A multi-purpose apparatus comprises a body portion 11 having a backrest 12 and a seat 14. A rear wheel assembly 18 is connected to the backrest via an axis around which the rear wheel assembly can move relative to the backrest, and a front wheel assembly 20 is connected to the seat via an axis around which the front wheel assembly can move relative to the seat. The backrest includes an opening to receive the rear wheel assembly, and the seat includes an opening to receive the front wheel assembly. The apparatus may further comprise two pairs of fixing assemblies 15, which may be Isofix (RTM) assemblies, connected to the underside of the seat. A collision safety module may be provided which includes two pairs of catches arranged to mate with the two pairs of fixing assemblies and which may include a damper. A retractable handle 22 may be provided.
Fig. 13a

Fig. 13b
The following terms are registered trademarks and should be read as such wherever they occur in this document:

Isifix
DESCRIPTION

MULTI-PURPOSE APPARATUS

This invention relates to a multi-purpose apparatus. In a preferred embodiment, the apparatus can be used as a car safety seat and pushchair/stroller.

It is common to push small children in a pushchair (also called a stroller). It is also common (and required by law in many territories) to carry small children in motor vehicles in a specially designed child safety seat. There have been a number of design attempts to combine these functions to a degree. Typically, such systems have a large, heavy trolley as their base. These trolleys are standalone items and are usually manufactured from steel tube. The other part of these systems is a child safety seat that can be secured to the trolley to make it into a pushchair or fitted inside a car to act as a child safety seat. If the seat is being used in the car, the unused wheeled trolley has to be stowed in the car and transported to the journeys end, thereby taking up precious luggage space.

It is therefore an object of the invention to improve upon the known art.

According to the present invention, there is provided a multi-purpose apparatus comprising a body portion comprising a backrest and a seat, a rear wheel assembly connected to the backrest via an axis around which the rear wheel assembly can move relative to the backrest, and a front wheel assembly connected to the seat via an axis around which the front wheel assembly can move relative to the seat, wherein the backrest includes an opening to receive the rear wheel assembly, and the seat includes an opening to receive the front wheel assembly.

Owing to the invention, it is possible to provide an apparatus that is a multi-purpose piece of equipment designed to make life easier for parents and more comfortable and safer for toddlers. It is a car safety seat and pushchair,
combined. The apparatus includes a seat and the backrest and the vertical
sides of the seat and the backrest have been designed as load bearing pods
and are used to house the pushchair wheels and their supporting frames. This
means that there is no longer a need to have a large separate trolley because
the wheels are housed inside the pods when not in use.

Preferably, the apparatus comprises two pairs of fixing assemblies
connected to the underside of the seat and the fixing assemblies are
rotationally connected to the underside of the seat. The provision of Isofix
fixing assemblies allow the apparatus to be easily connected to vehicle seats
as most modern vehicles include Isofix hoops to which the fixing assemblies
can attach.

Advantageously, the apparatus further comprises a collision safety
module that comprises a module body portion, two pairs of catches connected
to a seat attachment chassis and arranged to mate with the two pairs of fixing
assemblies connected to the underside of the seat and a pair of fixing
assemblies connected to the exterior of the module body portion. The two
pairs of catches connected to seat attachment chassis are located in
respective recesses within the module body portion. The collision safety
module can further comprise a readily removable inner damper located within
the module body portion.

The invention provides a travel system based on a stroller/pushchair
that can be converted into a car seat. The car seat can be attached to a
collision safety module to increase the protection given to the occupant during
a collision. Another option is to attach the seat to a special frame for the infant
to sit at home or around the dining room table. Isofix catches are the industry
standard for quickly fitting child seats to the rear seats of cars. They are a
quicker and safer method of attaching the child car seat to the car's seat
compared to using the adult seat belt. Most new cars are fitted with structural
steel loops between the seat cushion and back rest and this enables the fast
and correct fitment of child seats if they are fitted with the mating Isofix
catches.
The design of the apparatus, in a preferred embodiment, is based around two Isofix catch assemblies, rather than one, to increase the safety, convenience, versatility and speed of operation of the apparatus. The Isofix assemblies, which are part of the child seat, are flexibly housed in such a way that they can be moved forward and aft and side to side independently of the seat. The Isofix assemblies have a compliant material between them and the seat which gives a controlled damping effect during a collision. This helps reduce the damaging affect of “g” forces on infants strapped to their car seat during a collision. The design cushions the movement of the seat in a controlled manner and helps prevent bruising and internal injuries when the momentum of the child is arrested by their seat belts.

