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**EP 1532954 A** **US 4783862 A**  
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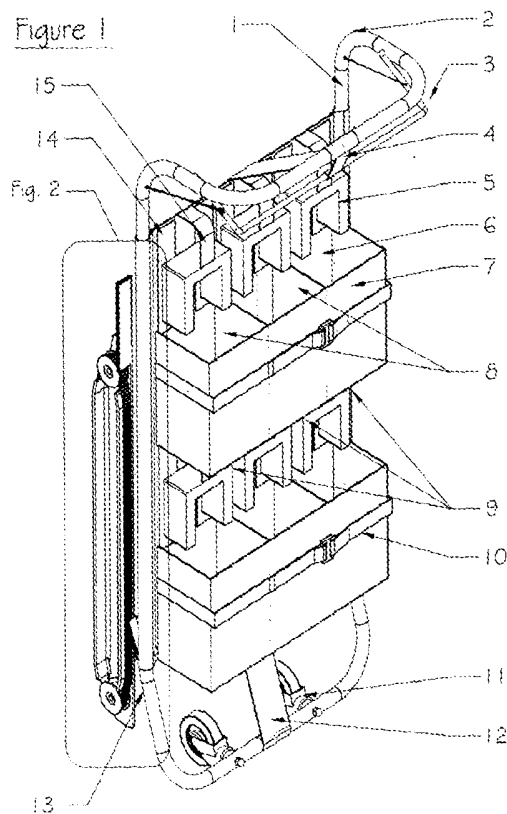
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(54) Title of the Invention: **Infant evacuation device**  
Abstract Title: **Evacuation device for a plurality of babies**

(57) A baby evacuation device comprises a frame 1, connected to a double track each with a continuous belt (4, fig. 2), to which is affixed a patient support membrane 14 with at least two pockets 7. Each pocket 7 has an open end and able to accommodate a plurality of babies having their heads secured in adjustable cushioned head rests 5. The tubular frame 1 is covered with a fire-retardant, water impermeable and mold and fungus resistant material. The double track system (fig.2) which has a dual braking system allows the device to glide down stairs safely and quickly during an emergency. The device is fitted with a set of casters 11 for transport across a flat surface.



