

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
12 January 2006 (12.01.2006)

PCT

(10) International Publication Number
WO 2006/003385 A1

(51) International Patent Classification : **B60P 1/64**,
3/12, 7/08, A61G 3/00

(21) International Application Number:
PCT/GB2005/002546

(22) International Filing Date: 29 June 2005 (29.06.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0414673.4 30 June 2004 (30.06.2004) GB

(71) Applicant (for all designated States except US): **GLIDE-
RITE PRODUCTS LTD** [GB/GB]; Mill Lane, Passfield,
Liphook, Hampshire GU30 7RP (GB).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **LANGRIDGE, John**
[GB/GB]; 2 Rodney Way, Guildford, Surrey GU1 2NY
(GB).

(74) Agent: **TOPLEY, Paul**; Beresford & Co., 16 High Hol-
born, London WC1V 6BX (GB).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,
KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA,
MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ,
OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL,
SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC,
VN, YU, ZA, ZM, ZW.

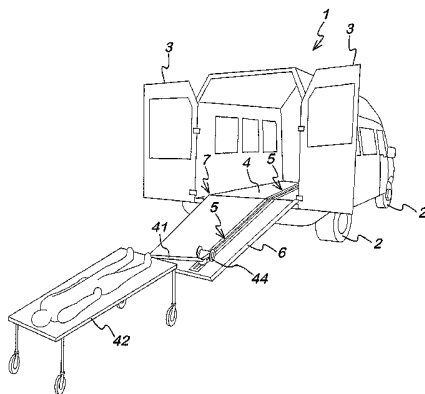
(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM,
ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),
European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,
FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO,
SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN,
GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
amendments

For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.

(54) Title: LOAD HANDLING DEVICE



(57) Abstract: There is described an apparatus for moving a load (42) into a vehicle, the load handling apparatus comprising a track (5) laid in the vehicle load bed (4), along which a traveller (13) is drivable by means of a motor or other actuator. The traveller (13) has a load-engaging element (25) which is movable between a retracted position and an extended position. In the extended position, the element can be attached to a load so that the load can be drawn or pushed by the traveller. The load-engaging element may be entirely within the track (5) when retracted. In the preferred embodiment, the load-engaging element is a ball and the load is provided with an inverted cup (40) which is engagable with the ball (25) to transmit force from the traveller to the load. The loading-engaging element may be moved from its retracted to its extended positions, and vice versa, by cam surfaces (20, 20a, 20b) positioned within the track so as to lift or lower the load-engaging element as the traveller passes along the track. The apparatus is particularly suitable for use in ambulances, for loading and unloading patients from stretchers. An ambulance fitted with the load handling device may comprise a secondary catch (50) device for engaging a rear end of the stretcher as the stretcher is drawn into the ambulance, so as to locate the stretcher in a transit position within the ambulance.

WO 2006/003385 A1

LOAD HANDLING DEVICE

The present invention relates to load handling apparatus, and is particularly concerned with load handling apparatus for use in vehicles, for moving a load onto and off a load bed of the vehicle. Most particularly, the invention is concerned with attaching a load to a traveller running in a track in the vehicle load bed, and bringing a wheeled load into and out of the vehicle by actuating the traveller to move the load across the load bed and optionally also up or down a ramp. The attachment may also be used in buildings for moving a load along a floor, or up a ramp.

A particular application of the invention is in ambulances, in which patients on wheeled stretchers or wheelchairs, or infants in incubators, are required to be brought into the ambulance for transportation to a treatment centre, and must be taken out of the ambulance on arrival. Since the floor inside the ambulance is spaced at a height above the ground surface, the patient and stretcher or incubator must generally be lifted into the vehicle.

It has hitherto been proposed to draw a load along a horizontal surface by attaching the load to an actuator mounted for movement along the surface. However, the attachment and detachment of the load to the actuator have in the past proved cumbersome and difficult to operate.

The present invention seeks to overcome the disadvantages of the prior art, by providing a load handling system for moving a load across a surface by a traveller driven by an actuator, wherein attachment of the load to the traveller is simplified in operation and structure.

A further objective is to provide a load handling system for a vehicle and a vehicle wherein a load is moved onto a horizontal load bed of the vehicle by means of a ramp surface, a traveller being movable along the load bed and optionally also the ramp surface to urge the load into or out of the vehicle.

According to a first aspect of the present invention, a load handling device for moving a load across a surface comprises an elongate recess formed in the surface, a movable traveller received in the recess for movement therealong, actuating means for selectively moving the traveller along the recess, wherein the traveller has a load-engaging element movable between an extended position, wherein the element is cooperable with a complementary element associated with the load permitting attachment of the load to the traveller so that movement of the traveller causes movement of the load, and a retracted position.

The load-engaging element may be positioned entirely within the recess when in its retracted position.

Alternatively, the load-engaging element may project from the recess when in its retracted position.

5 The load handling device may also comprise a disengagement device for disconnecting a load from the load-engaging element. The disengagement device may comprise a movable element mounted on the traveller and engageable with a load to apply a force to disengage the load from the load-engaging element.
10 The movable element may be driven by an actuator mounted on the traveller or mounted adjacent the recess. Alternatively, the load handling device and its complementary element of the load may be so arranged that movement of the load-engaging element to
15 its retracted position causes disengagement of the load-engaging element from the load.

The engagement between the load-engaging element and the load may be maintained by releaseable latching
20 means such as a resilient catch or a magnet mounted in one component and attracted to the other.

Alternatively, the load-engaging element may comprise a stem with an enlarged head, and of the complementary
25 element may comprise a recess into which the head is movable through an undercut opening. Relative lateral movement of the head and the recess after insertion of the head will then bring an "underside" of the head into contact with the edge of the undercut opening,
30 preventing egress of the head. The opening may be of "keyhole" form, with an enlarged end through which the

head may pass and a narrower end which closely surrounds the stem. A "double keyhole" is also foreseen, wherein the opening has an enlarged central part and two opposed narrower end parts. Preferably the end parts of the opening are aligned with the movement directions of the load as the traveller moves along the recess

The surface may be a generally horizontal surface such as a floor in a building or a load bed of a vehicle. It is further foreseen that the surface may be an inclined surface such as a ramp, or may be a combination of horizontal and inclined surfaces.

The recess may be rectilinear in plan view, or may be curved along its length to move and guide the load in a curved path across the surface.

In a preferred embodiment, the recess is provided in a vehicle load bed such as a floor of an ambulance, and has a section extending longitudinally of the vehicle for leading a load such as a stretcher into and out of the ambulance. At a forward end of the longitudinally-extending section of the recess, a transversely extending section is arranged in order to move the forward end of the stretcher toward the side after the stretcher has been drawn into the interior of the ambulance. Preferably the recess is smoothly curved so that the traveller may move along the longitudinally-extending section and into the transversely-extending section smoothly.

In a further development of this embodiment, the ambulance floor or vehicle load bed may be provided with a releasable catching means which engages a rear end of the stretcher or load, substantially at the same time as the traveller moves from the longitudinally-extending section to the transversely-extending section of the recess. As the traveller moves along the transversely-extending section of the recess to draw the forward end of the stretcher towards the side of the vehicle, the catching means is operated to draw the rear end of the stretcher towards the same side of the vehicle. When the stretcher has reached its final position alongside a side wall of the ambulance, releasable latching means may be engaged between the ambulance floor and the stretcher to hold the stretcher in place during transit.

Preferably, the load is provided with wheels or runners such as skids or "Caterpillar" tracks to facilitate its movement and to reduce the power requirement for the actuator. Alternatively, the load bed and/or ramp surface may be provided with rails, rollers or other friction-reducing structures, to facilitate movement of the load over the ramp surface and/or load bed.

In one embodiment, the ramp surface is pivotally mounted to a vehicle adjacent an end of the vehicle's load bed, and is movable between a stowed position wherein the ramp surface is substantially

perpendicular to the load bed, and a deployed position wherein the ramp surface extends from the load bed of the vehicle to the ground.

