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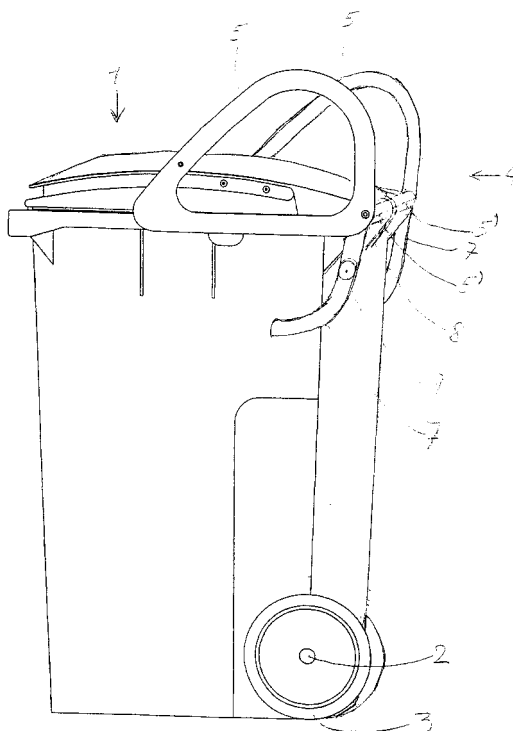
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(54) Transportable container with handle

(57) A transport container in the form of a refuse container (1) is disclosed. The refuse container comprises a first handle (5) used by the user during transport which commonly occurs by pushing the container (1). In order to enable a varied working position, the container (1) is provided with a further handle (7) which is mounted pivoting about a pivot axle (8) between an active position

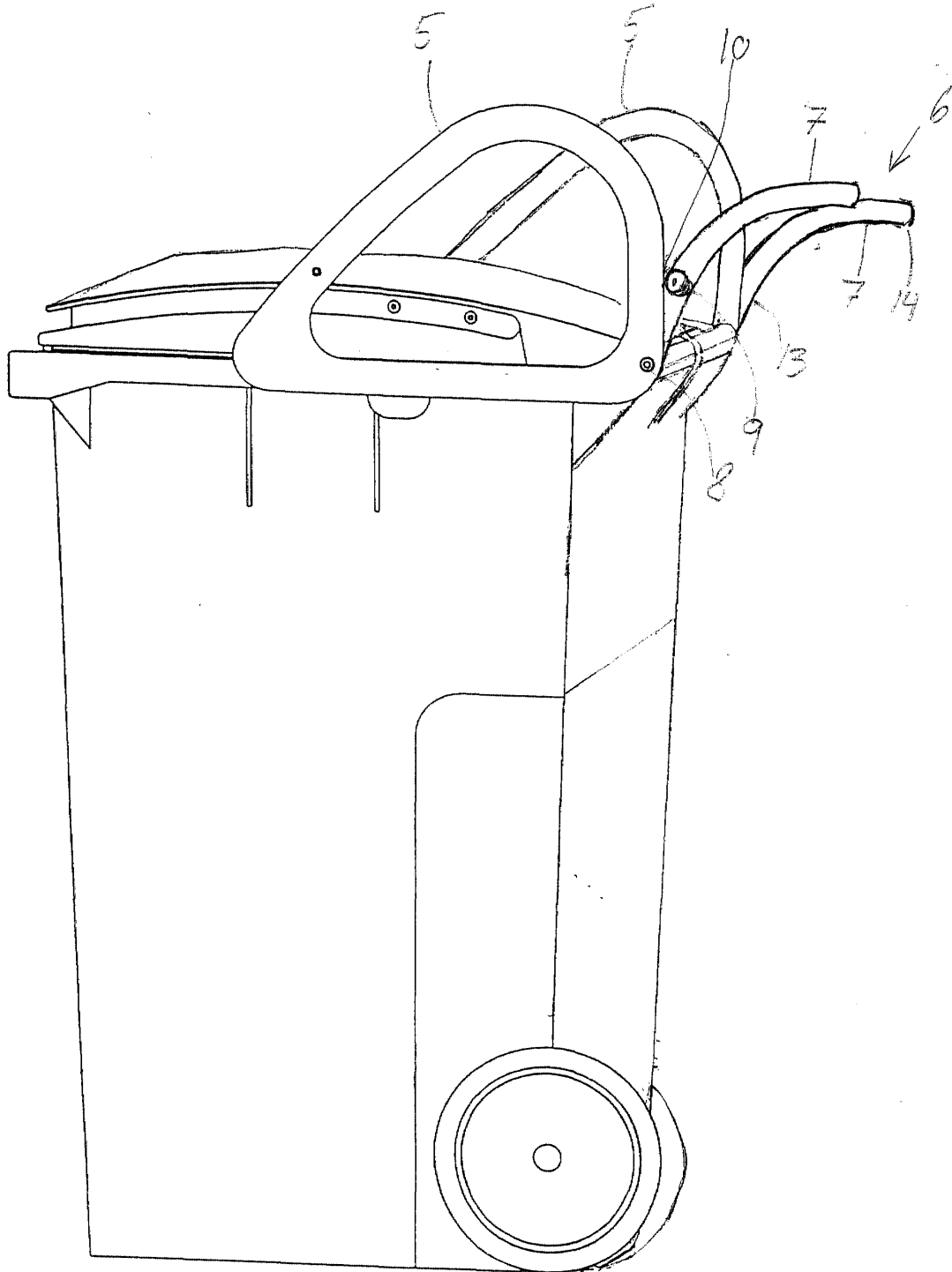
where it extends rearwards away from the container to an inactive position where it is pivoted in at the side of the container. Further handles will thus not interfere with the use of the first handles when these are not in use, and the first handles (5) will not interfere with the use of the further handles (7) when these are in their active position.

Fig 7



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Fig 3



Description

[0001] The present invention concerns a transport container, preferably a refuse container, intended to be transported on wheels, the transport container being provided with a first handle set with handles for the user's grip during transport by pulling or pushing.

[0002] The present invention has appeared in connection with development of refuse containers. However, the invention will also advantageously be used in connection with other transport containers such as fodder trucks, catering trolleys, kitchen modules and other rolling equipment which is pushed or pulled manually by the user. The transport container being the object of the invention is of the type which is transported while supported on wheels that may be provided in a number of 3, 4 or more. Alternatively, the transport container may also be of a type intended to be transported in a position where it is tilted about an axle on which is mounted one or two wheels.

[0003] In connection with the still greater focus on the work environment, in Denmark focus has been made on the work environment for refuse collectors in connection with handling of refuse containers. Guidelines have thus been established for how great loads refuse collectors may lift and how refuse container are to be handled for avoiding harmful physical influence due to unergonomic and/or uncomfortable placing of handles of refuse containers.

[0004] Different refuse containers have therefore been developed where the handles to a large degree make allowance for ergonomically suitable handling.

[0005] Examples of such handles are known, for example, from the description to Danish utility model registration DK 1995 00441 and DK 1994 00100. The handles and the refuse containers described in these publications provide a substantial improvement compared with previous constructions.

[0006] It is noted that the handles on these containers comprise a first handle set with handles oriented in a largely horizontal plane and handles oriented in a largely vertical plane.

[0007] Concerning the horizontally oriented handles, these are not suited for pushing or pulling the transport container over large distances.

[0008] Concerning the vertically oriented handles, it is possible for person of different height to push the transport container in an ergonomically suitable way.

[0009] By a situation with vertical handles mounted on a container with three or more wheels it is thus possible to grip in different heights on the handle part when the container is pushed. By another type of container intended to be transported on wheels in a tilted driving position, it will also be possible for persons of different height to establish an ergonomically correct arm and wrist position when the container is pushed.

[0010] However, neither the vertical handles nor the horizontal handles are optimal for use in situations

where the transport containers are to be pulled over greater distances.

[0011] The inventor has recognised that in certain situations it is expedient to pull the container, especially where the ground is uneven. When transport containers are pushed, the container more or less blinds the outlook for the person pushing them, whereas the person has free outlook on the driveway when the containers are pulled behind the person's back.

[0012] Furthermore, the inventor has recognised that it is inexpedient to push very heavy 1 or 2-wheeled containers in tilted position where the container is only tilted a little over its point of balance over the wheel axle, even though container is transported via the above mentioned vertical handles where it is possible to hold the upper arms mainly vertically and the forearms mainly in parallel with the ground and the wrist in a neutral position. In such situations, the person pushing the container has to use an excessive amount of shoulder and arm power to keep the container in balance, and the container may easily tilt forward if a wheel hits an unevenness on the ground on which it is transported, for example a small hole or a small stone.

[0013] In situations where particularly heavy 1 or 2-wheeled containers are to be transported, it is ergonomically suitable to pull or push the container in a tilted driving position where the container is situated substantially above its point of balance over the wheel axle and so that the arms are kept straight down along the body or a little inclining rearwards of the body while simultaneously the wrists are in a neutral position, i.e. like the work positions taken by a person when he pushes or pulls a wheelbarrow.

[0014] It is desirable to have a transport container that enables the user to vary his work method so that the handling does not become uniformly loading work and to vary his work method in relation to the properties of the driveway/ground, for example by alternating between pushing and pulling without hereby ergonomically unsuitable grips or work positions arise, and without a harmful physical load by transporting the containers occurs.

[0015] It is the purpose of the present invention to indicate a transport container of the kind mentioned in the introduction and which comprises a handle which makes possible for the user to provide for these wishes and which makes possible to alternate between pushing and pulling without any ergonomically incorrect grips occurring that may imply harmful physical loading and which simultaneously gives possibility of variation by transport of a heavy or light container.

[0016] According to the present invention, this is achieved by a transport container of the type mentioned in the introduction which is peculiar in that a further handle set is provided comprising two displaceably mounted handles, each of which being disposed in association with the handles in the first handle set, that the handles are arranged for displacing between a first inactive po-

sition in which they do not interfere with the use of the further handles by the user, or that the handles of the first set and the further set are disposed so that they do not mutually interfere when using the handles of the first set or the further set.

[0017] As a further handle set, besides the first handle set (comprising horizontal and/or vertically oriented handles), has been provided on the container and which preferably is arranged with handles that may be displaced from an inactive position to an active position, the user gets the possibility of choosing between the first handle set or the further handle set by transporting the transport container. Hereby the user may choose between different work positions. As the further handles are provided displaceable, preferably pivoting, they may be displaced/pivoted to an inactive position where they will not interfere with the use of the first handles. Thus, a situation where the use of the horizontal and/or vertical handles will be hampered due to the presence of the further handles does not occur.

[0018] This situation may also be established with a transport container which is peculiar in that a further handle set is provided, comprising two fixedly mounted handles which are disposed in association with the handles in the first handle set, and that the handles of the first set and the further set are disposed so that they do not mutually interfere when using the handles of the first set or the further set. In this container, the further handles are fastened in a position where no mutual interference occurs by using the horizontal or vertical handles. This may, for example, occur by placing each of the handles at different levels/planes in relation to each other.