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Figure 1

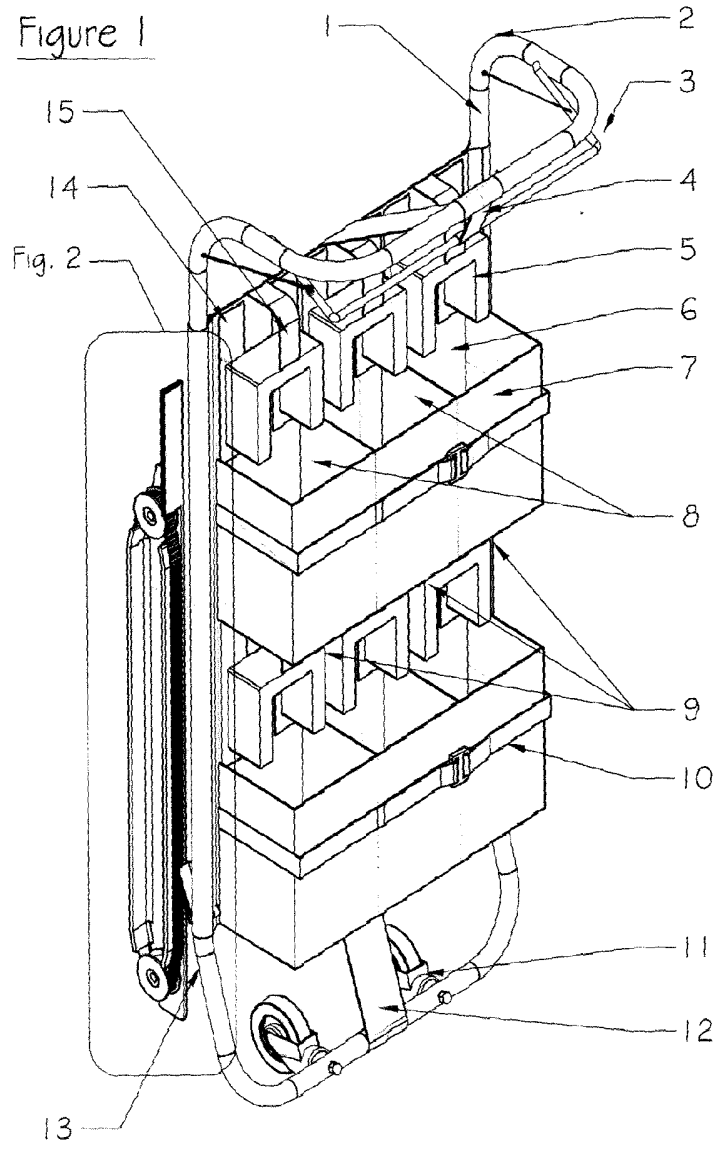


Figure 2

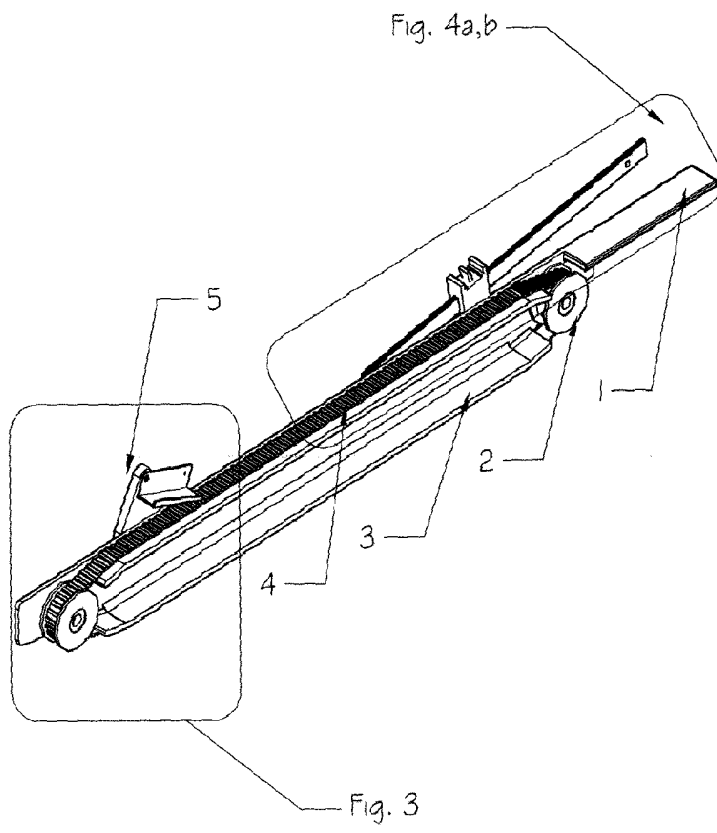


Figure 3

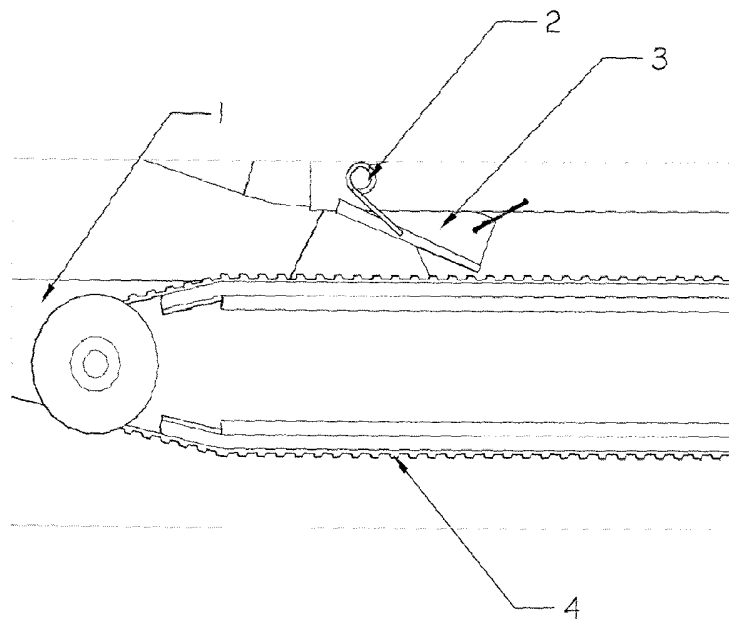


Figure 4a

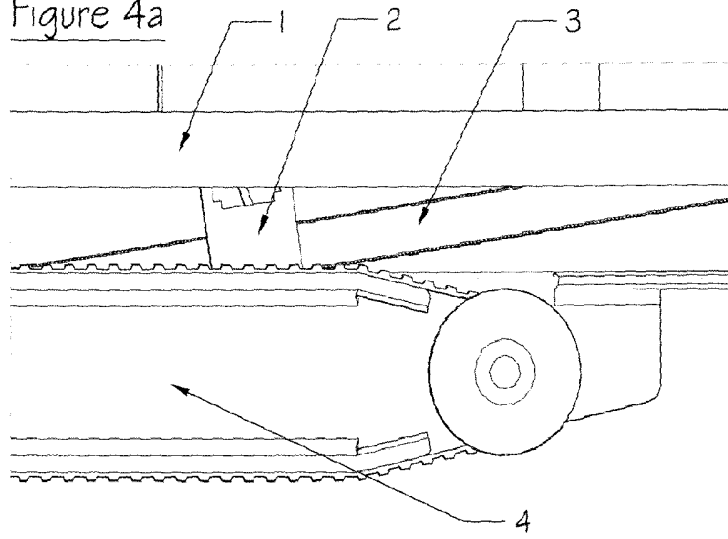
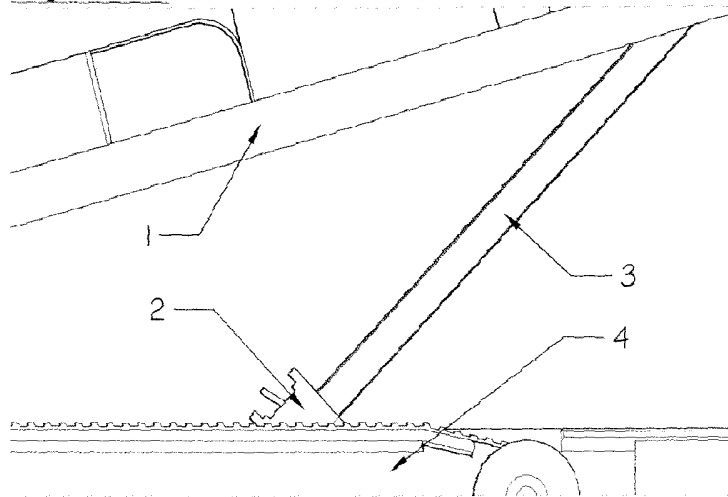
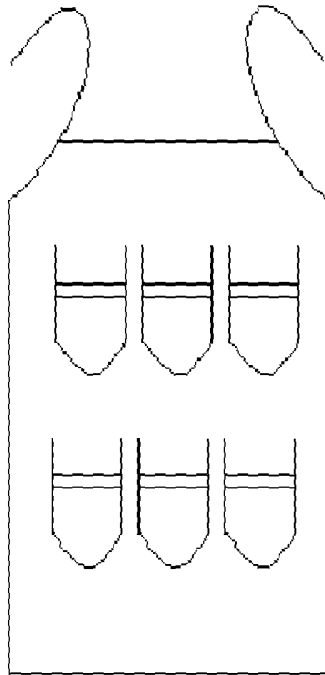


Figure 4b

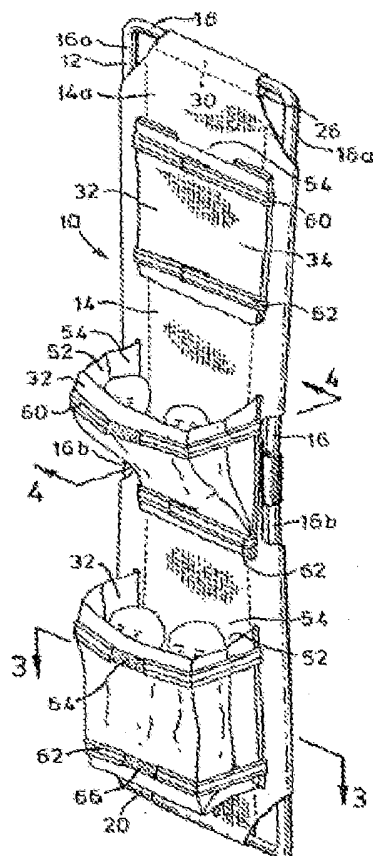


# Figure 5



“PRIOR ART”

# Figure 6



“PRIOR ART”

**Description****Title: Infant Evacuation Device****Background of the invention**

During the course of attending and exhibiting at several industrial and hospital-related trade-shows with an adult evacuation chair, it was brought to our attention that there was a need for a similar apparatus for babies in a health care environment. In an emergency such as a fire, elevators can not be used. Today, modern hospitals are usually constructed with multiple floors. The challenge is to transport infants as quickly as possible from a dangerous environment to a safe environment. Most of the time, this process involves transporting the infants down stairs. Since the ratio of staff to babies is quite low, this does not permit for the safe evacuation of multiple babies by one staff member alone. It also raises the question of re-entering the building to evacuate additional babies. This poses additional problems for the babies who have already been evacuated as they can not be left unattended.