5 The ramp surface may comprise a first ramp portion pivotally mounted to the load bed and a second ramp portion pivotally mounted to the first ramp portion, the arrangement being such that in the stowed position the first and second ramp portions are substantially
10 perpendicular to the load bed, and in the deployed position the first ramp surface extends beyond the load bed, and the second ramp portion extends from the first ramp portion to the ground.

15 In an alternative embodiment, the ramp may comprise a fixed inclined surface extending downwardly from the load bed, and a ramp component of substantially triangular section pivotally attached to the lower end of the fixed inclined surface, the ramp component
20 having a stowed position in which it overlies the fixed inclined surface and a deployed position in which it extends from the fixed inclined surface to the ground. Preferably the ramp component is so arranged that in its stowed position it provides a
25 horizontal continuation of the load bed above the fixed inclined surface.

The load handling system preferably comprises a first elongated track portion extending substantially in the
30 plane of the load bed, and a second track portion extending across the ramp surface in alignment with

the first track portion. A traveller is mounted to the track so as to be movable from a position within the load bed to a position adjacent the end of the ramp surface remote from the load bed. The traveller is provided with an engagement means cooperable with the load, for releaseably securing the load to the traveller.

The engagement means of the traveller preferably takes the form of a shaft mounted to the traveller for axial movement generally perpendicularly to the direction of the track, the shaft having at one end a ball for engagement with a socket provided on the load. In alternative embodiments, the engagement means may comprise a hook pivotally mounted to the traveller for movement between a retracted position in which the hook is received within the track and an extended position in which the hook extends out of the track and is engageable by a loop or bar on the load. In a yet further embodiment, the engagement means of the traveller may be a socket engageable by a ball mounted to the load.

A second aspect of the invention provides a vehicle having a load bed provided with a track along which a traveller is selectively movable.

A further aspect of the invention provides a combination of a vehicle and a wheeled load, the load of being movable into and out of the vehicle by means of a track and a traveller, and a transit position for

the load being defined in the vehicle so that the load is drawn into the vehicle and placed in the transit position by movement of the traveller along the track. In a development of this aspect, a secondary load-engagement device may be provided in the vehicle to engage the load at a point remote from the traveller, in order to guide the load into the final transit position. The vehicle may be further provided with restraining devices or latches to retain the load in the transit position, particularly in the case where the vehicle is an ambulance and the load to be transported is a stretcher, incubator or the like.

The present invention thus provides a means for moving a wheeled load into and out of the vehicle without the need for an attendant to manhandle or support the load at any time during the transfer operation. While the invention will be described principally in relation to patient handling apparatus for use in ambulances, it is to be understood that the system is applicable to the handling of other loads, and may be used in other types of vehicle such as trains, aircraft, ships and boats, or hovercraft.

Embodiments of the present invention will now be described in detail with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a vehicle load bed and a ramp surface provided with the load handling

apparatus of the present invention, with a stretcher engaged on the traveller;

5 Figure 2 is a schematic side view showing the track and traveller of Figure 1 in a first position with the traveller adjacent the end of the ramp;

Figure 3 is a view similar to figure 2, showing the traveller at the end of the ramp;

10

Figure 4 is a view similar to figures 2 and 3, showing the stretcher attached to the traveller;

15

Figure 5 is a schematic side view showing the release of the stretcher from the traveller.

Figure 6 is a schematic perspective view of an ambulance and stretcher according to a further embodiment of the invention.

20

Referring now to figure 1, there is seen a vehicle 1 supported by wheels 2 and having a rear opening with loading doors 3. The vehicle has a load bed 4, into which is set a track 5 extending longitudinally of the vehicle to the rear end of the load bed. At the rear end of the load bed 4, a ramp 6 is pivotally mounted to the load bed by means of a pivot 7. The ramp 6 is pivotally movable between a stowed position in which the ramp 6 is substantially vertical, and a deployed position seen in figure 1 in which the ramp 6 extends from the end of load bed 4 to the ground beyond the

25

30

rear end of the vehicle 1. Ramp 6 may be a simple metal plate divided into left and right halves by a slot 8 and having a channel section attached to the undersides of the left and right halves to form an extension of the track 5. Alternatively, the ramp 6 may be a box section, and the track 5 may be built into the box section. The edges of the ramp may be provided with low sidewalls upstanding from the upper surface of the ramp. Alternative materials for the ramp may include glass-reinforced plastics, composite materials, wood, etc.

Extending along the load bed 4 in the longitudinal direction of the vehicle, and preferably on the vehicle centerline, is a track 5 comprising a channel situated below the load bed 4, with an open side of the channel accessible via a slot in the load bed 4. The load bed may be provided with a number of tracks extending toward and away from a loading station such as a door in the vehicle, or extending from one part of the load bed to another.

An end portion of the track 5 is shown in side view in Figure 2. The track comprises a pair of side walls 10, joined by a base 11 and in-turned at their upper edges to form a flange 12. A traveller 13 is mounted for movement within the track 5, the traveller comprising a main body 14 which engages the undersides of the flanges 12 by means of rollers 15. To maintain the rollers 15 in engagement with the flanges 12, a pressure roll 16 is mounted to the main body 14 of the

traveller by a swinging arm 17 which is urged downwardly (as seen in Figure 2) by a spring 18. The resilience of the spring 18 enables the swinging arm 17 to move relative to the main body 14 of the traveller 13, particularly when the traveller is negotiating the bend in the track 5 at the pivot 7 between the ramp 6 and the load bed 4 of the vehicle 1.

10 In an alternative embodiment (not illustrated) the pressure roll 16 is omitted, and the dimensions of the rollers 15 and the track 5 are arranged such that the rollers 15 may selectively engage either with the base of the track, or with the undersides of the flanges 15 12.

In a further alternative embodiment, the rollers 15 may be omitted and the traveller 13 may be supported within the track 5 by means of skids or other sliding elements. Preferably the skids are formed from a low friction material such as nylon.

20 At the extreme end of the track 5 is a central cam element 20 having an inclined cam face 20a spaced from the end of track 5, and a generally horizontal face 20b between the cam face 20a and the end of track 5. At the extreme end of track 5 is an actuator 21 with a push rod 22, the function of which will be described later.

30

Mounted to the main body 14 of the traveller 13 is a load-engaging ball 25 supported by a shaft 26 which is slidably received in a bore 27 in the main body 14 of the traveller. A transverse pin 28 cooperates with a slot 29 in the shaft 26 to limit the vertical movement of the shaft 26 between a lowered position seen in Figure 2 and a raised position seen in Figure 3. While the shaft 26 is shown in Figure 3 as being arranged with its axis vertical, or perpendicular to the track direction, it should be understood that the shaft 26 may be slightly inclined away from the vertical. In such embodiments, a tension spring may be provided to draw the shaft into the traveller in order to retract the ball towards the track.

15

A conical fairing 30 is mounted to the main body 14 of the traveller, and has a central opening through which the ball 25 may pass. A release sleeve 31 surrounds the shaft 26, and is movable between a lowered position (seen in Figure 2) and a raised position (seen in Figure 5) by means of an operating lever 32.

20

When not in use, the traveller is positioned intermediate the length of track 5, in a position such as that shown in Figure 2. In this position, the shaft 26 and sleeve 31 fall under gravity and are retracted, so that the ball 25 is positioned within the conical fairing 31, to reduce the trip hazard. It is foreseen that the traveller may be so constructed that the ball 25 falls to a position below the level of the top of the flanges 12, and thus the fairing 30

25
30

may be dispensed with since no part of the traveller will project above the track 5.

5 In order to engage a load with the traveller, the traveller is moved to the end of the track, to a position shown in Figure 3. As the traveller approaches this position, the lower end of the shaft 26 will engage the cam surface 20a and this will urge the shaft 26 upwards to expose the ball 25 above the
10 conical fairing 30. The horizontal surface 20b will retain the ball 25 in this exposed position for attachment of the load.

The load, in this case a stretcher, is attached as
15 shown in Figure 4 by placing an inverted cup 40 over the ball 25. The inverted cup 40 is provided at the distal end of a swinging arm 41 mounted in this case to a stretcher 42. The load may of course be other than a stretcher. In medical applications, the load
20 may be a wheelchair, an incubator or other medical equipment. Furthermore, in non-medical applications the load may be a wheeled pallet or bin.

