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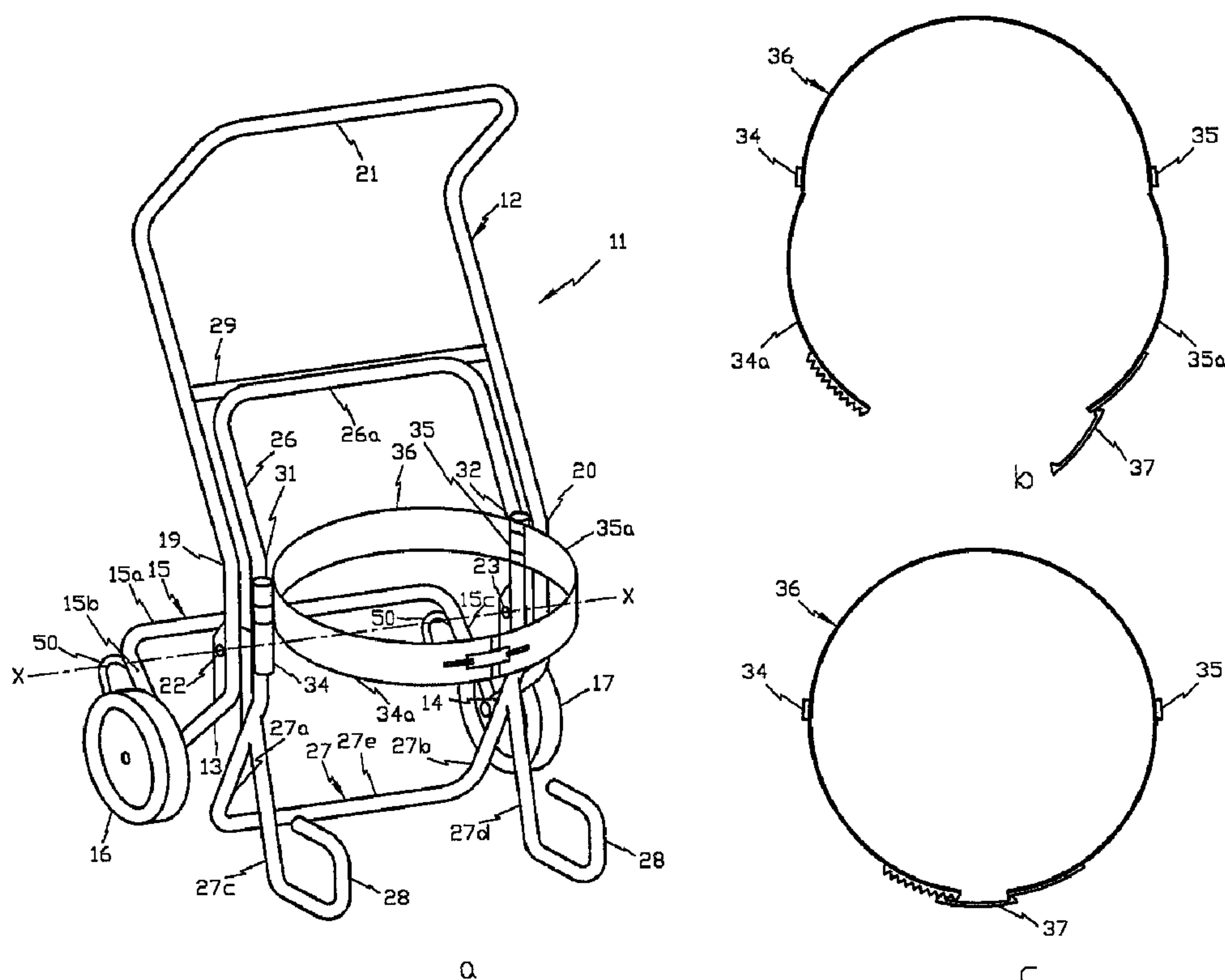
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(54) Title: IMPROVEMENTS RELATING TO A HAND TRUCK



(57) Abrégé/Abstract:

A hand truck for transporting a load comprising a primary frame (12) having one or a plurality of wheel (16, 17) or other rolling support, turnable about a first axis, and means (21) by which the hand truck may be manipulated by hand, and a secondary frame (26) pivotally attached to the primary frame and turnable with respect thereto about a second axis (x-x) parallel to the said first axis, in which there are provided load-engagement means (36) carried on or by the secondary frame by which a load may be secured thereto.

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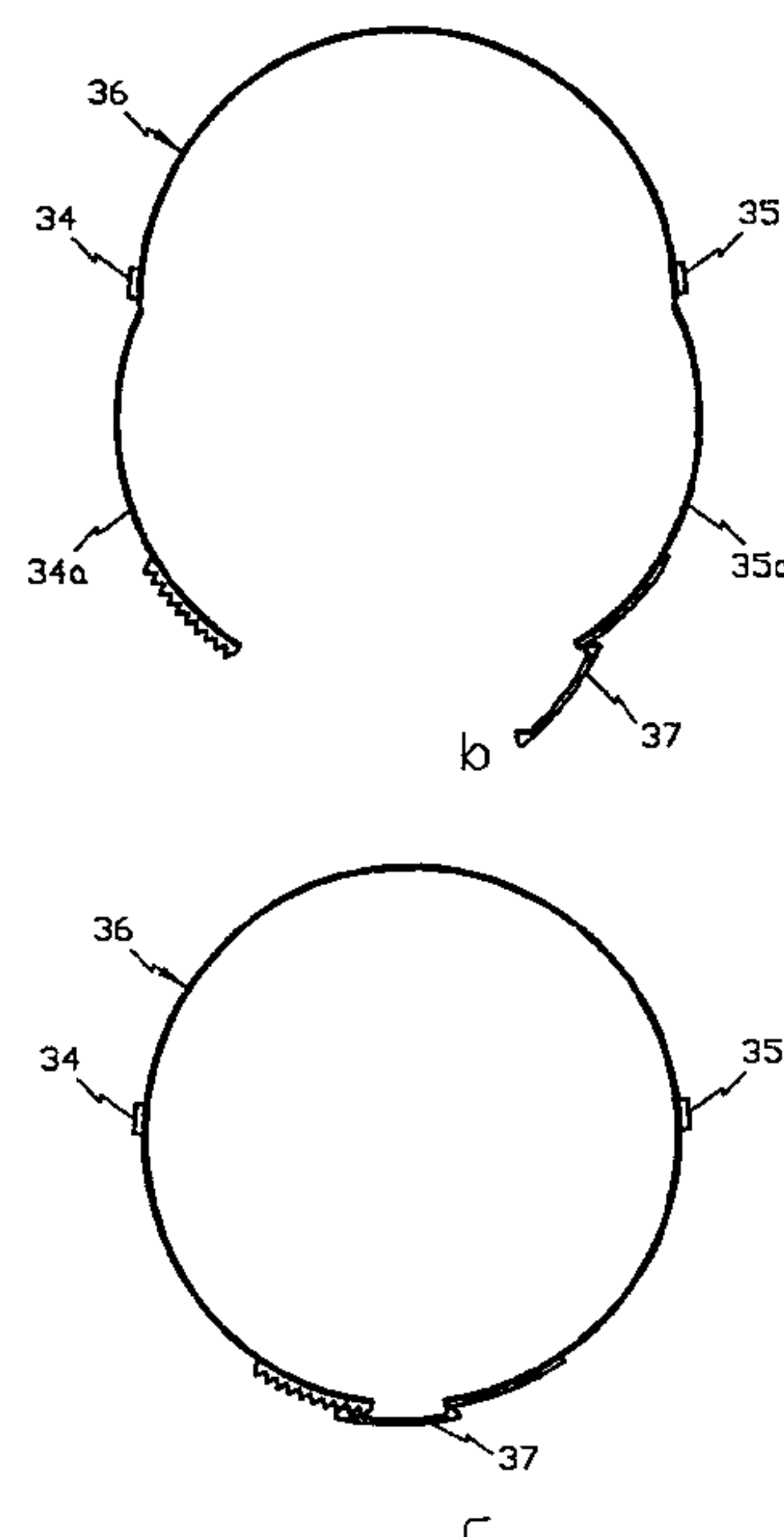
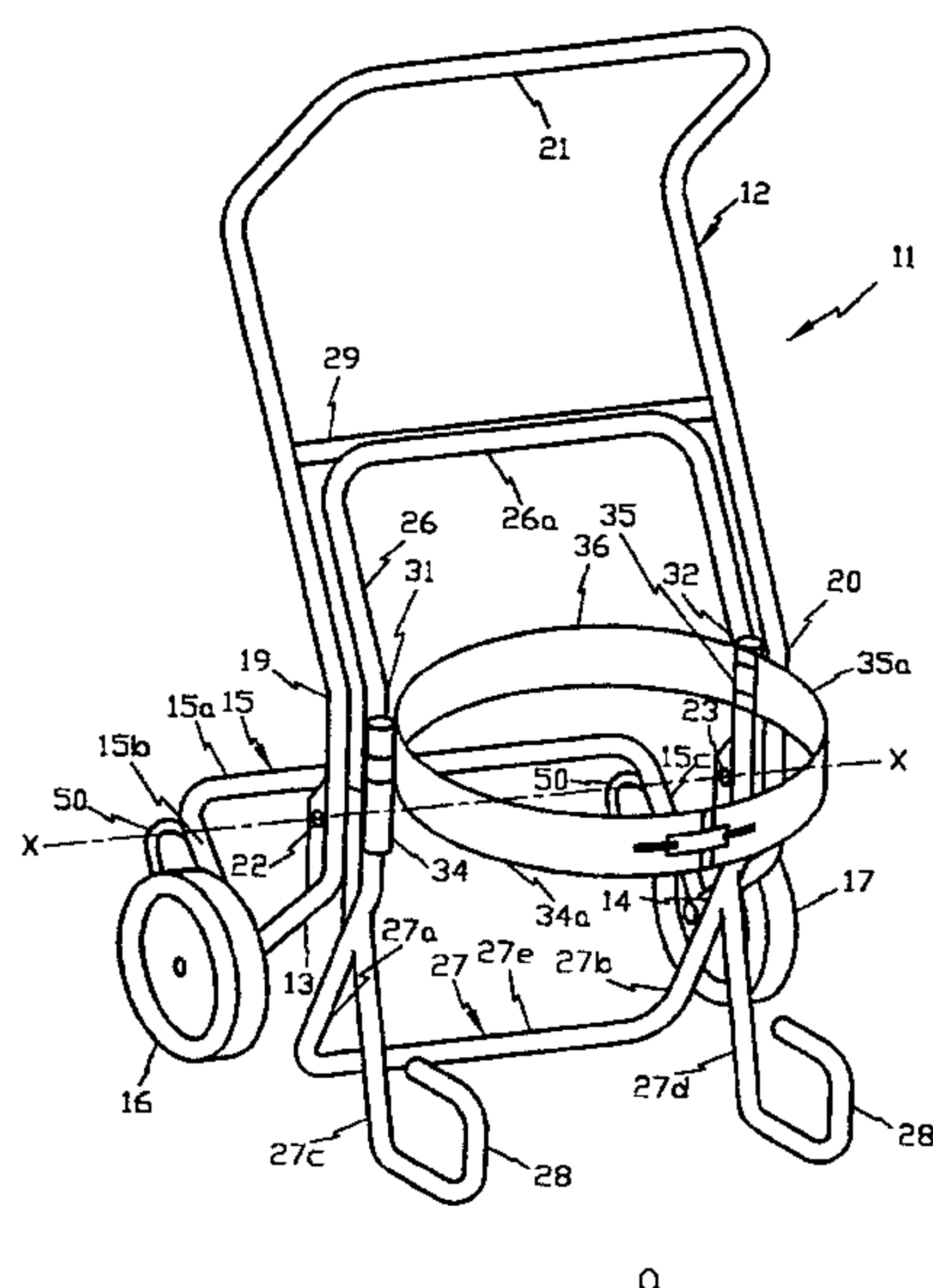
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(54) Title: IMPROVEMENTS RELATING TO A HAND TRUCK



(57) Abstract: A hand truck for transporting a load comprising a primary frame (12) having one or a plurality of wheel (16, 17) or other rolling support, turnable about a first axis, and means (21) by which the hand truck may be manipulated by hand, and a secondary frame (26) pivotally attached to the primary frame and turnable with respect thereto about a second axis (x-x) parallel to the said first axis, in which there are provided load-engagement means (36) carried on or by the secondary frame by which a load may be secured thereto.

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IMPROVEMENTS RELATING TO A HAND TRUCK

The present invention relates to a hand truck or trolley for transporting loads which are too heavy or bulky to be
5 carried.

Various different trucks or trolleys for transporting loads are known. One such known truck or trolley, the so-called sack-barrow, comprises a rigid L-shape frame
10 with a pair of wheels pivoted at the intersection of two approximately orthogonal arms of the frame. The horizontal arm is very much shorter than the vertical arm and this latter has a pair of handles at the upper end, or a loop by which the barrow can be manipulated. Such
15 barrows have the disadvantage that loading and unloading involves tipping the load in order to introduce the platform constituted by the horizontal arm of the L-shape frame. Further, the weight of the load is to a large extent carried by the operator through the handle,
20 particularly if the frame is inclined at a substantial angle to the vertical in operation, and there is a risk that the load will tip and fall off if the load-bearing platform is placed on the ground, for example, to allow the operator to rest. A development of the sack-barrow
25 is known from British Patent 566,932, which discloses a trolley having a pivoted sub-frame with arms for engagement under a raised floor of a special load.

A special load is also envisaged for another trolley described in French Patent 1,339,773. In this latter Patent a frame for a gas bottle can be engaged by a hook on a main frame to lift this into a tilted position for transport as is common with sack-barrows.

European Patent 138571 describes a double-frame hand truck which can be used as a load-bearing trolley or barrow and which overcomes some of the disadvantages of the known sack-barrow, having the features that it is designed to carry the load upright rather than in a tilted orientation like a sack-barrow, and can rest in a stable state on the ground and support the weight of the operator without risk of rolling. Another hand truck with a primary and secondary frame is shown in FR-A-821909. A similar configuration of cranked main frame, but with a box instead of a secondary frame is shown in US-A-4460188.

In such a truck the load is carried partly balanced about an axis (of the ground wheels) and the leverage which is required to be applied by an operator is low making it possible to control even substantial loads on the platform, with this lying horizontally, without requiring the application of a very great force by the operator.

Where the centre of gravity of the load is above the level of the pivot which joins the two frames there is a risk that if the frame used by the operator as a handle

is for any reason unexpectedly released or pulled down towards the ground, to a position beyond that which would be used under normal operating conditions, for example if the operator fell or stumbled, the load may suddenly fall forwards or even backwards towards the operator putting him at risk. Further, for large, bulky or fragile loads the importance of securing the load on the trolley is great. The present invention is designed to address these problems.

10

According to the present invention there is provided a hand truck for transporting a load comprising a primary frame having a pair of ground engaging wheels turnable about a first axis, handle means by which the primary frame may be manipulated by hand, and a secondary frame pivotally attached to the primary frame and turnable with respect thereto about a second axis (x-x) parallel to the said first axis, characterised in that interengagement means are provided for interengaging the said primary and secondary frames together in a predetermined relative orientation and restraining relative turning movement of one frame with respect to the other in both directional senses about the said second axis.

25 The wheels may of course be in the form of normal wheels, rollers, castors or balls.

In a preferred embodiment in a first end position the

3a

load is in contact with the ground and in a second end position the load is raised off the ground.

The load may be suspended from the load-engagement means
5 in use and/or may be supported and restrained thereby.

The position of the load engagement means with respect to the secondary frame may be variable whereby, for example, to allow adjustment of the load engagement means to be in register with a necessarily corresponding part of a load.

5

In a preferred embodiment the load engagement comprises a load encircling band. The encircling band may have a gap whereby to define two arms; the two arms may be flexible whereby to allow relative separation and approach for the introduction and retention of a load. Alternatively the band may comprise several parts at least one of which is relatively movable with respect to the others.

10 The internal diameter of the encircling band is preferably variable so as to allow it to accommodate variously sized loads.

The internal surface of the encircling band may include at least a portion which is formed from a resilient material.

20 The truck may further comprise a clasp means for securing a load to the load engagement means in a preferred embodiment the clasp means comprise a toggle clamp.

In embodiments including the resilient material and the clasp means described above the resilient material of the

encircling band and the clasp means may co-operate to grip a load within the band.