The existing products are old and outdated (Fig. 5 “EVACU-5” which is not patented and “WEE VAC” Fig.6 which has a patent number (CA 1276053). These devices provide inadequate solutions to meet the existing market demand. The existing products could cause injury to the babies during their evacuation.

With the EVACU-5, a nurse wears an apron device with pockets at the front and rear. Not only are the infants at risk of being kicked or bounced around as the nurse walks quickly across the ward floor toward the stairs, but there will be considerable rocking as the nurse descends the stairwell. Additionally, the nurse’s line of sight is limited to the infants in the front pockets. The nurse has no visual contact and therefore no way of ensuring that the infants in the pockets behind her are safe. Furthermore, the EVACU-5 requires the assistance of a second nurse to place the infants in the rear pockets – something that is not guaranteed during an emergency. The nurse then has limited options in terms of what to do with the infants once he/she reaches the safe area. If the nurse needs to be transported, she can neither sit, nor remove the apron without posing serious risk to the infants.



The WEEVAC device has several advantages over the EVACU-5, but there is still no guarantee that two nurses will be available to carry six infants on a stretcher out to safety. This method requires an increased patient to nurse ratio. This reduces the number of infants that can be evacuated safely during an emergency. Similar to the EVACU-5, there is still the problem of what the nurse is to do with the infants when they arrive at the safe area. The only options are to either place the stretcher on the cold wet concrete, or have two nurses stand around holding the stretcher off of the ground.

After researching the existing products available on the market and reviewing their safety and operational functionality, it was determined that we could design a more efficient product. By incorporating and improving on the existing design features from adult evacuation devices, we designed a new and improved product to be used in the safe and rapid evacuation of babies from multi story building.

The “Infant evacuation device ” will hereafter be referenced as the “device”. The device is used in the evacuation of up to six infants or small children from hospitals or similar environments during times of an emergency, such as during fires or earth quakes. The device is comprised of a patient support membrane made of flexible fire retardant and mildew resistant fabric, on which a plurality of pockets, all opening in the same direction, are affixed and mounted to a tubular main frame. Sufficient space is provided between the top of the membrane and the top handle of the main frame to permit the operator to see the next step on the stairs as they descend. A tether strap across each pocket permits the securing of each baby in their independent sub-pockets. The two interior common walls of the pockets come affixed to a loop and hook strap at the top edge, permitting the operator to quickly tear away the interior wall or walls to increase the pocket size considerably. Each sub-pocket has a portion cut out in the bottom to permit liquid to escape or drain more efficiently when cleaning is required. A collapsible rail assembly, also connected to the main frame, is comprised of two laterally spaced tracks with sliding endless belts, used to support the device as it glides down the stairs. There is a reverse braking device on the track system to assist the operator in a stairwell descent and permit the operator to release the brake handle on the device, (permitting the device to stop on the

descent) and remove any debris that may be in the path of evacuation. Attached to the front of the main frame is a set of caster wheels to help a single user manipulate the device quickly and efficiently over a horizontal plane particularly the restricted area of a stairwell landing. The main frame is comprised of two separate U-shaped tubular sections which have a unique design feature at the bottom to accommodate the castors. The casters only engage the horizontal plane when the device is lifted by the operator. The top of the frame also has a unique design permitting the operator to see through an empty space between the bar grip and the top of the patient support membrane as he/she descends the stairs, to ensure that no unseen obstruction will cause the operator to stumble. The babies are placed into each pocket so that their heads are secured with the unique, adjustable U-shaped cushioned head rests and are secured for transport. With the chair's ability to turn 360 degrees to manipulate crowded halls and stairwell landings, the headrest adds sufficient safety for the infants. Once removed from the wall bracket and placed on the floor, the operator grips the top handle of the main frame while the lower end with the casters rests on the floor. The operator then lifts the chair up to their waist and with a sharp jerk down, deploys the rail system with the aid of gravity. The device is now ready to have infants placed inside.