[0019] When such a further handle is in its well-defined active position, and the when the container is tilted simultaneously, it will be possible to use the further handles for drawing a container or pushing it before oneself when transporting as a wheelbarrow.

[0020] The further handles may preferably pivot in a vertical plane which is largely in parallel with the plane of the direction of driving. However, it will also be possible to dispose the handles so that they are pivoted about a largely vertical axis. It will also be possible to provide a combined pivoting with mounting of the further handles by means of a swivel link. In such a situation, an individual adjustment of the height of the handles may be achieved when they are in their active position and of the mutual width of the handles so that they may be adjusted according to users with different physical stature with respect to height and width.

[0021] If the further handles are displaceable by a translational or telescopic movement, this movement may preferably occur in a vertical plane which is largely parallel with the plane of the direction of driving and preferably by a translational or telescopic movement with approximately horizontal orientation.

[0022] If further handles are placed on a transport container intended to be transported in tilted position, it is preferred that the handles have a stopper which in-

teracts with a stopper fastened to the transport container for defining the active position. The stopper sitting on the transport container may be mounted directly on the container or on the first handle set. Alternatively, the stopper, which is fastened to the container, may be formed by a part of the first handle set.

[0023] If the further handles are made with a first part which is largely straight at the end where they are connected with the transport container and a second end which contains a handle part, it is possible to create sufficient distance between the container and the user. Hereby there is no risk that the container hampers the user during transport by hitting front or rear side of the user's legs during the transport. If the handle part of the handles have a downwardly directed curvature which largely has parabola shape, it will be possible for the user to get optimal gripping comfort. The curvature will also counteract the handle sliding out of the hand if the container hits an obstacle during transport. Also, it will be possible for the user to grip the part of the handle part which better corresponds to the height of the user compared with the actual angle in which the container is tilted.

[0024] In order to achieve the best ergonomic power grip, the handles will have a largely oval cross-section known from an axe handle. The cross-section will approximately be circular as the longitudinal and short axes are approximately equal. The diameter of the circle or the longitudinal/short axes of the ellipse will preferably have a length between 20 and 50 mm, preferably about 40 mm. Hereby are achieved the best diameters for a secure and ergonomically correct power grip.

[0025] In an embodiment, further handles will be mounted for pivoting in a vertical plane which is immediately adjacent to a vertical plane containing the vertical handles of the first handle set. In this situation, the further handles will preferably have a cranking at a position between their mounting part and their handle part. Hereby the cranking and handling may be used as stoppers abutting on a limit stop position which is formed by the first handle in a simple way. In this situation, it will be possible to have equal distance between the handles in both sets. This may be of significance with regard to the placing of the transport container from first handle set under tight conditions. This may be the case with catering trolleys on airplanes, trains and the like, as well as being the case also with refuse containers.

[0026] If the transport container is intended to be supported on 3 or more wheels during the transport, it is preferred that the further handles are arranged for pivoting freely in their active position. Hereby it becomes possible to adjust the correct height of the handle depending on the user's height and width. In the active position, the pivoting will preferably occur in height. However, this pivoting may be combined with a pivoting about a vertical axis for adjusting to the width of the user.

[0027] In advantageous embodiments, the handle and the transport container will comprise releasable

locking means enabling defining and retaining the further handles in the inactive position. Also there may be provided locking means which retain the further handle in the active position and/or other desired intermediate positions.

[0028] By having releasable locking means retaining the further handles in an inactive position it will be possible to retain the handles in their inactive position during emptying. Hereby it is avoided that the emptying is hampered and/or impeded by projecting handles.

[0029] In the inactive position, the handles will usually be placed down along an outer side of the transport container at a position below the handles of the first handle set. Since they are situated under the first handles and at a position close to the container, a user may easily grip the horizontal or vertical handles of the first handle set. The further handles are mounted on a pivot axle so that they may pivot upwards to their active position in which they may have a largely horizontal orientation away from the container in the transport position. Hereby is created the necessary distance between the user and the container so that the user does not bump into the container during transport.

[0030] By formation of the further handles with sufficiently great mutual distance it is possible for the user to go between the handles. Hereby a symmetrical pull may be performed which is least straining for the body. Irrespectively whether the case is the tilted container with transportation in wheelbarrow position or the container supported on three or more wheels, it will be possible to perform such a symmetrical pull behind the body or a symmetrical push in front of the body if the handles have a length corresponding to the handles on a wheelbarrow or rickshaw. Hereby twisting of the shoulder, arm and hand is avoided.

[0031] With containers provided with a further handle set, the user will not be locked in a situation where a single handle grip has to be used. It will be possible for the user to move the hands freely up and down in height. Furthermore, there will also be the possibility of the user varying the width between his hands. Hereby the user will also achieve the possibility to adjust where and at which height hands have to grip the handles during pushing. This liberty of choice is particularly pronounced when the gripping part of the further handles is parabola shaped. Hereby the work position of the user for body as well as for arms and legs may be adjusted in a way which is suitable with regard to the size of the orientation and the control of the forces to be exerted for surmounting a given resistance encountered by the transport container during transport. Thus it may be said that the use of the further handles ensures a great flexibility, simultaneously ensuring an adjustment to users of different height.

[0032] When pivoting further handles are used in connection with containers having support on three or more wheels during transport, it is possible to draw such a container after oneself symmetrically via handles with

sufficiently great mutual distance. When the handle at each side is hinged under the first handles, they will pivot upward to their active position where an upward and forward directed pull is ensured in a situation where both hands and arms of the user are situated down along the side of the body or inclining backwards. Hereby the harmful twists are avoided. At the same time, the pivoting out from the container may give a sufficient distance to the container so that the user does not bump the heels into this during the transport. This distance may be kept by using further handles with greater or lesser length.

[0033] With a suitable design of the further handles of the transport container, it is thus possible to ensure suitable work positions and work movements. At the same time, it is possible to avoid unnecessary loads on the body or parts of the body. The pivotable further handles ensure a flexibility, enabling alternation between push and pull and which simultaneously makes possible that this may happen without fixing the user to a fixed gripping height or to a fixed gripping plane. Furthermore, by pivoting the further handles to a desired position, the user may avoid work positions in which the body and/or body parts are unsuitably turned, twisted or bent.

[0034] The invention will be explained more closely hereinbelow with reference to the accompanying drawings showing different embodiments for the transport container in the form of a refuse container, and where:

30 Figs. 1 - 3 35 Figs. 4 and 5 40 Figs. 6 and 7 45 Fig. 8 50 Figs. 9 and 10 55 Figs. 11 and 12 Fig. 13	shows a side view of a refuse container according to the invention with further handles in inactive position, an intermediate position and an active position, respectively, show perspective views of details by the refuse container shown in Figs. 1- 3, show the refuse container of Figs. 1-5 in a situation where the user is pulling and pushing the container, respectively, shows a further embodiment of a refuse container according to the invention, illustrate the refuse container of Fig. 8 in a situation where the user pulls and pushes the refuse container, respectively, by using the further handles, illustrate perspective, partial views for illustrating a stopper defining the active position of the further handles, illustrates a picture that substantially corresponds to the embodiment shown in Figs. 1 - 7 but where the further handles are provided externally in relation to the
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- first handles,
 Fig. 14 shows a partial view, partly in section, for illustrating a further embodiment of mounting the further handle,
 Fig. 15 shows a view corresponding to Fig. 14 for illustrating a further embodiment for the further handle,
 Fig. 16 shows a situation where the user pulls a refuse container by using a further embodiment of the further handle,
 Fig. 17 shows a further embodiment of a transport container according to the invention, and
 Fig. 18 shows yet an embodiment of a transport container according to the invention.

[0035] The Figures 1 - 7 illustrates a first embodiment of a transport container according to the invention in the shape of a refuse container 1 intended for being transported in a position where it is tilted about an axle 2 supporting drive wheels 3. The refuse container 1 comprises a first handle set 4 comprising handles 5,5'. The shown handles 5,5' are intended for use in pushing and pulling the container 1 or pulling with one hand over short distances.

[0036] Therefore, the construction of the container, wherein the handles have been described in prior art cited above, will not be described in more detail here. Any embodiment disclosed in prior art is incorporated by reference for its content.

[0037] The container comprises a further handle set 6 comprising the handles 7 which may be disposed in association with the handles 5 of the first handle set 4. The handles 7 are disposed pivotably about an axle 8 for pivoting between the inactive position illustrated in Figs. 1 and 2 to the active position illustrated in Fig. 3. In the active position in Fig. 3, stoppers 9 on the further handles engage stoppers 10 that are constituted by a part of the first handles 5. As it particularly appears from Figs. 4 and 5, the further handles 7 are disposed at an inwardly facing side of the first handles 5 with the stopper 9 disposed outward facing sides of the further handles 7. The further handles 7 are arranged for pivoting in a largely vertical plane located immediately beside the vertical plane where each of the first handles 5 are provided. The vertical plane will be parallel with the direction of driving as it appears from Figs. 6 and 7.

[0038] In an inactive position, the further handles 7 are mounted on the pivoting axis 8 at their upwardly facing end 11. The downwardly facing end 12 may be pivoted rearwards to a position where it extends largely horizontally in use (see Figs. 6 and 7). The further handle 7 comprises a first, largely straight part 13 situated at the end 11 where it is pivotably attached to the container. This part is connected with a second handle part

14 which in use will have a downwardly directed curvature largely having the shape of a parabola. Hereby is achieved an ergonomically correct grip. This appears from Figs. 6 and 7.

[0039] From Figs. 6 and 7 is seen that the user, when using the further handles, is situated between these and may draw the container behind himself or push it before himself without any risk of bumping into the container as sufficient distance between the user 15 and the container 1 is provided, irrespectively whether it is pulled or pushed.

[0040] In Figs. 8 - 10 there are illustrated a refuse container 16 with four wheels 17. This container is disclosed in the above described prior art, the content of which is incorporated by reference. Therefore, no detailed explanation of the container 16 itself will be given. The container 16 comprises a first handle set 4 which comprises largely vertical handles 19 and largely horizontal handles 18.

[0041] The container comprises a further handle set 6 consisting of two further handles 20 which at their upwardly facing end 11 are pivotably suspended on a pivot 21. Each of the handles 20 comprises a first straight part 13 and a curved part 14 which in use may curve downward. Alternatively, and according to a preferred embodiment, the curved part will, however curve upward as shown in Fig. 16 for the purpose of an ergonomic correct hand position when using the handles 20.

[0042] In their active position, the handles 20 will be freely pivotable in a vertical plane about the pivots 21. Alternatively, the pivoting may occur about pivots disposed at an arbitrary second hinge point on the container/handle sets. In their inactive position as illustrated in Fig. 8, they will be locked by releasable locking means (not shown). These may be constituted by snap locks retaining the handles 20 in their inactive position. Corresponding releasable locking means are provided in the embodiment shown in Figs. 1 - 7. The snap means may be resiliently abutting on each other and may be released when the handles are pulled.

