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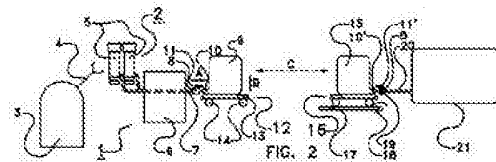
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Dairy farm system.

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Dairy farm system (1) comprising a non-mobile milking system (2) with a milking machine (6), a milk receptacle (9) that is removably fluidly connectible to the milking system, a central milk tank (21), separate from the milking system, for storing milk from a plurality of milkings, an automatic handling system (11, 12) for handling the milk receptacle, and arranged to disconnect the milk receptacle from the milking system after each milking and to move the milk receptacle from the milking system to the central milk tank, wherein at least one of the handling system and the milk receptacle is arranged to transfer the milk from the milk receptacle to the central milk tank. The handling system transferring the (filled) milk receptacles to a destination such as the central milk tank ensures that the milk is handles very gently, thereby improving milk quality.



Dairy farm system

The present invention relates to a dairy farm system. Dairy farm systems are used on dairy farms to obtain milk from dairy animals.

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A dairy farm system generally comprises a non-mobile milking system with a milking machine, and in particular a milking robot, for performing a milking on a dairy animal, a milk receptacle that is arranged to receive, when connected to the milking device, milk from the milking, and a central milk tank, separate from the milking device, for storing milk from a plurality of milkings. To transport milk from the milk receptacle, often also called a milk jar, to the milk tank, there is provided a milking line and a milk pump. During milking, the milk from the milking is collected in the milk jar. When the milked milk is determined to be fit for human consumption, the milk is pumped to the milk tank, otherwise to a separate tank for rejected milk, or to a sewer or the like. A known problem is that transferring milk from the milking system to the milk tank gives rise to mechanical load on the milk, which in turn often leads to damaged fat globules, and a (too) high free fatty acids concentration.

20 It is an object of the present invention to improve the milk quality of the known dairy system, with a similar efficiency and capacity of the dairy system.

This object is achieved with a dairy system according to claim 1, in particular a dairy farm system comprising a non-mobile milking system with a milking machine, and in particular a milking robot, for performing a milking on a dairy animal, a milk receptacle that is removably fluidly connectible to the milking system and is arranged to receive, when connected to the milking system, milk from the milking, a central milk tank, separate from the milking system, for storing milk from a plurality of milkings, an automatic handling system for handling the milk receptacle, and arranged to disconnect the milk receptacle from the milking system after each milking and to move the milk receptacle from the milking system to the central milk tank, wherein at least one of the handling system, the milk receptacle and the central milk tank is arranged to transfer the milk from the milk receptacle to the central milk tank. The inventor has realised that having the dairy

system automatically move the milk receptacle as a whole to the milk tank provides in principle the least mechanical load on the milk, thus allowing an optimum quality. The milk is separate for each milking, so no mixing of fit and unfit milk for consumption is possible in the milk receptacle, and the milk can be cooled
5 immediately.

Another advantage is that there is no long milk line, extending between the milking machines and the milk tank, to be cleaned e.g. three times a day. This is incidentally what is meant with the central milk tank being "separate" from the
10 milking system: there is no longer a direct fluid connection between the two. No longer having such a long milk line to the milk tank saves a lot of energy and water, and also prevents a lot of downtime, as cleaning of the milking system is now much faster. Furthermore, since there is no longer any cleaning of a long milk line, it also saves a lot of water, energy and chemicals.