The swinging arm 41 is provided with a lead-in device
25 43 to assist in engaging the ball 25. The lead-in device 43 comprises a pair of wheels 44 and a top plate and side plates to define a downwardly-open converging space at whose narrow end is situated the inverted cup 40. The swinging arm 41 is preferably
30 held by resilient elements in a position such that the wheels 44 will engage the lower end of the ramp 6 as

the stretcher is brought towards the ramp. The conical fairing 30 is then engaged by the converging walls of the lead-in device to bring the inverted cup 40 to a position over the ball 25. The cup then
5 either falls onto the ball 25, or is pushed down to engage the ball 25 for example by the operator placing a foot on the cup 40. The inverted cup 40 may be provided with a magnet 45 to retain the engagement between the ball and the cup, or alternatively a
10 resilient catch (not shown) may retain the ball within the cup.

The downwardly-facing opening of the cup 40 is preferably undercut so that the transverse dimensions
15 of the interior of the cup are slightly greater than the transverse dimensions of the opening. This ensures that, when the traveller starts to move, the ball 25 first moves laterally within the cup 40 to create a slight misalignment between the axes of the
20 cup and the shaft 26. This slight misalignment ensures that the undercut edge of the opening will engage a downwardly-directed surface of the ball 25, resisting separation of the cup and ball.

25 In the illustrated embodiment, the opening of the cup 40 is substantially circular in plan view. The cup 40 may be elongated, and may have a downwardly-facing opening in the form of a "keyhole", one end of the opening being enlarged to enable the ball 25 to pass
30 through and into the cup 14, while the other end of the opening has a transverse dimension which closely

fits the shaft 26. After the ball 25 has entered the cup through the enlarged end of the keyhole opening, movement of the traveller draws the ball and stem laterally in relation to the cup so that the stem enters the narrow end of the keyhole opening. Clearly, the keyhole opening is attached to the load in such an orientation that traction of the load by the traveller will cause the shaft 26 to enter the narrow end of the keyhole slot. In a further alternative embodiment, the cup may have an opening in the form of a "double-ended keyhole", with a central enlarged portion through which the ball 25 may pass, and oppositely radially-extending narrowed portions which may selectively engage the shaft 26. The orientation of the narrowed portions in relation to the load is such as to correspond to the movement directions of the traveller in the recess.

With the ball and cup engaged as shown in Figure 4, a drive means connected to the traveller 13 is operated to move the traveller 13 along the track 5 so as to draw the stretcher 42 up the ramp 6 and onto the load bed 4 of the vehicle.

The ramp 6 can then be lifted to a vertical position and the rear doors 3 closed to enable the vehicle to move off.

Arriving at the destination of the patient or other load, the doors 3 are opened and the ramp 6 is lowered to engage the ground. The actuator propelling the

traveller 13 is again operated to move the traveller towards the distal end of the ramp 6, pushing the stretcher 42 out of the vehicle, down the ramp 6 and onto the ground. It will be appreciated that, when the traveller is positioned mid-way along the length of the track 5, the shaft 26 is no longer supported by the cam element 20. The magnet 45 (or resilient latch) in the inverted cup 40 prevents the shaft 26 from falling when the shaft 26 is disengaged from the surface 20b of the cam element 20.

When the traveller 13 reaches the distal end of the ramp 6, the stretcher 42 must be disengaged from the traveller to enable the patient to be transported further. Disengagement is achieved by operating the actuator 21 to extend the push rod 22, as shown in Figure 5. The actuator 22 engages the operating lever 32 and rotates the lever 32 so that the disengaging sleeve 31 is lifted. The upper end of the sleeve 31 engages the rim of the cup 40 and moves the cup 40 upward. The shaft 26 is held against upward movement by the transverse pin 28, and thus the inverted cup 40 is disengaged from the ball 25. The stretcher 42 may now be taken away.

The actuator 21 may then be de-energized to retract the push rod 22, allowing the lever 32 to rotate (anti-clockwise as shown in Figure 5) to retract the releasing sleeve 31 downwards into the conical fairing 30. By moving the traveller 13 to the left (as shown in Figure 5) to a position shown in Figure 2, the

shaft 26 is lowered so that the ball 25 re-enters the conical fairing 30, by the sequential cooperation of the surfaces 20b and 20a with the lower end of the shaft 26.

5

The actuator 21 may be a pneumatic cylinder or electrical solenoid, or may be any other suitable actuator. It is further foreseen that the push rod 22 may be replaced by a simple fixed abutment, and movement of the traveller 13 along the track 5 can be controlled such that the traveller is moved to a first position adjacent the end of the track to raise the ball 25 out of the fairing, and is moved further toward the end of the track to engage the lever 32 with a fixed abutment to raise the releasing sleeve 31 and thus disengage the load from the ball.

10

15

20

25

In a further alternative embodiment, the conical fairing may be dispensed with and the shaft 26 and cam element 28 may be so dimensioned so that the ball 25 in its lowermost position is below the upper edges of the track 5 and when the shaft 26 engages the cam element 20 the ball 25 is lifted out of the track so as to be engageable by the inverted cup of the load. With this arrangement, if the load is not connected to the traveller, the traveller may be moved away from the cam element 20 so that the ball 25 is received within the track 5, and no parts project from the floor of the vehicle to constitute a tripping hazard.

30

With this embodiment, the cup may be disengaged from the ball by providing a release sleeve normally positioned within the track 5, and movable upwardly to lift the cup off the ball by means of an actuator and lever arrangement similar to that described above. As an alternative, the lower end of the shaft 26 may be formed with upwardly-facing abutment surfaces and the cam element 20 may have both downwardly and upwardly facing engagement surfaces, and may have a profile which rises toward the end of the track and then falls. With such an arrangement, as the traveller is moved toward the end of the track, the traveller first reaches an engagement position in which the shaft 26 is lifted to expose the ball 25 above the track for engagement with the cup. Further movement of the traveller toward the end of the track will result in the shaft 26 being pulled downwardly by means of an engagement between cam surfaces and the upwardly-facing abutments at the lower end of the shaft. As the shaft is drawn downwardly, the cup will engage with the upper surface of the track 5 and thereafter further movement of the traveller will cause the ball 25 to be drawn downwardly into the track so as to disengage the ball from the cup and thus free the load from the traveller. The position of the traveller in the track may be controlled automatically by detecting the position of the traveller with microswitches spaced along the track, and moving the traveller to either a stowed position remote from the cam element where the ball is contained within the track 5, to an engagement position wherein the shaft 26 engages the

cam element to lift the ball 25 out of the track, or to a disengagement position wherein the cam element engages upwardly-facing surfaces of the shaft 26 to draw the ball 25 downwardly into the track and thus disengage it from the cup.

The position of the traveller 13 in the track 5 may be detected, for example by position detectors such as microswitches mounted adjacent the track, or by monitoring the rotation of motors, winches or sprockets controlling the position of the traveller. The movement of the traveller may be controlled on the basis of the outputs from the position detectors, so as to vary the speed of the traveller at different positions along the track. For example, the traveller may be accelerated as it moves along straight portions of the track, and the decelerated to pass round curves in the track. The control system may also detect the traveller approaching an end of the track, and gradually decelerate the traveller to a stop at the end of the track.

It is further foreseen that the ramp surface may be mounted to the vehicle for horizontal sliding movement to and from a stowed position beneath the vehicle load bed. In such an embodiment, the distal end of the ramp surface will move horizontally out of the vehicle during deployment, and will subsequently pivot so that the distal end of the ramp can contact the ground. The proximal end of the ramp moves from a position

below the load bed to a position adjacent the rear end of the load bed during this deployment operation.

5 It will be understood that the load handling device may be mounted in a vehicle load bed only, without the track extending across a loading ramp associated with the load bed. Such a device may be used when the vehicle is loaded and unloaded at a loading dock whose height is similar to that of the load bed, or in a
10 vehicle capable of lowering its load bed to or near ground level for loading.