The frame is uniquely designed to provide gripping bars at both ends to allow two operators to carry the device up stairs if required. Ropes can be attached to the frame in order to lower the device from a window should other exits be blocked or unsafe. Once outside the building the device can be wheeled to a safe area or loaded into a vehicle intact, for transport. The babies are safe and can be monitored at all times while remaining in the device until permission is granted to re-enter the building or until they are moved to another premise.

For a better understanding of the invention's features, a detailed description follows. The description is understood by referring to the following figures:

Fig. 1 is a main overview of device

Fig. 2 is a side view of the rail system.

Fig. 3 is the reverse braking system.

Fig.4 is the support rail for the tracking system.

The main tubular frame as shown in Fig. 1-1 is the main support system. The tubular frame is one solid entity that requires no assembly. There are unique bends, as shown in Fig. 1-2, at the top end (operator end) to allow the operator to walk with the device at arms length and descend the stairs safely, viewing the steps as they descend. The reverse brake handle, as shown in Fig. 1-3 is disengaged when the operator squeezes the handle to the main frame. Only when the operator releases the handle will the brake under pressure make contact with the track and stop the descent of the device. There is a nylon strap, as shown in Fig. 1-4, which holds the brake bar a comfortable gripping distance away from the main frame handle.

The six infant head-rests consist of several parts. The main portion of the headrest is the custom adjustable U-shaped head rest, as shown in Fig. 1-5, with the loop and hook system stitched to the bottom. A pair of loop and hook system straps, as shown in Fig 1-14, is attached to the main body of the patient support membrane, as shown in Fig. 1-6. At the back of the U-shaped headrest (Fig. 1-5) is tethered a nylon strap, of several inches, as seen in Fig. 1-15, which has the opposite end attached to the main body of the patient support membrane (Fig. 1-6).. With these four features the operator can quickly tear away the headrest, slide the infant into a pocket, re-position the headrest around the infants head and secure the headrest to the loop & hook system, as shown in Fig. 1-14. The loop & hook system straps (Fig. 1-14) are of sufficient length so that the operator can make adjustments to accommodate for any size of infant head. The two large pockets (one per row) are shown in Fig. 1-7. The two interior pocket walls, as shown in Fig. 1-8, divide the two larger pockets into 6 individual sub-pockets. These sub-pockets are designed in such a way that they are stitched on the bottom to the patient support membrane and have the upper edge finished with a strip of loop & hook system. This design provides the operator with the ability to tear away the interior wall or walls to accommodate for larger babies or an increased number of babies in the case of extreme over-crowding on the ward. As a maintenance feature, there is a half-moon shape cut out of the bottom of each sub-pocket, as shown in Fig. 1-9, in order to allow liquid to drain out if the device was soiled during an evacuation and required cleaning. Once the infants are placed inside the sub-pockets, a nylon belt, as shown in Fig. 1-10 is drawn snug across each large pocket. The belt is then secured by the loop & hook system, that is stitched at the end of the belt to the appropriate position on the surface of the belt.

The bottom end of the main frame, as shown in Fig. 1-13, has a specific angle incorporated into it, that permits the casters, as shown in Fig. 1-12, device, thereby ensuring that the casters are positioned at the correct angle to facilitate the quick and smooth movement of the chair across a horizontal surface. To maintain a taut surface on the overall patient support membrane, as shown in Fig. 1-6, a large nylon strap is stitched to the patient support membrane and secured to the operator end of the main frame, as well as the bottom end with a loop and hook system.

The device's main frame is attached to a track system, as shown in Fig. 2. The track system is comprised of two laterally spaced tracks, as shown in Fig. 2-3, with sliding endless grooved belts, as shown in Fig. 2-4, and two nylon pulleys, as shown in Fig. 2-2, which assist in the rotation of the belts. Also attached to the end of the track is a handle, as shown in Fig. 2-1, which is used by the operator as they lift the device down from the wall bracket.

Two other unique features of the device are the reverse braking system, as shown in Fig. 3, and the collapsible rail assembly, as seen in Fig. 4.

As previously described, the reverse brake handle, as shown in Fig. 1-3, is disengaged when the operator has squeezed the handle to the main frame. Only when the operator releases the handle will the brake under pressure (Fig. 3-2, Fig. 3-3 ) make contact with the grooves in the track (Fig. 3-4) and stop the descent of the chair. The use of a coiled steel spring, as shown in Fig. 3-2, forces the brake plate (Fig. 3-3) to continuously apply adequate pressure to the belt (Fig. 3-4) to restrict the forward movement of the rail system and device at any given point during a stairway descent.