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It is noted that document EP1523878 discloses a freely movable teat cup carrier with milking means and a milk storage vessel. In one embodiment, the teat cup carrier may move to a milk collecting tank, or the milk storage vessel is exchangeable and may be transported for example as a whole to a milk factory.
20 Although this also limits damage to the milk, this known device has a low capacity, or at least still requires a lot of manual work, since it is not efficient to have the milking device as a whole move to the milk tank, which is the case for the known teat cup carrier. In any practical barn environment, the milk tank is often quite far away from the milking device. When moving all of the milking device back and
25 forth, a lot of valuable time is lost that cannot be used for milking, which is the primary task of the milking device. This alone is a reason not to combine this technology with that of a non-mobile milking system. It is neither efficient to have a multitude of milking devices that are idle because they are being moved around. Moreover, the moving of the milking means themselves (vacuum pump, teat cups
30 and robot arm, teat detection system and so on) requires a lot of additional energy, which is wasted if moving around those means does not serve a purpose. Furthermore, as in another disclosed embodiment, moving in a non-disclosed way an obviously large number of milk collecting vessels to a milk factory is neither a desirable efficient solution to the problem. Note that milk has to be cooled (such as

EC Regulation No 1662/2006: Milk must be cooled immediately to not more than 8 °C in the case of daily collection, or not more than 6 °C if collection is not daily.) Therefore, it is not feasible to store more than a single milking in the milk collection vessel, unless the milking system would have cooling means on-board. Moreover, mixing milk from multiple milkings is undesirable since it is possible that a single milking makes the milk from all other milkings unfit for consumption, which would mean a lot of loss. Thus the milk collecting vessel would have to be exchanged after each milking anyway, which requires a lot of labour. No way of or means for doing so is given in the cited document.

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Contrarily, the present invention uses a non-mobile milking system, as is per se known in the field. Having an automatic transport device for disconnecting the milk receptacle after each milking and transporting in principle only the milk receptacle to the milk tank achieves a gentle milk transport, a minimum of energy and resources for the milk transport and full availability of the milking system for milking. The receptacle to be moved automatically is itself free from automatic milking means.

Further embodiments of the invention will be described hereinbelow.

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In embodiments, the non-mobile milking system comprises one or more milk stands, in particular one or a plurality of milking boxes, such as a rotary milking parlour or a herringbone milking stall. When the dairy farm system comprises one, or in particular more milk stands, the milk tank will often be far away from the milking system. Another reason for this is that the milk tank must be sited in a clean area, as the milk storage room is considered a food storage area. Thus, the milk line from milk receptacle to the milk tank, in prior art dairy farm systems, will often be very long. Contrarily, in the present invention such a long milk line is not necessary, or not even present, and a great advantage is achieved by having the removable milk receptacle and the automatic handling system for moving the milk receptacle to the milk tank. Examples of a dairy farm system having such a plurality of milking boxes are a twin stand milking robot, a herring bone milking stall or advantageously a rotary milking parlour. It is noted that each individual

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milking machine on the rotary milking parlour floor will of course move in a circle. However, the milking system as a whole is non-mobile.

5 In embodiments, the milk receptacle and the central milk tank are removably fluidly connectible. In such embodiments, and after moving the milk receptacle to the milking tank, the milk can flow from the milk receptacle to the milk tank via a coupling to said milk tank. Said coupling may for example be a releasable quick connector, comparable to the known garden hose connectors. In this way, a quick fluid connection can be made between the milk receptacle and the milk tank,
10 which connection is easily removable. It is noted that it is not necessary for there to be a removable fluid connection, since it is also possible to empty the milk receptacle into the milk tank, e.g. by tilting the milk receptacle or the like.

15 According to the invention, at least one of the handling system, the milk receptacle and the central milk tank is arranged to transfer the milk from the milk receptacle to the central milk tank. In embodiments, at least one of the milk receptacle and the central milk tank comprises a pump arranged to pump the milk from the milk receptacle into the central milk tank, in particular via the fluid connection. Alternatively or additionally, the handling system, the milk receptacle and/or the
20 central milk tank may comprise a tilting device, that is arranged to tilt the milk receptacle, such that the milk from the milk receptacle will flow towards and into the central milk tank under the influence of gravity, again in particular via the fluid connection. Advantageously, the handling system is arranged to bring the milk receptacle to a position at the level of at least that of a supply opening into the
25 central milk tank, such as at the top of the milk tank. In that way, the tilting device need not tilt the milk receptacle to a much higher level. If the central milk tank further comprises a supply device with a supply opening higher than the central milk tank itself, it may be sufficient for the milk receptacle to couple with the supply device and let the milk run out of the receptacle into the central milk tank under the
30 influence of gravity.

