

The Joint Examination Board

Advanced Examinations November 1997

Paper P3 Sample Scripts



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1997 PAPER P3 -SAMPLE ANSWER A

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* * * * *

A trolley

The present invention relates to a trolley. In particular, but not exclusively, it relates to a trolley which can be moved over a kerb or step.

A conventional trolley of this type is shown in Figures 1 and 2. The trolley 1 comprises an upright portion 3 having a forwardly extending base portion 5 fixed at right angles to the base of the upright portion 3. The upper end of the upright portion 3 comprises a handle portion 7 for manipulation of the trolley 1.

Towards the base of the upright position 3 is attached a pair of tri-lobal spiders 9 in which each lobe carries a wheel 11, 13, 15. Each spider 9 is pivoted about its centre 17 so that it is rotatable with respect to the trolley 1.

These trolleys are particularly useful for negotiating small steps or kerbs. In use, when carrying a load, the trolley 1 is backed against the kerb, in a direction indicated by the arrow A in Figure 1, until the rear-most wheel 13 contacts the edge of the kerb. Pulling on the handle 17 causes the spider 9 to rotate relative to the trolley so that the upper wheel 11 moves into contact with the upper surface of kerb. Further rearward motion will bring another of the wheels 15 into contact with the upper surface of the kerb and allow continued movement of the loaded trolley.

A disadvantage of such an arrangement is that, when the trolley is heavily loaded and the kerb is relatively high, considerable effort is required to lift the pivot of the spiders 9 over centre to bring the other wheels 15 into contact with the upper surface of the kerb. Consequently the mechanical advantage inherent in the device is relatively small.

The present invention seeks to overcome the above disadvantage.

Therefore, according to the present invention there is provided a trolley comprising an upright portion having a handle portion at one end and a forwardly extending base portion at the other end, lower wheel means and upper wheel means rotatably attached to the upright position at fixed locations so that the upper wheel means is located at a position rearward of the lower wheel means.

The positioning of the upper wheel means relative to the lower allows the trolley to negotiate a kerb when carrying a load by merely pushing the trolley in a forward direction and on meeting a step or kerb tilting the upright portion in a rearward direction onto its upper wheel means. This causes the lower wheel means to be raised above the ground so that it can be placed onto the upper surface of the kerb by merely continuing the forward motion. The trolley is then merely tilted forwards to then raise the upper wheel means off the grounds and continue movement of the trolley in the forward direction along the upper surface of the kerb. Therefore the trolley can

be raised onto the kerb without the considerable effort involved in lifting the pivot of the spiders of the prior art arrangement.

The arrangement of the present invention also provides a simplified construction with a reduction of moving parts making it easier and cheaper to manufacture. Preferably the wheel means are located toward the base of the upright portion to give better leverage on the handle of the trolley.

To further improve the leverage to make the task of lifting a significant weight over a kerb, the upright portion is preferably substantially longer than the base portion. In the preferred embodiment, each of the wheel means comprise a pair of wheels each side of the trolley to provide sufficient support and to simplify the construction of the trolley.

The trolley may further comprise a third wheel means rotatably attached to the upright portion towards the handle portion so that the upright portion is supported in a substantially horizontal position.

This provides a flexible arrangement in which the trolley is convertible into a substantially horizontal position. Preferably, the third wheel means is retractable and/or removable so that it can be placed out of the way when not in use. In order to assist manipulation and movement of the trolley in its horizontal position, the trolley may further comprise a foldable end arm which is extendible to form a handle. The end arm can then be folded into a position out of the way when not in use. Further, the end arm may be removable.

The upright portion, when in its horizontal position, may form a load bearing platform so that in this position the trolley can be used to carry a load.

An embodiment of the present invention will now be described in detail with reference to the following drawings, in which:-

Figure 1 shows a side view of a conventional trolley;

Figure 2 shows a front view of the trolley of Figure 1;

Figure 3 shows a side view of a trolley according to the embodiment of the present invention in its upright position;

Figure 4 shows a front view of the trolley of Figure 3;

Figures 5 to 8 show the steps of manipulating the trolley of the present invention over a kerb; and

Figure 9 shows a side view of the trolley of Figure 3 in its horizontal position.

The trolley 21 of the present invention comprises an upright portion 23 having a forwardly extending base portion 25 fixed at right angles to the base of the upright portion 23. The other end of the upright portion 23 comprises a rearwardly tilted handle portion 27.

The upright portion 23 comprises a pair of parallel upright members 29 and a plurality of cross members 31 fixed between the upright members 29 by means of a standard nut, washer and bolt.

Attached towards the base of the upright portion 23 at either side of the trolley 21 is a pair of upper wheels 33 and a pair of lower wheels 35. Each of the upper wheels 33 is rotatably attached to one end of a rearwardly extending flange 37 so that each upper wheel is located at a fixed position rearward of the location of each lower wheel 35.

This arrangement of the upper and lower wheels 33, 35 enables the trolley 21 to be moved over a kerb as shown in the sequence of steps illustrated by Figure 5 to 8.

As shown in Figure 5, the trolley 21 is tilted in a rearward direction indicated by the arrow X by the user grasping the handle portion 27 and tilting the upright portion 23 slightly towards himself and pushing the trolley on the lower wheel 35 in a forward direction indicated by arrow Y. As the trolley 21 approaches the kerb 39, the trolley 21 is tilted further in the rearward direction (arrow X) so that the trolley rests on its upper wheels 33. The trolley 21 is continuously moved in its forward direction (arrow Y) on its upper wheels 33 until the lower wheels 35 rest on the upper surface of the kerb 39 as shown in Figure 6.

The relative position of the upper and lower wheels 33, 35 means that tilting of the trolley rearwardly raises the lower wheels 35 above the ground sufficiently so that merely moving the trolley forward in this position enables it to rest on the upper surface of the kerb.

In this position (Figure 6), the upright portion 23 is then lifted in the direction of the arrow Z about the lower wheels 35 so that the upper wheels are raised off the ground to a height sufficient to enable it to rest on the upper surface of the kerb 39 by continued forward movement of the trolley to the position shown in Figure 7.