[0043] Appearing from Figs. 9, 10 and 16, the user 15 will be situated between the handles irrespectively whether the container 16 is pulled or pushed. As the handles 20 are pivotable to their active position, the user may achieve an ergonomically correct position when pulling as explained hereinabove. It is preferred that the handles 20 have a straight part with such a length that the user may place himself between the handles with the hand grips situated in front of him and at a height where the user's forearm is approximately horizontal and the wrist in a position of about 70° in relation to the forearm. In reality, the transport is hereby established by exerting a push which is ergonomically better than pulling the container behind oneself. By pushing, the user may place the handles 20 at an angle which makes possible to keep the forearm approximately horizontal and the wrist in a position of about 70° in relation to the forearm, resulting in minimum load by pushing.

[0044] As an alternative to the individual hinging of the further handles 20 and 6 illustrated in Figs. 8, 9, 10 and 16, and in Figures 1-7 and 11-15, respectively, it is possible to connect these handles with a common axle 34 illustrated with stippled lines in Fig. 8. Hereby the user only needs to grip one of the handles 20, and he will automatically get the second handle 20 to pivot up with it. It is possible to provide such a common axle 34 with a ratchet mechanism 35 which is fastened to the container or the first handle set, and which in a way known per se contains a spring-biased pawl and ratchet mechanism which enables moving the handles to an intermediate position where it is retained against swinging down to the shown inactive position. With such a ratchet mechanism, the handles may be retained in a projecting position wherefrom they may be released, for example by lifting the handles completely to a vertical position after which the ratchet mechanism is released, and the handles may be moved to the downwardly oriented inactive position shown.

[0045] Figs. 11 and 12 illustrate a refuse container 1 corresponding to the one illustrated in Figs. 1-7. The further handle 7 is hinged at the outer side of the first handle 5 by means of a pivot 22. Fittings 23 are used here, fastened on the first handle 5 and having a U-shaped part 24 against which the further handle 7 abuts on (see Fig. 12) when being brought to its active position. When the handle 7 is pivoted to its inactive position, the U-shaped part 24 may have an inherent resiliency squeezing around the further handle 7 so that it is retained in an inactive position corresponding to the inactive position shown in Fig. 1.

[0046] Fig. 13 illustrates a refuse container 1 corresponding to those illustrated in Figs. 1 - 7. In this embodiment, the further handles 7 are provided at the outer side of the first handles 5 and provided with a stopper 9 situated at the inward facing side for engagement with the part 10 on the first handle 5 when the further handle 7 is brought to its active position.

[0047] In Fig. 14 is illustrated a further embodiment of the stoppers used to define the active position of the further handles 7. The further handle 7 is mounted on the first handle 5, using a pivot axle 25. This is provided with a self-locking nut 26 at one end and retained by means of a locking pin 27 in the further handle 7. Around the axle 25 is provided a rotationally fixed pawl 29 that may pivot between two positions shown with fully drawn lines and stippled line within a quadrangular recess 30. The pawl 29 functions as stopper which via a surface 28 abuts on the inner side 31 within the quadrangular recess 30. The quadrangular recess 30 may be provided by stainless square tubing which is moulded into the material. The further handle is retained by means of a nut 32 at the inward facing side of the first handle 5. This nut will preferably bear against a supporting washer 33.

[0048] The supporting washer 33 is suitable as the material for the further handle as well as for the fixed handle is usually made of plastic.

[0049] In Fig. 15 is illustrated a further embodiment which substantially corresponds to Fig. 14. In Fig. 15, the stopper limits 29 and 30 are supported by the shape of the further handle 7. The further handle 7 has a cranking 34. In the active position for the further handle 7, the cranking 34 will thus come into abutment with the first handle 5 partly corresponding the part 10 in Fig. 2. It is possible to use the cranking 34 without the stoppers 29 and 30, or in combination with these as illustrated in Fig. 15.

[0050] In Figs. 17 and 18 a container is illustrated, substantially corresponding to the container shown 16 in Figs. 8-10 which is supported on four wheels 17. In this embodiment, the vertical handles 19 and the horizontal handles 18 connected thereto are hinged about a pivot axis 36, whereby one may say that a combination of a first handle set and the further handle set 6 is established. In Fig. 17 to the left is shown how the handle is swung to the active position for functioning as a further handle set, and in the right side there is illustrated a situation where it is in its position for functioning as a first handle set.

[0051] In Fig. 18 is shown a further embodiment where the further handle set 6 is pivotably hinged about a pivot axis 37 that is substantially coincident with the largely horizontal handle 18 of the first handle set 4. Thus the further handles 38 may pivot from the inactive position shown to the right to an active position shown at centre, or to an active position shown to the left in Fig. 18.

[0052] As it appears from Fig. 18, the first handle set 6 will be hinged for pivoting about the pivot axis 36. Thus the further handles 38 are brought to their active position by simultaneous pivoting about the pivot axis 36 and the pivot axis 37.

[0053] The handles illustrated in Figs. 17 and 18 may also be provided with releasable locking means (not shown) which makes possible to hold the handles in inactive position and/or active position.

[0054] In the above, the invention has been described with reference to specific embodiments. However, it will be possible to design the invention in other ways, in particular, it will be possible to use a further handle in connection with other transport containers than the shown refuse container, as for example catering trolleys, fodder trucks and the like. Also, it will be possible to place the further handles in a fixed position if no mutual interference occurs by using handles of the first set or the further set.

Claims

1. A transport container, preferably a refuse container, intended to be transported on wheels, the transport container being provided with a first handle set with handles for the user's grip during transport by pulling or pushing, **characterised in that** a further han-

- dle set is provided comprising two displaceably mounted handles, each of which being disposed in association with the handles in the first handle set, that the handles are arranged for displacing between a first inactive position in which they do not interfere with the use of the further handles by the user, or that the handles of the first set and the further set are disposed so that they do not mutually interfere when using the handles of the first set or the further set.
2. A transport container according to claim 1, **characterised in that** each of the further handles are arranged for pivoting in a largely vertical plane which is mainly in parallel with the direction of driving of the transport container.
 3. A transport container according to claim 1 or 2, **characterised in that** the further handles have a stopper which is intended to interact with a stopper fastened to the transport container for defining the active position.
 4. A transport container according to claim 1 or 2, **characterised in that** the further handle is arranged for pivoting freely in the active position for adjusting to the height and width of the user.
 5. A transport container according to any preceding claim, **characterised in that** the further handles are mounted in a position below or at the first handles, and that they are mounted on a pivot axle or by hinge connections, and that they are arranged for pivoting upwards or outwards to their active position where they have a largely horizontal orientation away from the transport container.
 6. A transport container, preferably refuse container, intended for being transported on wheels, the transport container being provided with a first handle set with handles for the user's grip during transport by pulling or pushing, **characterised in that** there is provided a further handle set comprising two fixedly mounted handles which are disposed in association with the handles in the first handle set, and that the handles of the first set and the further set are disposed so that they do not mutually interfere when using the handles of the first set or the further set.
 7. A transport container according to any preceding claim, **characterised in that** the further handles have a first, largely straight part at the end where they are connected to the transport container, and a second handle part has a downwardly or upwardly directed curvature largely having the shape of a parabola for increasing the gripping comfort of the user.
 8. A transport container according to any preceding claim, **characterised in that** the further handles have a largely oval cross-section with longitudinal/short axes that are mainly equally large and with a length between 20 and 50 mm, preferably about 40 mm.
 9. A transport container according to any of preceding claims 1 - 5 or 7, 8, **characterised in that** the further handles are mounted for pivoting in a vertical plane which is immediately adjoining a vertical plane containing the handles on the first handle set, that the further handles have a cranking between their mounted end and their handle end so that in use both handle sets are provided with the same mutual distance.
 10. A transport container according to claim 9, **characterised in that** the cranking on the further handles is used as stopper against the first handles for defining the active position.
 11. A transport container according to any of preceding claims 1 - 5 or 7 - 10, **characterised in that** the further handles comprise locking means which releasably co-operate with locking means fastened to the transport container for defining and retaining the further handles in the inactive position.