In embodiments, the dairy farm system further comprises at least one further milk receptacle that is removably fluidly connectible to the milking system and is arranged to receive, when connected to the milking system, milk from the milking,

and that in particular is removably fluidly connectible to the central milk tank. In such embodiments, there are a plurality of milk receptacles that may each be connected to the milking system, consecutively or even in parallel. An advantageous use of such a plurality of milk receptacles is to milk a first cow and collect the milk in a first milk receptacle, while milking a further cow and collecting her milk in a further milk receptacle. During milking of the further cow, the milk of the first cow, in the first milk receptacle, is moved to the milk tank by means of the milk handling system. Thereby, no time is lost. Any number of milk receptacles is possible, while it is advantageous to have a relatively higher number of milk receptacles if a relatively longer milk line is to be replaced. Furthermore, if the handling system is able to transport the milk receptacle to the milk tank quickly, then a relatively lower number of milk receptacles will suffice. Note that it is the receptacle as a whole that it is transported, and not the milk by exerting a force or pressure thereon. Thereby, much higher transport speeds are possible without causing fat globules to break, or in any other way jeopardizing the milk quality.

In embodiments, the handling system comprises a displaceable carrier for carrying the milk receptacle and for moving the milk receptacle to the central milk tank. The carrier may be provided with any means that is suitable for carrying and moving the milk receptacle, which does not need to be provided on the milk receptacle itself. This allows a dedicated design of the carrier and of the milk receptacle, as their functions are different, *viz.* transport, and milk collection, respectively. It will be clear that it is also possible to provide a plurality of displaceable carriers, in such a way that there is always a carrier available to carry a milk receptacle to the milk tank or vice versa.

In embodiments, the carrier comprises a gripping device for gripping the milk receptacle. Such a gripping device may grip the milk receptacle as a whole, for example by having two or more arms exert a pressure on the milk receptacle on opposite sides thereof. Alternatively or additionally, the gripping device may grip a dedicated portion of the milk receptacle, such as a protruding plate, or be embodied in the form of a hook or the like, such as to grip a ring or counterhook or the like on the milk receptacle. Other embodiments of a gripping device having the same functionality are not excluded.

In embodiments, the handling system comprises a, preferably branched, guide rail system arranged between the milking system and the central milk tank, wherein the carrier is displaceable along the guide rail system. In this embodiment, there is
5 a system for moving the milk receptacles, or the carrier(s), in the form of a rail system. Such a rail system may be provided with any known propulsion means for the milk receptacles and/or carriers, such as endless chains etc. Furthermore, no navigation means is necessary. By providing a branched guide rail system, a compact and quick system to guide the milk receptacle to a plurality of
10 destinations is provided, such as a milk tank for consumption and a sewer for milk that is not fit for consumption, and/or a calf milk tank. Note that the guide rail system and the carrier or receptacle may be mechanically connected, such as a train and rails, or the guide rail system may be a navigational guidance for a non-coupled carrier or receptacle.