Additionally or alternatively to a load encircling band
5 the load engagement means may comprise or include, without limitation, one or a combination of any of the following: a tray portion; one or a plurality of lifting straps; gripping means for gripping a corresponding projection on a load; a fork portion; a lifting hook
10 portion for engaging a corresponding projection on a load.

In a particularly useful embodiment the primary frame may be shaped such as to be turnable to a stable position in
15 which the wheels thereof are raised from the ground and the primary frame comprises a stable base with respect to which the secondary frame is turnable about the second axis whereby to allow dispensing of the contents from a container carried thereby as the load.

20

In such an embodiment the primary frame may include a raising member which contacts the ground when the primary frame is turned to the stable position. In some embodiments there may be provided two such raising
25 members, one on either side of the primary frame. The or each raising member may be rearwardly extending.

The primary frame may be provided with a handle forming

at least part of the means for manipulating the hand truck, which handles contacts the ground when the primary frame is turned to the stable position.

- 5 In a preferred embodiment when in use, in the first end position the secondary frame is in contact with the ground, in which case any attempt to move the primary frame further in the direction of displacement from the second end position towards the first end position is
10 prevented by an abutment stop located on the primary frame, and forces exerted on the primary frame are transferred to the ground through the secondary frame.

The said primary frame may include two parallel side
15 members each pivotally connected to a respective side members of the secondary frame. The primary and/or secondary frame side members may be cranked at their lower ends, i.e. L-shape.

- 20 The primary frame may include an axle member joining the two ground wheels of the primary frame. The axle member may also constitute a restraining means against which the secondary frame can abut to determine the said second end position of the secondary frame with respect to the
25 primary frame, the said axle member being generally U-shape and having two parallel arms attached at their free ends to respective primary frame side members.

The primary frame is preferably provided with operating handle means for manipulation of the truck. It is preferred that the primary and/or secondary frames are composed of an upper frame part in the form of a loop, and a lower frame part, the two frame parts defining
5 respective planes inclined at an angle to one another.

In a preferred embodiment of the invention the load can be raised from the ground to a substantially horizontal raised position by relative turning movement of the
10 primary frame with respect to the secondary frame about the said second pivot axis to move the said secondary frame to the said second end position thereof with respect to the primary frame with the load experiencing
15 no substantial tipping from the substantially horizontal position in moving from the lowered to the raised positions.

There may further be provided further load bearing means attached or attachable to the primary frame and/or to the
20 secondary frame for supporting, for example, piping associated with gas cylinders. The further load bearing means may be in the form of one or more arms which project from one or both of the frames.

25

According to a second aspect of the present invention there is provided a hand truck for transporting a load, of the type comprising a primary frame having a pair of

ground-engaging wheels turnable about a first axis, and
a secondary frame carrying a load bearing means pivotally
attached to the primary frame and turnable with respect
thereto about a second axis parallel to the said first
5 axis between first and second end positions, in which
there are provided restraining means for restraining
relative turning movement of one frame with respect to
the other in at least one directional sense when the two
frames are located at or adjacent one of the said end
10 positions.

In the said first end position said load bearing means is
orientated to lie parallel to the ground and in contact
with it, and is displaced forwardly of the said wheels,
15 and said second end position at least a part of the said
load bearing means is displaced rearwardly of at least
part of said wheels.

It is therefore a feature of the present invention that
20 relative turning movement between the primary frame and
the secondary frame may be restrained by restraining
means to determine the said first or second end positions
of the secondary frame with respect to the primary frame.

25 In a preferred embodiment the restraining means act at or
adjacent the second end position. The restraining means
may be selectively engageable, and may be manually or
automatically engageable. The restraining means may be

releasable.

The restraining means may comprise an engagement member on one frame engageable with a co-operating member on or
5 on a member carried by the other frame.

In a preferred embodiment the restraining means comprise an automatically engaging latch which is releasably engageable, and acts between the lower parts of the two
10 frames. The latch may be resiliently biased to an engagement position.

Other forms of restraining means may comprise a wedging element turnably or fixedly mounted on one of the two
15 frames at a position close to the pivot point between the two. Such a wedging element may be positioned to lie in between the two frames and to prevent further turning movement therebetween.

20 Alternatively a manual latch may be used which works, for example, at the opposite end to the above lock and catch restraining means. Such means may be in the form of an attachable substantially rigid bar spanning between the primary and secondary frames to hold them in a desired
25 position with respect of each other.

When in use, the first end position the load bearing platform of the secondary frame can be placed in contact

with the ground, in which case any attempt to move the primary frame further in the direction of displacement from the second relative position towards the first relative position is prevented by such abutment stops, and forces exerted on the primary frame are transferred to the ground through the secondary frame. In this position the line of action of a force on the handle passing through any point of the load platform exerts a turning moment about the said secondary axis urging the said secondary frame towards the said first relative position of the secondary frame with respect to the primary frame.

The primary frame may include an axle member joining the two ground wheels of the primary frame. If the axle member is present and the restraining means has not been engaged either through failure of the mechanism or through a decision not to engage said restraining means, the axle member may also constitute a restraining means against which the secondary frame can abut to determine the said second end position of the secondary frame with respect to the primary frame, the said axle member being generally U-shape and having two parallel arms attached at their free ends to respective primary frame side members.

The said primary frame may include two parallel side members each pivotally connected to a respective side

members of the secondary frame. The primary and/or secondary frame side members may be cranked at their lower ends, ie. L-shape.

- 5 The primary frame is preferably provided with operating handle means for manipulation of the truck. It is preferred that the primary and/or secondary frames are composed of an upper frame part in the form of a loop, and a lower frame part, the two frame parts defining
10 respective planes inclined at an angle to one another.

In a preferred embodiment of the invention the said load bearing means can be raised from the ground to a substantially horizontal raised position by relative
15 turning movement of the primary frame with respect to the secondary frame about the said second pivot axis to move the said secondary frame to the said second end position thereof with respect to the primary frame with the load bearing means experiencing no substantial tipping from
20 the substantially horizontal position in moving from the lowered to the raised positions.

The said load bearing means may be formed as a tray or pan attached to the secondary frame and projecting
25 therefrom transversely of a plane joining its point of attachment to the primary frame with the said pivoted end thereof, the length of the said tray or pan, in the direction of projection thereof, being at least as great

as the width thereof.

Alternatively, the load bearing means may be in the form of two parallel arms which are also parallel to the ground to form a fork which may be pushed under or positioned around a load. The two parallel arms may simply be attached to the secondary frame or may form a part of the frame and may be joined by a rectilinear bight portion to form a generally C-shape load bearing means.

Transverse struts may be positioned between the two parallel arms to form a load bearing platform. The transverse struts may be removable.

15

There may further be provided load restraining means attached or attachable to the primary frame and/or to the secondary frame to restrain a load on the said load platform against tipping with respect to the load platform. Such load restraining means may for example comprise a chain or other flexible elongate member attached or releasably attachable at one or both ends thereof to the primary or secondary frame of the said mechanism.

25

There may further be provided a second load bearing means attached or attachable to the primary frame and/or to the secondary frame for supporting, for example, piping

associated with gas cylinders. The second load bearing means may be in the form of one or more arms which project from one or both of the frames. In a preferred embodiment the second load bearing means comprise two
5 inverted L-shape arms attached orthogonally to the secondary frame.

Various embodiments of the present invention will now be more particularly described, by way of example, with
10 reference to the accompanying drawings wherein like reference characters refer to like parts, in which:-

Figure 1a is a perspective view of an embodiment of the first aspect of the invention constructed as a load-bearing trolley;

15 Figure 1b is a schematic plan view of the encircling band of Figure 1a in a closed configuration;

Figure 1c is a schematic plan view of the encircling band of Figure 1b in an open configuration;

Figure 2 is a perspective side view of the
20 embodiment of Figure 1 in a first position; and

Figure 3 is a perspective side view of the embodiment of Figure 1 in a second position.

Figure 4 is a schematic side view of the trolley of Figure 2;

25 Figure 5 is a schematic side view of the trolley of Figure 3;

Figure 6 is a perspective view of the embodiment of Figure 1 in a stable position;

Figure 7a is a magnified perspective view of a foot formed as part of a further embodiment of the first aspect, shown in a raised position; and

Figure 7b is a magnified perspective view of the foot of Figure 7a shown in a lowered position.

Figure 8 is a perspective view of a further embodiment of the first aspect of the invention illustrating alternative load-engagement means;

Figure 9 is a perspective view of a further embodiment of the first aspect of the invention illustrating alternative load-engagement means;

Figure 9a is a sectional magnified view taken along line IX-IX of Figure 9;

Figure 10 is a perspective view of a further embodiment of the first aspect of the invention illustrating alternative load-engagement means;

Figure 11 is a perspective view of a further embodiment of the first aspect of the invention illustrating alternative load-engagement means;

Figure 11a is a perspective view of a further embodiment of the first aspect of the invention illustrating alternative load-engagement means;

Figure 12 is a perspective view of an embodiment of the second aspect of the invention constructed as a load-bearing trolley;

Figure 13 is a schematic side view of the embodiment of Figure 12 in a first position;

Figure 14 is a schematic side view of the embodiment

of Figure 12 in a second position;

Figure 15 is an enlarged schematic side view of part of the trolley of Figure 13 showing the restraining means of the invention;

5 Figure 16 is a schematic side view of a further embodiment of the second aspect of the invention adapted to carry larger loads shown in a first position; and

Figure 17 is a schematic side view of the embodiment of Figure 16 shown in a second position.

10

Referring now to the drawings, a trolley according to the first aspect of the invention is illustrated in a first end position and is generally indicated with the reference numeral 11. The trolley 11 comprises a
15 generally U-shape primary frame 12 having lower side limbs 13, 14 joined at their free ends by an axle member 15 carrying two wheels 16, 17 one at each end. The axle member 15 is a shallow U-shape having a main bight portion 15a and two substantially parallel limbs 15b and
20 15c. Each limb 15b, 15c carries a resting loop 50. The main bight portion 15a forms an abutment stop for a secondary frame 26 to determine the second end position as described below. The main bight portion 15a lies parallel to the axis of rotation of the two ground wheels
25 16, 17 and is displaced somewhat rearwardly of this axis. The upper part of the primary frame 12, which is joined to the lower primary frame side limbs 13, 14 by elbows 19, 20, has an inverted U-shape with a bight portion 21

which constitutes the handle member by which the mechanism is manipulated by an operator. Just below the elbows 19, 20 there are two pivotal mounts 22, 23 to which are pivoted a secondary frame 26. The upper part
5 of the secondary frame 26 is joined to lower secondary frame side limbs 27a, 27b, 27c, 27d and is an inverted U-shape with a bight portion 26a.

In line with elbows 19, 20 of the primary frame 12 the
10 secondary frame 26 has elbows 31, 32. Just below the elbows 31, 32 there are two mounting brackets 34, 35. The mounting brackets 34, 35 carry an annular encircling band 36. Referring now to Figures 1a, b and c the band 36 includes a semicircular support 36a which projects
15 rearwardly of the mounting brackets 34, 35 being fixedly attached to both; each mounting bracket 34, 35 further carries an arcuate support 34a, 35a. The arcuate supports 34a, 35a are pivotally mounted on the mounting brackets 34, 35 to allow them to swing apart as shown in
20 Figure 1c so as to allow a load to be placed within the band 36. The arcuate supports 34a, 35a each carry one half of a toggle clamp mechanism 37 to secure a load within the annular band 36. The pivoting arcuate supports 34a, 35a and a toggle clamp mechanism 37 that
25 can span varied gaps allow the effective internal diameter of the band to be variable to accommodate differently sized loads.

A transverse strut 29 is situated on the primary frame 12 just above the elbows 19, 20. The transverse strut 29 helps confer rigidity on the primary frame 12 and also serves as an abutment stop means for the secondary frame 5 26 as will be described below.

The lower ends of the lower secondary side limbs 27a, b are joined by a bight portion 27e to form a U-shape stop means 27. The lower ends of the lower secondary frame 10 side limbs 27c, 27d extend to form lateral guide means 28. In this embodiment the lateral guide means 28 are formed as two C-shape members.

Referring now to Figures 2 and 4, the trolley 11 is shown 15 in a first end position with a load 30 and the lateral guide means 28 flat on the ground. In this position the primary frame 12 has been turned about the pivot axis x-x (shown in Figure 1) in a clockwise direction as viewed in Figure 2 and 4, to its maximum extent; the arms 13, 14 of 20 the primary frame 12 have turned about the pivot axis x-x until, with the wheels 16, 17 still on the ground, the load 30 and the lateral guide means 28 now rest flat on the ground. The upper parts of the primary and secondary frames 12, 26 are juxtaposed and the upper part of the 25 secondary frame 26 is in abutment with the traverse strut 29; no further turning of the primary frame 12 clockwise can take place.

The second end position illustrated in Figures 3 and 5 is achieved by pulling the handle 21 downwardly and to the left as viewed in Figures 2 and 4, lifting the secondary frame 26 and thus the band 36 carrying the load 30, from the ground. This has the effect of turning the primary frame 12 about the pivot axis x-x until the axle 15 contacts the stop means 27 of the secondary frame and prevents further turning.

10 The axle 15 acts in conjunction with the handle 21 to assist in converting the trolley 11 from the first to the second end position, using a foot. The axle 15 also constitutes a restraining means by abutment with the stop means 27 of the secondary frame 26 to define the second
15 end position.

As will be appreciated, in passing from the position shown in Figures 2 and 4 to the position shown in Figures 3 and 5, the load 30 experiences no substantial tipping
20 motion.

Because the primary frame 12 is cranked at the elbows 19, the handle 21 is located a considerably greater distance from the vertical centre line through the wheels 16, 17 than the centre of gravity of a load 30 secured in the band 36. This leverage gives the operator a great mechanical advantage in handling the trolley, even with a heavy load.

As will be seen from Figure 3 the load 30 can be carried entirely upright with its weight counterbalanced by the force applied to the handle 21. The weight of the load 5 30 is partly balanced on the wheels 16, 17 by the fact that the band 36 extends some way behind the common axis of the wheels 16, 17, thereby reducing the force required on the handle 21 by between one quarter and one third of that which would be required if the band 36 did not 10 extend beyond the wheel axis, thereby enabling heavier loads to be handled more easily.

Referring now to Figure 6 the secondary frame 26 is shown in a stable position in which the trolley 11 and the load 15 30 are now perpendicular to their starting position as shown in Figures 1, 2 and 4 and the weight of the load and the trolley is supported by the handle 21 and rearwardly extending members formed as resting loops 50. The load 30 is held and gripped by the encircling band 36 20 so that it can not move relative thereto. This configuration may be useful for dispensing the contents of the load 30. To achieve this configuration the handle 21 of the primary frame 12 is pushed down, past the point of the second end position shown in Figures 3 and 5 so 25 that the resting loops 50 of the axle 15 come into contact with the ground. The handle 21 is pushed to rest on the ground and the resting loops 50 raise the wheels 16, 17 completely off the ground. The bight portion 26a

of the secondary frame 26 is used as a handle to pull the secondary frame 26 towards the primary frame 12 until it contacts the strut 29 of the primary frame 12 to define the stable position in which the load 30 is horizontal to the ground. The trolley 11 may be locked in the stable position by any suitable locking means (not shown) to prevent pivotal movement of the secondary frame 26 relative to the primary frame 12.

10 Referring now to Figures 7a and 7b there is shown an alternative embodiment in which the resting loops 50 are replaced by feet as described below. Each side of the trolley preferably has a foot however the figures show only one side of the trolley, the components and method
15 of working being identical; further the wheels are not shown for clarity of the figures.

Figure 7a shows a foot generally indicated 60 in a raised position. The foot comprises two parallel rectangular
20 plates 61a, 61b joined at their lower edges by a base element 62. The base element 62 is generally rectangular with an inclined face 64 at one end, and is preferably formed from a durable, non-slip material such as nylon. The rectangular plates 61a, 61b flank the limb 15c of the
25 axle member 15 and are pivotally attached to it at a pivot point 70. The foot 60 is maintained in the raised position by a pin 63 that spans the plates 61a, 61b above the limb 15c.

