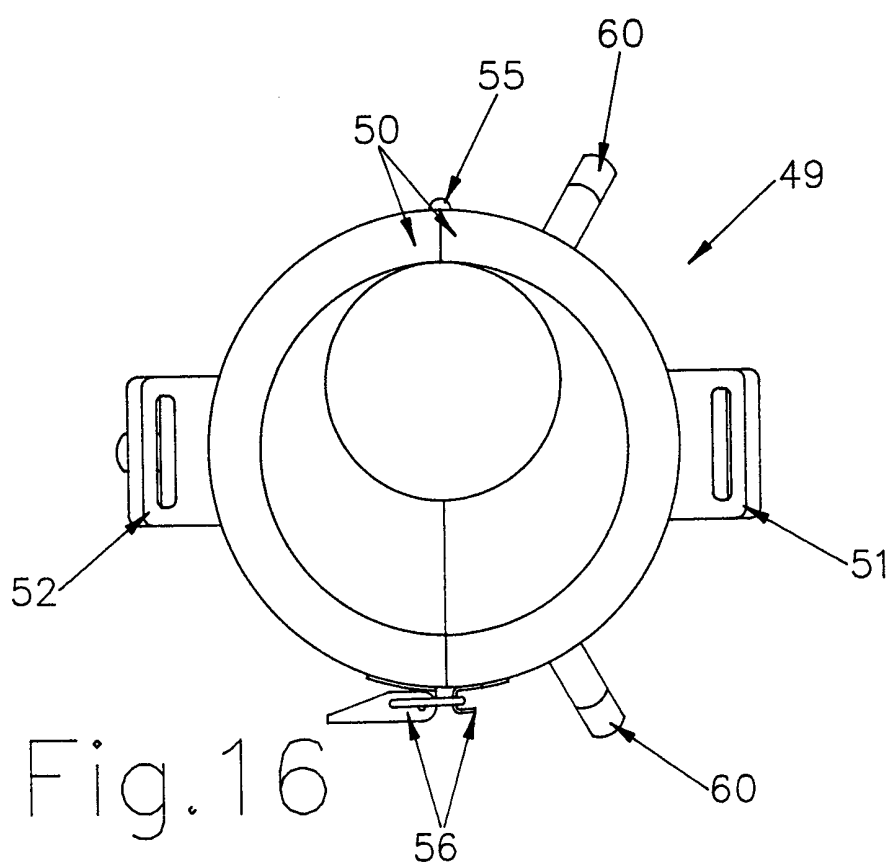


Fig. 16

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NZ 99/00119

A. CLASSIFICATION OF SUBJECT MATTER

Int Cl⁶: A63G 31/00

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)

IPC: A63--

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

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

WPAT: (bungy OR bungee) AND jump

USPTO: (bungy OR bungee) AND jump

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|--|-----------------------|
| A | CA-A-2109908 (Arel) 25 May 1995 See page 15 line 3 to page 17 line 6 | 1 to 25 |
| A | US-A-5094448 (Hackett) 10 March 1992 See figures 4 and 5 | 1 to 25 |

☐ Further documents are listed in the
continuation of Box C

☒ See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search
23 September 1999

Date of mailing of the international search report
- 6 OCT 1999

Name and mailing address of the ISA/AU
AUSTRALIAN PATENT OFFICE
PO BOX 200
WODEN ACT 2606
AUSTRALIA
Facsimile No.: (02) 6285 3929

Authorized officer

Michael Hardy
Telephone No.: (02) 6283 2547

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/NZ 99/00119

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

| Patent Document Cited in Search Report | | Patent Family Member | |
|--|---------|----------------------|--------|
| CA | 2109908 | | |
| US | 5094448 | EP | 380247 |
| END OF ANNEX | | | |