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In embodiments, the carrier comprises a vehicle with a propulsion device, in particular wheels or continuous tracks, which vehicle is arranged to move autonomously between the milking system and the milk tank. These embodiments are advantageous because of a vehicle's inherent flexibility and movability.
20 Depending on a desired destination, the vehicle will move there autonomously by means of its own propulsion device and if need be other means, such as a navigation device on-board. Note however that the vehicle may also be controlled by some external means such as a receiver (Bluetooth or other) for external navigation instructions or one or more strips on the floor to be followed, or the
25 guide rail system mentioned above. Alternative means are also possible to move and navigate the vehicle around. All navigation means are in principle possible, such as gps, gyroscopes, radio beacons and so on. Another advantage of a vehicle is that, in case of extension of the system, it is very easy for the vehicle to go to a new part of the dairy farm system, such as a new milking machine.
30 Furthermore, having a propulsion means on board has the advantage that the vehicle can climb up to a level suitable for transferring milk into a supply opening of the central milk tank by means of gravity. As described above, tilting the milk receptacle would then suffice, which is easier when the receptacle, or the vehicle together with the receptacle, is already at a desired height.

In embodiments, the dairy farm system comprises a controller for controlling the movement of the at least one receptacle, in particular the at least one carrier. The controller may control the navigation means, in that it is arranged to provide navigation instructions to the navigation means, for example based on a destination of the receptacle. In turn, the destination may be based on measured milk parameters or management information or the like. The controller may also be a distributed controller, such as an embodiment in which each vehicle has a controller that is in connection with the controller of the other vehicles and possibly with an external control unit, such as a management system for a milking device or the like. Based on information from the other controllers and possibly from the management system, the controller of the vehicle can not only determine its destination and its route, but also take into account the position and route of the other vehicles, such as to prevent collisions, traffic jams et cetera.

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In embodiments, the carrier and the milk receptacle are fixedly connected. In such embodiments, the carrier and the milk receptacle form one unit. This dedicated mobile milk receptacle allows a very reliable and safe milk transport, since there is no chance of switching milk receptacles between carriers. Thus the chance that milk that is not fit for consumption ends up in the milk tank is low.

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In embodiments, the milk receptacle is removable from the carrier, and the handling system comprises a loader-unloader system for automatically loading and unloading of the milk receptacle onto/from the carrier. In this alternative, or additional, embodiment, the carrier picks up a milk receptacle with milk from a milking, and carries this to the milk tank or some other place. This allows a flexible use of the carrier, since the milk receptacle may also be used in various other positions. Examples thereof are a cleaning position or at repair site. In other words, fewer carriers than there are milk receptacles may still provide a maximum capacity. The loader-unloader system may comprise any known purpose-fit system, such as a gripping system described herein above, a magnetic or other docking system and so on. It may comprise a tilting system, pump means for pumping the milk from the milk receptacle to the milk tank and so on.

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In embodiments, the dairy farm system comprises a milk receptacle production unit, arranged to produce said milk receptacle from stock material, in particular comprising a plastic material stock and a receptacle separator, more in particular a knife arranged to cut a portion from the stock material and a sealing means arranged to seal the cut portion into a milk bag. These embodiments allow a very hygienic set-up, and also do away with the need for the milk receptacle to be moved back to a milking machine. In these embodiments, the milk receptacle is made from stock material on the spot. The milk receptacle production unit may comprise for example a long tube of plastic material, an optional blower for blowing up the stock material to a desired volume, and sealing means to seal a part of the stock material into the desired shape for the milk receptacle. Herein, a knife or the like may be used to cut the desired portion from the stock material of plastics. Note that a connection portion is also preferably provided in the milk receptacle, for connection to the milking system and/or to a blower for inflating the tube material. It is possible to provide such a connection portion already in the stock material, e.g. in the form of a reel of ready-made receptacles that only need to be inflated. Furthermore, inflating the receptacle is only an option, as it may also be filled simply by the milk flowing into it.

In embodiments, the dairy farm system is provided with a quality control device for attributing a quality indication to the milk of the milking. These embodiments may make use of any known milk quality sensor that is known in the field, such as a conductivity sensor, a color analysis sensor or the like. For example, if a conductivity sensor senses a milk conductivity that is higher than a threshold, it is concluded that the milk is not fit for human consumption. A corresponding quality indication may then be made, for example in the management system, that decides on a route to be followed by the milk receptacle (or carrier or the like).