The car seat can be converted into a stroller by deploying the wheel assemblies which are normally housed inside the seats’ side pods and head shields. The wheel frames are pivoted and can be swung down from their stowed position and are then held firmly in place via their protruding studs by the Isofix catches. When the wheels are deployed to make the stroller variant, the flexible mounting of the Isofix assemblies means that the wheel assemblies have a sprung shock mount interface to provide suspension movement. This gives the child a more comfortable ride.

The collision safety module is designed to further reduce the damaging effects of sudden restraint of the child during a collision. It can be used to accommodate the car seat for forward or rear facing occupancy by group 0 and group 1 children.

The base unit sits on the car seat swab and is held in position by an Isofix assembly that is adjustable longitudinally. The front is supported by a height adjustable frame which has two uprights and a horizontal footrest. It is fixed to the front of the collision safety module and sits on the car floor to keep the base unit horizontal during a collision. This front support is different to the normal type which has a single vertical upright. This arrangement provides a step for older infants to climb up to their seat unaided and provides a footrest. The adjustable Isofix attachment allows the base unit to be moved relative to
the car's seat to give the child the maximum room for their feet. This is particularly important when used in the rear facing configuration.

Inside the base unit there is a seat attachment chassis which can move forward and aft and side to side independently to the base unit. The space between the chassis and the inner face of the base unit houses a compliant material, springs or other methods of damping this movement. This allows the chassis to move in any direction, but in a controlled and cushioned manner, and this reduces the "g" forces the child is subjected to during a collision.

The seat attachment chassis has four receptacles for the twin Isofix assemblies on the child car seat to locate into. By having two pairs of Isofix assemblies it is possible to mount the car seat forward or rear facing. Group 0 infants, birth to 10 kilograms, need to face rearward and lie more horizontally than group 1 infants. The angle of the car seat relative to the base unit can be changed by fitting two spacer columns between the car seat and the base unit.

To compensate for the different weights of group 0 and group 1 children, the base unit incorporates a feature that stiffens up the movement of the seat attachment chassis. A doughnut shaped sponge is fitted inside the base unit to make the seat attachment chassis more rigid when accommodating group 1 infants. When group 0 children are being carried this feature is disabled by removing a column that compresses the doughnut shaped sponge.

With the addition of a special frame, the car seat can be used in the home as a high chair, a rocking chair or baby's first chair. The seat is fixed to the special frame with the twin Isofix assemblies. When fitted in position 1 it can be used as a rocking chair for groups 0 and 1 infants. The angle of the seat is changed by fitting the two spacer columns. To stop the seat from rocking the two stops can be pulled down.

The special frame can be converted into a high chair by unclipping the two hinged arms and pivoting them through 90 degrees to form a four legged base. The seat can then be slotted into the 4 apertures for the Isofix assemblies and it becomes a high chair. This is an ideal first seat for the infant and they have their very own place to sit in the family room. When the family
are having a TV meal in their lounge, a tray can be fitted to the child’s chair to allow the infant to feed themselves.

The tray is reversible with one side having a flat surface with a recess for a cup. At meal times it can be turned over and the plate and bowl can be placed into the recesses to prevent them being knocked off the tray. The mug is also held securely by a spring loaded catch which the parents can disable if the child is able to drink from the mug unaided. Alternatively the mug can stay secured and a straw used for drinking. When the plate and bowl are not being used they can be stored inside the body of the tray with access through the drop down cover.

For bike owners there is a bike attachment that bolts onto the bike’s frame. This has four apertures for the seats Isofix assemblies so that the seat can be simply clipped into place. By using the two spacer columns the seat can be used for group 0 and group 1 children. The existing bike seats on the market cannot be used for anything except carrying the child on the bike. When the bike rider parks their bike and need to travel by foot or go into a shop they have to either carry their child, make them walk or carry a stroller with them. The design allows the seat to be removed from the bike and be transformed into a stroller.

Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view from above of the apparatus as a pushchair,

Figure 2 is a perspective view from behind of the apparatus as a pushchair,

Figure 3 is a perspective view from above of the apparatus as a car safety seat,

Figure 4 is a perspective view from below of the apparatus as a car safety seat,

Figure 5 is a perspective view from above of the apparatus in use as a car safety seat,
Figure 6 is a perspective view from above of the apparatus as a car safety seat, showing the connections between components,

Figure 7 is a perspective view from above of the apparatus in use as a car safety seat in a second embodiment,

Figure 8 is a perspective view from above and a side view of the apparatus in use as a car safety seat in a third embodiment,

Figure 9 is a perspective view from above of a collision safety module,

Figure 10 is an exploded perspective view from above of the collision safety module,

Figures 11 and 12 are perspective views from above of various configurations of a tray,

Figures 13a and 13b are partial top plan views of the tray and a cup,

Figures 14 to 17 are various perspective views from above of the apparatus in use as a rocking chair,

Figures 18 and 19 are various perspective views from above of the apparatus in use as a high chair, and

Figures 20 to 23 are various views of the apparatus as a bike chair.