- When the stable position shown in Figure 6 is required the foot 60 is converted from the raised position shown in Figure 7a to a lowered position shown in Figure 7b.
- 5 The lowered position is achieved by removing the pin 63 and allowing the foot 60 to pivot so that the plates 61a, 61b are parallel to the limb 15c whereupon the pin 63 is used to secure the foot 60 to the limb 15c.
- 10 When the trolley 11 is converted to the stable position as previously described the feet 60 fulfill the same function as the resting loops 50. The inclined face 64 of the base element 62 contacts the ground first allowing the foot to roll onto the ground as the trolley
- 15 approaches the stable position; in the stable position the base element 62 is flat on the ground.

Figures 8 and 9 show alternative embodiments in which the arcuate supports 34a, 35a shown in Figure 1a are removed

20 and replaced with alternative load engagement means.

In the embodiment shown in Figure 8 the bight portion 26a of the upper part of the secondary frame 26 has a downwardly depending U-shape holder 26b located centrally

25 on the underside thereof. A lifting strap 70 is suspended from the holder 26b. The lifting strap 70 comprises a strip 71 having a hook 72 at each end thereof. In use the hooks 72 engage handles or other

projections on a load (not shown); once the load is secured in this way the operation of the trolley 11 is the same as hereinabove described.

- 5 In the embodiment shown in Figure 9 the bight portion 26a of the upper part of the secondary frame 26 has gripping means 73 located centrally thereon.

The gripping means 73 are shown in use in Figure 9a. The
10 gripping means 73 comprise a generally rectangular upper portion 73a and a generally triangular lower portion 73b that is attached to the bight portion 26a. The upper and lower portions 73a, 73b each have a projecting tooth 74 at one end thereof. The portions 73a, 73b are pivotally
15 attached to each other at a pivot point 75 and also connected to each other by a spring 76 which resiliently biases the gripping means 73 to a closed position in which the teeth 74 are in contact. In use the gripping means 73 is moved to an open position by squeezing the
20 upper and lower portions at the ends remote from the teeth 74 together. The gripping means 73 engages a bead rim 76 of a load 77 by allowing the gripping means 73 to close so that the teeth 74 grip either side of the rim 76. Having secured the load 77 in this way the operation
25 of the trolley 11 is the same as hereinabove described.

Figures 10 and 11 and 11a show alternative load engagement means in which the encircling band 36 is not

present. In both cases the bight portion 26a of the upper end of the secondary frame 26 and the bight portion 27e of the lower end of secondary frame 26 are joined by two vertical struts 78a, 78b.

5

In the embodiment shown in Figure 10 the vertical struts 78a, 78b support load engagement means in the form of a fork 79; the lateral guide means shown in Figure 1 are not present. The fork 79 comprises two L-shape prongs 10 80a, 80b being attached to respective vertical struts 78a, 78b. The prongs 80a, 80b are connected to each other by transverse struts 81a, 81b. In use the fork 79 is slid under a load (not shown), such as a pallet or box; thereafter the working of the trolley 11 is the same 15 as hereinabove described.

In the embodiment shown in Figure 11 the load engagement means are in the form of a tray 82. The tray 82 comprises a back wall 83, bottom wall 84 and two side 20 walls 85, 86. The back wall 83 is a rectangular plate that is attached to the bight portion 26a of the upper part of the secondary frame 26 and to the vertical struts (not shown). The bottom wall 84 is a square plate located at the bottom of the back wall 83, lying 25 orthogonally to it. The two side walls 85, 86 are generally L-shape and are connected to the bottom 84 and back 83 walls to form the tray 82. The tray 82 as a whole is therefore attached to the secondary frame 26,

fitting between the lateral guide means 28.

In use a load (not shown) may be placed on the tray 82, or the tray may be slid under a load. In a further
5 embodiment (not shown) the bottom wall 84 includes an inclined surface at the front of the tray 82 to allow it to slide under a load more easily. Once a load is in the tray 82 the working of the trolley 11 is the same as hereinabove described.

10

In the embodiment shown in Figure 11a the load-engagement means are a lifting hook portion generally indicated 90 which comprises a generally rectangular plate 91 that is slidably mounted between the struts 78a, 78b, lying
15 orthogonal to them, by virtue of two corresponding apertures. Extending away from one edge of the rectangular plate 91 is a generally L-shape hook 92 for engaging a corresponding projection on a load (not shown).

20

Because the rectangular plate 91 is slidably mounted on the struts 78a, 78b the position of the hook 92 can be varied whereby to allow engagement with loads having the necessary corresponding projections at different
25 positions relative to the secondary frame 26. The lifting hook portion 90 may also have locking means (not shown) for locking the rectangular plate 91 in position.

Referring now to Figure 12, the trolley according to the second aspect of the invention illustrated is generally indicated with the reference numeral 111 and comprises a generally U-shape primary frame 112 having lower side limbs 113, 114 joined at their free ends by an axle member 115 carrying two wheels 116, 117 one at each end. The axle member 115 is a shallow U-shape having a main bight portion 115a and two substantially parallel limbs 115b and 115c. In the absence of engagement of further restraining means (as described below) or if they fail, the main bight portion 115a may form an abutment stop for the secondary frame to determine the second end position. The main bight portion 115a lies parallel to the axis of rotation of the two ground wheels 116, 117 and displaced somewhat rearwardly of this axis. The upper part of the primary frame 112, which is joined to the lower primary frame side limbs 113, 114 by elbows 119, 120, has an inverted U-shape with a bight portion 121 which constitutes the handle member by which the mechanism is manipulated by an operator. Just below the elbows 119, 120 there are two pivotal mounts 122, 123 joined by a pivot rod 124 to which are pivoted a secondary frame 126. The upper part of the secondary frame 126 which is joined to the lower secondary frame side limbs 126a, 126b by elbows 127a, 127b is an inverted U-shape. Near the top of the secondary frame is a first transverse strut 129 with two pins 129a, 129b which carry a restraining chain 130 or like flexible linear member which may be used to

restrain a load securely in place. Level with the first transverse strut 129 are two L-shape retainers 131a, 131b on either side of the secondary frame which may be used as supports for additional equipment such as gas cylinder hoses. A second transverse strut 132 is situated on the secondary frame 126 just above the elbows 127a, 127b. The first and second transverse struts 129, 132 help confer rigidity on the secondary frame and may also serve as abutments for loads.

10

The lower ends of the lower secondary frame side 126a, 126b extend to form load bearing means generally indicated 128. The interconnection between the lower secondary frame side limbs 126a, 126b and the load bearing means 128 is made by any convenient method such as welding or bolting but in such a way that a rigid interconnection at a predetermined fixed angle between the plane of the platform bottom and the plane defined by the lower secondary frame side limbs 126a, 126b is obtained, and is strengthened by the incorporation of the two support struts 134a, 134b. Alternatively the load bearing means 128 may be formed as part of the secondary frame.

25 In this embodiment the load bearing means 128 is in the form of a U-shape frame having a bight portion 128a and two substantially parallel limbs 128b, 128c. Load bearing strips 135 span the substantially parallel limbs

128b, 128c to form a platform for receiving a load.

The restricted pivotal movement of the secondary frame 126 with respect to the primary frame 112 about the pivot
5 axis x-x effected by restraining means (generally indicated 133) will be described hereinbelow with reference to Figures 13, 14 and 15.

Referring now to Figure 13, the trolley is shown in a
10 first end position with the load bearing means 128 flat on the ground. In this position the main frame 112 has been turned about the pivot axis x-x, in an anti-clockwise direction as viewed in Figure 2, to its maximum extent; the arms 113, 114 of the primary frame 112 have
15 turned about the pivot axis x-x until, with the wheels 116, 117 still on the ground, the load bearing means 128 now rests flat on the ground. The upper parts of the primary and secondary frames 112, 126 are juxtaposed; no further turning of the primary frame 112 anti-clockwise
20 can take place. Any downward load on the handle 121 will result in an anti-clockwise moment on the secondary frame 126, either because of the diverging action of the primary frame lower side limbs 113, 114 and the secondary frame 126, in the case of a downward force the line of
25 action of which passes behind the pivot axis x-x; or, in the case of a force the line of action of which passes forwardly of the axis x-x, because this also passes through the load bearing means 128 thereby pressing this

onto the ground and tending to turn the primary frame 112 in an anti-clockwise direction.

The position illustrated in Figure 14 is achieved by
5 pulling the handle 121 downwardly and to the right as viewed in Figures 2 and 3, lifting the load bearing means 128 from the ground. This has the effect of turning the primary frame 112 about the pivot axis x-x until the restraining means (generally indicated 33) prevents
10 further turning.

As will be appreciated, in passing from the position shown in Figure 13 to the position shown in Figure 14, the load bearing means 128 experiences no substantial
15 tipping motion.

Because the primary frame 112 is cranked at the elbows 119, 120 the handle 121 is located a considerably greater distance from the vertical centre line through the wheels
20 116, 117 than the centre of gravity of a load on the platform 127. This leverage gives the operator a great mechanical advantage in handling the trolley, even with a heavy load on the load bearing means 128.

25 As will be seen from Figure 14 the load 129 can be carried entirely upright with its weight counterbalanced by the force applied to the handle 121. The weight of the load 129 is partly balanced on the wheels 116, 117 by

the fact that the platform 127 extends some way behind the common axis of the wheels, thereby reducing the force required on the handle 121 by between one quarter and one third of that which would be required if the platform did
5 not extend beyond the wheel axis, thereby enabling heavier loads to be handled more easily.

The working of the restraining means 133 will now be described in more detail with reference to Figure 15.

10

The restraining means 133 comprise a latch member 150 and an engagement member 160. The latch member 150 is pivotally attached to the primary frame lower side limb 114 at a pivot point 153. The engagement member 160 is
15 a generally C-shape element and is located on the secondary frame lower side limb 126b opposite the latch member 150.

The latch member 150 is a generally elongate lever-like
20 member with a transverse notch 151 adjacent an enlarged head portion 152. The head portion 152 has a curved side wall adjacent the mouth of the notch 151, shaped so as to act as a cam surface upon engagement with the engagement member 160 as the truck 111 is urged from the first end
25 position shown in Figure 13 towards the second end position shown in Figure 14. This causes the latch member 150 to turn (clockwise as viewed in the drawings) about the pivot point 153, bringing the mouth of the

notch 151 into register with the engagement member 160 where upon the latch member 150 engages the engagement member 160.

- 5 The latch member 150 is resiliently biased to the engaged position by a resilient member 154 attached thereto at a point upstream of the pivot point 153 with respect to the head portion 152. The other end of the resilient member is attached to a pin 155 located on the primary frame
10 lower side limb 114. The resilient member 154 may be in the form a a tension spring, a torsion spring or a coil spring.

In the engaged position the primary and secondary frames
15 112, 126 are locked in position with respect to each other so that if for any reason the handle 121 is pulled down towards the ground whilst a load 129 with a high centre of gravity is being transported, the secondary frame 126 cannot pivot to allow the upper end thereof to
20 approach the primary frame 112, so that the danger of the load 129 tipping towards the operator is avoided.

In the embodiment of Figures 16 and 17 the method of operation is the same as in the first embodiment - the
25 primary and secondary frames move between first and second end position as shown in Figures 5 and 6 respectively. In this embodiment the primary frame 112 has a further projecting loop 136 acting as a limit stop

by engaging the secondary frame 126 when the primary frame 112 is in the second end position. The loop 136 is generally U-shape.

- 5 The loop 136 acts in conjunction with the handle 121 to assist in converting the trolley 111 from the first to the second end position, using a foot. The loop 136 also constitutes a restraining means by abutment with the secondary frame 126 to define the second end position.

10

A clamp band 137 projects from the secondary frame. This is composed of two parts which can be joined by a fastening 138, for example, in the form of a toggle clamp, to restrain a large load such as a drum 139 as
15 shown in the drawing.

CLAIMS

1. A hand truck for transporting a load comprising a primary frame (12) having a pair of ground engaging
5 wheels (16, 17) turnable about a first axis, handle means (21) by which the primary frame (12) may be manipulated by hand, and a secondary frame (26) pivotally attached to the primary frame (12) and turnable with respect thereto about a second axis (x-x) parallel to the said first axis,
10 characterised in that interengagement means (133, 160) are provided for interengaging the said primary and secondary frames (12, 26) together in a predetermined relative orientation and restraining relative turning movement of one frame with respect to the other in both
15 directional senses about the said second axis.

2. A hand truck according to Claim 1, characterised in that the secondary frame (26) has load-engagement means (34, 35, 36; 70, 71, 72; 73) from which a load may be
20 suspended in use.

3. A hand truck according to any of Claims 1 or 2, characterised in that the position of the load engagement means (73) with respect to the secondary frame (26) is
25 variable.

4. A hand truck according to any preceding claim, characterised in that the load engagement means comprise a load encircling band (36).

5

5. A hand truck according to Claim 4, the band (36) has a gap whereby to define two arms (34a, 35a).

6. A hand truck according to Claim 5, characterised in that the two arms (34a, 35a) are flexible whereby to allow relative separation and approach for the introduction and retention of a load.

7. A hand truck according to Claim 4, characterised in that the band (36) comprises several parts at least one of which is relatively movable with respect to the others.

8. A hand truck according to any of Claims 4 to 8, characterised in that the internal diameter of the encircling band (36) is variable.

9. A hand truck according to any of Claims 4 to 8, characterised in that the internal surface of the encircling band (36) includes at least a portion which is

formed from a resilient or elastic material.

10. A hand truck according to Claim 9, characterised in
that the band (36) is closed by clasp means comprising a
5 toggle clamp (37).

11. A hand truck as claimed in any of Claims 1 to 3,
characterised in that the load engagement means include
one or a plurality of lifting straps (70,71).

10

12. A hand truck according to any of Claims 1 to 3,
characterised in that the load engagement means (73)
include gripping means for gripping a corresponding
projection on a load.

15

13. A hand truck according to any preceding claim,
characterised in that the primary frame (12) is shaped
such as to be turnable to a stable position in which the
wheels (16) thereof are raised from the ground and the
20 primary frame (12) comprises a stable base with respect
to which the secondary frame (26) is turnable about the
said second axis whereby to allow dispensing of the
contents from a container carried thereby as the said
load.

25

14. A hand truck according to Claim 13, characterised in that the primary frame includes a raising member which contacts the ground when the primary frame is turned to the said stable position.

5

15. A hand truck according to Claim 13 or Claim 14, characterised in that the primary frame (12) is provided with a handle (21) forming at least part of the said means for manipulating the hand truck, which handle
10 contacts the ground when the primary frame is turned to the said stable position.

16. A hand truck according to any of Claims 13 to 15, characterised in that there are provided two such raising
15 members, one on either side of the said primary frame.

17. A hand truck according to any preceding Claim, characterised in that the said interengagement means are selectively engageable.

20

18. A hand truck according to Claim 17, characterised in that the said restraining interengagement means are automatically engageable.

25 19. A hand truck according to any preceding Claim 19,

characterised in that the said interengagement means
comprise a latch.

20. A hand truck according to Claim 19, characterised in
5 that the said latch is resiliently biased to an engaged
position.