While the previous embodiments describe the track as being mounted within the load bed, it is to be
15 understood that the track may be mounted above the level of the load bed, for example in retro-fit embodiments. The drive means for propelling the traveller may also be housed in a position above the level of the load bed.

20 In an advantageous feature of the invention, particularly where the track is fitted in "clean" vehicles such as ambulances, a number of disinfectant dispensing heads may be fitted along the length of the
25 track, and connected to a reservoir of disinfectant liquid via a delivery system such as a pump. The disinfectant delivery system may be interconnected to the control system for the movement of the traveller, for example so that when the traveller reaches an end

position in the track, a predetermined amount of disinfectant is dispensed from each of the dispensing heads along the slot. When the traveller moves again along the track, the disinfectant material, which may preferably be a liquid or a gel, will be distributed by the traveller to all parts of the track, thus reducing the possibility of infection for patients being transported in the vehicle. The traveller may include spreader elements, such as wiper blades, brushes or pads, which engage the internal surfaces of the track to wipe the disinfectant material along the entire length of the track as the traveller is moved. The disinfectant material may be collected from an outlet port formed at one end of the track and led by a conduit to a collection bottle, for disposal. The control circuitry for the load handling apparatus may include a display to indicate to the operator that the collection bottle requires emptying.

In an alternative embodiment, not illustrated, the cam element 20 may be so shaped that as the traveller 13 nears the end of the track 5, the ball 25 is first raised to an extended position, in which the cup 40 of the stretcher may be engaged with the ball, and then lowered as the traveller reaches the extreme end of the track to withdraw the ball into the conical

fairing 30 or into the track and thus disengage the ball from the inverted cup 40.

5 In a further alternative embodiment, a sensor may be positioned in the surface 20b of the cam element 20 so as to be positioned beneath the lower end of the shaft 26 when the traveller 13 is at the load releasing position. The sensor detects a change in the magnetic field at the lower end of the shaft 26 which occurs
10 when the magnet 45 is moved out of contact with the bore 25. The detector may be linked to the system control circuitry, for example to give an indication to the operator of the state of the connection between the inverted cup and the ball.

15 In a further alternative embodiment, the engagement between the ball and the cup may be maintained by the use of a resilient element in the cup which grips the ball when the cup is seated over the ball. The
20 resilient grip on the ball is arranged to be such that when the releasing sleeve is raised, sufficient force is exerted on the releasing sleeve to push the cup away from the ball and disengage the two components. In order to engage the cup with the ball during
25 connection of the load to the traveller, a downward force will have to be exerted on the cup, for example an operator placing a foot on the cup and pressing,

once the cup and ball are aligned by the cooperation between the fairing 30 and the lead-in device 43.

In a further alternative embodiment, the cam element
5 20 may be movable between an operative position wherein it can engage the shaft to lift the ball to its extended position, and a lowered position wherein the traveller may pass over the cam element without raising the ball. Such a movable cam element may be
10 provided intermediate the length of the track, optionally in addition to a fixed cam element at one end of the track. Selective operation of the movable cam element may provide a second location, in addition
15 to the distal end of the track, at which the ball may be lifted so that a load may be attached to the traveller.

As an alternative to a "telescopic" movement of the load-engaging element relative to the traveller, the
20 ball may be mounted to the end of a swinging arm pivotally attached to the main body of the traveller. In such an arrangement, the swinging arm will pivot upwardly out of the track to present the ball for attachment to the load. In a retracted position, the
25 swinging arm and ball may be entirely received within the track. Movement of the swinging arm to extend and retract the ball may be achieved by engagement of the

swinging arm with one or more cam element disposed in the track.

Figure 6 is a perspective view of the load handling device of the present invention applied in an ambulance, for drawing a stretcher into a transit position within the ambulance, and for moving the stretcher out of the ambulance. Parts of the stretcher are shown cut away, in order to show otherwise hidden detail.

The ambulance is provided with a rear ramp 6 and a track 5 extending up the ramp, and longitudinally of the floor 4 of the ambulance. The track 5 has a first section 5a extending across the ramp 6, a second section 5b extending longitudinally of the vehicle, and a third section 5c extending transversely of the vehicle from the forward end of the second section 5b.

A catch device 50 is movably mounted in a track 51 extending parallel to the third section 5c of the track 5. The catch device 50 engages a leg 52 of the stretcher 42 as the stretcher is drawn into the ambulance by the traveller moving in the track 5, when the traveller reaches the junction of the second section 5b and the third section 5c of the track 5.

The catch device 50 preferably engages a rear leg 52 of the stretcher 42, the front leg of the stretcher being positioned to move past the catch device without being trapped therein. The rear leg 52 of the
5 stretcher may itself engage the catch device, or may be provided with a detent (not shown) extending laterally outwardly from the rear leg, so that as the stretcher moves longitudinally of the vehicle the front leg may pass the catch device 50, and the detent
10 may engage the catch device. Alternatively, the stretcher may be constructed so that the track width of the front wheels of the stretcher is smaller than the track width of the rear wheels, so that when the stretcher is moved in a straight line, the rear wheel
15 on each side does not follow exactly behind the front wheel.

As the traveller moves forward along the third section 5c of the track 5, the catch device 50 is
20 driven along its track 51 to guide the leg 52 of the stretcher forwardly and sideways in relation to the vehicle, so that the stretcher reaches a transit position alongside a side wall 53 of the ambulance.

25 As an alternative to a moving catch device 50, there may be provided on the ambulance floor a guide rail or rails to engage the rear leg of the stretcher or a

detent mounted on the rear leg of the stretcher to guide the rear leg of the stretcher to its final transit position as the traveller moves along the third section of the track.

5

One or more clamping devices 54 may be provided on the ambulance floor 4, each positioned to engage a respective wheel 55 of the stretcher when the stretcher reaches its transit position, so as to lock the stretcher in place. Conventional clamping devices 54, either manually operated or power operated, may be used. If the illustrated embodiment, the clamping device 54 engages the front wheel 55 of the stretcher. Clearly, clamping devices 54 may be provided for two or more of the stretcher wheels, and are preferably provided for the two stretcher wheels which are nearest to the side wall 53 of the ambulance when the stretcher is in its transit position. This arrangement minimises obstructions in the central area of the ambulance floor.

10

15

20

The forward ends of the third section 5c of the track 5 and of the track 51 may have a respective end part extending forwardly and parallel to the vehicle centerline, in order to draw the stretcher in a forward direction at the end of its travel towards the transit position, so that the castoring wheels 55 are

25

correctly aligned with their respective clamping devices 54.

5 The catch device 50 is preferably operated by an actuator controlled by the control circuitry for the traveller, to synchronise the movement of the catch device 50 with the movement of the traveller along the third section 5c of the track 5. Such a synchronised movement ensures that the stretcher remains parallel
10 to the vehicle centerline as it is moved laterally into the transit position.

The third section 5c and the track 51 are shown in figure 6 has being arranged obliquely to the vehicle
15 centerline. It is to be understood that the third section of the track may extend perpendicularly to the vehicle centerline, provided that the junction between the second and third sections of the track is given a sufficiently large curvature to enable the traveller
20 to move easily between the second and third sections of the track. In order that the catch device 50 should remain in engagement with the leg 52 of the stretcher during movement of the traveller along the third section of the track, the track 51 is arranged
25 to extend parallel to the third section of the track 5. It is further foreseen that the third section of the track 5 may follow a curved path, and in such an

embodiment, the track 51 will follow a corresponding curved path.

Claims

1. A load handling device for moving a load across a surface comprises an elongate recess formed in the surface, a movable traveller received in the recess for movement therealong, actuating means for selectively moving the traveller along the recess, wherein the traveller has a load-engaging element movable between a retracted position and an extended position wherein the load-engaging element is co-operable with a complementary element associated with the load so as to releaseably attach the load to the traveller so that movement of the traveller causes movement of the load.
2. A load handling device according to claim 1, wherein the load-engaging element is positioned entirely within the recess when in its retracted position.
3. A load handling device according to claim 1, wherein the load-engaging element projects from the recess when in its retracted position.
4. A load handling device according to any of claims 1 to 3, wherein the traveller comprises a disengagement device for disconnecting a load from the load-engaging element.
5. A load handling device according to claim 4, wherein the disengagement device comprises a movable

element mounted on the traveller and engageable with a load to apply a force to disengage the load from the load-engaging element.