To regain the original position of the trolley for forward movement, the trolley is continuously tilted forward in the direction of the arrow Z so that the trolley is moved forward on its lower wheels 35 as shown in Figure 8.

The trolley 21 further comprises a pair of removable, retractable casters 41. Each caster is rotatable attached to one end of an armature 43. The armature 43 is pivotably attached at its other end to each upright member 29 towards the handle portion 27 via a fixing B. The fixing B comprises a screw 45 having a thread at one end 47 and a nut 49 which is screw-threaded onto the threaded end 47 of the screw 45.

The trolley 21 further comprises a generally U-shaped end arm 51 pivotably attached at each end to each upright member 29 towards the handle portion 27 by means of the fixing B used for fixing the armatures 43 of the casters 41. The end arm is then foldable and can also be removed as required.

The trolley 21 is convertible between its upright position shown in Figures 1 and 2 and its horizontal position shown in Figure 9.

In its upright position, the casters 41 and end arm 51 are placed in their folded positions, substantially parallel to the upright portion 23, or are removed. The trolley 21 is then moved in a forward direction by tilting the upright portion slightly rearward about the lower wheels 35 by the user grasping the handle portion 27.

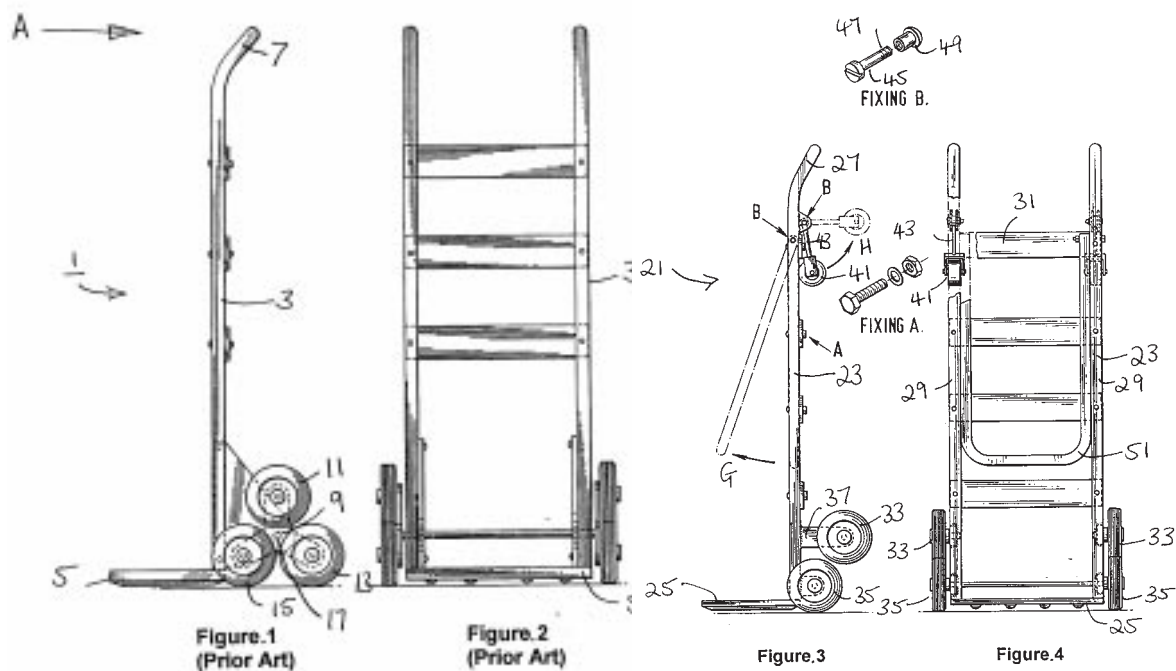
It its horizontal position, the casters 41 are extended into a position substantially perpendicular to the upright portion 23, as indicated by the dashed lines in Figure 1 by movement in the direction H. The end arm 51 is also extended into a position substantially perpendicular to the upright portion by moving it in a direction indicated by arrow G in Figure 1. The upright portion 23 can then be placed horizontally supported by the upper wheels 33 and casters 41 as shown in Figure 9. The end arm extends upwardly to form a handle to enable the trolley to be manipulated in this position. The cross members 31 of the upright portion 23 provide a load bearing platform enabling the trolley to carry a load in this position.

Claims:

1. A trolley comprising an upright portion having a handle portion at one end and a forwardly extending base portion at the other end, lower wheel means and upper wheel means

rotatably attached to the upright portion at fixed locations so that the upper wheel means is located at a position rearward of the lower wheel means.

2. A trolley according to claim 1, wherein the lower and upper wheel means are located toward to the base of the upright portion.
3. A trolley according to claim 1 or 2, wherein the upright portion is substantially longer than the base portion.
4. A trolley according to any one of claims 1 to 3, wherein each of the wheel means comprise a pair of wheels either side of the trolley.
5. A trolley according to any one of the preceding claims, wherein the trolley further comprises a third wheel means rotatably attached to the upright portion toward the handle portion so that the upright portion is supported in a substantially horizontal position.
6. A trolley according to claim 5, wherein the third wheel means is retractable.
7. A trolley according to claim 5 or 6, wherein the third wheel is removable.
8. A trolley according to any one of claims 5 to 7, wherein the trolley further comprises a foldable end arm which is extendible to form a handle for manipulation of the trolley with its upright portion in its horizontal position.
9. A trolley according to claim 8, wherein the foldable end arm is removable.
10. A trolley according to any one of claims 5 to 9, wherein the upright portion in its horizontal position forms a load bearing platform.
11. A trolley substantially as hereinbefore described with reference to any one of figures 3 to 9.