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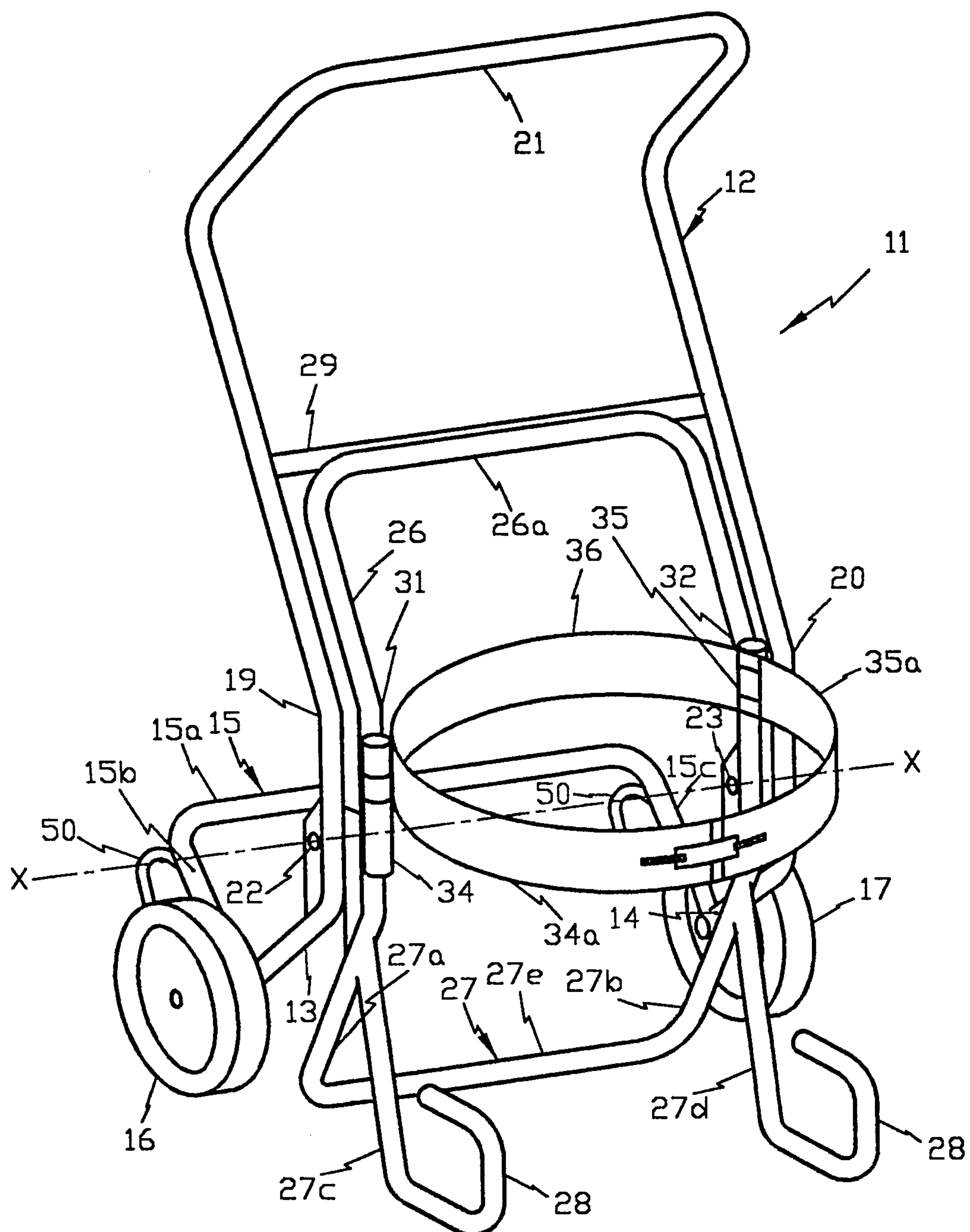


FIG 1a

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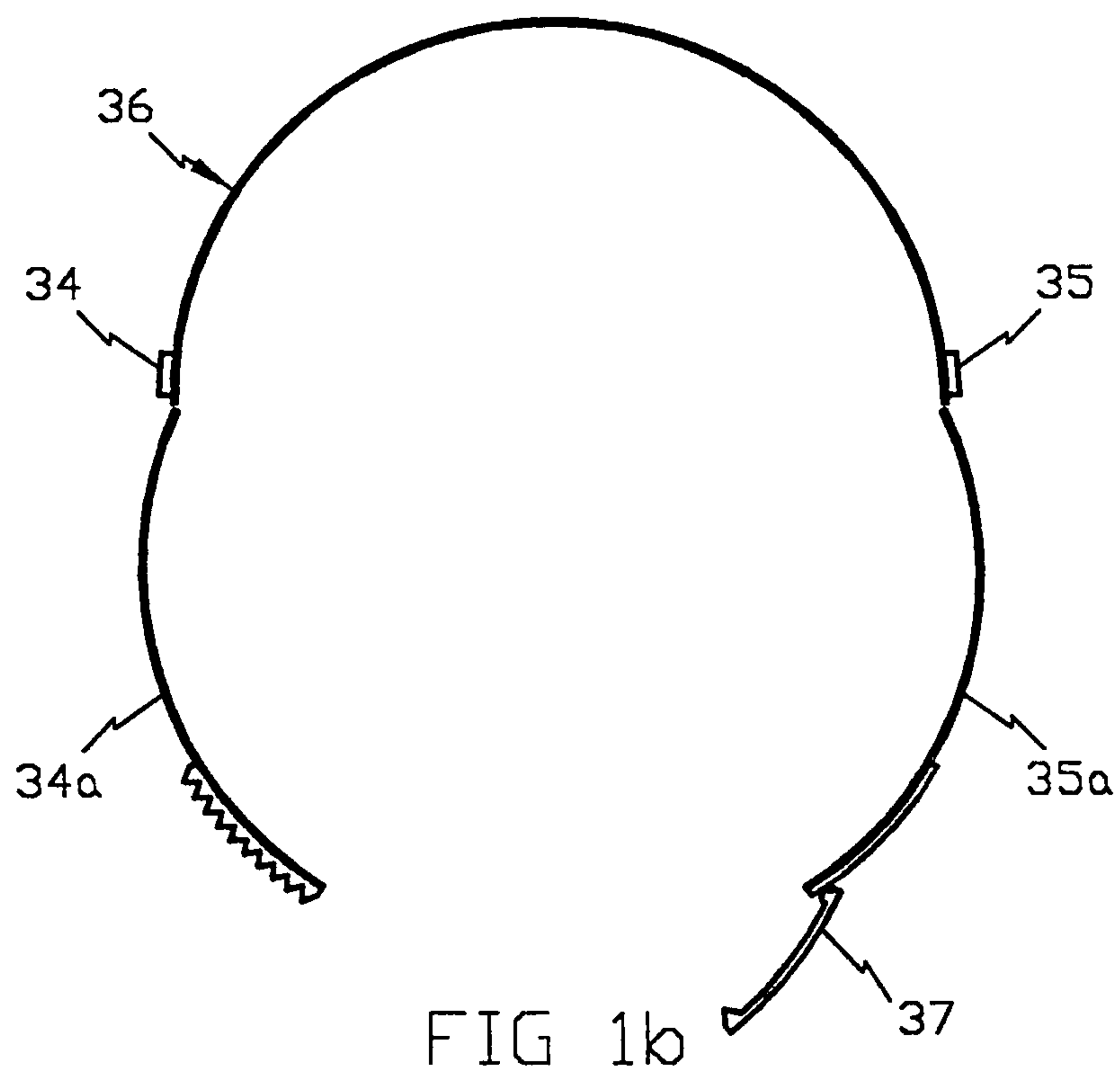


FIG 1b

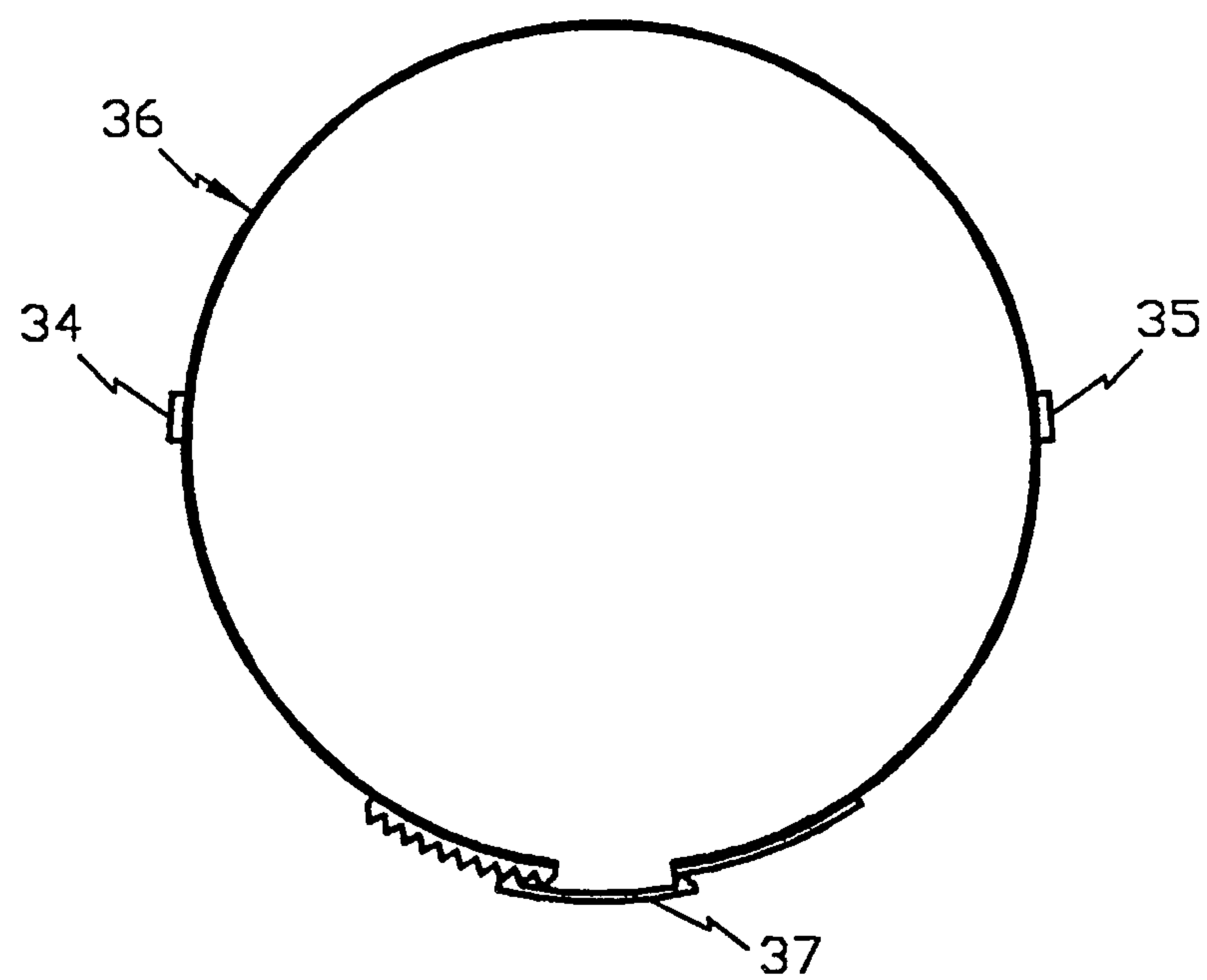
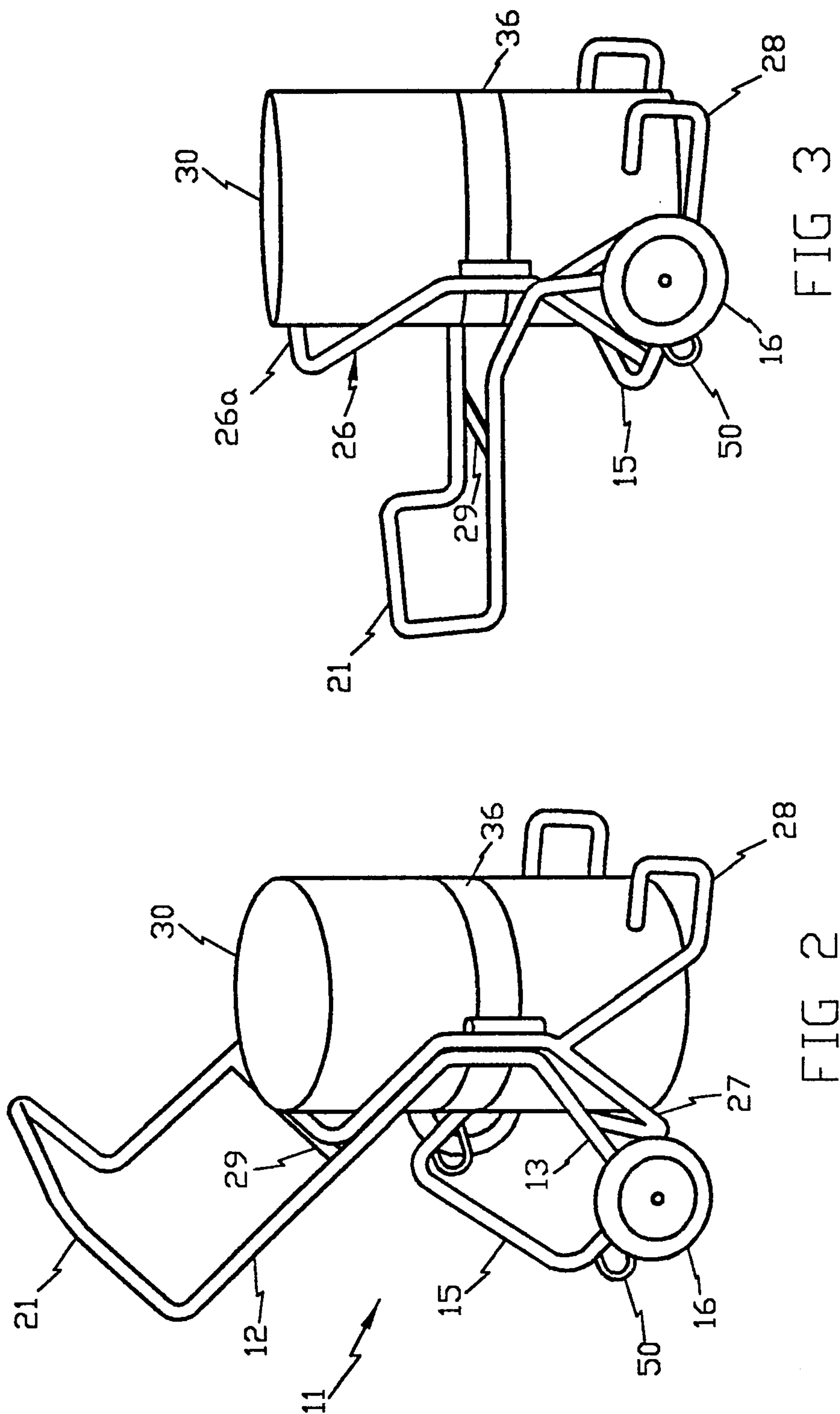