Fig 7

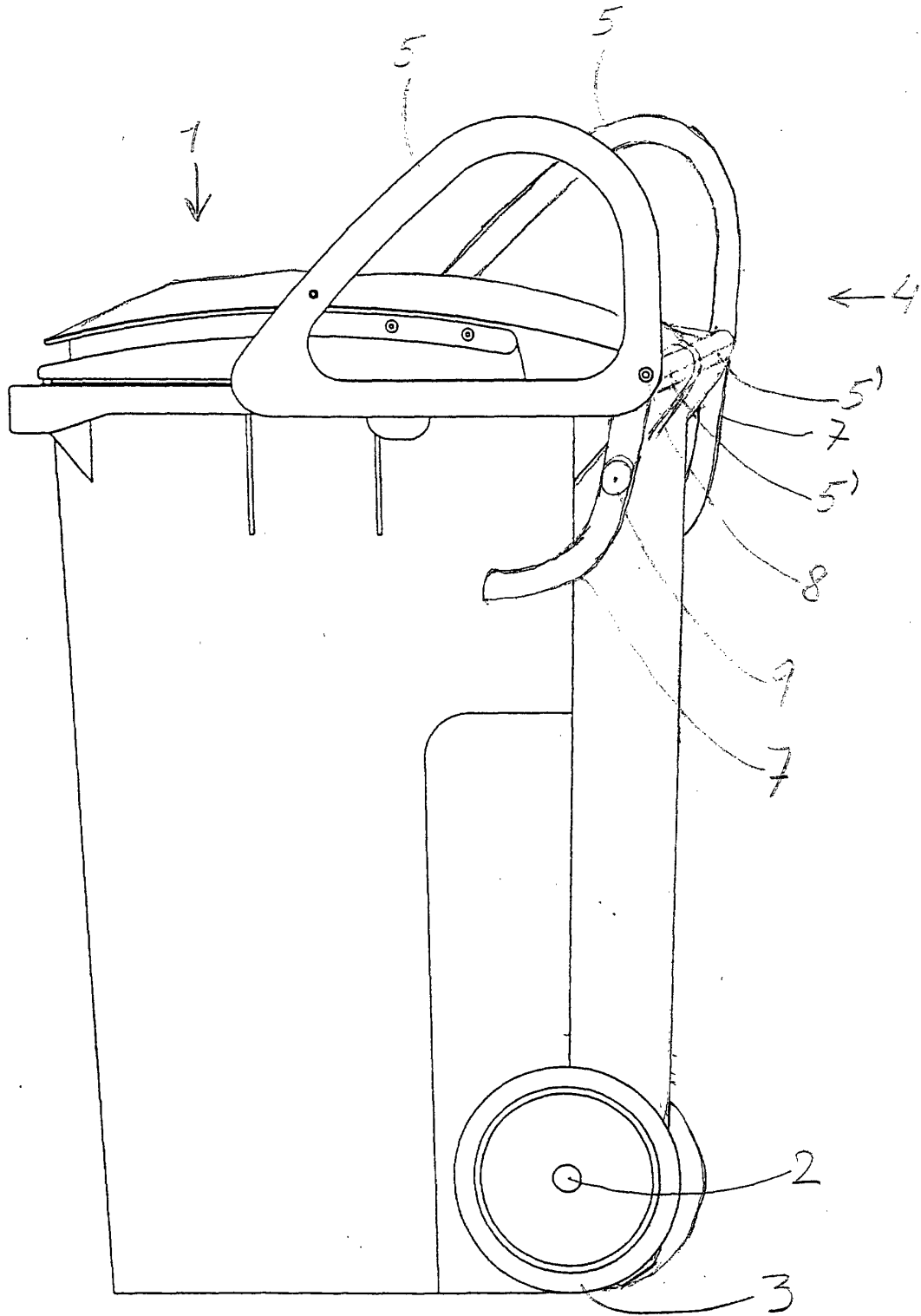


Fig 2

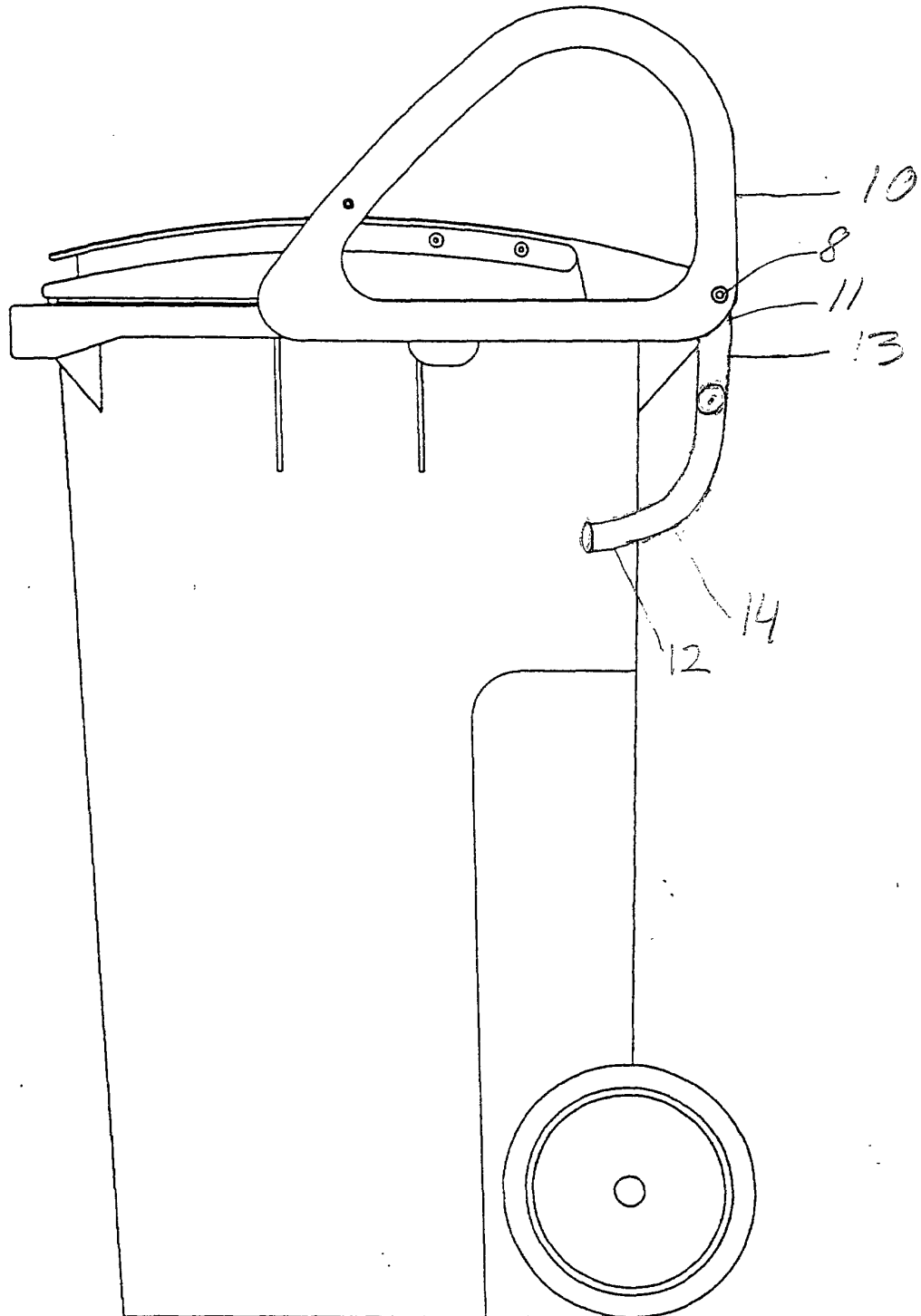


Fig 3

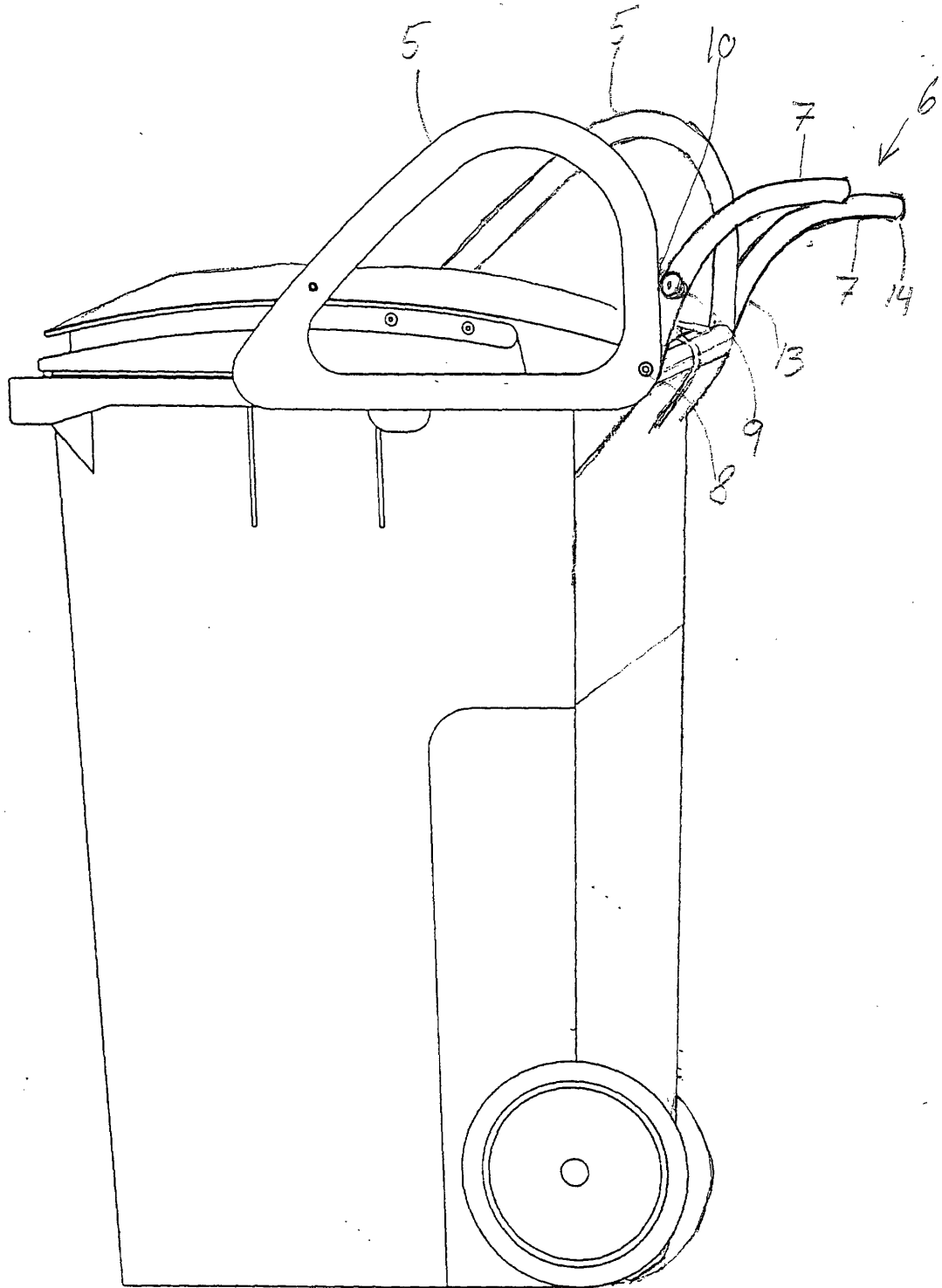


Fig. 4