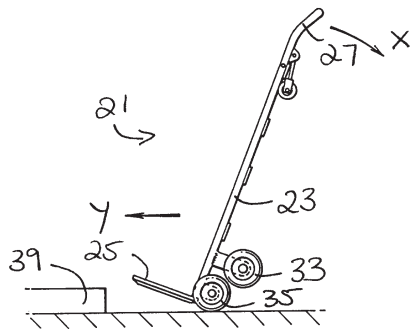


Figure.5

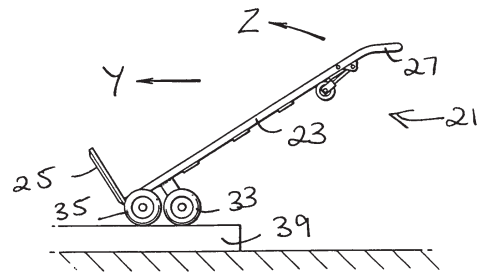


Figure.7

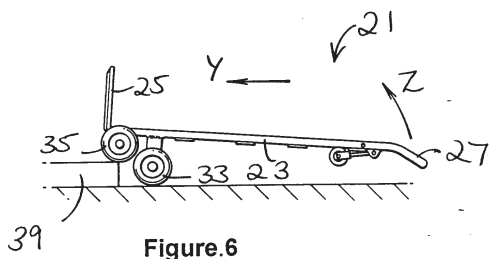


Figure.6

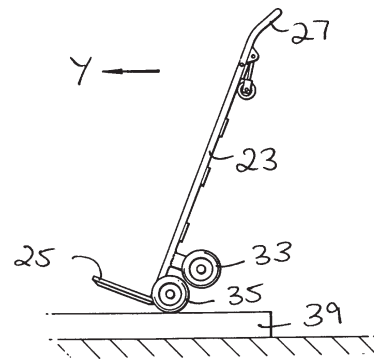


Figure.8

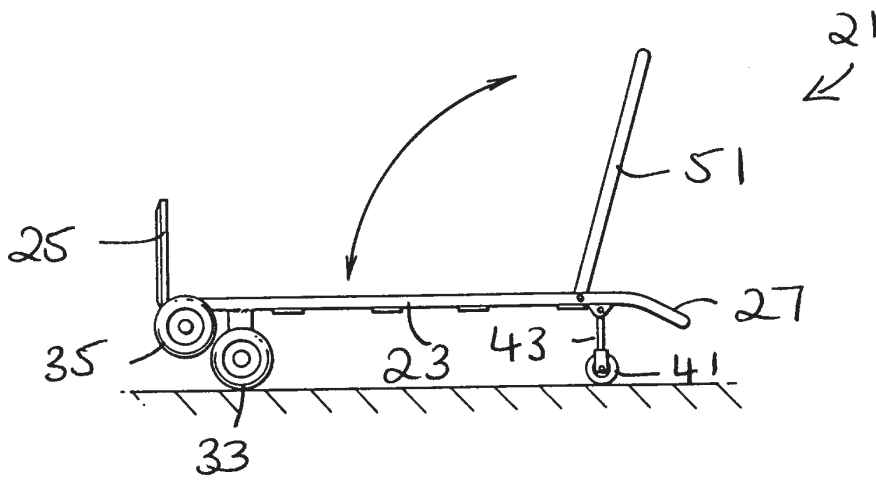


Figure.9

1997 PAPER P3 -SAMPLE ANSWER B

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* * * * *

A Trolley

The invention relates to a trolley, in particular a trolley of the type including a trolley frame and a load bearing platform extending therefrom, the trolley frame including a handle portion at an upper portion and a wheel assembly at a lower portion arranged for wheeling the trolley in an upright position. The invention further relates to a method of transporting a load using such a trolley.

One well-known form of trolley comprises a trolley frame having a handle at the top and a pair of wheels at the base, with a load bearing platform extending from the base of the frame on the opposite side to the wheels. The trolley can be pushed along in the upright position with a load carried on the load bearing platform with ease, rolling along on its wheels. However, problems arise when a kerb or other step is encountered, and considerable effort is expended lifting the entire arrangement over the step.

A solution that has previously been proposed is discussed in relation to Figs. 1 and 2. A trolley is designated generally as 10 and includes a trolley frame 12 including an upper portion 14 and a lower portion 16. The trolley further includes a load bearing platform 18 extending forwardly from the base of the lower portion 16 of the trolley frame 12. The trolley frame 12 further includes a handle portion 20 at the top of the upper portion 14.

In order to overcome the above identified problem, the trolley 10 further includes a wheel arrangement designated generally 22. The wheel arrangement 22 comprises a tri-lobal spider 24 each lobe 26 of which carries a wheel 28. The spider 24 is pivoted at its centre 30 and is capable of rotation about its pivot. In use, when carrying a load, the trolley 10 is backed against a kerb until the rear most wheel 28 contacts the edge of the kerb. Pulling on the handle 20 causes the spider 24 to rotate relative to the trolley frame 12 so that the upper wheel 28 moves into contact with the upper surface of the kerb. Further rearward motion will bring another of the wheels 28 also into contact with the upper surface of the kerb and allow continued movement of the loaded trolley 10.

These trolleys have been successful in allowing negotiation of small steps or kerbs with little effort. However, when the trolley is heavily loaded and/or the kerb is relatively high, the effort required to lift the pivot of the spider “over centre” is quite considerable. Furthermore, the trolley requires a comparatively large number of moving parts, and is complex and costly to manufacture. Yet a further problem suffered by the trolley shown in Figs. 1 and 2, and the earlier arrangement, is that the versatility and flexibility of the trolley is limited by the dimensions of the load bearing platform which is relatively small.

One aspect of the invention is set out in claim 1. Because of the provision of a second wheel assembly between the first wheel assembly and the handle portion, and extending further than the first wheel assembly, the trolley can be pivoted about the second wheel assembly to lift the first wheel assembly over an obstacle such as a kerb, even where the kerb is relatively high. There is no need to reverse the trolley, nor to stop motion of the trolley. The trolley can further be supported in an intermediate position on the first and second wheel assemblies, part of the weight of the trolley being borne by the user. Only a small number of moving parts is required, reducing the cost and complexity of manufacture. In particular, as set out in claim 3, use is made of the mechanical advantage provided by the distance between the trolley handles and the second wheel assembly.

The trolley frame may comprise a load bearing platform itself, across its upper and lower portions, so that even if it is tilted, there is no risk of the load falling off the principal load bearing platform. The second wheel axis may be spaced further from the trolley frame from the first, allowing identical wheels to be used for each set.