5 6. A load handling device according to claim 5, wherein the movable element is drivable by an actuator mounted in or mounted adjacent the recess.

10 7. A load handling device according to claim 5, wherein the movable element is drivable by an actuator mounted on the traveller.

15 8. A load handling device according to claim 2, wherein the load handling device and its complementary element of the load are so arranged that movement of the load-engaging element from its extended position to its retracted position causes disengagement of the load-engaging element from the load.

20 9. A load handling device according to any preceding claim, wherein engagement between the load-engaging element and the load is maintained by releaseable latching means.

25 10. A load handling device according to claim 9, wherein the releaseable latching means comprises a resilient catch.

30 11. A load handling device according to claim 9, wherein the releaseable latching means comprises a magnet mounted in one of the load-engaging element and

its complementary element of the load, and attracted to the other.

12. A load handling device according to any preceding claim, wherein the traveller comprises a main body, 5
rollers for engaging internal walls of the recess, and a pressure roll mounted to the main body and resiliently urged away from the rollers, so as to maintain the rollers 15 in engagement with the internal walls of the recess. 10

13. A load handling device according to claim 12, wherein the pressure roll is mounted to a swinging arm which is pivotally attached to the body of the traveller and is urged by a spring to move relative to 15
the main body of the traveller.

14. A load handling device according to any preceding claim, wherein the load-engaging element is a load-engaging ball formed at one end of a shaft which is slidably received in a bore in the main body of the traveller. 20

15. A load handling device according to claim 14, wherein a transverse pin fixed in the body of the traveller is cooperable with a slot in the shaft to limit the axial movement of the shaft between the extended position and the retracted position of the load-engaging element. 25

16. A load handling device according to claim 14 or claim 15, wherein a release sleeve surrounds the shaft, and is movable independently of the shaft between a lowered position and a raised position by means of an operating lever, and wherein the ball is positioned within the sleeve when the sleeve is raised and the ball is in its extended position.

17. A load handling device according to claim 16, wherein an actuator is mounted at one end of the recess and is engageable with the operating lever when the traveller is adjacent is said to one end of the recess to move the release sleeve from its lowered to its raised position.

18. A load handling device according to claim 16 or claim 17, wherein the actuator is a pneumatic cylinder or a solenoid.

19. A load handling device according to claim 16, wherein an abutment is provided at an end of the recess, the operating lever being engageable with the abutment as the traveller is moved towards the end of the recess in order to move the release sleeve from its lowered position to its raised position.

20. A load handling device according to any of claims 16 to 19, wherein a conical fairing is mounted to the main body of the traveller and is positioned outside the track, the conical fairing having a central

opening through which the ball, the shaft and the release sleeve may pass.

5 21. A load handling device according to any of claims 14 to 20, wherein the ball is moved from its retracted position to its extended position by engagement of the shaft with an inclined cam face of a cam element positioned within the recess.

10 22. A load handling device according to claim 21, wherein the inclined cam face is spaced from the end of the track, and a generally horizontal cam face extends between the inclined cam face and the end of track.

15 23. A load handling device according to claim 21 or claim 22, wherein the cam element includes a first cam face engageable with the shaft to move the ball to its extended position, and a second cam face adjacent and end of the recess, the second cam face being
20 engageable with the shaft to move the ball to its retracted position.

25 24. A load handling device according to claim 23, wherein a generally horizontal cam face is positioned between the first cam face and the second cam face.

30 25. A load handling device according to any of claims 21 to 24, wherein the cam element is selectively movable between an operative position wherein it can engage the shaft to lift the ball to its extended

position, and a lowered position wherein the traveller may pass over the cam element without raising the ball.

5 26. A load handling device according to any preceding claim, further including a reservoir for disinfectant, a plurality of dispensing nozzles spaced along the length of the recess, and pump means for delivering disinfectant to the nozzles.

10

27. A load handling device according to claim 26, wherein the pump means is controlled by a control means responsive to the position of the traveller along the recess.

15

28. A load handling device according to claim 26 or claim 27, wherein the traveller is provided with spreader elements to spread the disinfectant material along the recess.

20

29. A vehicle having a load bed provided with a load handling device according to any preceding claim.

25

30. A combination of a vehicle and a wheeled load, the load of being movable into and out of the vehicle by means of load handling device according to any of claims 1 to 28, wherein a transit position for the load is defined in the vehicle and wherein the arrangement of the recess is such that the load is drawn into the vehicle and placed in the transit

30

position by movement of the traveller along the recess.

5 31. A combination according to claim 30, further comprising a secondary load-engagement device provided in the vehicle to engage the load at a point remote from its engagement with the traveller, in order to guide the load into the final transit position.

10 32. A combination according to claim 31, wherein the secondary load engagement device is a catch device movable along a track.

15 33. A combination according to claim 31, wherein the secondary load engagement device is a fixed guide rail, engageable with an abutment mounted to the load.

20 34. A combination according to any of claims 30 to 33, wherein the vehicle is further provided with restraining devices or latches to retain the load in the transit position

25 35. A combination according to claim 34, wherein the vehicle is an ambulance and the load to be transported is a stretcher, incubator or the like.

30 36. A combination according to any of claims 30 to 35, wherein the load engaging element of the traveller is a ball, and the complementary element associated with the load comprises an inverted cup provided with

a lead-in device to assist in engaging the ball of the traveller.

5 37. A combination according to claim 36, wherein the lead-in device comprises a pair of wheels and a top plate and side plates to define a downwardly-open converging space at whose narrow end is situated the inverted cup.

10 38. A combination according to claim 36 or claim 37, wherein the inverted cup is provided with retaining means operable to retain the ball within the cup.

15 39. A combination according to claim 38, wherein the retaining means comprises a magnet or a resilient catch.

20 40. A load handling device or a combination, according to any preceding claim, in which detectors are provided to detect the position of the traveller along the recess, and wherein position data from the detectors is used by a control means to control the position of the traveller along the track.

25 41. A load handling device or a combination, according to claim 40, wherein the detectors comprise microswitches mounted adjacent the recess.

30 42. A load handling device or a combination, according to claim 40, wherein the detectors are rotation sensors and are adapted to monitor the

rotation of motors, winches or sprockets controlling the position of the traveller.