In embodiments, the dairy farm system further comprises a marker device for marking the receptacle with information regarding the attributed quality indication, in particular said quality indication. In such embodiments, at least some code for identifying the milk and/or the cow is preferably marked on the milk receptacle. This allows tracking of the milk receptacle with the milk from a milking. More in particular, if furthermore the attributed quality indication is marked on the

receptacle, a check can be performed on the receptacle by the receiving side, such as the milk tank. This reduces the chance that unfit milk is supplied to the milk tank, or that consumption milk is provided to the sewer, or the like. Also, in case of failure of a carrier, of a power failure etc., the milk can still be contributed
5 to the milk tank, the sewer etc.

In embodiments, the dairy farm system further comprises at least one additional milk destination, and the handling system is arranged to move the milk receptacle to either the milk tank or one of the at least one additional destination in
10 dependence of said quality indication. In these embodiments, as briefly indicated above, the milk may be distributed according to e.g. quality or other requirements, to the milk tank for consumption milk, a sewer for milk from infected cows or antibiotics cows etc., a colostrum tank for feeding calves, for special purpose milk (for example with some specific milk component) and so on. A corresponding
15 number of sites for supplying the milk from the milk receptacles to is preferably provided. The handling system, or a control system for controlling the handling system, is arranged to move the milk receptacle (or the carrier carrying the milk receptacle) to any of the indicated destinations in dependence of a quality indication. Note that a quality indication may alternatively also be made only in the
20 control system.

In embodiments, the dairy farm system comprises one or more additional milk tanks, each for storing milk from a plurality of milkings, in particular each intended for human consumption. The dairy farm system, and in particular the handling
25 system, is then arranged to move a receptacle to one of the central milk tank, one of the additional milk tanks or another destination for non-consumption milk on the basis of the quality indication. A great advantage of such a system derives from the fact that milk is not transported through a long milk line. In such a long milk line, milk from different (subsequent) milkings will inevitably be mixed. Therefore, it
30 is not possible to separate different qualities, such as standard milk for drinking, or top quality for cheese making, or milk with special contents such as from a genetically altered/different cow or the like. of course, such a separation system could be made directly behind a milk jar or the like, but that requires very much more milk line length, at high cost, and in addition that is needed for each milking

device, such as up to a few dozen for bigger dairy farms. All this is not necessary with the present invention's system, in which each milking's milk can be sent separately to a specific destination, based on the specific quality of the milk in that milking, without any additional milk lines.

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In embodiments, the quality control device comprises one or more milk quality sensors, that is/are arranged on the receptacle and for determining a quality parameter value of the milk in the receptacle. An advantage of this set-up is that right after milking, or even during milking, the sensor(s) can start determining the value(s), but they may take more time to do so then when in a customary milking system. After all, in the latter, milk must be tested before sending it through the milk conduit system, for which there is not much time if the milking device is not to be blocked for a next dairy animal. In the present invention, the milk is carried in a separate receptacle, and measuring may take all the way from the milking station to the milk tank, or other destination. For example, the one or more milk quality sensors comprise a conductivity sensor, an optical sensor for determining colour (blood-related or the like), or SCC. In particular an SCC sensor according to the California Mastitis Test (CMT) takes a relatively long measuring time, but may be important to decide where the milk should go. Advantageously, at least one milk quality sensor, and in particular a SCC sensor, comprises a sampling device, arranged to sample the receptacle's milk, such as with a syringe or a sample bypass between the connector and the milk receptacle. Therefore, in particular, the quality control device is arranged to attribute a quality indication on the basis of the measured quality parameter value(s). In particular, the handling system is then arranged to guide the receptacle to one of either the milk tank or one of the at least one additional destination in dependence of said quality indication. In particular, the at least one milk quality sensors is provided on a vehicle on the vehicle, as this allows to test each receptacle's milk without requiring each receptacle to have its own sensor(s).