An auxiliary wheel assembly may be provided at the upper portion of the trolley frame, arranged to support the full weight of the trolley, in conjunction with the second wheel assembly, in a non-upright position. As a result the full length of the trolley frame can be used to support the load. The auxiliary wheel assembly is preferably movable between a support position and a retracted position and is preferably releasably attachable to the trolley frame, allowing the user to select the desired mode of use.

An auxiliary handle portion preferably extends from the trolley frame as set out in claim 6. As a result, it is particularly easy to push the trolley when it is fully supported by the auxiliary and second wheel assemblies. The auxiliary handle is preferably moveable between pushing and retracted positions, so as not to interfere with the normal use of the trolley.

The invention further extends to a method as set out in claim 8.

Another aspect of the invention is set out in claim 9. The auxiliary wheel assembly allows the entire trolley frame to act as a support for a load. Further preferred features of this aspect are set out in claims 10 -16.

Embodiment of the invention will now be described, by way of example, with reference to the Figures, of which:

- Fig. 1 is a side view of a known trolley;
- Fig. 2 is a front view of the trolley of Fig.1;
- Fig. 3 is a side view of the trolley of the present invention;
- Fig. 4 is a front view, partially cut-away, of the trolley of Fig. 3;
- Fig. 5 is a side view of the trolley of Fig. 3 in a first use position;
- Fig. 6 is a side view of the trolley in a second use position;
- Fig. 7 is a side view of the trolley in a third use position;
- Fig. 8 is a side view of the trolley in a fourth use position; and
- Fig. 9 is a side view of the trolley in an alternative use position.

The description with reference to Figs 3 to 9 makes use, as appropriate, of the reference numerals introduced in relation to Figs. 1 and 2, and description of the common features will only be repeated where necessary.

Referring to Figs. 3 and 4 the trolley 10 includes a trolley frame 12 and a load bearing platform 18 as previously described. However, instead of a spider bearing wheels, first and second wheel assemblies 32, 34 respectively are provided. The first wheel assembly 32 corresponds to the conventional wheels provided at the base of a trolley allowing the trolley to be wheeled in a substantially upright position. In the embodiment shown the first wheel assembly comprises a pair of wheels mounted on a wheel axis 38 slightly rearward of the trolley frame 12 and mounted on flanges or ears 36 near the base of the trolley frame 12.

In addition, the second wheel assembly 34 is mounted closer to the handle position 20 and extends further from the trolley frame 12. In the embodiment shown, the second wheel assembly 34 comprises a pair of wheels mounted on a wheel axis 40 spaced further from the trolley frame 12 than the first wheel assembly wheel axis 38. The wheel axis is preferably mounted on flanges or ears 42 longer than flanges or ears 36.

Operation of the trolley 10 is described with reference to Figs. 5 to 8. In the normal, upright position, the trolley 10 is wheeled along on wheels 32. When a kerb 44 is encountered the trolley is pivoted about second wheels 34, and wheels 32 are lifted onto the kerb 44. Second wheels 34 follow and the trolley 10 is partially supported on both wheel assemblies 32, 34. The trolley is then lifted upright again.

The trolley frame 12 can be a skeletal structure but preferably includes a plurality of cross-pieces 46 (Fig. 4), so that it acts as a load bearing platform across its whole length. The cross-pieces can be fastened by fasteners A allowing any desired configuration to be achieved.

It will be appreciated that the second wheel assembly 34 can be of greater radius than the first in which case the positioning of the wheel axis is less important, as long as a pivot can be formed. Preferably the second wheel assembly 34 is spaced as far as possible from the handle portion to provide optimum mechanical advantage.

A further use option is shown in Fig. 9. An auxiliary wheel set 50 adjacent the handle portion 20 allows the trolley to be pushed substantially horizontally, with the entire trolley frame 12 acting as a load bearing platform. The auxiliary wheel set can be, for example, castors. An auxiliary handle 52 also preferably allows the trolley to be easily pushed in the horizontal position. The auxiliary wheels and handle are both preferably retractable - for example pivotable to an out of use position - and/or removable allowing the user to select a desired use option. As a result the trolley can be supported in a range of different positions.

CLAIMS

1. A trolley comprising a trolley frame and a load bearing platform extending therefrom, the trolley frame including an upper portion including a handle portion and a lower portion on which a first wheel assembly is provided, arranged for wheeling the trolley in a substantially upright position, wherein a second wheel assembly is provided with a wheel axis fixed relative to the trolley frame, and wherein the second wheel assembly extends further from the trolley frame than the first wheel assembly to allow the first wheel assembly to pivot about the second wheel assembly relative to a supporting surface.