In an emergency each process or lack of processes is important to minimize the total evacuation time. The collapsible rail assembly is illustrated in Fig. 4a. The one-way locking mechanism is illustrated in Fig. 4a-2. There is a toothed bar, as shown in Fig. 4a-3, which will only slide and lock in one direction as it travels through the one-way locking mechanism (Fig. 4a-2). This permits the operator to lift the device up to their waist and with a sharp jerk down,

deploy the rail system with the aid of gravity,. The device is now ready for infants to be placed inside.

### **Prior Art of the Invention**

US Patent: 4,783,862 (Murphy) Nov 15, 1988 – Baby Stretcher (CAN patent exists)

US Patent: 6,648,343 (Way) Nov 18, 2003 – Stryker Stair Chair

US Patent: 7,125,022 (Medina) Oct 24, 2006 – Collapsible Chair

Attached is a list of individuals that have signed a non disclosure agreement prior to obtaining information on the chair design and purpose either in part or in whole;

- Tom Shaaban of Carritec a machine & metal fabrication shop in Montreal
- Murray Browning a private seamstress operation in Ottawa
- John Conroy of House of Canvas a seamstress operation in Ottawa
- Kevin Obal of Kard Percision a machine shop in Ottawa

## Claims

The embodiments of the present invention in which an exclusive property or privilege is claimed are defined as follows:

1. A baby evacuation device for a plurality of babies comprised of a frame connected to a track with a continuous belt, affixed to a patient support membrane are at least two pockets, whereby each pocket can accommodate a plurality of babies, having an open end and sharing a common orientation to permit the secure babies in the pockets to be at least parallel to the incline of the stairs during an evacuation.
2. A baby evacuation device for a plurality of babies comprised of frame whereas in the lower end of the main frame there is incorporated at the precise angle two castors that only engage the horizontal plane when the operator lifts the device to arms length in preparation of an evacuation therefore greatly increasing the devices agility.
3. A baby evacuation device for a plurality of babies, wherein the patient support membrane and pockets are made up of a fire-retardant, water-impermeable, mold and fungus-resistant material.
4. A baby evacuation device , that is constructed around a closed rectangular tubular main frame having two elongated parallel sections of equal length, as well as two parallel opposing ends consisting of an upper frame which has incorporated several unique bends that acts as a gripping bar, the opposing lower end has incorporated several unique bends that also act as a gripping bar.
5. The patient support membrane as claimed in claim 1 is mounted on the main frame as claimed in claim 4.
6. The patient support membrane as claimed in claim 1 has a plurality of pockets each having an open end oriented towards the top end of the chair frame, a bottom panel and two parallel side panels to complete the box shape of the pocket.

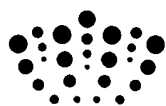
7. The pockets as claimed in claim 6 have a half-circle hole at their base to allow dust, dirt and waste to escape easily during cleaning.
8. The pockets as described in claim 6, wherein the rear edges of the two interior longitudinal walls are stitched to the patient support membrane, while the opposing upper edges are affixed with a hook and loop system running from the pockets top to bottom to closely confine and isolate babies located therein to individual compartments, the interior upper walls may easily be torn loose from the pocket and laid flat inside the pocket thereby creating a larger pocket.
9. The pockets as described in claim 6, wherein a nylon strap, runs across the top of said pockets and is secured at each of the opposing edges where the patient support membrane meets the main frame, furthermore, in the middle of the nylon strap there exists a buckle that is stitched in the middle of the strap permitting the strap to be pulled taut and secured along the path of the strap with a hook and loop system, therein providing a means to adjust the size of the pockets.
10. The patient support membrane as describe in claim 3, has two parallel hook and loop straps stitched longitudinally above each of the pockets claimed in claim 6.
11. A U-shaped infant headrest with a hook and loop stitched to the bottom of the headrest is tethered to the patient support membrane above the two parallel hook and loop straps claimed in claim 10.
12. An infant headrest as claimed in claim 11 is removable and adjustable, up and down, as well as in the width, on the two parallel straps claimed in claim 11 to accommodate different sizes of infant heads.
13. A tubular main frame as described in claim 4 wherein the top end of the upper frame acts as a gripping bar to be held by an individual in order to carry the device up stairs, be

pushed down stairs or be pushed forwards , backwards or side ways along a horizontal plane.