Figure 1 shows the multi-purpose apparatus 10, which comprises a body portion 11 that comprises a backrest 12 and a seat 14. If the apparatus 10 is to be used as a pushchair or stroller for a child then the apparatus 10 is placed into the arrangement shown in Figure 1. The apparatus 10 further comprises a rear wheel assembly 18 connected to the backrest 12 via an axis around which the rear wheel assembly 18 can move relative to the backrest 12 and a front wheel assembly 20 connected to the seat 14 via an axis around which the front wheel assembly 20 can move relative to the seat 14. These two assemblies can be folded out from the apparatus 10 as the backrest 12 includes an opening to receive the rear wheel assembly 18 and the seat 14 includes an opening to receive the front wheel assembly 20. The apparatus also further comprises a retractable handle 22 connected to the backrest 12 where the backrest 12 includes an opening to receive the retracted handle 22.
The user can pull the handle 22 into position and can then use the apparatus 10 as a pushchair.

A user can move the front and rear wheel assemblies into position so that the apparatus 10 can be converted from a pushchair into a car safety seat. The reverse process can be used to convert the apparatus 10 back from a car safety seat to a pushchair. The front and rear wheel assemblies are locked in position to be used as a pushchair by two pairs of protruding lugs that click into Isofix fixing assemblies 15, as shown in Figure 2. The flexible mounting of the Isofix fixing assemblies 15 inside a sprung shock mount interface means that the wheel assemblies are able to move under load. This provides front and rear suspension. The rear of the stroller 10 is shown in Figure 2, where the rear wheel assembly 18 can be seen connected to the Isofix assemblies 15 via a lug on the assembly 18.

The front and rear wheel assemblies can be stowed inside their respective components and the handle 22 can be pushed down and this configuration is shown in Figure 3. The apparatus 10 is also provided with a seatbelt 13 to restrain any infant who is sitting in the apparatus, whether it is used as a car safety seat or as a pushchair. The underside of the seat 14 is provided with the two pairs of fixing assemblies 15. These are Isofix assemblies 15 and are rotationally connected to the underside of the seat 14. They are used to fasten the apparatus 10 into position when it is being used as a car safety seat and will be discussed in more detail below.

The four fixing assemblies 15 can be more clearly seen in Figure 4, which shows the underside of the apparatus 10. Each pair of fixing assemblies 15 is connected together by a substantially horizontal rod, that is free to move. Two damping boxes 17 are connected to the underside of the seat 14, and each substantially horizontal rod passes through a respective damping box 17.

Each damping box 17 is provided with a pair of opposite openings through which the respective substantially horizontal rod passes, each opening forming a slot of greater cross-section than the substantially horizontal rod. The rod can provide movement in the event of a front or rear collision that will reduce the forces on a child using the apparatus 10. The substantially
horizontal rods are also able to move transversally in a controlled and dampened manner in the event of a side impact. The arrows in the Figure indicate the direction that the body portion 11 can move relative to the stationary Isofix assemblies 15.

Figure 5 shows the apparatus 10 in use as a car safety seat connected into a conventional car seat 19. The apparatus is connected to a collision safety module 21, which is described in more detail below. The collision safety module 21 is connected to Isofix loops that are provided behind the seats of modern cars, which are accessed through a gap between the flat cushion and upright cushion of the car seat 19. A ladder 23 is also provided that is connected to the collision safety module 21 and stabilises the apparatus 10 and the collision safety module 21 against the floor of the vehicle. The ladder 23 connects to the front of the collision safety module 21.

More detail of the connection between the apparatus 10 and the collision safety module 21 is shown in Figure 6. The collision safety module 21 comprises a module body portion 25 and two pairs of catches 27 (Isofix apertures) connected to a seat attachment chassis and arranged to mate with the two pairs of fixing assemblies 15 connected to the underside of the seat 14. A pair of fixing assemblies is also connected to the exterior of the module body portion 25. The two pairs of catches 27 that are connected to the seat attachment chassis are located in respective cut-outs within the module body portion 25. The apparatus 10 connects to the collision safety module 21 from above with the Isofix catches on the bottom of the apparatus 10 mating with the Isofix apertures on the top of the seat attachment chassis.