FIG 1c

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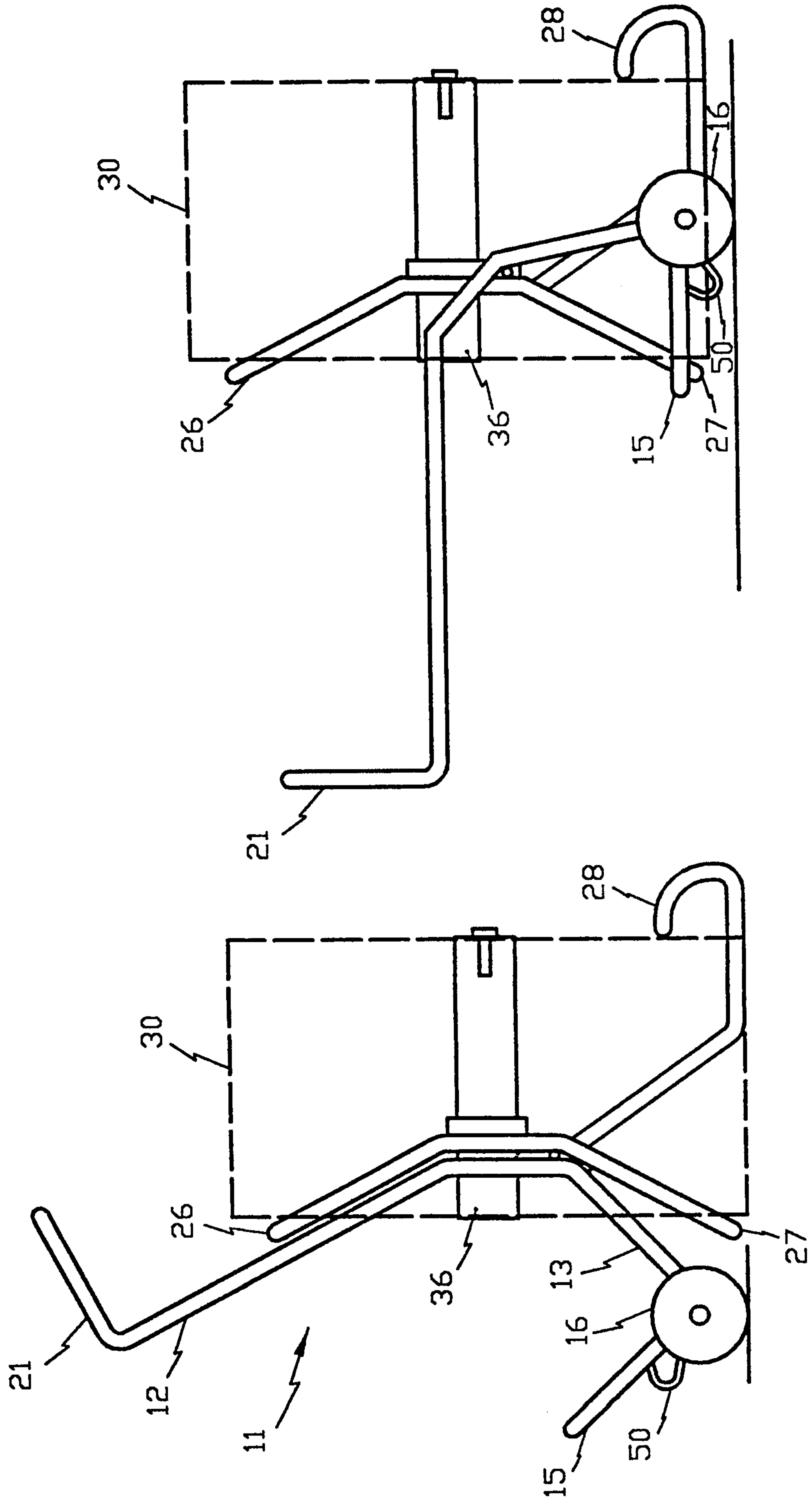
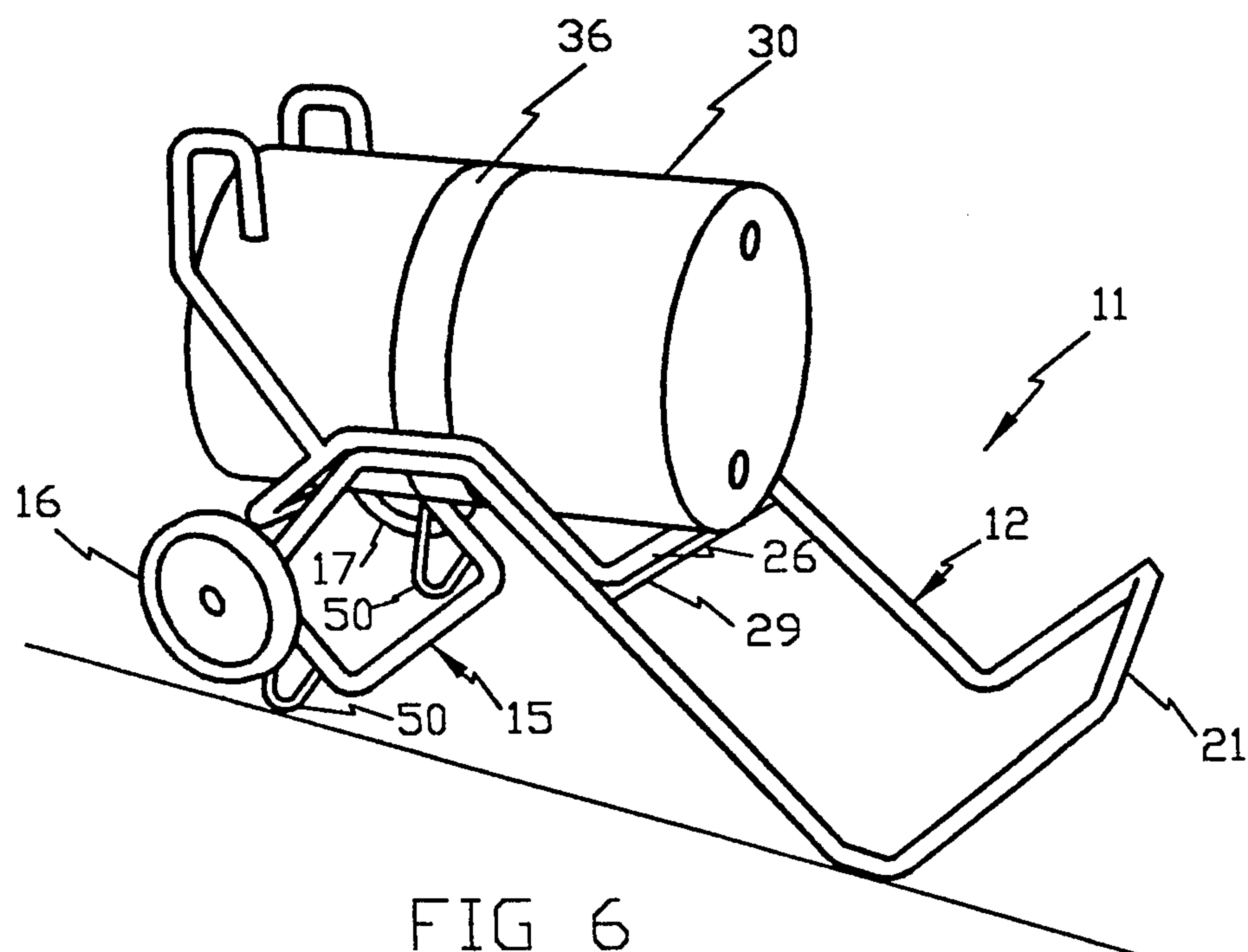


FIG 5

FIG 4

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FIG 7a

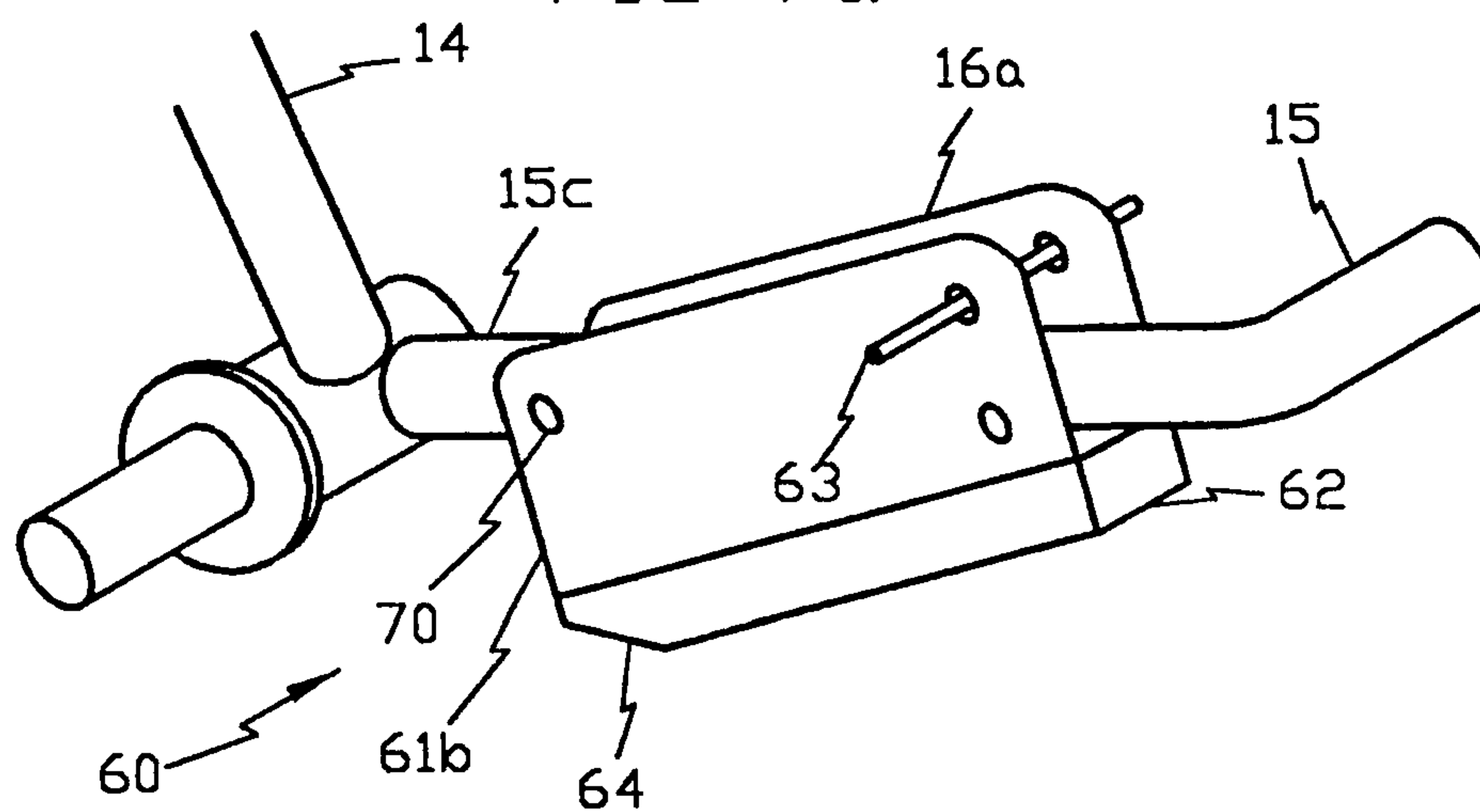
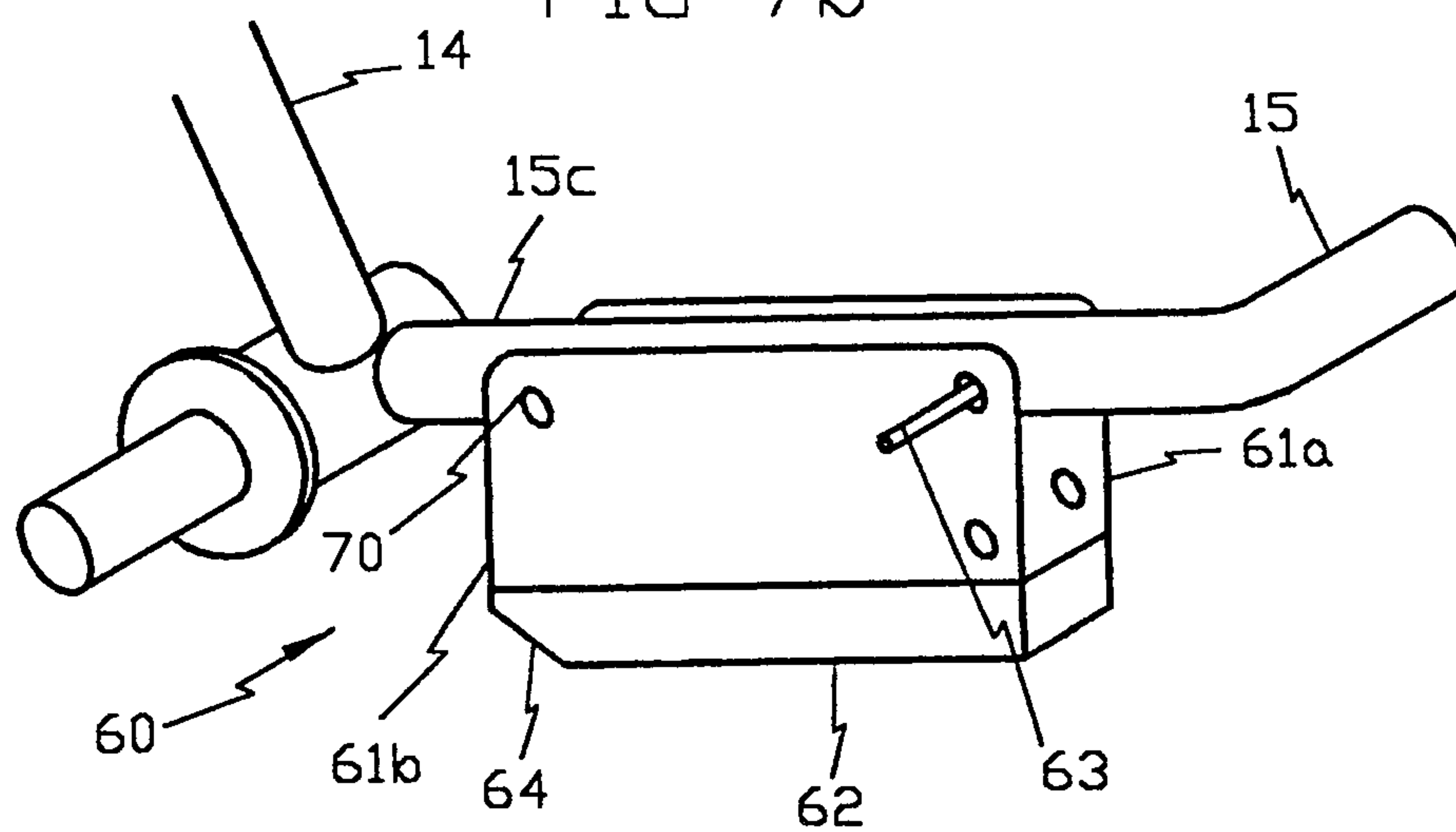