14. A tubular main frame as described in claim 4, wherein the top end of the upper frame has a reverse brake handle bar incorporated into the upper frame in an appropriate position so as to accommodate the operator in gripping the bar while operating the device.
15. A baby evacuation device as described in claim 1, wherein sufficient distance is left between the upper frame handle as claimed in claim 4 and the patient support membrane claimed in claim 5 to provide a clear view for the operator as they descend stairs.
16. A baby evacuation device as described in claim 1 wherein the membrane has a nylon strap stitched underneath that runs longitudinally from top to bottom and extends past the membrane with a significant length so as to wrap around each end of the main frame as described in claim 4, wherein a hook and loop system is stitched to the exposed ends, which are drawn taunt and secured.
17. A baby evacuation device as described in claim 4, wherein connected to the main frame, is supported at its two sides by a longitudinal rigid channel member frame with two pulleys mounted upon horizontal axes positioned at the opposite ends of the frames, and belts extending around those pulleys therefore forming two longitudinal runs between the pulleys allowing the belt to spin, each continuous belt assembly comprised of strong, high friction synthetic rubber is used to support the chair for movement down stairs by gripping said stairs.
18. A baby evacuation device according to claim 1, incorporating a belt gliding system claimed in claim 17, wherein at the rear end of the track a handle is attached to the rigid channel member frame behind the pulley to provide a gripping position for the operator to remove the chair from the wall bracket.



19. A baby evacuation device according to claim 1, incorporating a belt gliding system claimed in claim 17 wherein affixed near the front end of the tubular main frame claimed in claim 4, is a spring load reverse braking plate system.
20. A baby evacuation device according to claim 1, incorporating a reverse braking system as claimed in claim 19 is disengaged when the braking bar claimed in claim 14 is held against the upper frame claimed in claim 14. Wherein the braking bar is released the braking plate will engage the grooved track and halt the forward motion of the chair.
21. A baby evacuation device according to claim 1 incorporating a collapsible rail assembly constructed of, one-way locking mechanism and sliding toothed bar, when engaged will only permit the sliding tooth bar to traverse one direction as it travels through the one-way locking mechanism.
22. A collapsible rail assembly according to claim 21, comprised of dual parallel sliding toothed locking mechanism, secured at one end to the near rear longitudinal rigid channel member frame as claimed in claim 17, and the opposite end secured to the tubular main frame as claimed in claim 4, therein permitting the patient support membrane claimed in claim 1 to travel freely and lock in the open upright position.
23. A collapsible rail assembly according to claim 21, incorporates a release mechanism system consisting of two parallel pull cords tethered between the tubular main frame as claimed in claim 4, and locking mechanism as claimed in claim 21, therein releasing the locking mechanism and permitting the collapsible rail assembly to collapsed for storage.



**Application No:** GB1019182.3

**Examiner:** Mr Philip J. Roe

**Claims searched:** 1-23

**Date of search:** 4 March 2011

**Patents Act 1977: Search Report under Section 17**

**Documents considered to be relevant:**

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
Y	1-6, 13, 17	US 4783862 A (MURPHY) see whole document, especially col 1 line 39 - col 2 line 7.
Y	1, 3-6, 13, 17	EP 1532954 A (GROSSO) see whole document, especially paras [0002] - [0009], [0011].
Y	1-6, 13, 17	US 2008/0272629 A1 (WALKINGSHAW et al) see whole document, especially paras [0001] - [0007], and figure 4.

**Categories:**

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art.
Y Document indicating lack of inventive step if combined with one or more other documents of same category.	P Document published on or after the declared priority date but before the filing date of this invention.
& Member of the same patent family	E Patent document published on or after, but with priority date earlier than, the filing date of this application.

**Field of Search:**

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>X</sup> :

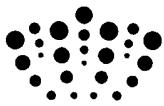
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Worldwide search of patent documents classified in the following areas of the IPC

A47D; A61G
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The following online and other databases have been used in the preparation of this search report

EPODOC, WPI
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**International Classification:**

<b>Subclass</b>	<b>Subgroup</b>	<b>Valid From</b>
A61G	0005/06	01/01/2006
A47D	0013/02	01/01/2006
A61G	0005/08	01/01/2006