Figure 7 shows the apparatus 10 operating as a car safety seat, connected to a car seat 19, however, without using the collision safety module 21. In this case, the body portion 11 of the apparatus 10 sits directly onto the car seat 19 and is connected safely using the rear pair of fixing assemblies 15 that are on the bottom of the seat 14 of the apparatus 10. These Isofix assemblies 15 connect to the vehicle’s Isofix loops through the cushions of the car seat 19, as described above. This means that the apparatus 10 can be
used as a pushchair and then converted to a car safety seat without having to use the collision safety module 21.

The apparatus 10, when being used as a car safety seat, can also be configured to be rearward facing, for use with Group 0 infants, as shown in Figure 8. In many countries it is a legal requirement with very young babies that they face opposite from the direction of travel of the vehicle. The body portion 11 of the apparatus mounts on the collision safety module 21 using spacers 29 to give the correct angle. The Isofix assemblies 15 on the underside of the body portion 11 connect to the Isofix catches 27 on the seat attachment chassis, although the rear pair of fixing assemblies 15 connect through the spacers 29.

Figure 9 shows more detail of the collision safety module 21. The module 21 comprises the module body portion 25, two pairs of catches 27 connected to the seat attachment chassis 35 and arranged to mate with the two pairs of fixing assemblies 15 connected to the underside of the seat 14 and a pair of fixing assemblies 31 connected to the exterior of the module body portion 25. The two pairs of catches 27 connected to the seat attachment chassis 35 are located in respective cut-outs within the module body portion 25. The pair of fixing assemblies 31 are Isofix assemblies and they are of adjustable length. This enables the collision safety module 21 to be positioned to give maximum leg room when used in the rear facing mode. In the Figure 8 configuration these assemblies 31 connect to the Isofix loops provided in the vehicle behind the car seat 19.

An exploded view of the collision safety module 21 is shown in Figure 10. In addition to the module body portion 25, catches 27 and fixing assemblies 31, the collision safety module 21 also includes a readily removable inner damper 33 that is located within the module body portion 25 and the seat attachment chassis 35. To compensate for the different weights of group 0 and group 1 children, this removable damper 33 stiffens up the movement of the seat attachment chassis by pushing against the fixed column 37, making it more rigid when accommodating group 1 infants. When group 0 children are being carried this feature is disabled by removing the column 37.
that compresses the doughnut shaped sponge, making it easier to move the seat attachment chassis 35.

A main damper 100 is designed to absorb the shock of any impact involving the vehicle that is carrying the apparatus 10 configured as a car safety seat. It is made from a compliant material or springs and fills the space between the module body portion 25 and the seat attachment chassis 35. In the centre of the inner damper 33 is a fixed column 37 that is fixed to the top and base of the module body portion 25 and this fixed column 37 compresses the inner damper 33 in a collision. The chassis 35 is a stable frame for locating the four catches 27, which are the Isofix apertures but it can move in any direction horizontally in a controlled manner.

Figure 11 shows a reversible tray 39 that can be used with the apparatus 10, whether the apparatus 10 is being used as a pushchair or a car safety seat. The tray 39 includes internal storage space for a plate and bowl which can be accessed via a pull-down door 41. A cup 43, plate 45 and bowl 47 can fit into recesses in the upper surface of the tray 39. This provides a useful functional tray for a child to use which can be easily connected to the apparatus 10. The child can easily reach the items that are in the recesses in the top surface of the tray 39.

More detail of the reversible tray 39 is shown in Figure 12. The cup 43 is provided with a groove 49 that is horizontal and runs all the way round the cup 43. The groove 49 is located close to the bottom of the cup 43. When the cup 43 is placed in the recess in the tray 39 then a locking catch within the tray 39 engages with the groove 49 to hold the cup 43 in place in the tray 39. The tray 39 has a recess 51 that is equal and opposite to the recess on the top side of the tray 39 so that when the tray 39 is reversed (lower view of Figure 12) there is still a recess present to receive the cup 43.

The workings of the locking catch 53 are shown in more detail in Figure 13. Figure 13a shows the locking catch 53 in an unlocked configuration and Figure 13b shows the locking catch 53 in a locked configuration. The cup 43 is locked in place within the tray by sliding the locking catch 53 into the position shown in Figure 13b, where the locking catch 53 engages with the groove 49
around the base of the cup 43. The locking catch 53 works in this manner whichever way round the tray 39 is positioned, since the recess 52 is present on both the top and bottom of the reversible tray 39.