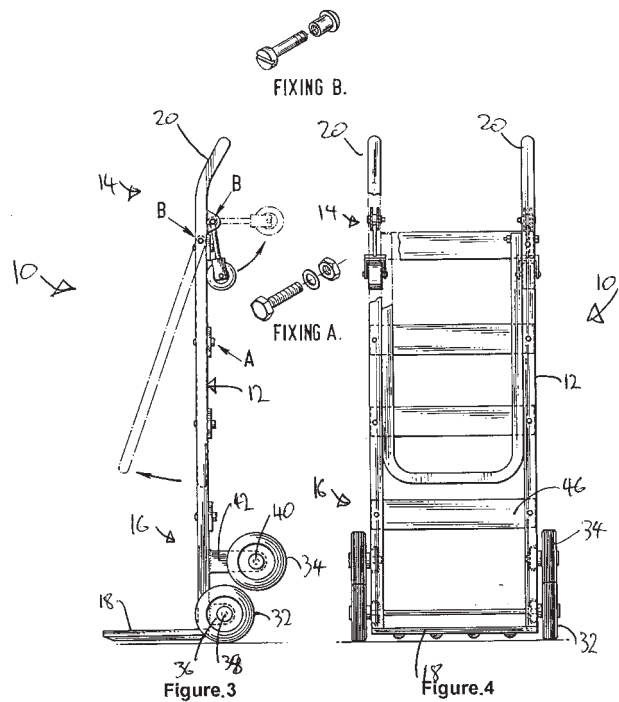
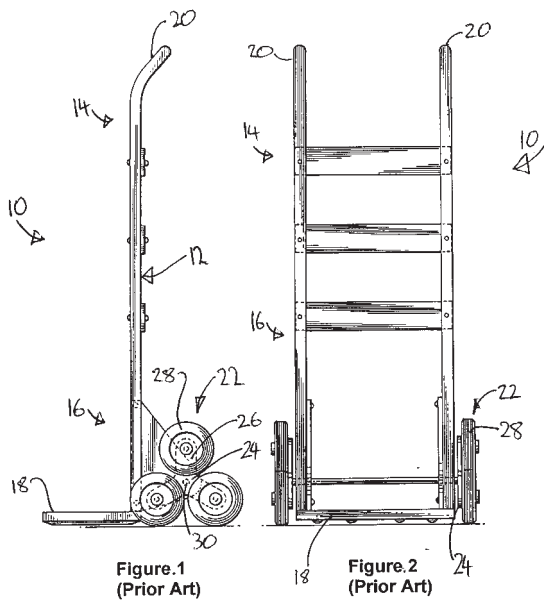
2. A trolley as claimed in claim 1 in which the wheel axis of the first wheel assembly is spaced a lesser distance from the trolley frame than the wheel axis of the second wheel assembly.
3. A trolley as claimed in claim 1 or claim 2 in which the second wheel assembly is provided substantially adjacent the first wheel assembly and spaced from the handle portion to provide maximum mechanical advantage.
4. A trolley as claimed in any preceding claim in which an auxiliary wheel assembly is provided at the upper portion of the trolley frame arranged to support the full weight of the trolley, in conjunction with the second wheel assembly, in a non-upright position.
5. A trolley as claimed in claim 4 in which the auxiliary wheel assembly is movable between a support position and a retracted position.
6. A trolley as claimed in any of claims 3 to 5, further including an auxiliary handle portion extending from the trolley frame on a side opposed to the auxiliary wheel assembly, for pushing the trolley in a non-upright position.
7. A trolley as claimed in claim 6 in which the auxiliary handle portion is movable between a pushing position and a retracted position.
8. A method of transporting a load using a trolley as claimed in any preceding claim comprising the step of pivoting the trolley frame about the second wheel assembly to lift the first wheel assembly clear of a supporting surface.
9. A trolley comprising a trolley frame and a load bearing platform extending therefrom, the trolley frame including an upper portion including a handle portion and a lower portion on which a first wheel assembly is provided arranged for wheeling the trolley in a substantially upright position, wherein an auxiliary wheel assembly is provided on the upper portion of the trolley frame spaced from the first wheel assembly and arranged to support the full weight of the trolley in conjunction with the first wheel assembly in a non-upright position.
10. A trolley as claimed in claim 9 in which the auxiliary wheel assembly is movable between a support position and a retracted position.
11. A trolley as claimed in claim 9 or claim 10 in which the auxiliary wheel assembly is releasably attachable to the trolley frame.
12. A trolley as claimed in any of claims 9 to 11, further including an auxiliary handle portion extending from the trolley frame on a side opposed to the auxiliary wheel assembly, for pushing the trolley in a non-upright position.
13. A trolley as claimed in claim 12 in which the auxiliary handle portion is movable between a pushing position and a retracted position.
14. A trolley as claimed in claim 12 or claim 13 in which the auxiliary handle portion is releasably attachable to the trolley frame.
15. A trolley as claimed in any of claims 9 to 14 in which the trolley frame comprises a load bearing platform, in a non-upright position, across its upper and lower portions.
16. A trolley as claimed in any of claims 9 to 15 in which the first wheel assembly has a wheel axis spaced a first distance from the trolley frame, and a second wheel assembly is provided on the trolley frame intermediate the first wheel assembly and the handle portion with a wheel axis fixed relative to the trolley frame and spaced a second distance, greater than said first distance, from the trolley frame.

17. A trolley substantially as herein described and as illustrated by Figs. 3 to 9.

Notes to client (please feel free to disregard!)

- 1) Two inventions - provision of extra wheel set acting as pivot seems to achieve their main goal and hence dealt with first.
- 2) Other invention is provision of castors at top allowing trolley to be laid flat.
- 3) One or other could be divided out.
- 4) Suggest registering TRUNDLE-HUMPER as TM!

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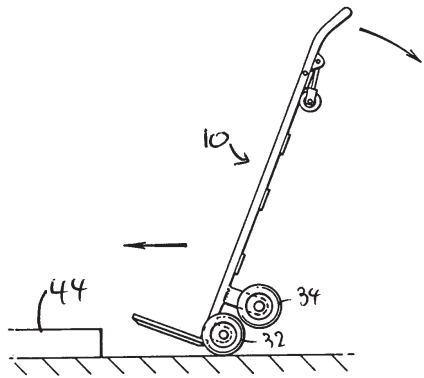