FIG 7b



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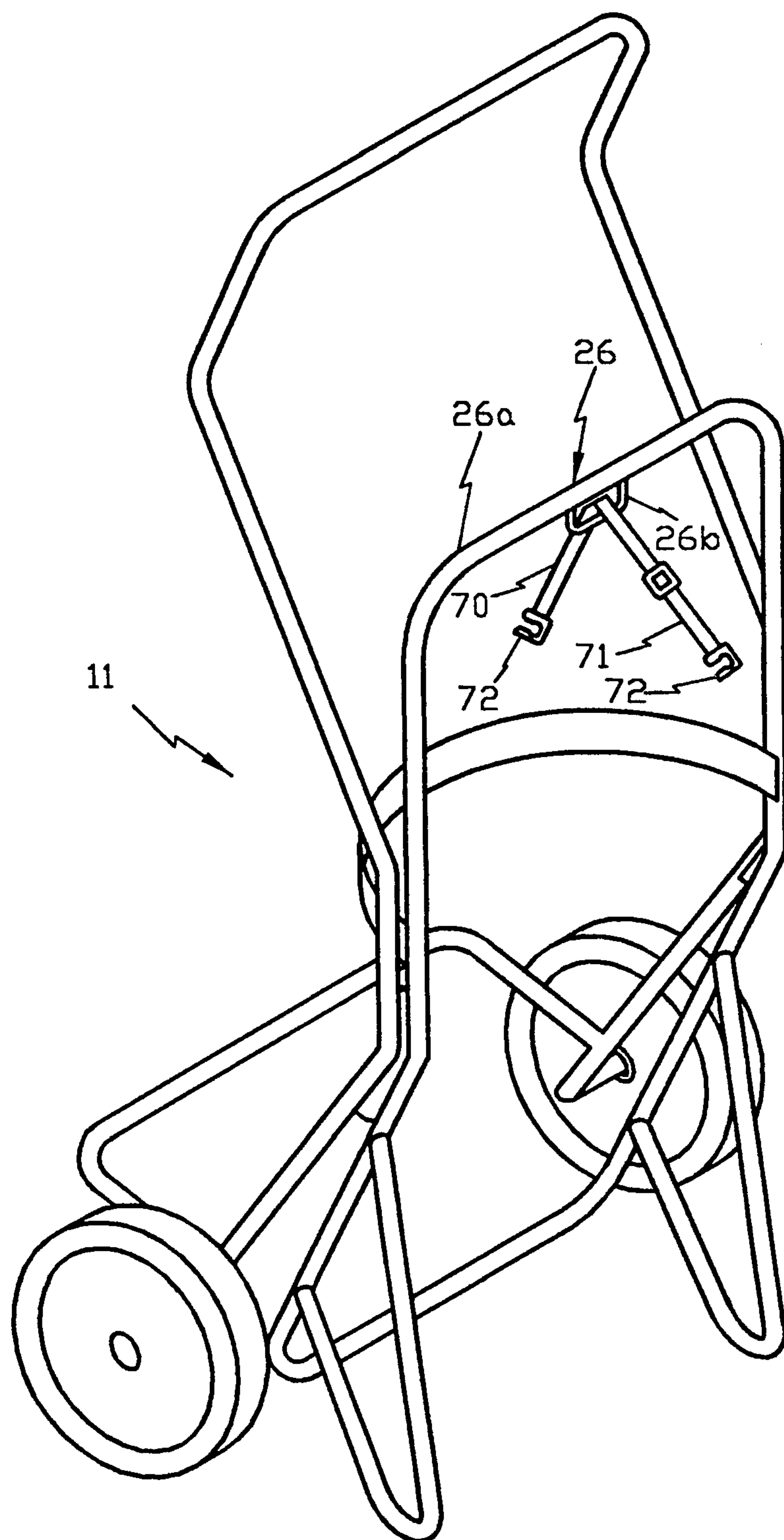
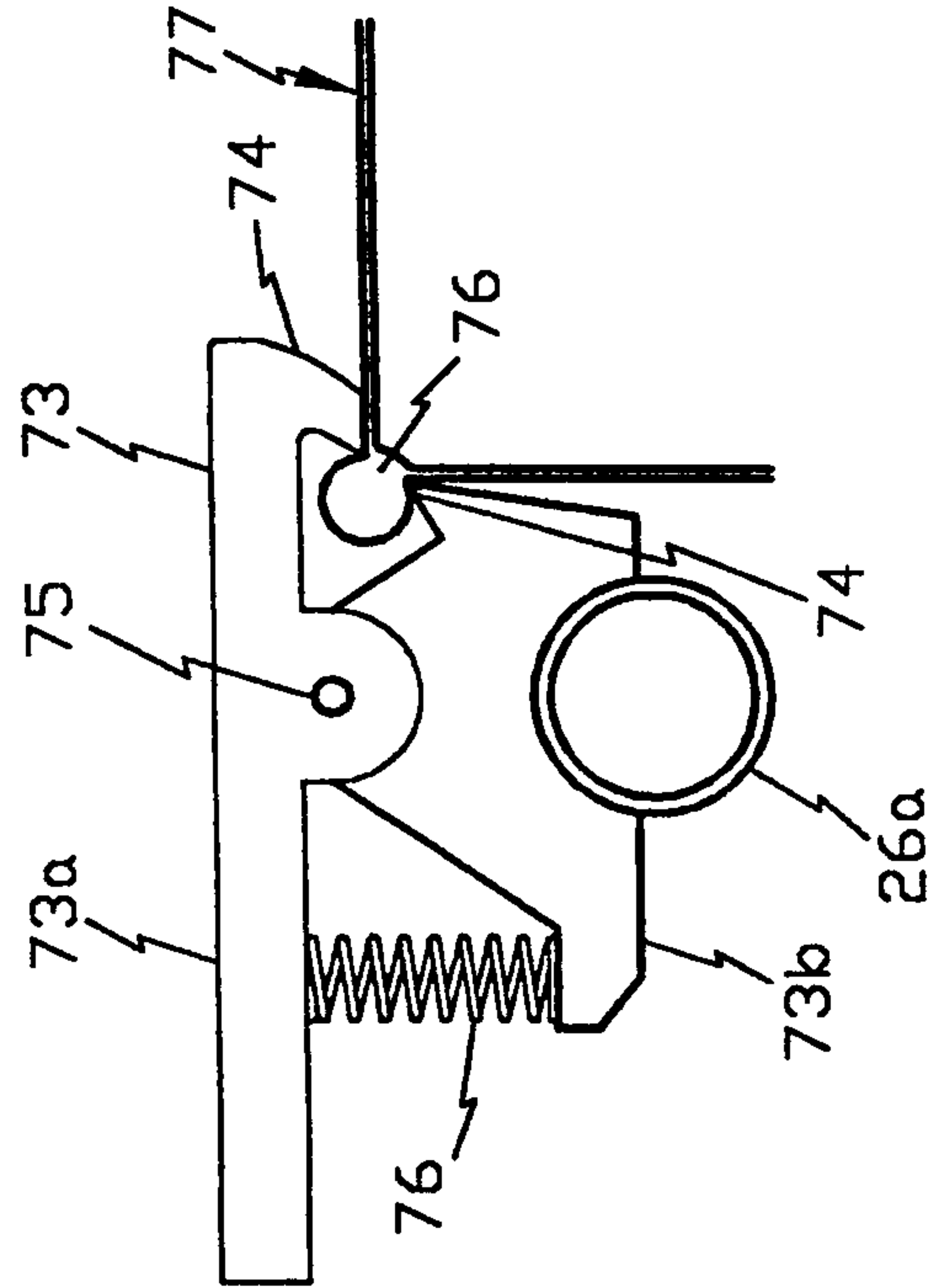
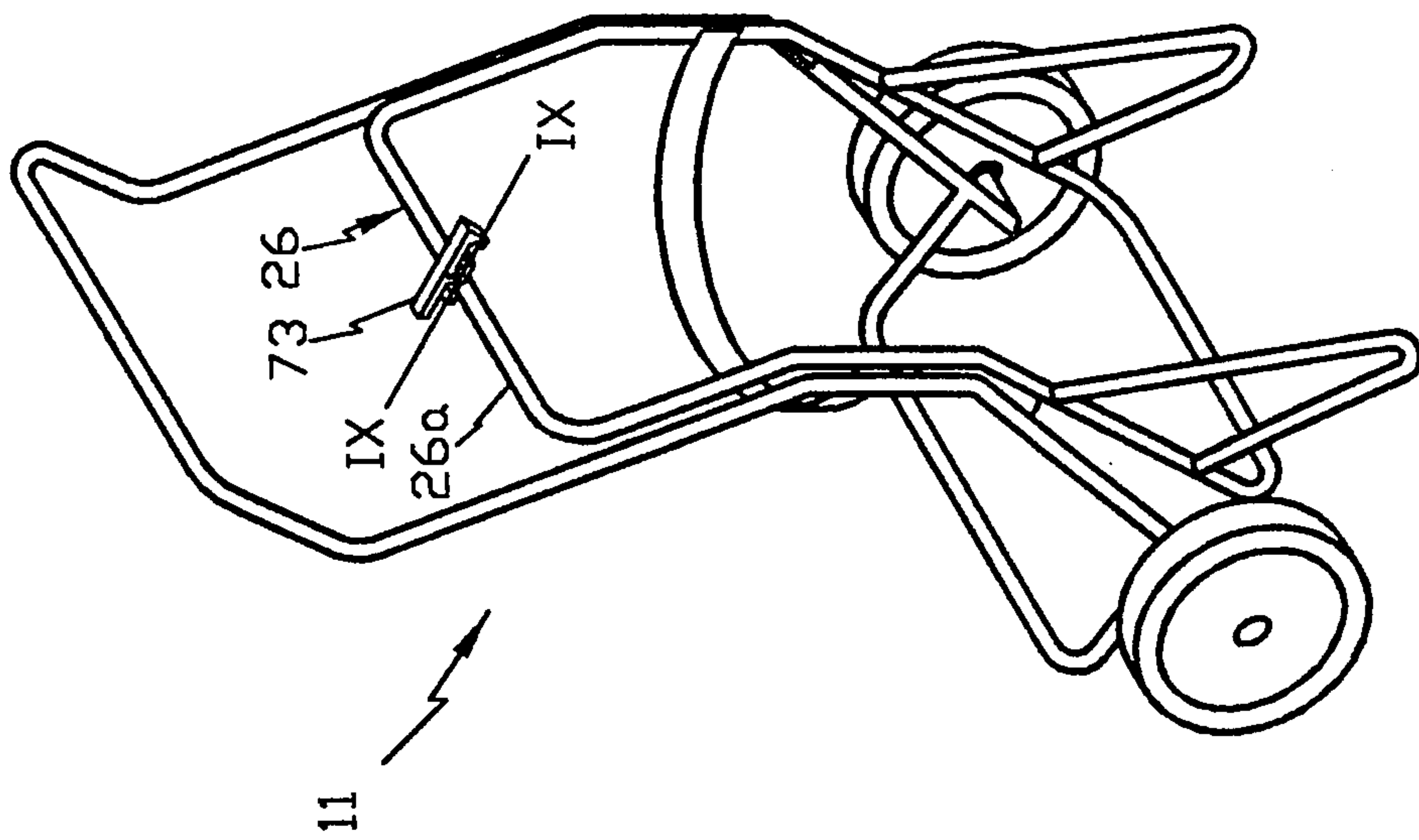


FIG 8

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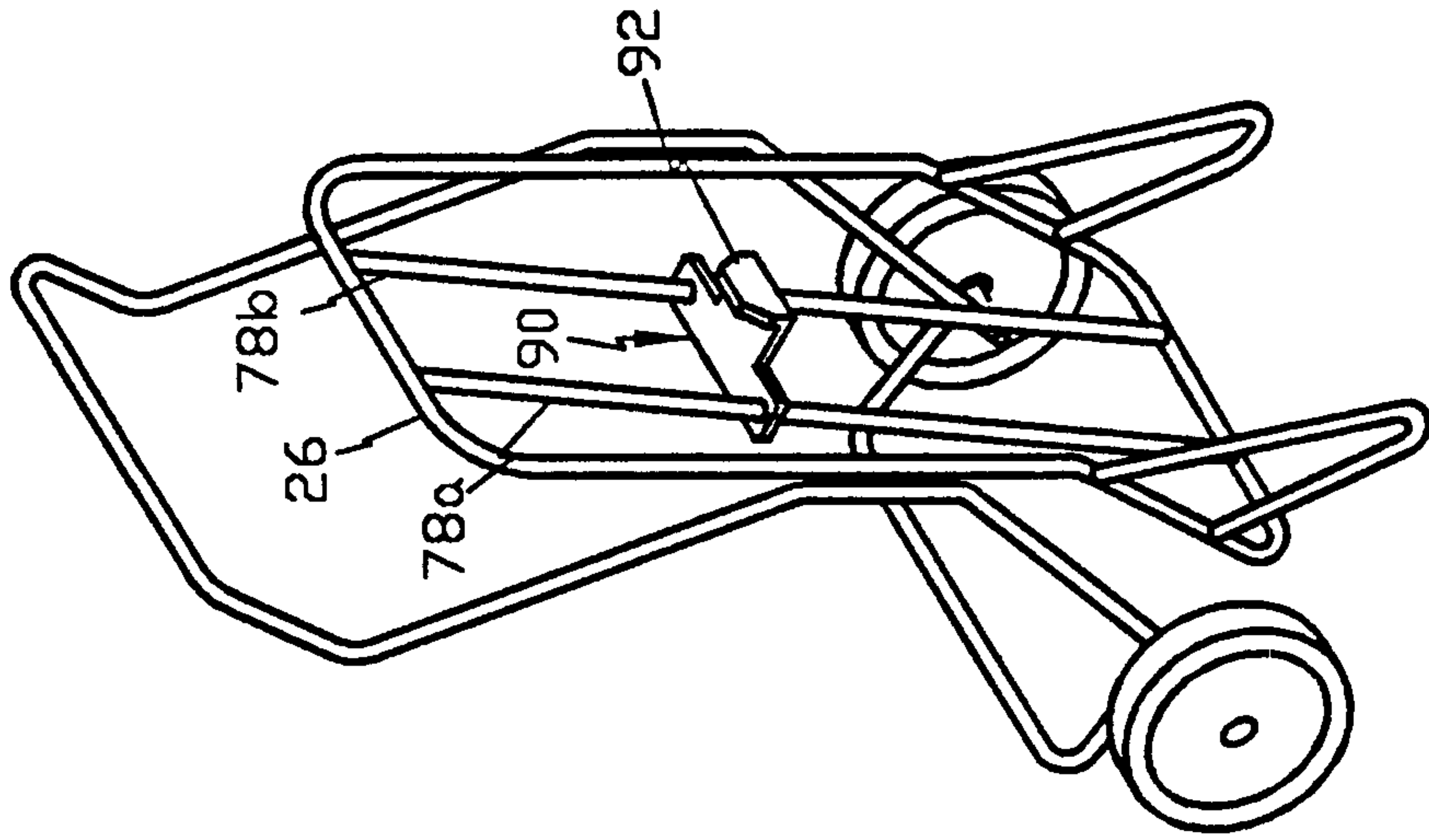


FIG 11a

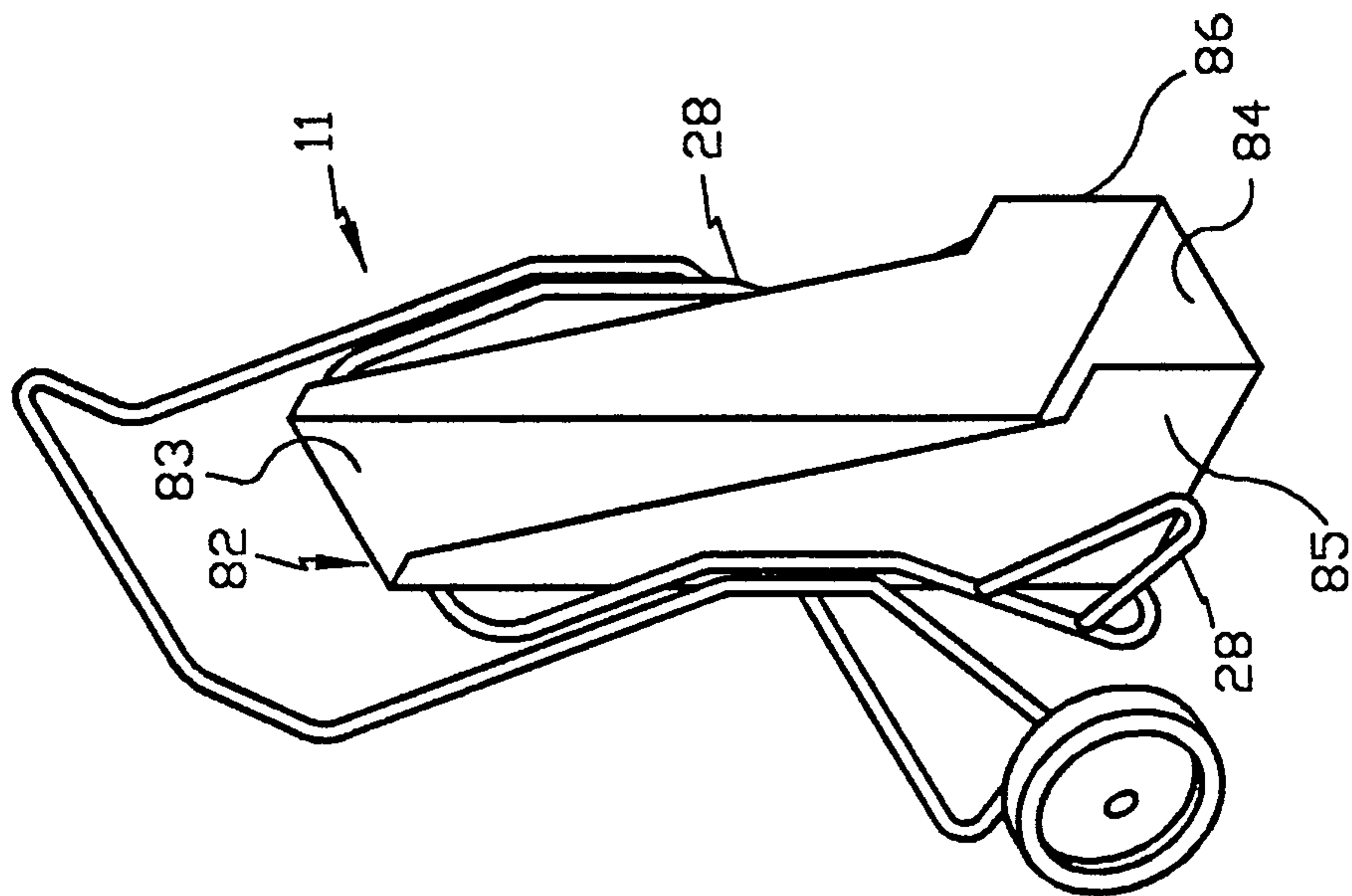


FIG 11.