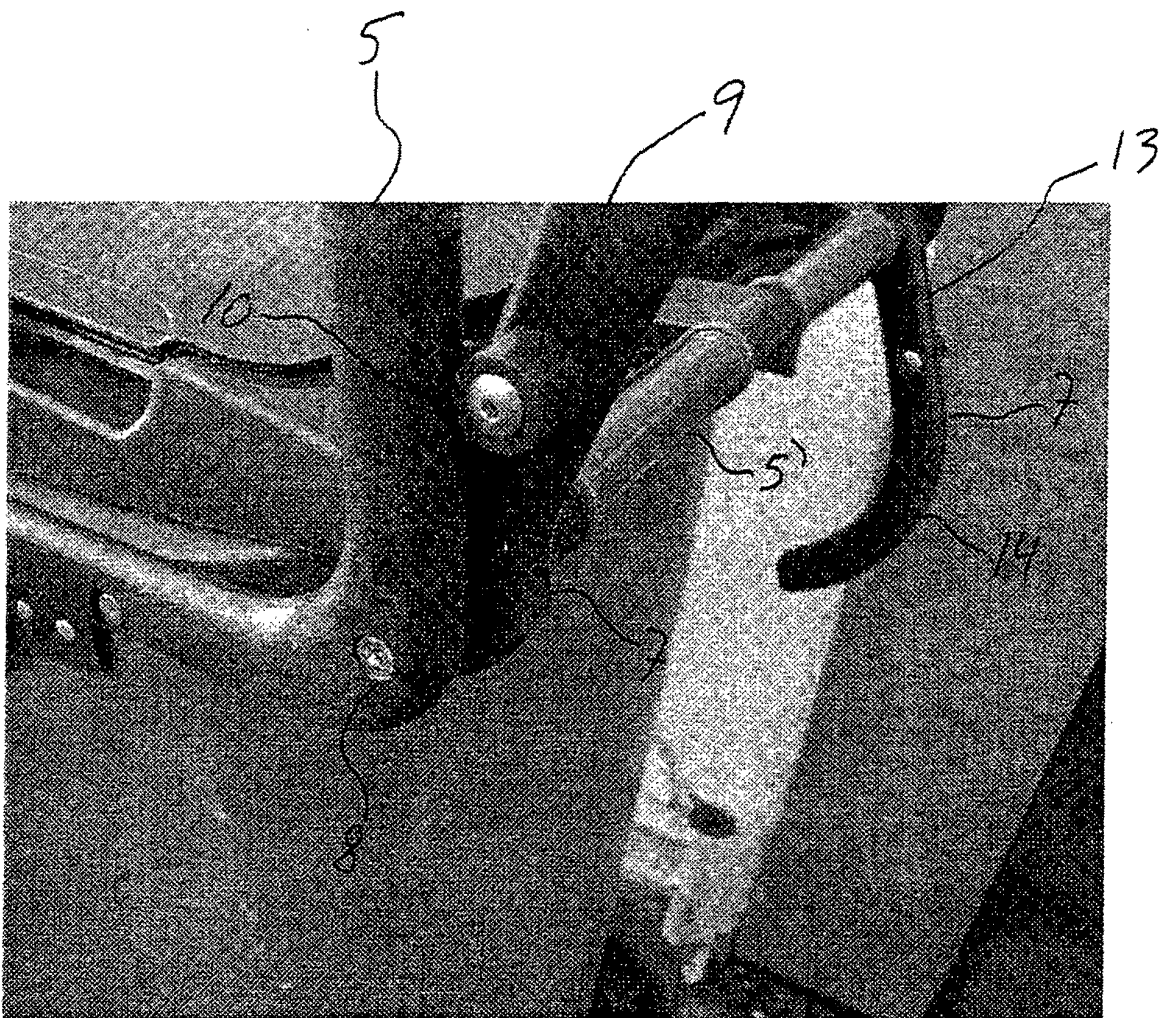


Fig. 5

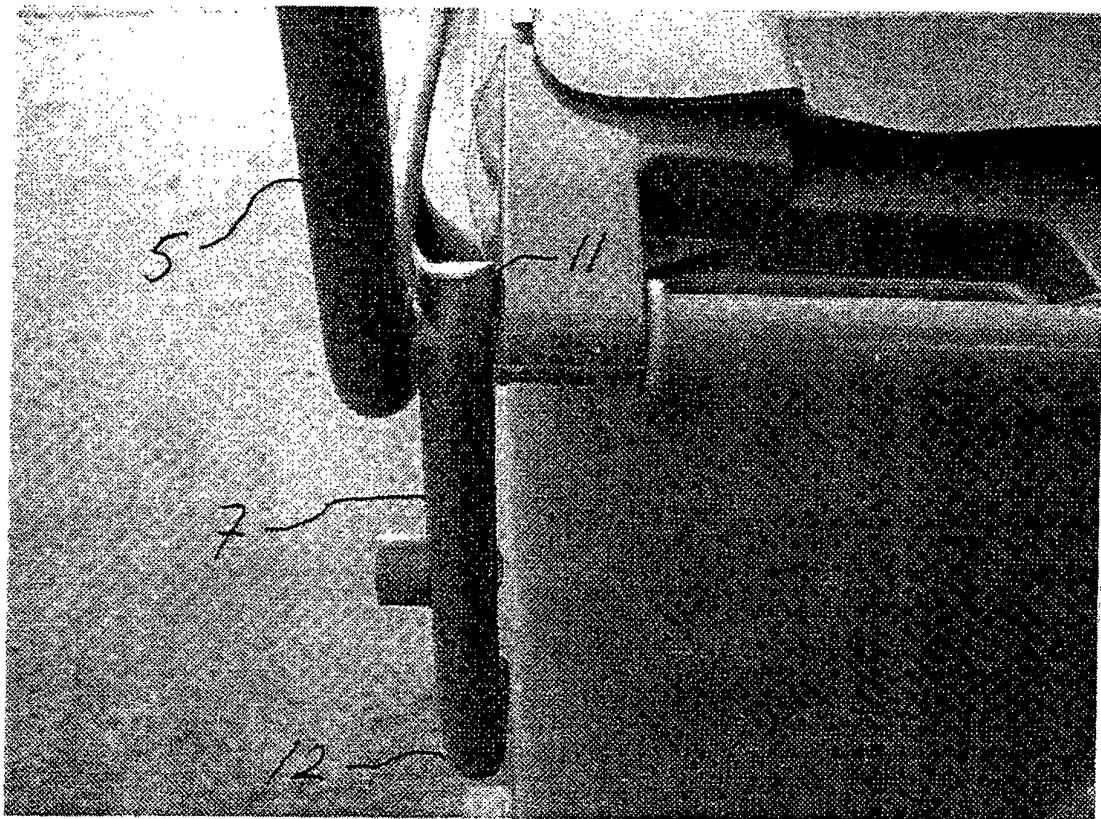


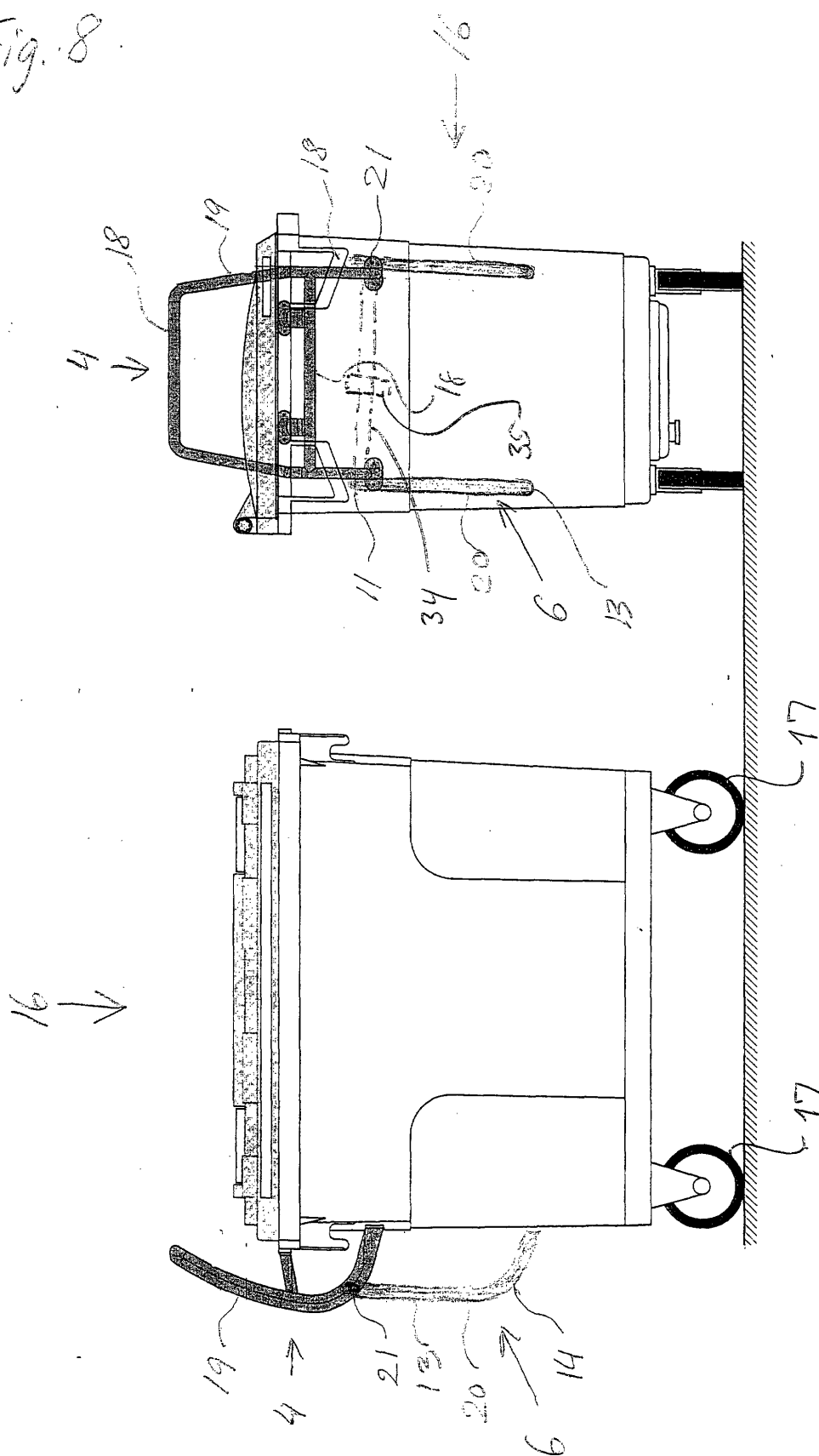
Fig. 6



Fig. 7



Fig. 8.