Figure.5

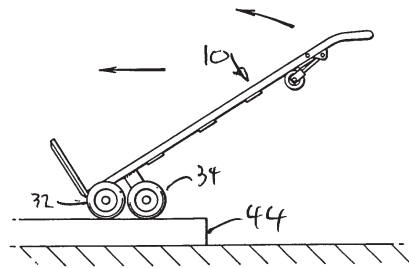


Figure.7

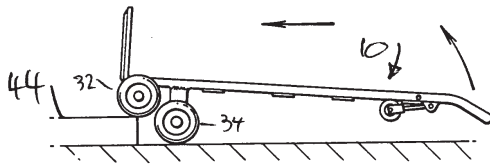


Figure.6

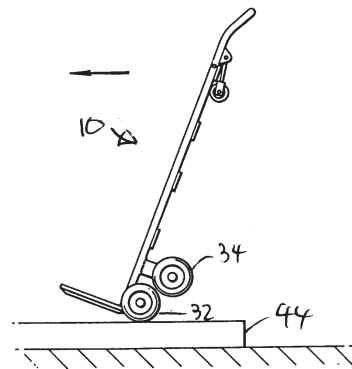


Figure.8

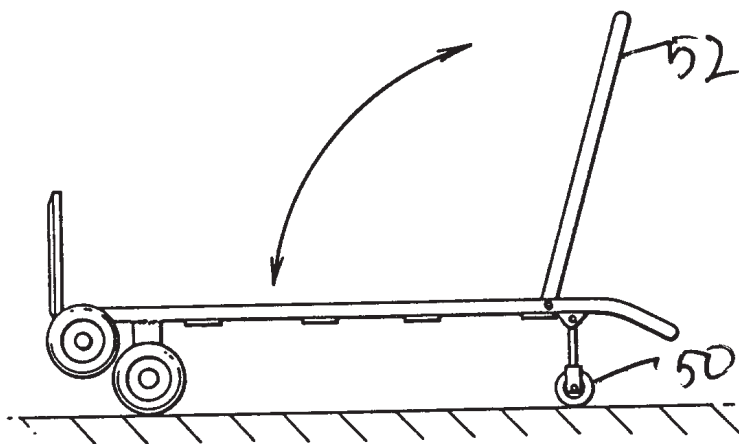


Figure.9

1997 PAPER P3 -SAMPLE ANSWER C

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NOTE TO EXAMINER

The Client's primary interest appears to be a trolley than can climb kerbs more easily than the prior art trolley. This is what I have directed the claims to.

However, it seems to me that the concept of a trolley that can be used both in an upright and a horizontal orientation is also something potentially worth protecting, irrespective of kerb climbing ability. So, while not drafting claims to this aspect, I have provided basis in the text at page 2 for such claims in the event the client thinks this aspect important. A divisional application would obviously be required ultimately if this aspect were to be pursued.

TROLLEY

The present invention relates to a trolley, in particular a trolley of the type comprising a frame with a handle portion at one end and a load supporting platform at the other, sometimes referred to as a "sack truck".

Trolleys of this type are often used to make deliveries to buildings and as a consequence must be man-handled up and down obstacles such as kerbs or steps. When this is attempted using a standard trolley with a single pair of wheels at the platform end of the trolley, considerable effort is required on the part of the user to overcome these obstacles, particularly if a heavy load is being carried on the platform.

In a move to address this problem, it is known to provide a trolley as shown in figs. 1 and 2, where the single pair of wheels of the standard trolley is replaced by a pair of tri-lobal spiders 102, each lobe of which carries a wheel 104. The spider 102 is rotatably mounted to the frame so that as the trolley is reversed to a small step or kerb the rearmost wheel on each spider contacts the edge of the step and curb and the further pulling of the handle results in rotation of the spiders relative to the frame of the trolley to bring the upper wheel into contact with the top surface of the step or kerb. Further rearward motion then brings another of the wheels also into contact with the upper surface of the step or kerb, and the climb is complete.

These known trolleys are seen to be particularly useful as a result of their ability to climb steps or kerbs. However, when the trolley is heavily loaded and the kerb or step is relatively high, the effort required to lift the pivot of the spider "over centre" is quite considerable still.

In one aspect, the present invention provides a trolley comprising a frame with a handle portion at one end thereof and a load supporting platform at the other end projecting forwardly from the

frame, first rotatable ground engaging means mounted on the platform end of the frame and having an axis of rotation extending laterally of the frame, the axis being substantially fixed relative to the frame, whereby the trolley can be rolled across the ground in a generally upright orientation, and second rotatable ground engaging means mounted on said frame and having an axis of rotation extending laterally of the frame, the axis being substantially fixed relative to the frame, wherein the second ground engaging means is spaced from said first ground engaging means along the frame towards the handle portion and projects rearwardly from the frame by a greater distance than the first ground engaging means, whereby said second ground engaging means can be brought into and out of contact with the ground by rotation of the trolley about the axis of rotation of the first ground engaging means.

With this arrangement, the mechanical advantage given by the spacing of the handle and the first and second ground engaging means can be used when climbing kerbs or steps, rather than the simple pulling force necessary in the prior art arrangement. This is particularly advantageous when carrying heavy loads.

The rotatable ground engaging means can take any suitable form and may for example be rollers, wheels or a combination of the two.

The greater rearward projection of the second ground engaging means may be achieved by a differential between the diameters of the first and second ground engaging means, but is more preferably arrived at by off-setting the rotational axis of these two means in the horizontal as well as the vertical direction. In this way, the ground engaging means may all be of the same or a similar size.

While it is possible for the first and second ground engaging means to be spaced apart by a considerable distance, it is preferred that they are generally adjacent one another, that is to say as close as possible, while maintaining adequate clearance between them. In this way the spacing of the handle portion and both ground engaging means is maximised and consequently so is the mechanical advantage achieved.

In a preferred form, the trolley also comprises an additional rotatable ground engaging means mounted on the trolley frame towards the handle portion, spaced from both said first and second rotatable ground engaging means and projecting rearwardly from the frame. This can enable the trolley to be supported on and rolled across the ground in a generally horizontal orientation. With this arrangement, the additional ground engaging means, which may be a castor for example, is preferably mounted on an arm that is pivotally mounted on the frame, so that the castor can be folded in towards the frame, out of the way, when not in use.

Where it is intended to use the trolley in a horizontal orientation, it is also preferably provided with a foldable handle, than can be folded out from the frame to project generally upright therefrom in the horizontal orientation.

This latter proposal, that is to say providing the further rotatable ground engaging means to enable horizontal operation of the trolley is useful in its own right. Accordingly, in a second aspect the present invention provides a trolley comprising a frame with a handle portion at one end thereof and a load supporting platform at the other end thereof projecting forwardly from the frame, first rotatable ground engaging means mounted on the platform end of the frame, whereby the trolley can be rolled across the ground in a generally upright orientation, and further rotatable ground engaging means mounted on the trolley frame towards said handle portion, spaced from said first ground engaging means and projecting rearwardly of the frame for supporting the trolley in a generally horizontal configuration.

In this way, a versatile trolley is provided that can be used in either a vertical or a horizontal orientation to carry a load.