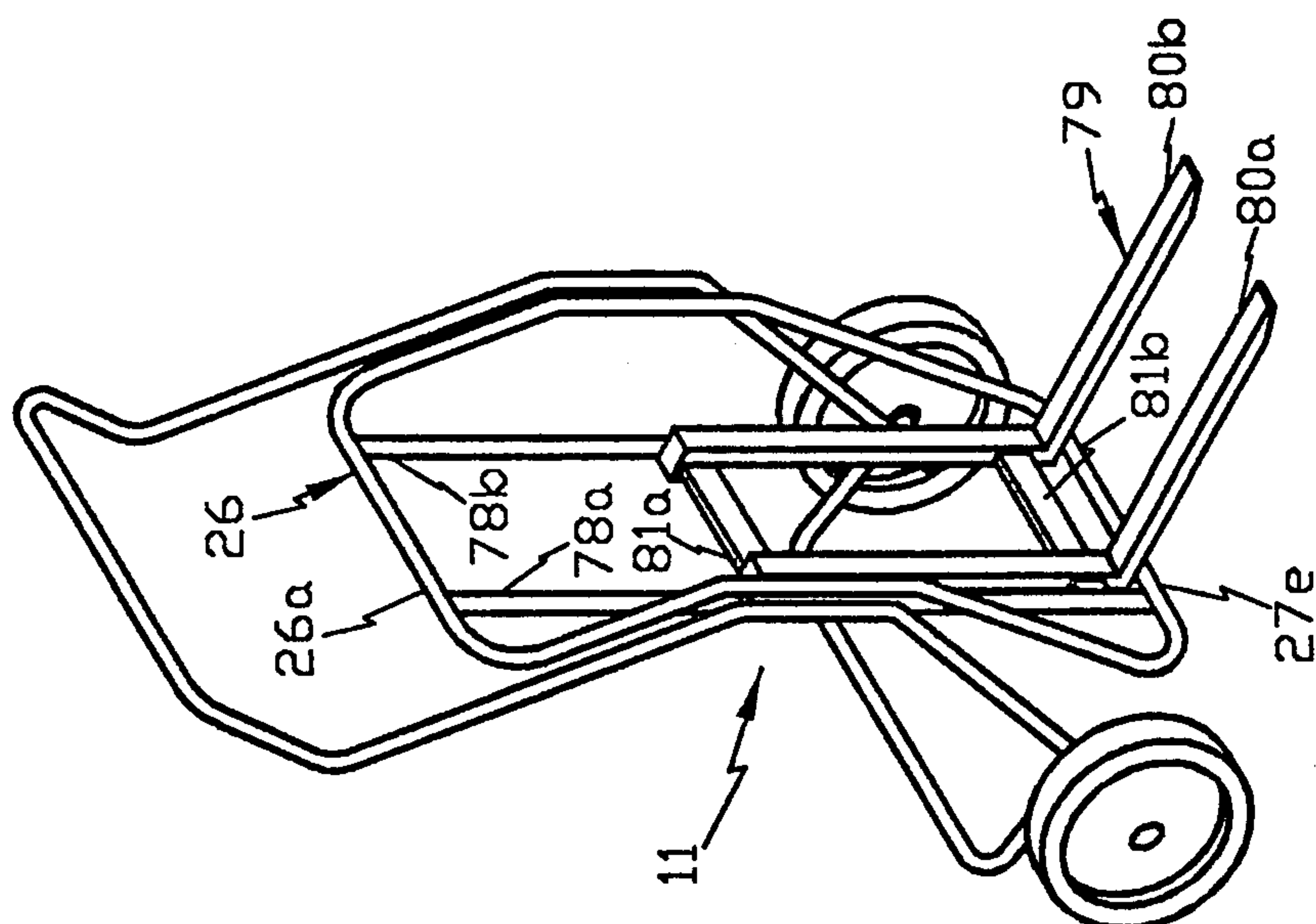


FIG 10.

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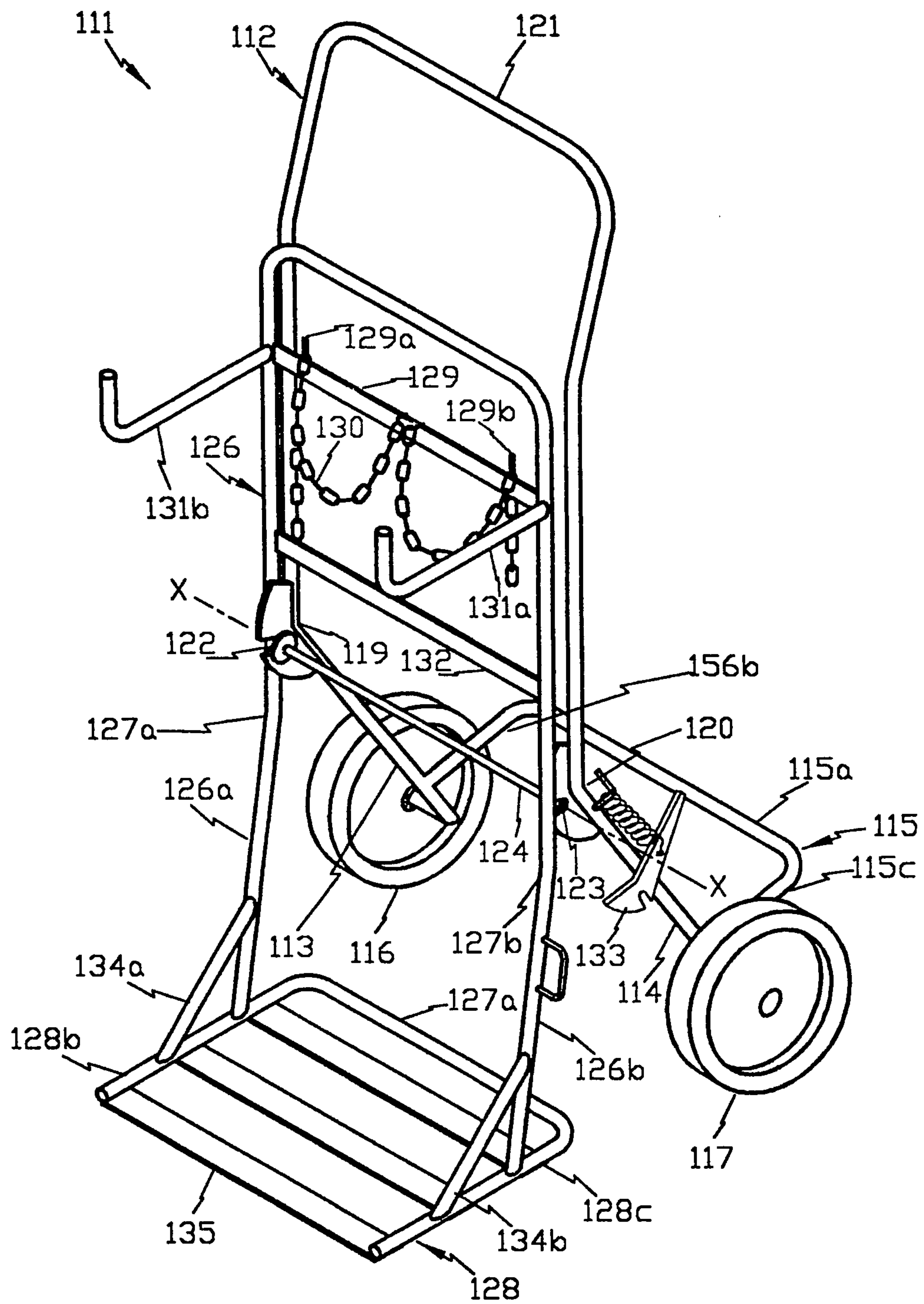


FIG 12

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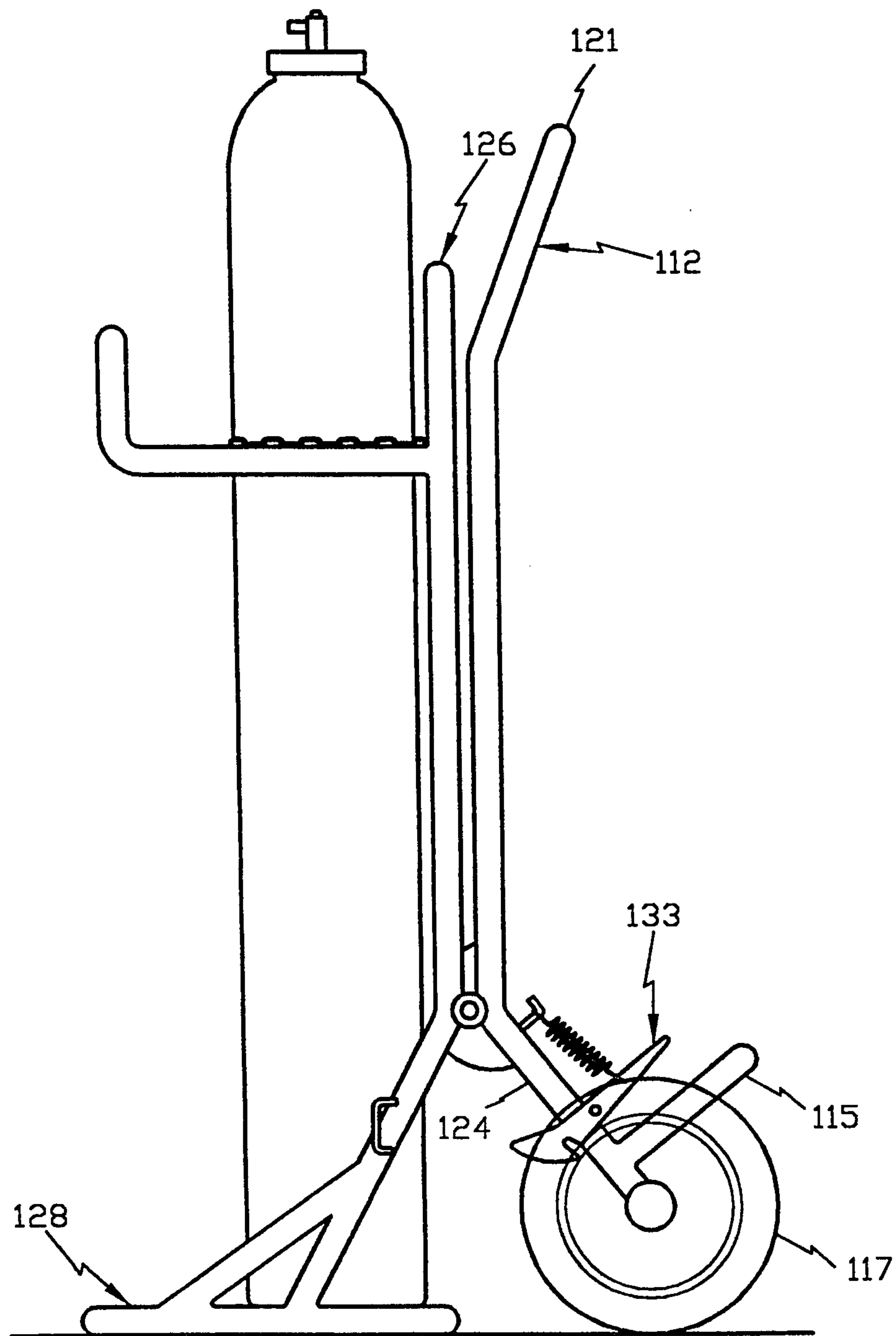
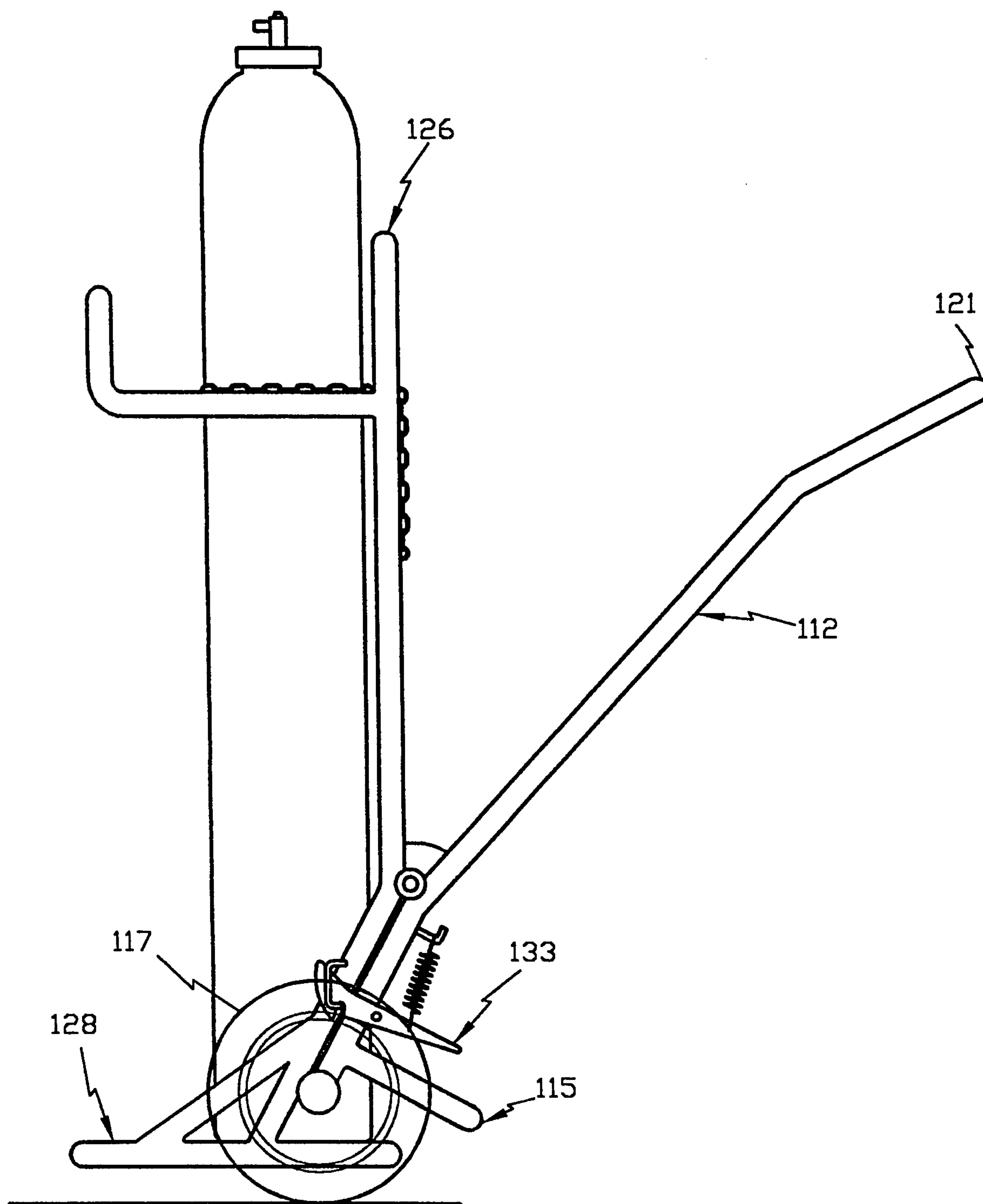


FIG 13

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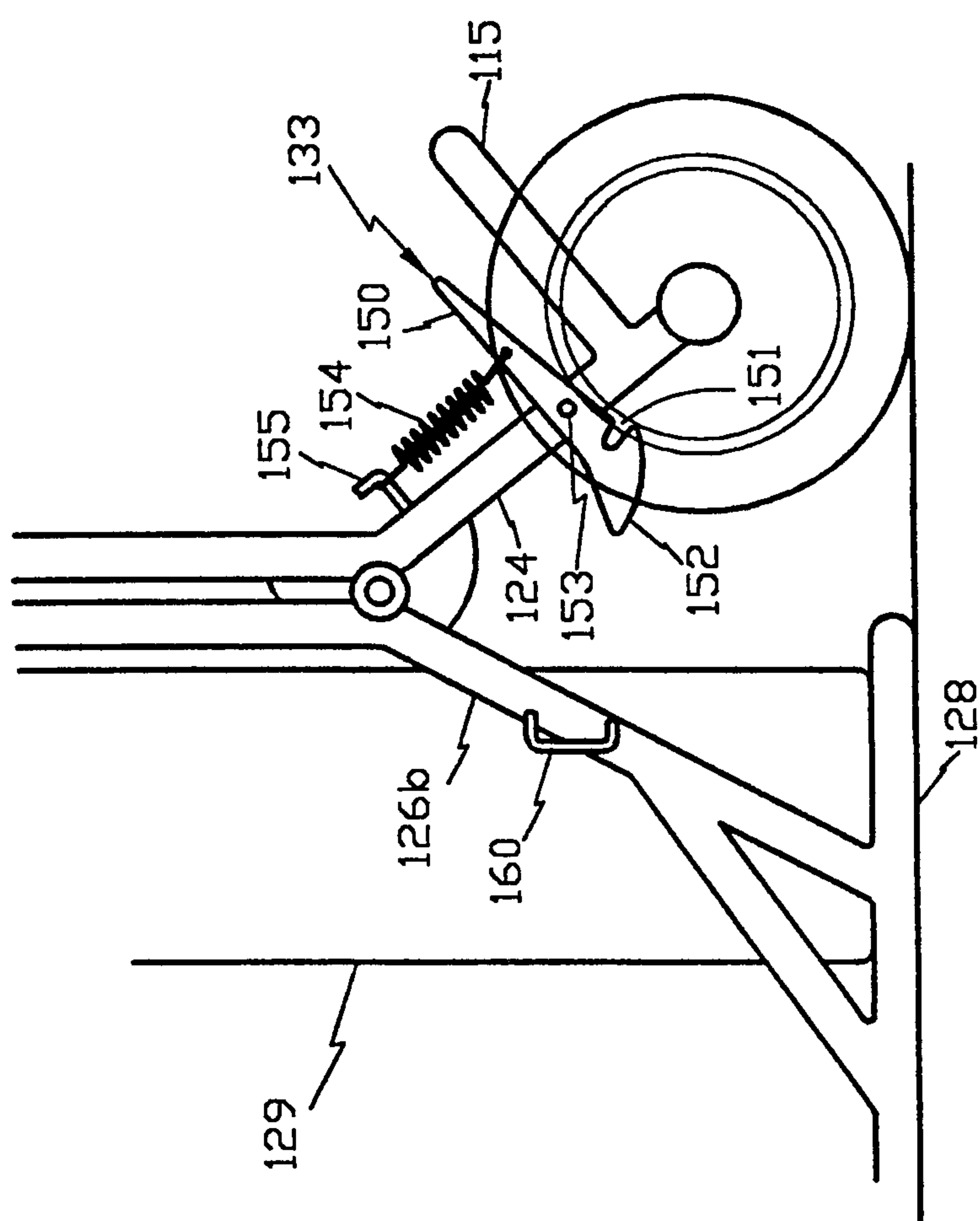