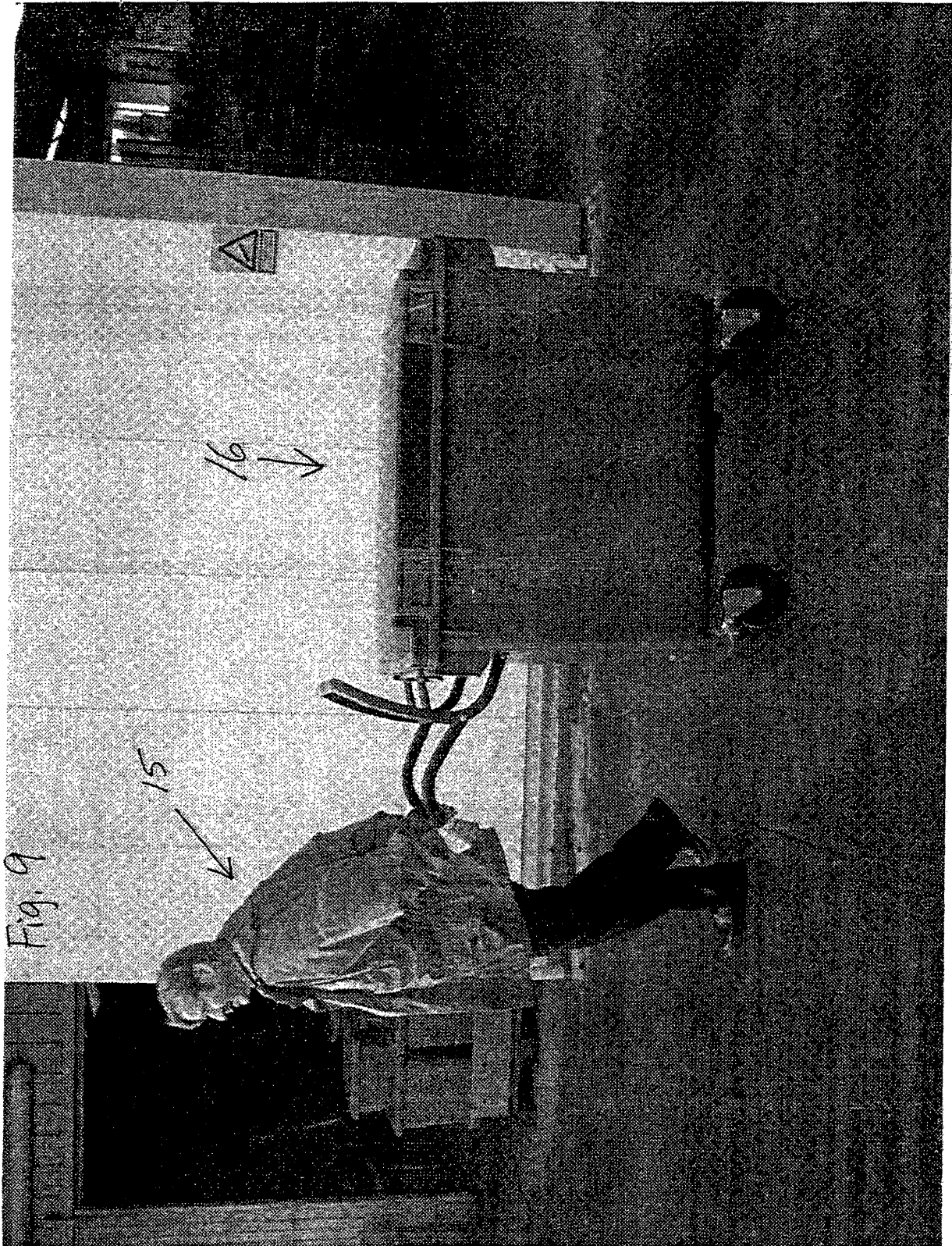


Fig. 10

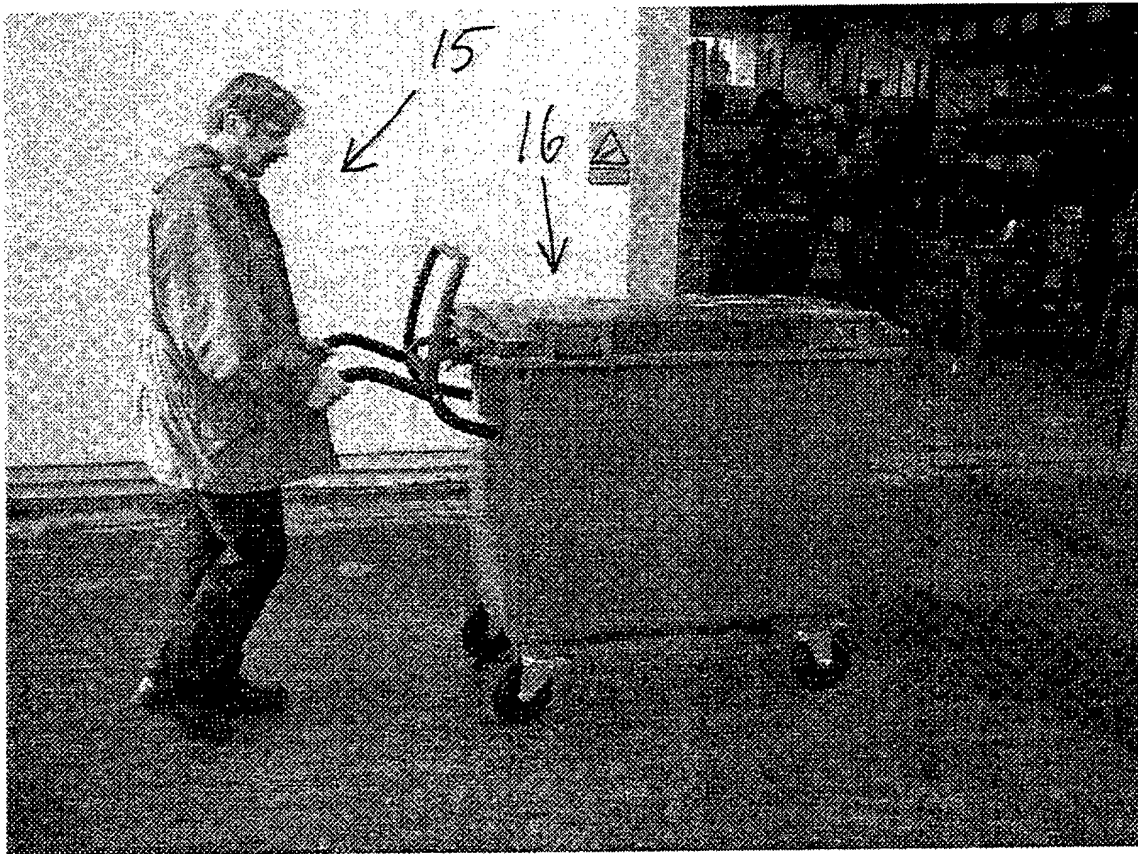


Fig: 11

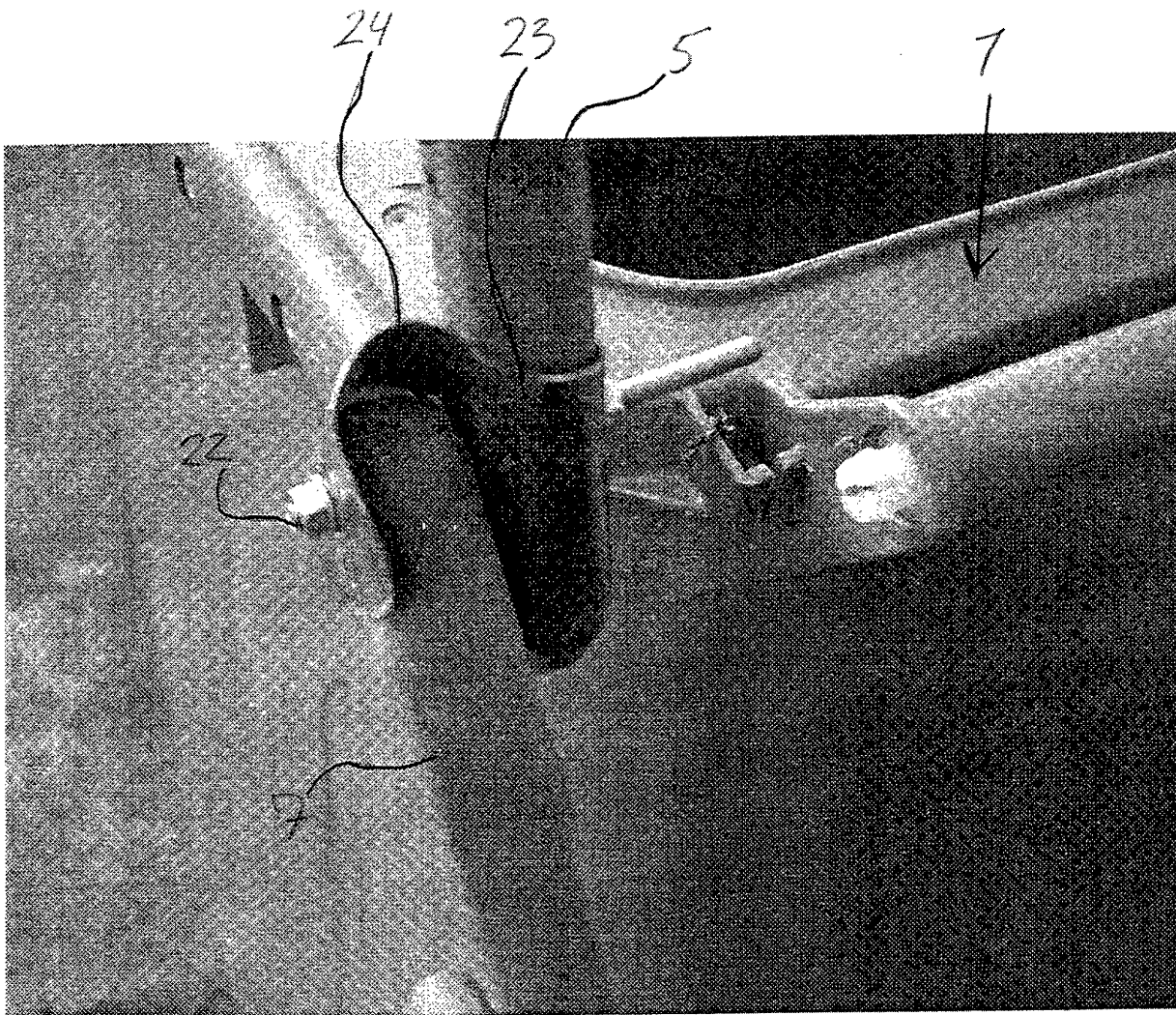


Fig. 12