* * * * *

An embodiment of the invention is described below, by way of example, with reference to the accompanying drawings, in which:

Fig 1 is a side elevation of a prior art trolley;

Fig 2 is a front elevation of the prior art trolley of Fig 1;

Fig 3 is a side elevation of the trolley according to an embodiment of the invention;

Fig 4 is a front elevation of the trolley of Fig 3;

Figs 5 to 8 show the manner in which the trolley of Fig 3 can be used to climb a step or kerb; and

Fig 9 is a side elevation, on a reduced scale, of the trolley of Fig 3 in a horizontal orientation.

Referring initially to Figs 3 and 4, the trolley comprises a frame 2 having a handle portion 4 at one end and a load supporting platform 6 extending perpendicularly to the front of the frame 2. The frame comprises two side members 8 jointed by a series of cross-members 10 along their length and the platform 6 at their bottom ends. The top ends of the side members 8 provide the handles 4, and are bent slightly rearwardly for this purpose.

At the bottom end of each side member 8 of the frame 2, a lug 12 is provided projecting to the rear of the frame. These lugs 12 are rigidly fixed to their respective side member 8, and provide bearings for an axle 14 extending transversely of the frame 2. A wheel 16 is mounted on each end of the axle 14, one to either side of the frame 2, the mounting of the axle to the lugs allowing the wheels to rotate about the axle. The position of the lugs 12 and the diameter of the wheels are selected so that the trolley can be rolled along in a generally upright orientation, with the wheels 16 supporting the frame and platform above the ground.

Spaced from the lugs 12 along the side members 8 towards the handles 4, but still generally towards the bottom ends of the side members, is a pair of arms 20, one projecting rearwardly from each side member 8. The arms 20 are fixed rigidly to the side members 8 and project by a greater distance from the side members 8 than the lugs 12. A wheel 22 is rotatably mounted on the outer end of each arm 20. These upper wheels 22 are of the same diameter as the other, lower wheels 16, but by virtue of the greater rearward projection of the arms 20, project themselves beyond the lower wheels. In the example illustrated, the lower wheels 16 are carried on an axle 14, whereas the upper wheels 22 are individually mounted on the arms 20, but other arrangements are possible, e.g. the reverse, both pairs of wheels on an axle, or all wheels independently mounted.

Towards the handle end of the side members 8, just below the rearward bend, two further lugs 24 are fixed firmly to the rear of the frame. A support arm 26 is pivotally mounted to each lug 24 at one end, and the other end of each pivotable arm 26 carries a castor 28 rotatable relative thereto. The arm 26 can be swung between a position in which the castor 28 is adjacent the trolley frame, shown in solid lines, and a position in which it projects rearwardly of the frame 2 with the castor 28 spaced from the frame 2, shown in broken lines in Fig 3.

A foldable handle 30 is also mounted on the frame 2 towards the handles 4, in this example just below the lugs 24. The foldable handle 30 is generally u-shape, the ends of the handle being pivotably mounted to the sides members 8 of the frame 2. The foldable handle 30 can be pivoted from a storage position in which it lies between the side members 8 (shown in Fig 3) away from the frame 2 (shown in chain-link lines in Fig 2) and onto a position shown in Fig 9 in which it projects generally perpendicularly to the front of the frame 2.

Reference is now made to Figs 5 to 8 to describe the operation of the trolley in traversing a kerb 40. The trolley is rolled towards the kerb 40 in a normal manner, in a generally upright orientation, on the lower wheels 16 (Fig 5). As the kerb 40 is approached a backward pressure is applied to the handles 4 to bring the upper wheels 22 into contact with the ground, by rotating the frame about the lower wheels' axle. The handles 4 are then pushed down further, transferring all of the load to the upper wheels 22 and lifting the lower wheels 16 above the level of the kerb 40 over which they can then be pushed (Fig 6). The handles are then lifted up, while pushing the trolley forward, to transfer load back to the lower wheels 16, which are now on the upper surface of the kerb 40 and lever the lower wheels 22 up onto the upper surface of the kerb 40 also (Fig 7). The trolley can be pushed along in the orientation shown in Fig 7, or the handles 4 can be lifted further to return all of the load to the lower wheels 16, as shown in Fig 8. Throughout this operation, the effort required by the user can be considerably less than that required when using the prior art device carrying the same load, not least because of the substantial mechanical advantage given by the spacing of the handles 4 and the wheels 16, 22 when the trolley is being levered up onto the kerb 40 about the wheels 16, 22.

Turning to Fig 9, an alternative orientation in which the trolley can be used is shown. The trolley is laid down horizontally, the castors 28 being extended from the frame 2 so that the trolley is supported by the castors 28 and the upper wheels 22. As can be seen, the castors 28 and wheels 22 project from the rear of the frame 2 by the same distance, so the frame 2 provides a level load carrying platform itself.

Conveniently, in this horizontal mode of operation, the foldable handle 30 is pivoted away from the frame into a generally upright position. It can then be used to push the trolley along on the castors 28 and upper wheels 22.

Claims

1. A trolley comprising:

a frame with a handle portion at one end thereof and a load supporting platform at the other end projecting forwardly from the frame;

first rotatable ground engaging means mounted on the platform end of the frame and having an axis of rotation extending laterally of the frame, the axis being substantially fixed relative to the frame, whereby the trolley can be rolled across the ground in a generally upright orientation; and

second rotatable ground engaging means mounted on said frame and having an axis of rotation extending laterally of the frame, the axis being substantially fixed relative to the frame;

wherein said second ground engaging means is spaced from said first ground engaging means along the frame towards the handle portion and projects rearwardly from the frame by a greater distance than the first ground engaging means, whereby said second ground engaging means can

be brought into and out of contact with the ground by rotation of the trolley frame about the axis of rotation of said first ground engaging means.

2. A trolley according to claim 1, wherein said first and/or said second ground engaging means comprise a pair of wheels disposed one on either side of the trolley frame.

3. A trolley according to claim 1 or claim 2, wherein said second ground engaging means projects more rearwardly than said first ground engaging means by virtue of its axis of rotation being disposed rearwardly of the frame by a greater distance than the axis of rotation of said first ground engaging means.

4. A trolley according to claim 3, wherein said first and second ground engaging means are of substantially the same diameter.

5. A trolley according to any one of the preceding claims, wherein said first and second ground engaging means are disposed substantially adjacent one another.