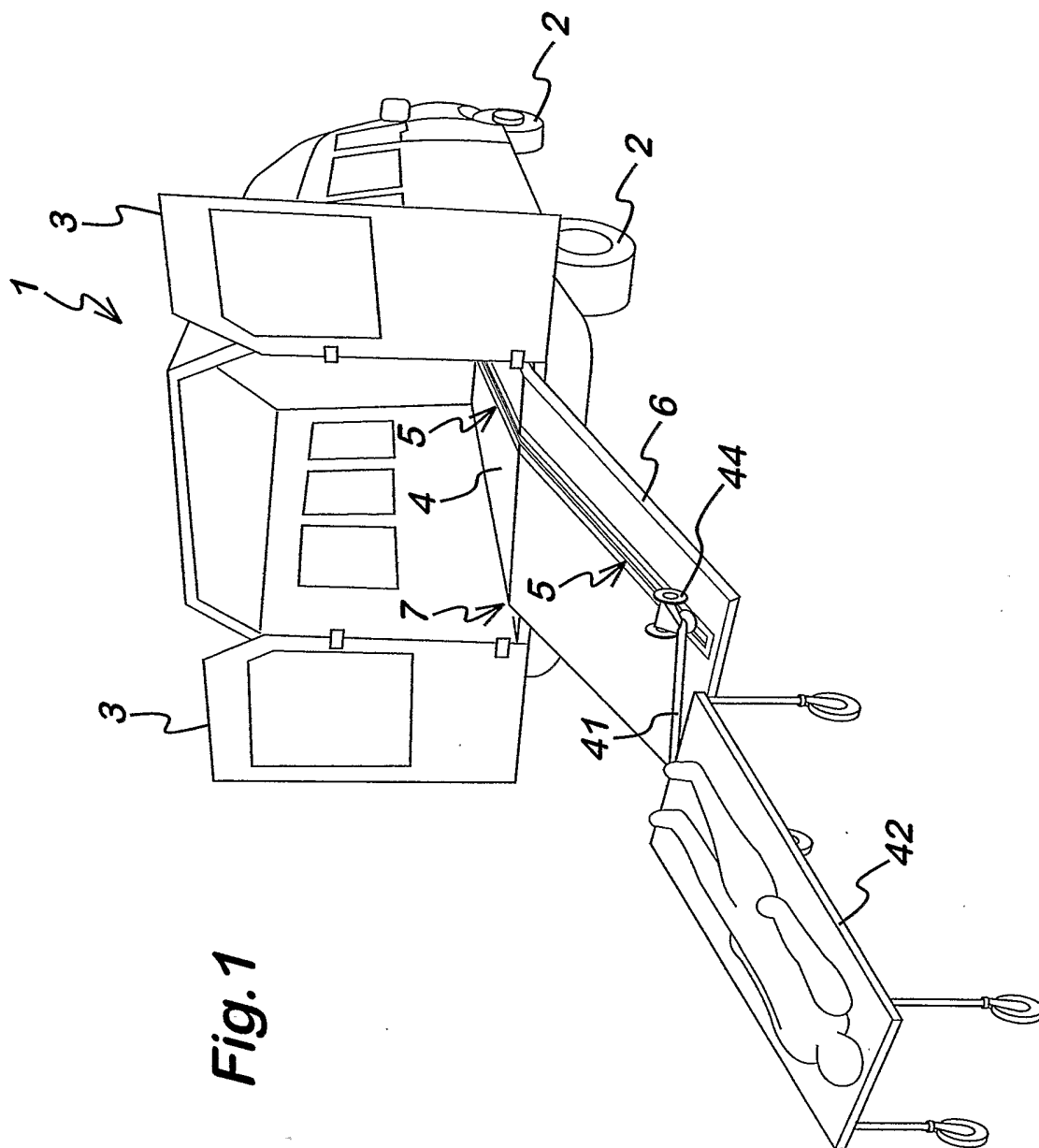


Fig. 2

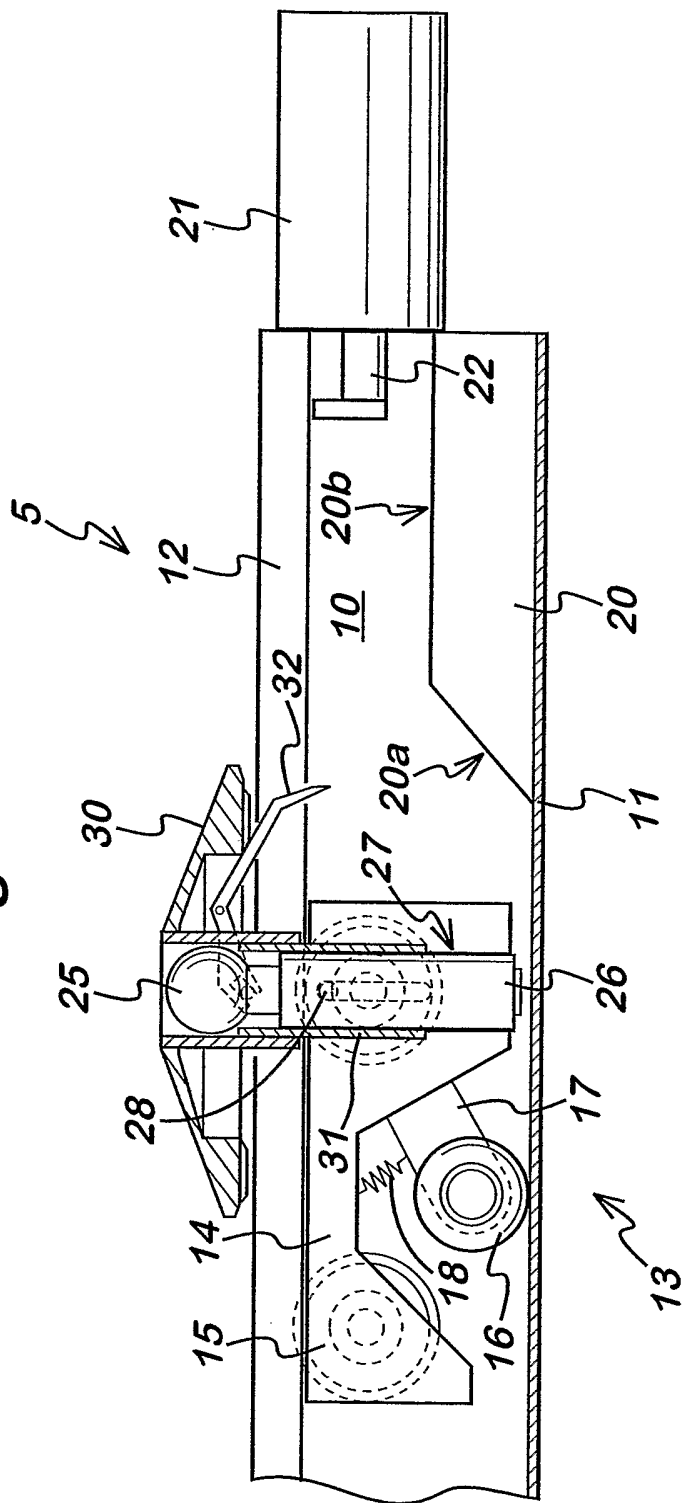
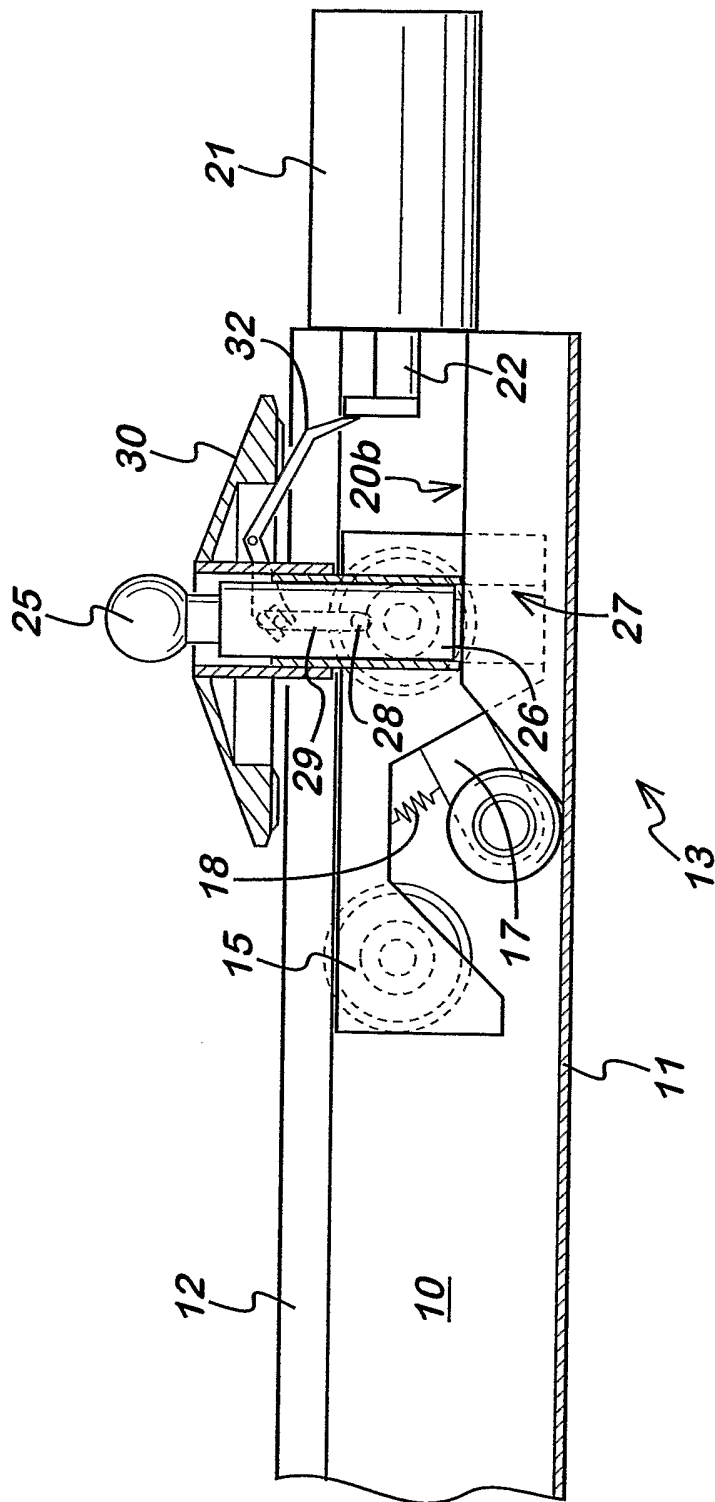