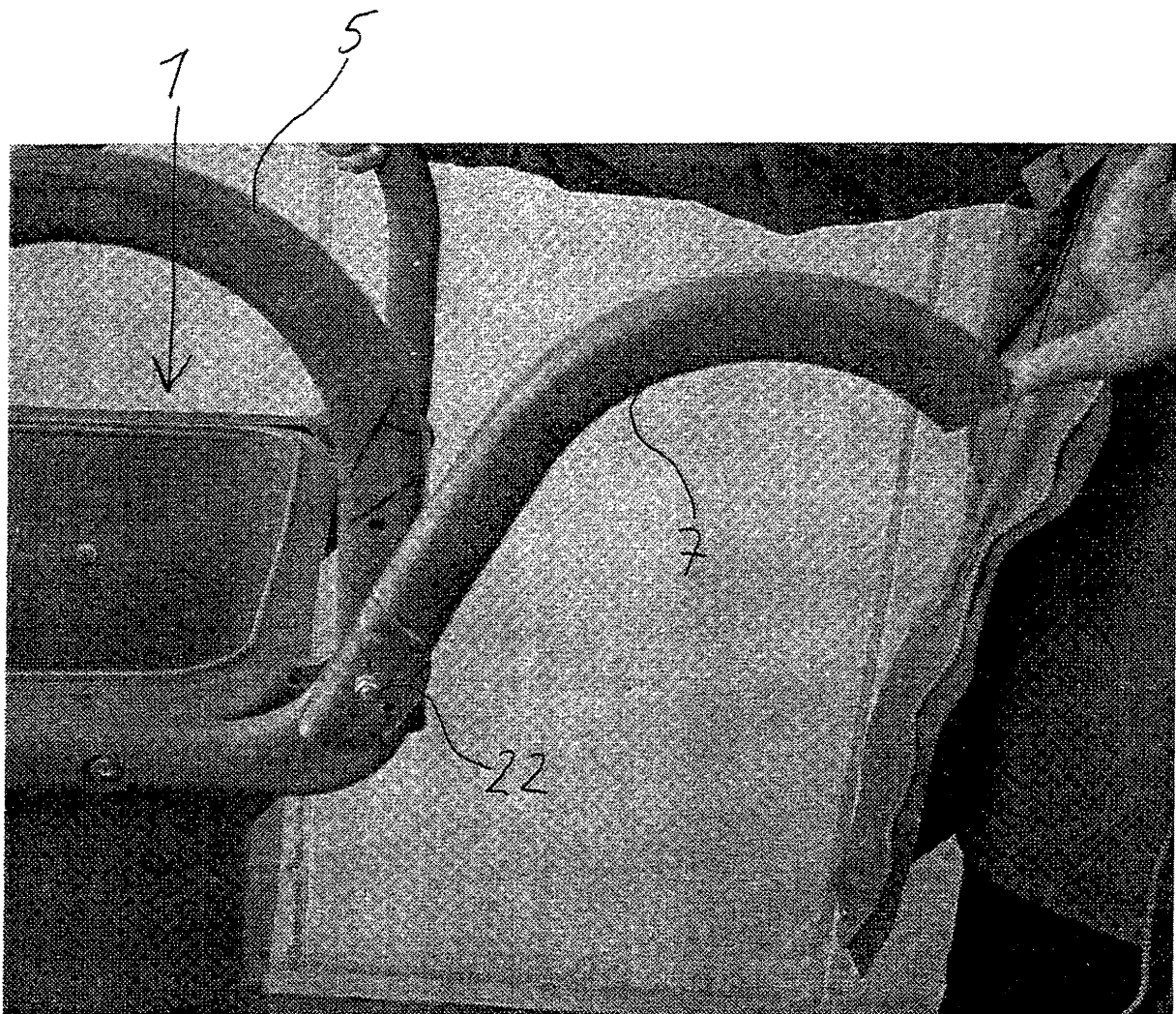


Fig. 13

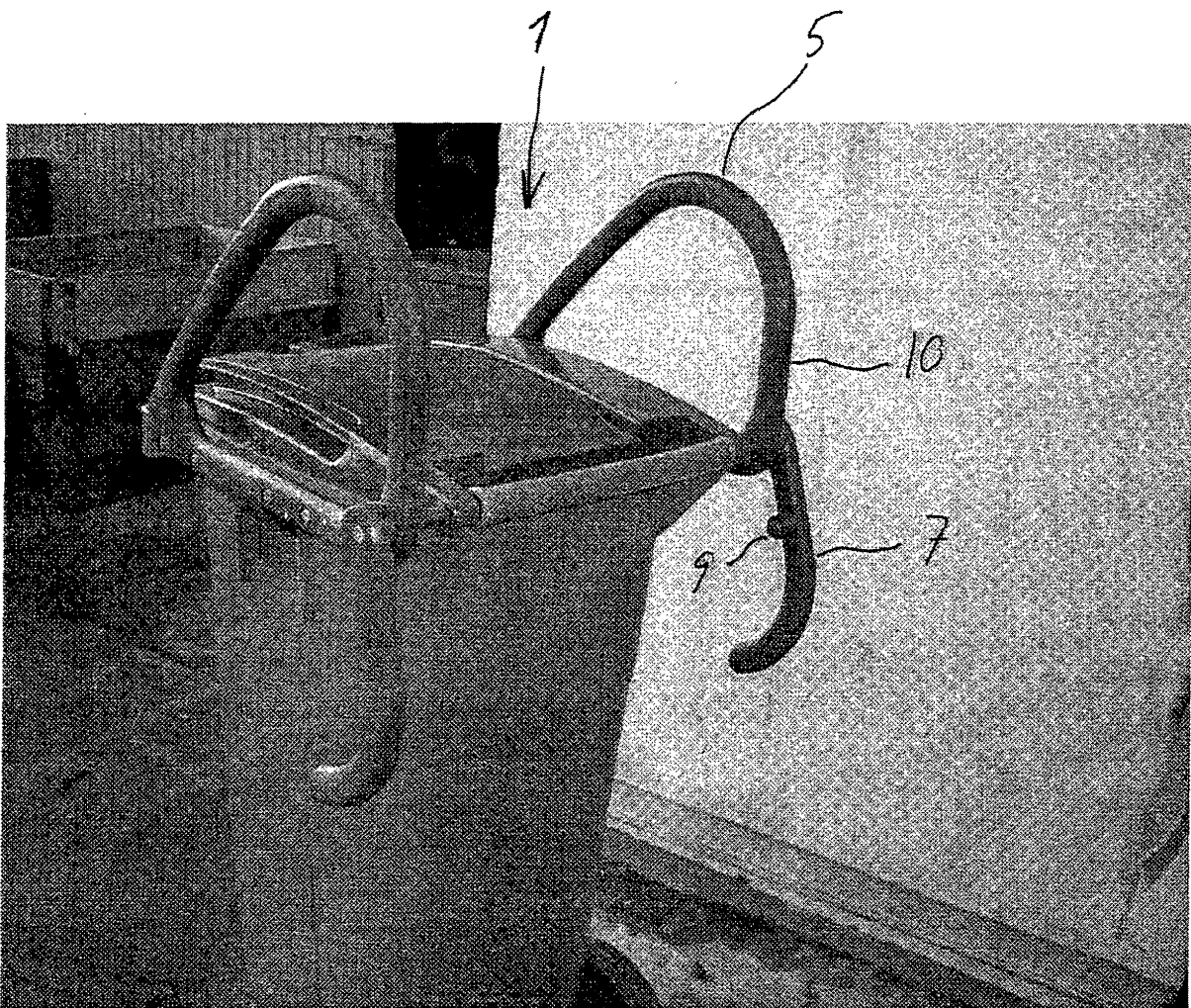


Fig. 14

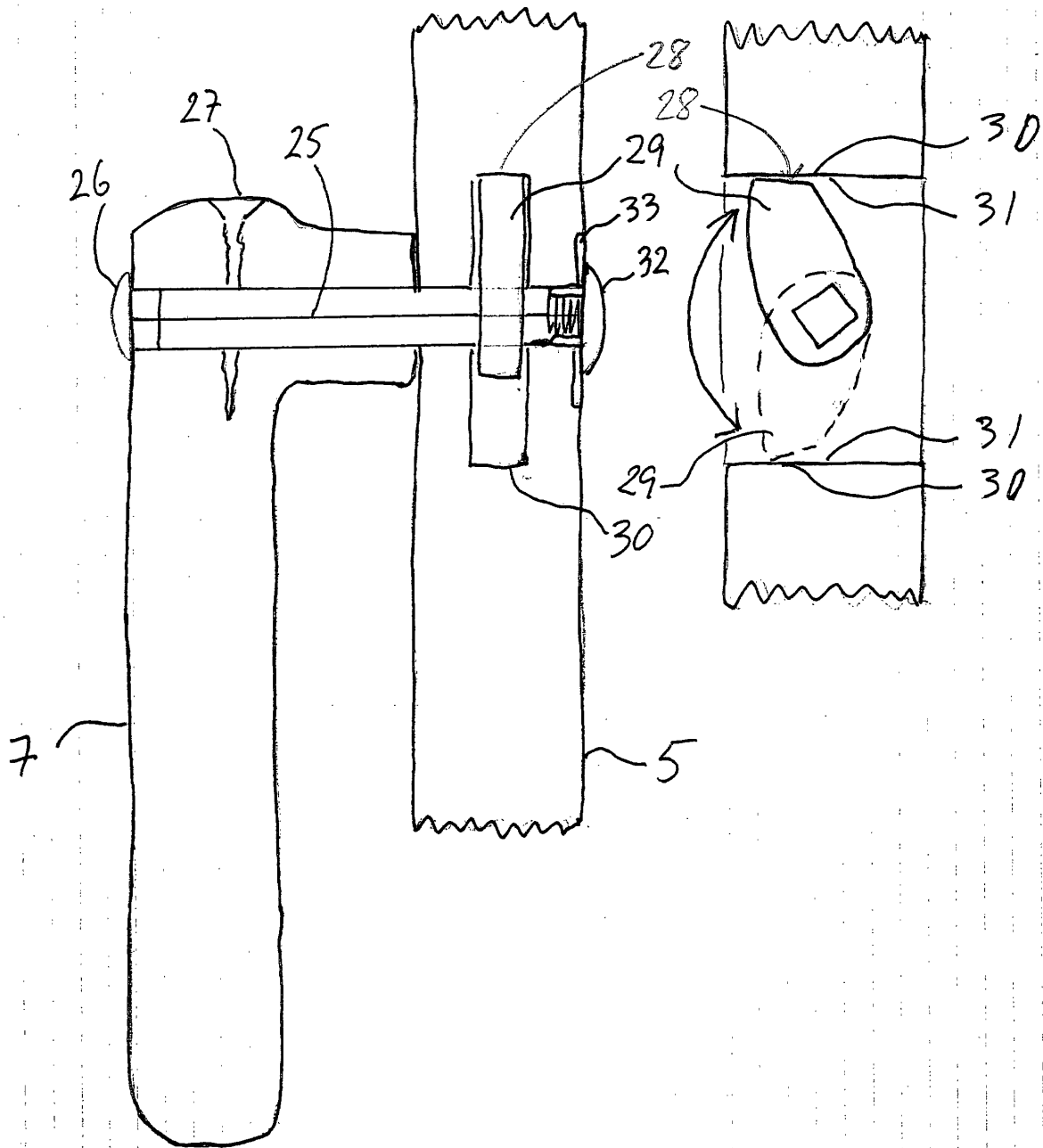
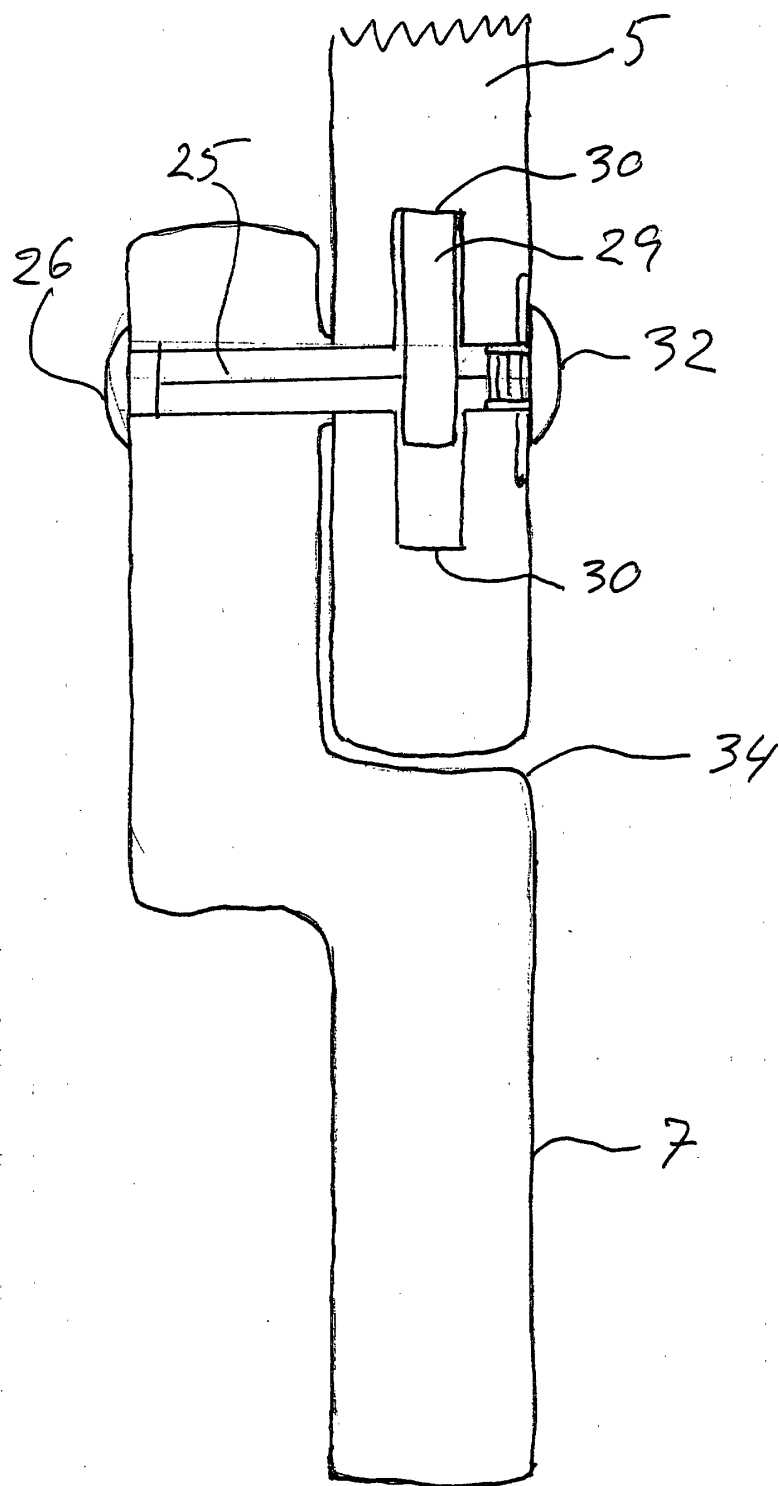