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Based on the measured milk quality, measures may be taken to separate milk into various qualities, such as beestings, consumption milk and milk from infected cows. In particular, the dairy farm system is arranged to separate milk from different quarters, on the basis of the measured quality parameter values for one

or more quarters. In embodiments, the handling system is arranged to instruct the milking machine to milk only a desired subset of the quarters of the animal. In this way, the handling system may collect e.g. consumption milk from (say) three healthy quarters in the receptacle. Then, a separate receptacle may be used for
5 collecting the milk from the infected quarter. In this way, mixing of fit milk and unfit milk can be reliably prevented.

In embodiments, the dairy farm system is further provided with a cleaning system for cleaning and/or disinfecting the milk receptacle. In these embodiments, such a
10 cleaning system allows for cleaning and/or disinfecting the milk receptacle, e.g. by washing the receptacle with rinsing fluid, by supplying steam or some other disinfectant to the milk receptacle etc., all according to any known cleaning and/or disinfecting matter known in the art. It is noted that the cleaning system need not be provided at the side of the milking system, but may be provided elsewhere, e.g.
15 near the milk tank. This allows cleaning and/or disinfecting of the milk receptacle shortly after the milk receptacle has supplied its milk to the milk tank. Furthermore, such cleaning and/or disinfecting of the milk receptacle will only be required for a multiple use milk receptacle.

20 The invention will now be elucidated by means of a number of exemplary and non-limiting embodiments, as shown in the drawings, and in which:

- Figure 1 diagrammatically shows a top view of a prior art dairy farm system,
- Figure 2 very diagrammatically shows a dairy farm system 1 according to the invention,
- 25 - Figure 3 shows a part of another dairy farm system according the invention, in a diagrammatic side view,
- Figure 4 very diagrammatically shows another dairy farm system 1' according to the invention in a top view,
- Figure 5 diagrammatically shows a milk receptacle production unit 60, and
- 30 - Figure 6 very diagrammatically shows a milk receptacle for use in the dairy farm system according to the invention, in a diagrammatic side view.

Figure 1 diagrammatically shows a top view of a prior art dairy farm system, designated by reference numeral 100. It comprises a herring bone milking stall

101, with six milking places 102 for milking dairy animals 103, and has six milking machines 104, each with teat cups 105, a milk jar 106 and a milk pump 107. The milking machines 104 supply milk to the central milk line 108. Central milk pump 109 pumps the milk to the central milk tank 110.

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The drawing is not to scale, and the part of the central milk line 108 that has been left out may be up to several hundred meters long. In such a case, the pressure exerted by the central milk pump 109 as well as the friction and turbulence due to the resistance in the central milk line 108 may deteriorate the milk quality before
10 the milk arrives in the central milk tank 110.

Figure 2 very diagrammatically shows a dairy farm system 1 according to the invention, comprising a milking system 2 with a robot 3 with a robot arm 4, teat cups 5 of a milking machine 6 with a milk line 7 and a first connector 8. A milk
15 receptacle is designated by 9 and has a second connector 10. A connector controller is designated by 11 and controls the removable connection between the first and second connectors in the direction of arrow A. The receptacle 9 is positioned on a vehicle 12 with a vehicle controller 13 and wheels 14.

20 A further milk receptacle 15 on a further vehicle 16 has been transported in the direction of one of arrows C and is now positioned on top of a tiltable platform 17, that is tiltable around a hinge 18. Here, as throughout all of the drawings of this application, similar parts have been denoted by the same or (double) primed reference numerals. Furthermore, 19 designates a pump, and 20 designates a
25 flexible milk line to the central milk tank 21.

The dairy farm system as shown comprises a milking system 2 that has one or more milking machines 6, although only one is shown here. Furthermore, although the teat cups 5 may be connected to a dairy animal by hand, in Figure 2, this is
30 performed by means of the robot 3 with a robot arm 4. Examples of such milking robots are the Lely Astronaut™ and DeLaval VMS™ milking robots.