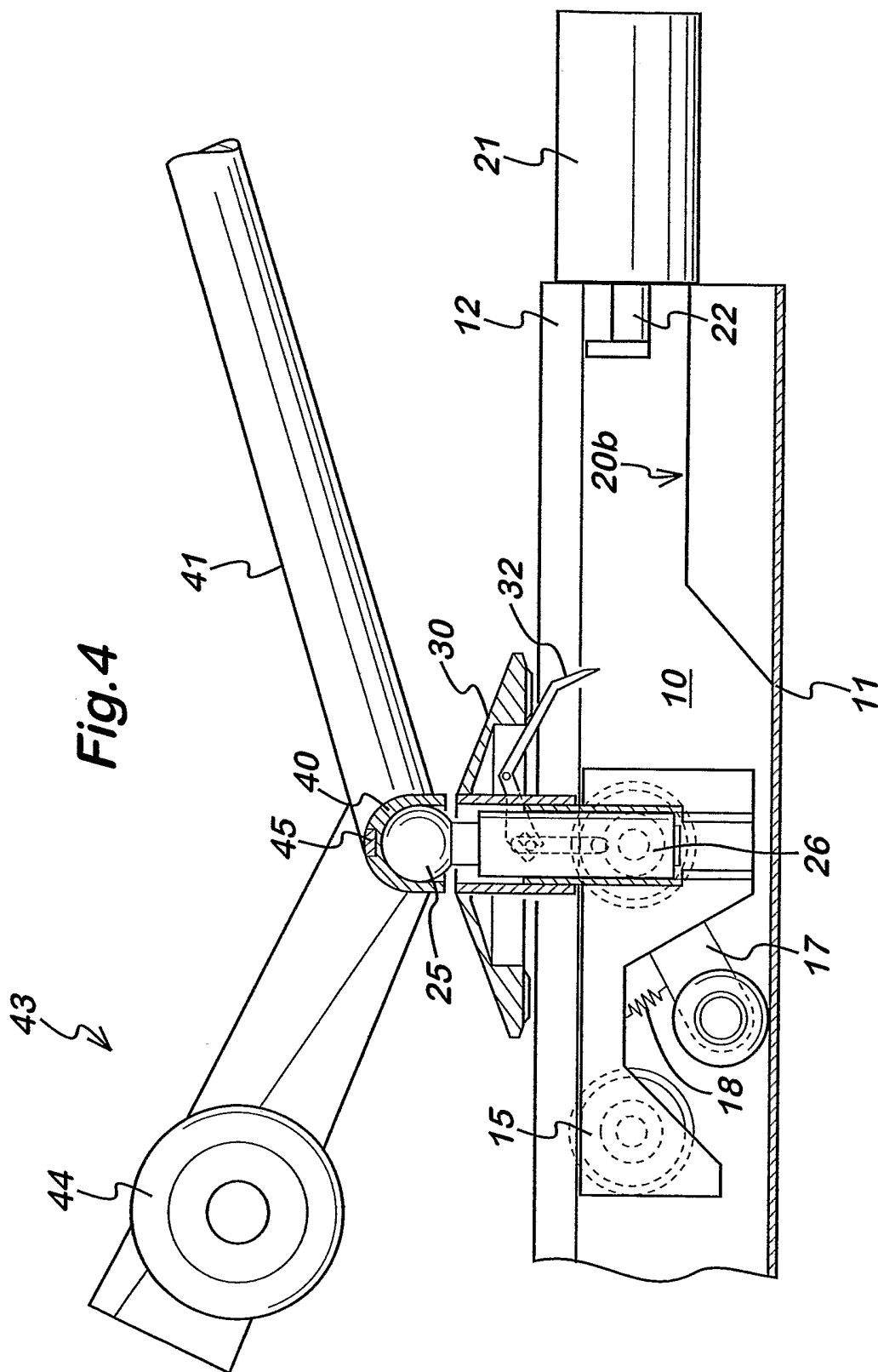
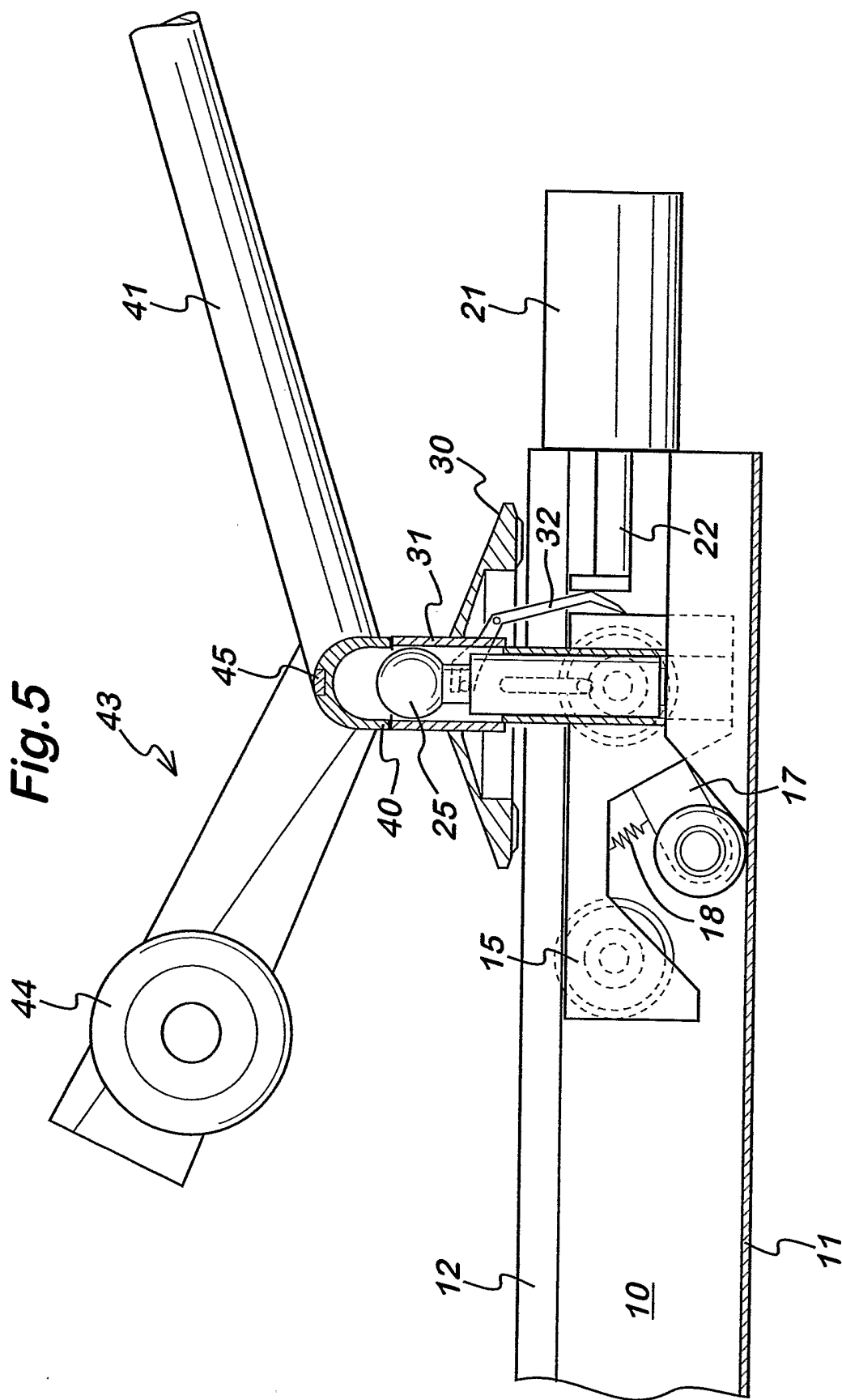
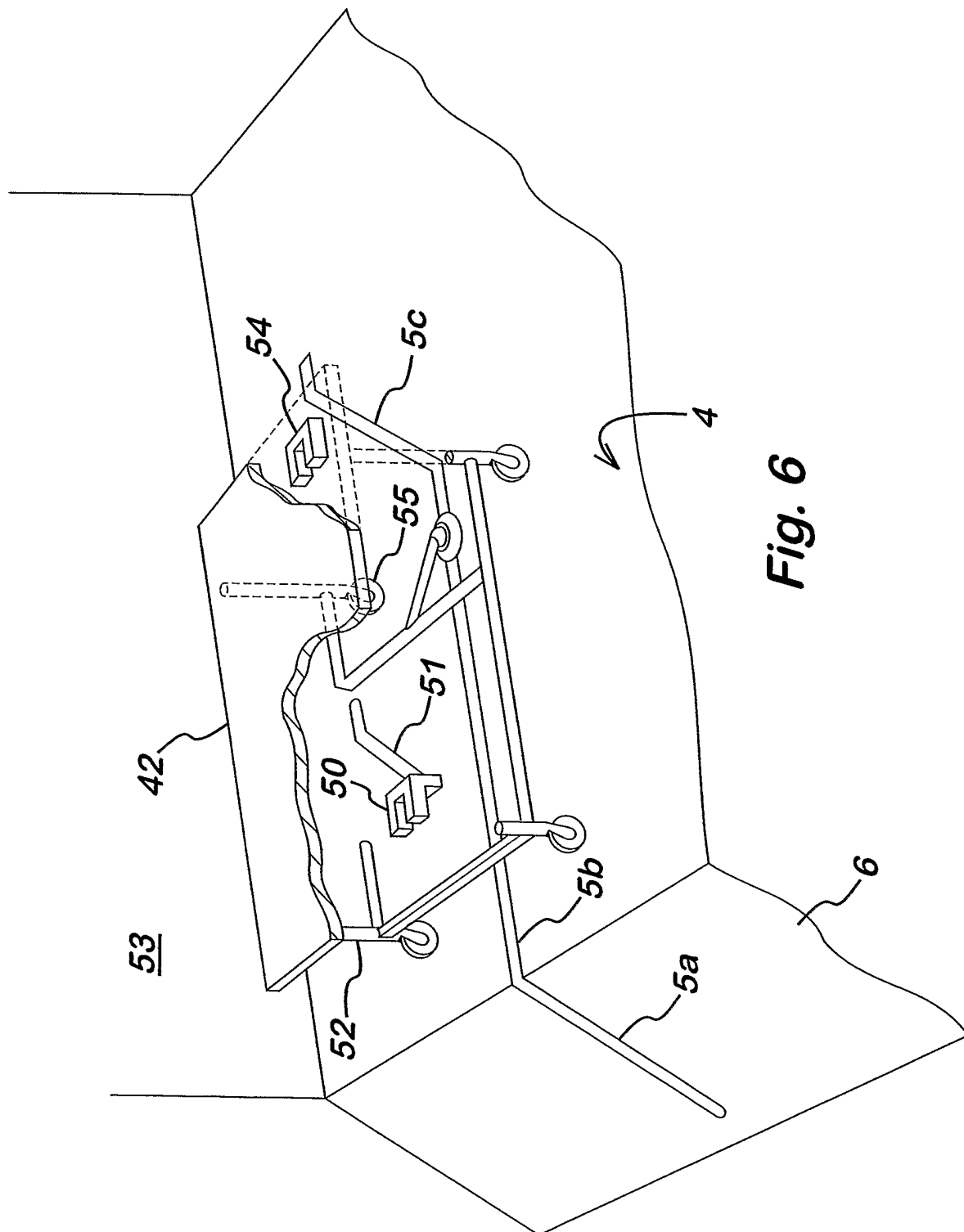