6. A trolley according to any one of the preceding claims, further comprising an additional rotatable ground engaging means mounted on the trolley frame towards said handle portion, spaced from both said first and second rotatable ground engaging means and projecting rearwardly of the frame, whereby the trolley can be rolled across the ground in a generally horizontal orientation.

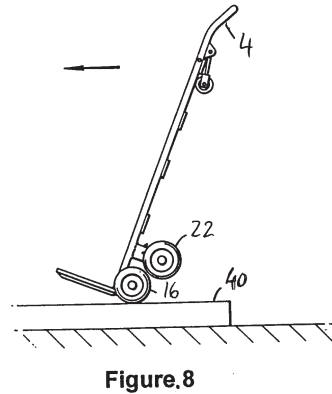
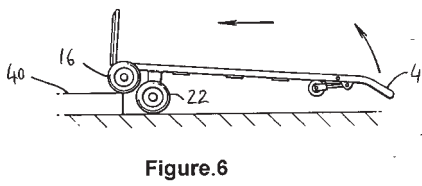
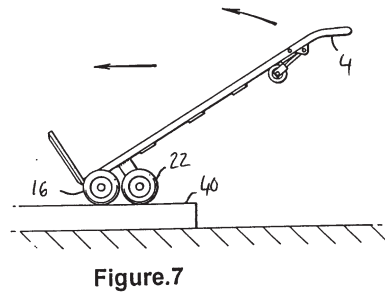
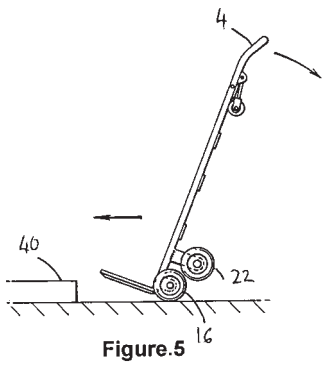
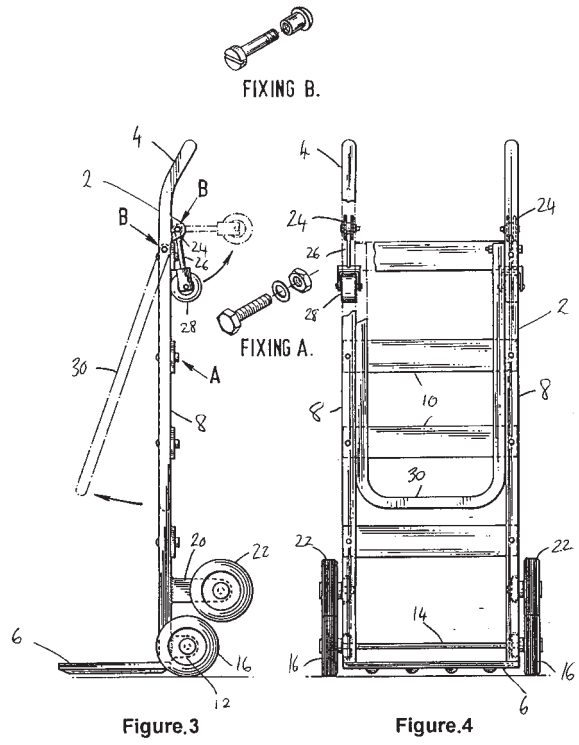
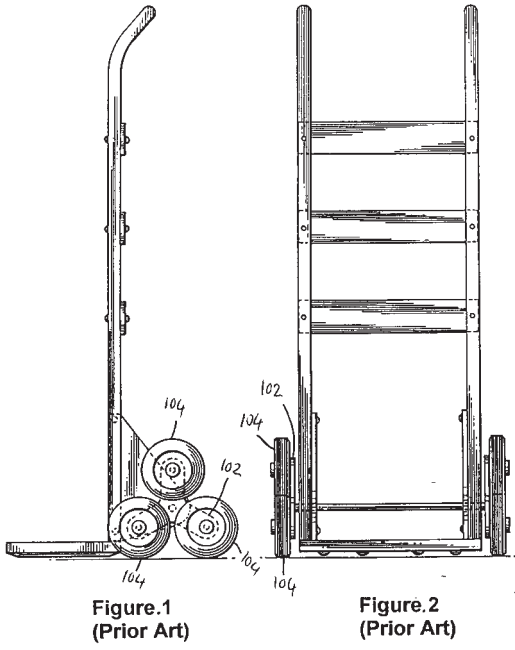
7. A trolley according to claim 6, wherein said additional ground engaging means projects rearwardly of the frame by substantially the same distance as said second ground engaging means, in an operative position.

8. A trolley according to claim 6 or claim 7, wherein said additional ground engaging means is rotatably carried on an arm or arm which in turn is/are pivotally mounted on the trolley frame, whereby said additional ground engaging means can be pivoted towards and away from the frame.

9. A trolley according to any one of the claims 6 to 8, further comprising a folding handle pivotally mounted on the trolley frame towards the handle portion, the folding handle being pivotable on the frame between a position in which it is generally flush with the frame and a position in which it projects forwardly of the frame to provide a substantially upright handle when the trolley is in said generally horizontal orientation.

10. A trolley substantially as herein described with reference to and as illustrated in Figs 3 to 9 of the accompanying drawings.

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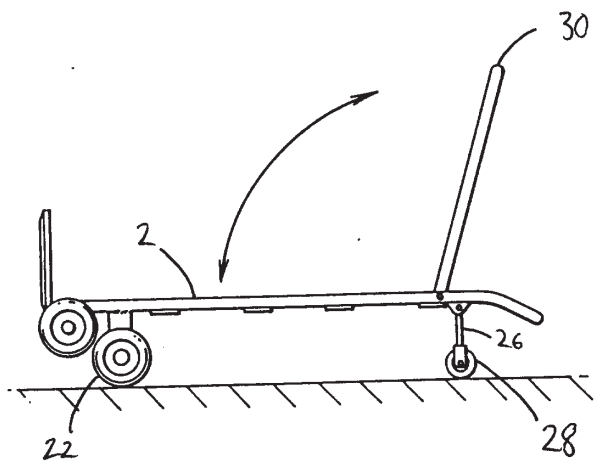


Figure.9