The body portion 11 of the apparatus 10 can also be used with a frame 55, as shown in Figure 14, in order to provide a rocking chair or just a conventional chair for use around the home. The Isofix assemblies 15 on the lower side of the body portion 11 of the apparatus can be used to connect and fix the body portion 11 to the frame 55. The frame 55 is provided with a pull-down stop 57 to stop the frame 55 from rocking if it is desired to provide a conventional chair for the child. The body portion 11 can be easily removed from the frame 55 and used as a pushchair or car safety seat, as desired.

Figure 15 shows the body portion 11 connected to the frame 55 to create the rocking chair, without the tray 39 for use by group 1 toddlers. Figure 16 shows the rocking chair of Figure 15, with the tray 39, for use by group 1 toddlers. The pull-down stop 57 has been activated, to prevent the chair from rocking. Figure 17 shows the rocking chair for use by group 0 babies, with the provision of spacer columns 59 to change the angle of the body portion 11 to be more appropriate for the preferred position of babies, which in general must allow them to lie back rather than be upright.

Figures 18 and 19 show the apparatus 10 configured as a high chair. The frame 55 can be reversed and the legs 61 unfolded to form the base for a high chair. The body portion 11 fits onto the frame 55 and the end result is an infant’s high chair. In Figures 18 and 19, the tray 39 is shown as fitted to the body portion 11 to help restrain the infant in the high chair, but this does not have to be used, as the belts can be used to hold the infant in position.

The apparatus 10 can also be used on an adult bike as a child’s seat. This is shown in Figure 20. A special bike attachment 63 is used that will be fixed to a bicycle. The body portion 11 of the apparatus 10 will then clip onto the bike attachment 63 to provide the child’s seat on the bicycle. The Isofix attachments 15 on the base of the body portion 10 will mate with corresponding catches on the top of the bike attachment 63. Figure 21 illustrates the body portion 11 in place on the bike attachment 63 and Figure
22 illustrates the process of the body portion fitting to the bike attachment 63. Figure 23 shows the apparatus 10 after having been removed from the special bike attachment 63 and opened out into the form of the stroller.
CLAIMS

1. A multi-purpose apparatus comprising:
   o a body portion comprising a backrest and a seat,
   o a rear wheel assembly connected to the backrest via an axis around which the rear wheel assembly can move relative to the backrest, and
   o a front wheel assembly connected to the seat via an axis around which the front wheel assembly can move relative to the seat, wherein:
      § the backrest includes an opening to receive the rear wheel assembly, and
      § the seat includes an opening to receive the front wheel assembly.

2. Apparatus according to claim 1, and further comprising two pairs of fixing assemblies connected to the underside of the seat.

3. Apparatus according to claim 2, wherein the fixing assemblies are rotationally connected to the underside of the seat.

4. Apparatus according to claim 2 or 3, and further comprising a collision safety module comprising a module body portion, two pairs of catches connected to a seat attachment chassis and arranged to mate with the two pairs of fixing assemblies connected to the underside of the seat and a pair of fixing assemblies connected to the exterior of the module body portion.

5. Apparatus according to claim 4, wherein the two pairs of catches connected to the seat attachment chassis are located in respective recesses within the module body portion.
6. Apparatus according to claim 4 or 5, wherein the collision safety module further comprises a readily removable inner damper located within the module body portion.

7. Apparatus according to claim 4, 5 or 6, wherein the pair of fixing assemblies connected to the exterior of the module body portion are of adjustable length.

8. Apparatus according to any one of claims 2 to 7, wherein each pair of fixing assemblies connected to the underside of the seat are connected together by a substantially horizontal rod.

9. Apparatus according to claim 8, and further comprising two damping boxes connected to the underside of the seat, wherein each substantially horizontal rod passes through a respective damping box.

10. Apparatus according to claim 9, wherein each damping box is provided with a pair of opposite openings through which the respective substantially horizontal rod passes, each opening forming a slot of greater cross-section than the substantially horizontal rod.

11. Apparatus according to any preceding claim, and further comprising a retractable handle connected to the backrest and wherein the backrest includes an opening to receive the retracted handle.

12. Apparatus as hereinbefore described, and as shown in any one of the attached Figures.
**Patents Act 1977: Search Report under Section 17**

**Documents considered to be relevant:**

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<th>Category</th>
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<td>US7506921 B1 (SIGMON) See Figure 3 in particular.</td>
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<td>DE20007466 U1 (HUANG) See Figure 1.</td>
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<td>EP0466429 A1 (RAINBOW) See Figure 3 in particular.</td>
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<td>US4736959 A (AMATECH) See Figure 5.</td>
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**Field of Search:**

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC:

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

A47D; B60N; B62B

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

WPI, EPDOC, TXTE
## International Classification:

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