Fig.3









INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB2005/002546

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B60P1/64 B60P3/12 B60P7/08 A61G3/00

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 7 B60P A61G

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 practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 618 105 A (KASISCHKE, MICHAEL; F + E GESELLSCHAFT FUER VERMITTLUNG UND ENTWICKLUNG) 5 October 1994 (1994-10-05) the whole document	1-11, 29-42
X	DE 16 55 233 A1 (STEADMAN INDUSTRIES LTD) 16 June 1971 (1971-06-16) pages 13-18; figures	1-11, 29-42
X	EP 1 205 347 A (FAUN UMWELTTECHNIK GMBH & CO) 15 May 2002 (2002-05-15) abstract; figures	1-11, 29-42
X	GB 2 236 518 A (* D.J. INDUSTRIES LIMITED) 10 April 1991 (1991-04-10) abstract	1-11, 29-42
	----- -/-- -----	

Further documents are listed in the continuation of box C.

Patent family members are listed in 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 document 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

13 October 2005

Date of mailing of the international search report

02/11/2005

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Panatsas, A

INTERNATIONAL SEARCH REPORT

 International Application No
 PCT/GB2005/002546

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 092 722 A (REAZER, III ET AL) 3 March 1992 (1992-03-03) abstract; figures -----	1-11, 29-42
X	WO 03/051668 A (GLIDE-RITE PRODUCTS LIMITED; STEVENS, ROGER, CHARLES) 26 June 2003 (2003-06-26) abstract; figures -----	1-11, 29-42
X	WO 02/00466 A (GLIDE-RITE PRODUCTS LIMITED; MOGER, KEVIN) 3 January 2002 (2002-01-03) abstract; figures -----	1-11, 29-42
A	DE 36 21 366 A1 (PAUL, JOSEF) 21 January 1988 (1988-01-21) abstract; figures 1-4 -----	12
A	DE 22 25 021 A1 (GERHARD KRUEGER MASCHINENFABRIK, 8951 RIEDEN) 13 December 1973 (1973-12-13) figures -----	12
A	US 3 685 673 A (ROBERT W. SCHWEIS) 22 August 1972 (1972-08-22) -----	11

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/GB2005/002546

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
EP 0618105	A	05-10-1994	AT 175386 T DE 59309278 D1	15-01-1999 18-02-1999
DE 1655233	A1	16-06-1971	GB 1144154 A	05-03-1969
EP 1205347	A	15-05-2002	DE 20019391 U1	15-02-2001
GB 2236518	A	10-04-1991	NONE	
US 5092722	A	03-03-1992	AT 147688 T AU 652654 B2 AU 2149792 A CA 2102621 A1 DE 69216823 D1 DE 69216823 T2 EP 0583406 A1 ES 2097914 T3 WO 9219466 A1	15-02-1997 01-09-1994 21-12-1992 08-11-1992 27-02-1997 12-06-1997 23-02-1994 16-04-1997 12-11-1992
WO 03051668	A	26-06-2003	AU 2002352434 A1	30-06-2003
WO 0200466	A	03-01-2002	AU 6769601 A GB 2366782 A	08-01-2002 20-03-2002
DE 3621366	A1	21-01-1988	NONE	
DE 2225021	A1	13-12-1973	NONE	
US 3685673	A	22-08-1972	DE 2108323 A1 FR 2092315 A5 GB 1288327 A JP 49000586 B	02-03-1972 21-01-1971 06-09-1972 08-01-1974