Fig. 15



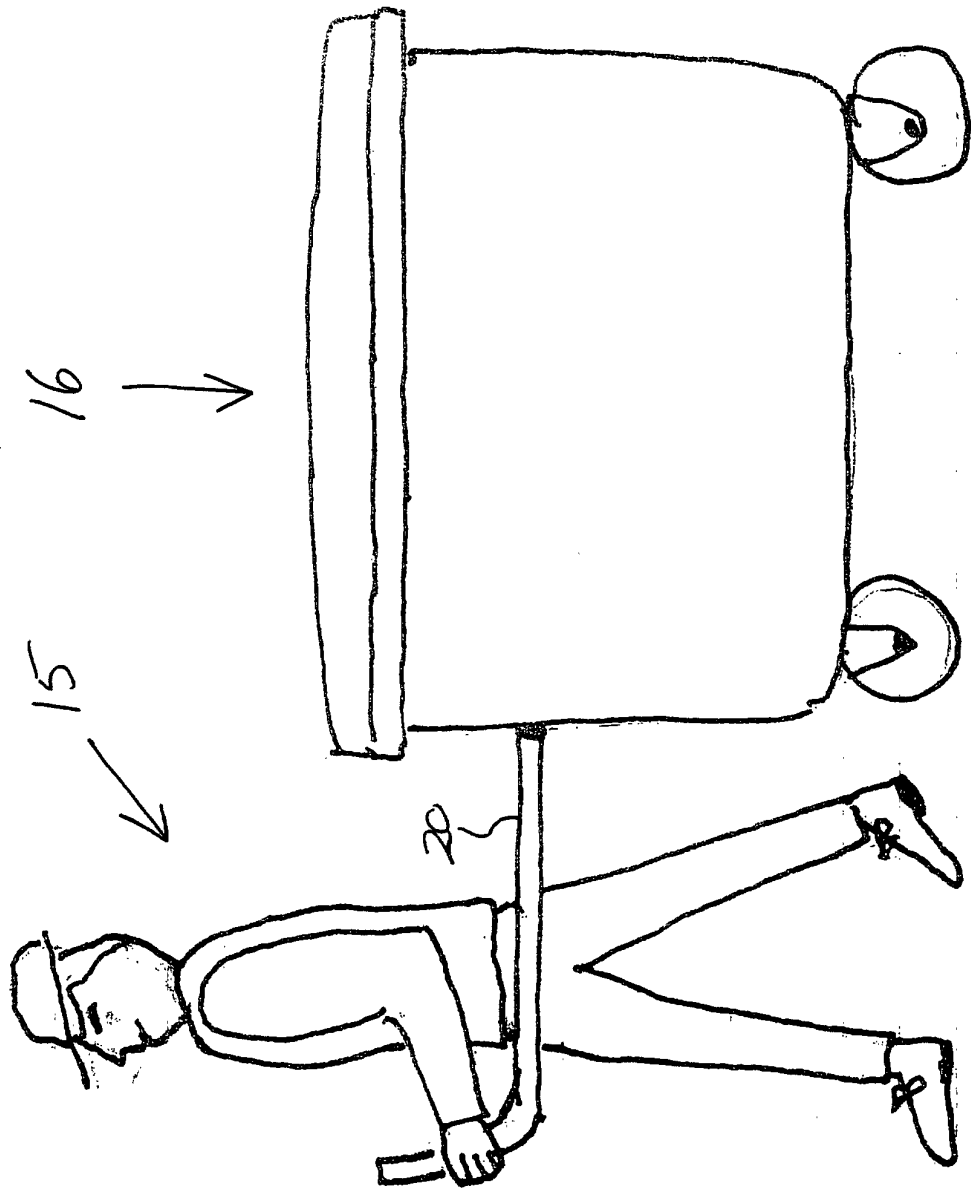


Fig. 16

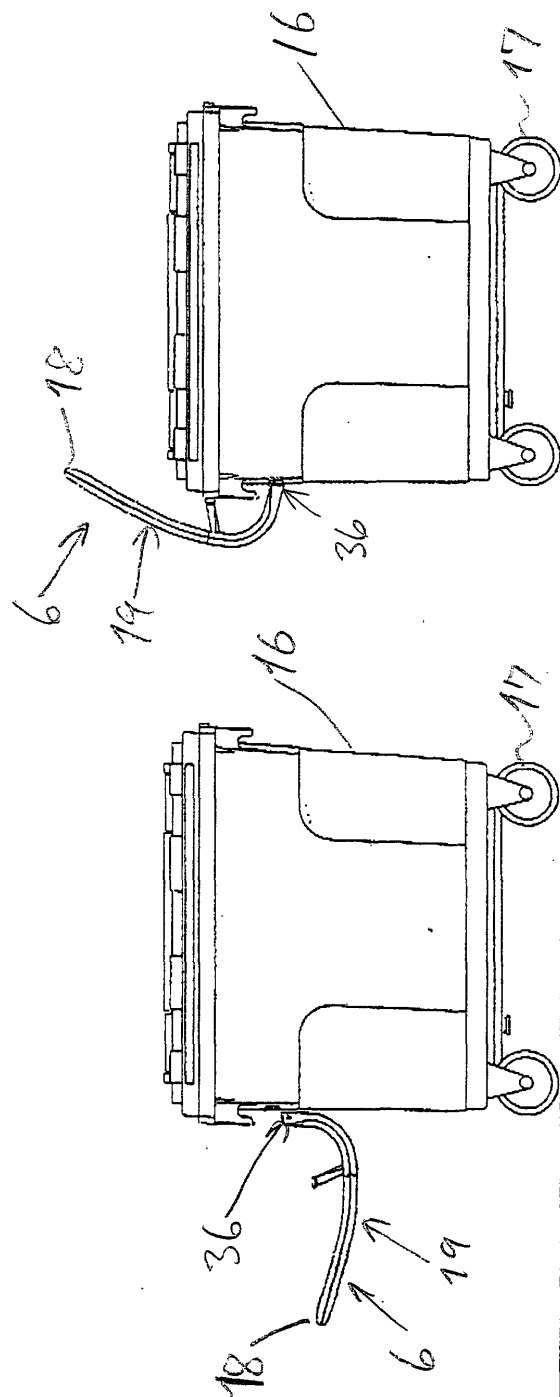


Fig 17

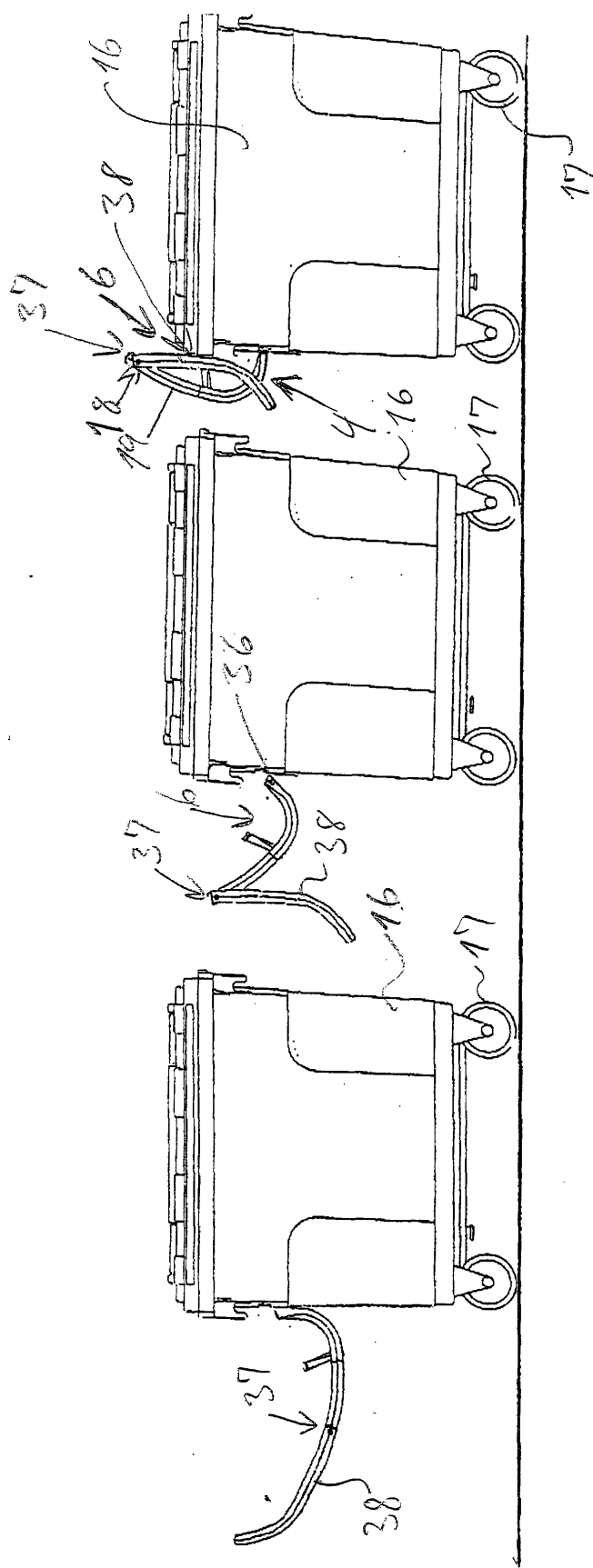


Fig. 18



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 01 10 2373

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Place of search		Date of completion of the search	Examiner
THE HAGUE		7 May 2001	Smolders, R
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