FIG 15

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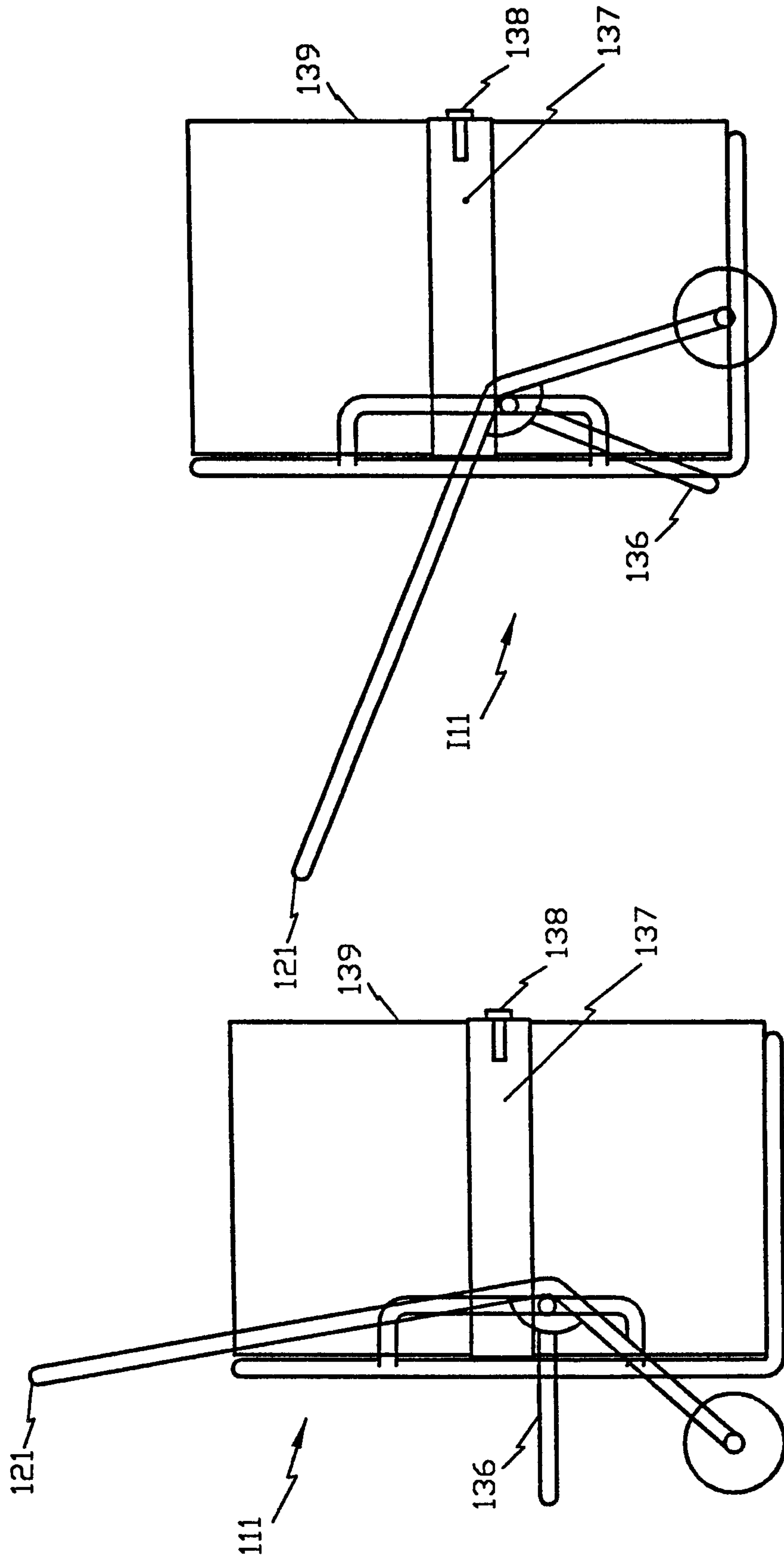
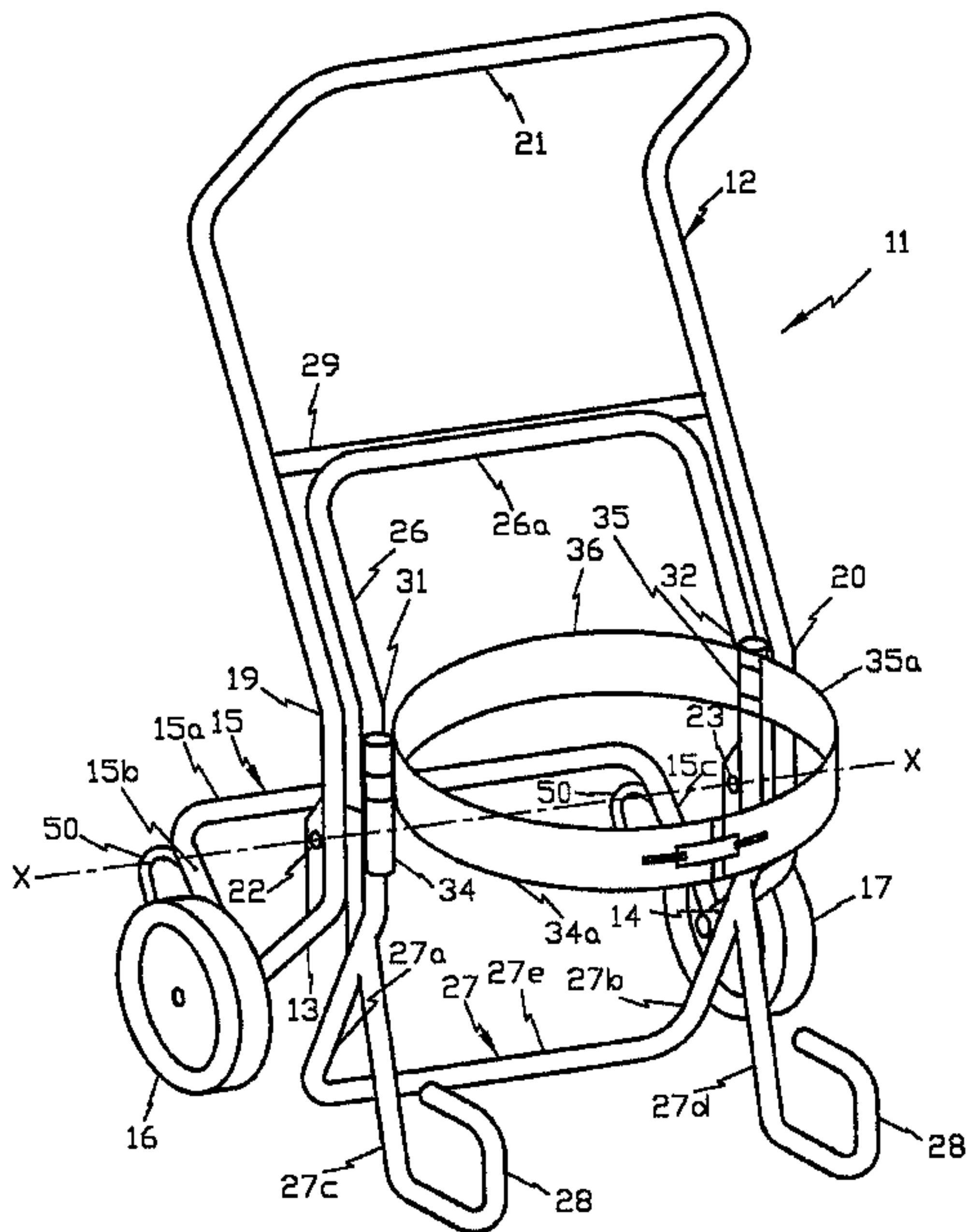
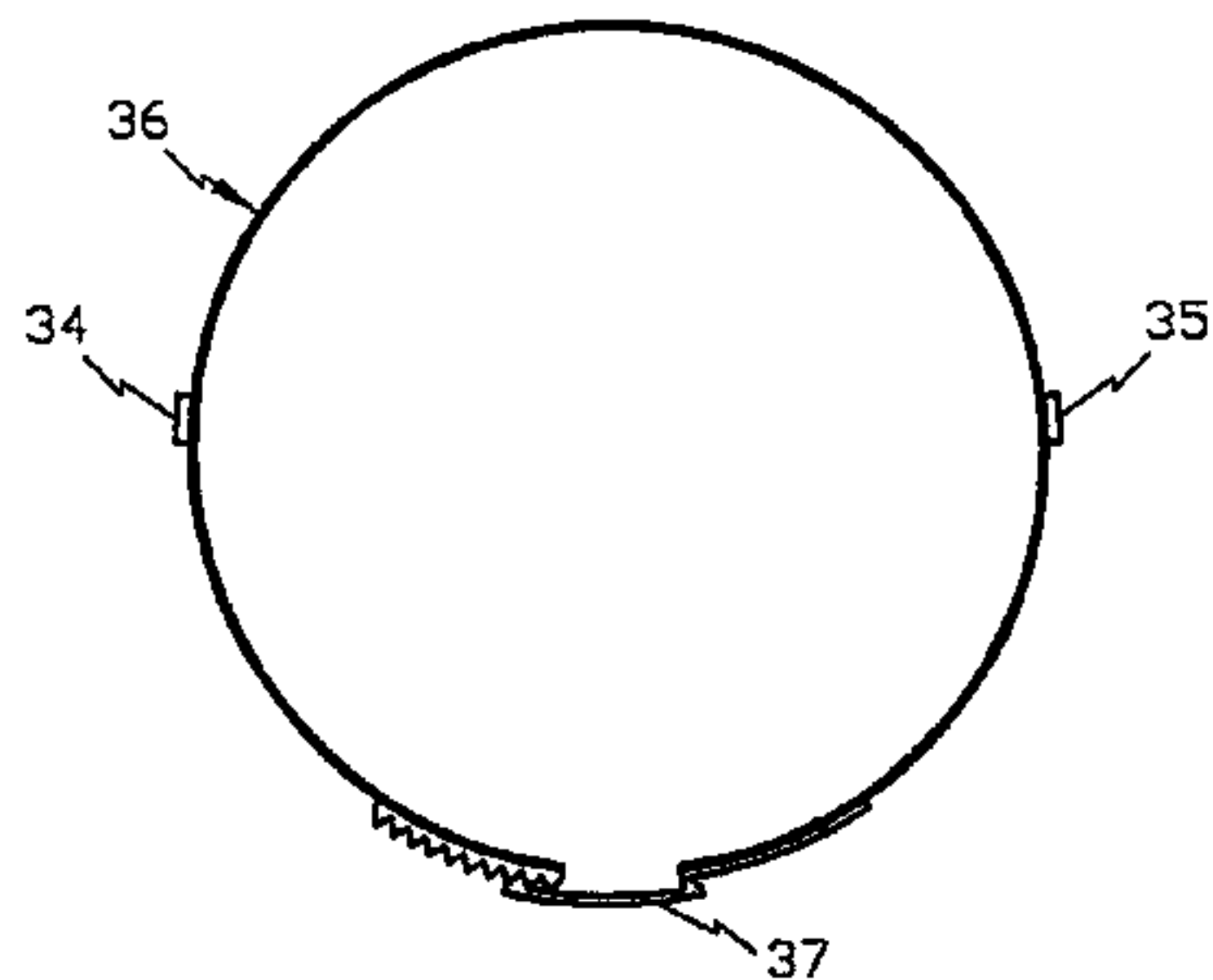
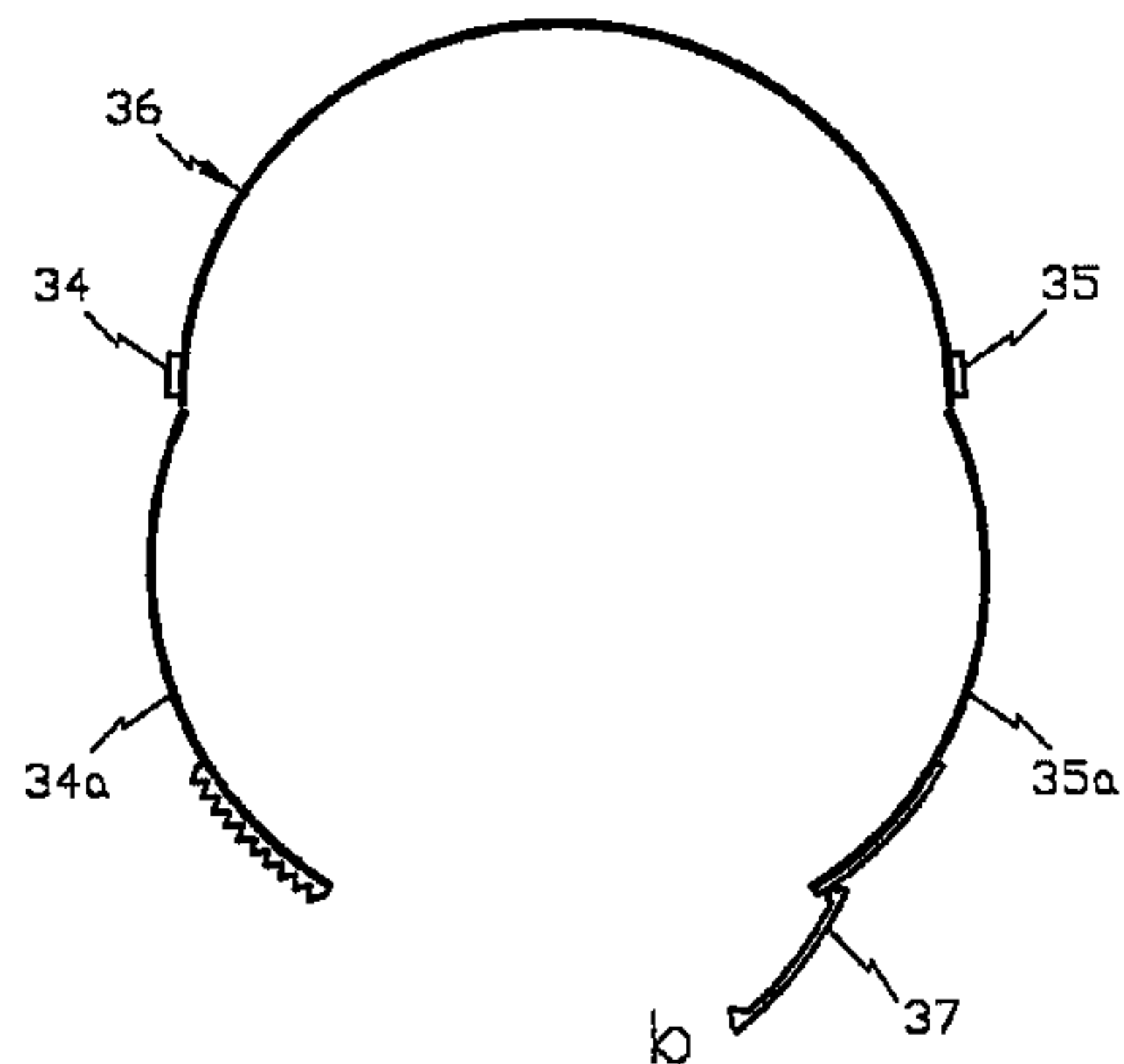


FIG 17

FIG 16



A



C