The milking machine 6 comprises the usual parts, such as a milking vacuum pump, a pulsator vacuum pump and a pulsator, none of which is shown here in

any further detail, as they do not relate to the heart of the invention. As is usual, the milking machine 6 is used to extract milk from the dairy animal via the teat cups 5 and to supply the milk to the milk line 7, such as by means of a non-shown pump. The milk line 7 ends in a first connector 8 onto which a second connector 10 of the milk receptacle 9 may be removably connected. The connecting and disconnecting is controllable by means of the connector controller 11, for example comprising a pusher element for pushing the receptacle, and in particular the second connector 10 thereof, away from the first connector 8. Automatic connectors are known per se, and may for example be derived from garden hose connectors or the like.

In this embodiment, the receptacle 9 is positioned on top of a vehicle 12. The vehicle 12 has a vehicle controller 13, for example comprising navigation means and a controller for controlling a non-shown wheel motor for the wheels 14, for propulsion of the vehicle.

After this connecting by means of the connector controller 11, the vehicle 12 with the milk receptacle 9 that is now filled with milk can move or be moved away from the milking machine 6 and towards another destination. In Figure 2, such a destination has been reached by the further milk receptacle 15 on the further vehicle 16. This vehicle is now in a position for supplying its milk to the central milk tank. Thereto, first of all the connection between the corresponding first and second connectors 8' and 10' is made under the control of the connector controller 11'. Now, there is a fluid connection between the further milk receptacle 15 and the central milk tank 21. In order to supply the milk from the further milk receptacle 15, the tiltable platform 17 may be tilted around the hinge 18 in the direction of the arrow D. Then, the milk from the further milk receptacle 15 will flow to the central milk tank 21 under the influence of gravity. It is also possible to provide the platform at a higher level, such as on top of or near the top of the central milk tank 110. In fact, it then need not be tiltable, as the milk may flow out of the receptacle into the tank 110 under the influence of gravity.

Alternatively, or additionally, and preferably because of better flow control, the milk may be pumped from the further milk receptacle 15 to the central milk tank by

means of the pump 19. Note that in the former case, the milk line 20 should be flexible, which need not be so in the latter case.

The milk receptacle 9 is shown to be removable in the direction of the arrow B.
5 Either by hand or by means of a non-shown device, the milk receptacle 9 may be lifted off the vehicle 12, for example in order to be replaced or the like.

Figure 3 shows a part of another dairy farm system according the invention, in a diagrammatic side view. The system comprises a guide rail system 30 with a guide
10 rail 31 and carriages 32, each with a gripper 33 and a gripper controller 34. The milk receptacles 9, 15 have a protrusion 35 to be gripped by the gripper 33. Shown in dashed lines is a vehicle onto which the milk receptacle 9 may be positioned. However, the carriage 32 may also position the milk receptacle 9 on a non-moving platform or the ground.

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With the guide rail system 30 as shown, the milk receptacles 9 may be positioned where needed, such as at a connector 8 of a (non-shown) milking machine or milking system. There, the milk receptacle 9 may be filled with milk. After filling,
20 the gripper 33 grips the protrusion 35 and moves the filled milk receptacle 9 to a different position, such as the position now taken in by another milk receptacle 15. This other milk receptacle 15 may be connected to another first connector 8', such as of a central milk tank (not shown here). It can then supply its milk to the central milk tank or the like.

25 Figure 4 very diagrammatically shows another dairy farm system 1' according to the invention in a top view.

The dairy farm system 1' comprises a rotary platform 50 and a platform controller 51. The rotary platform 50 has milking places 52 with a milking machine 6'. Each
30 milking machine 6' has a quality meter 54.

A handling system, or loader-unloader system, is designated by reference numeral 53, a marking station is designated by 55 and a cleaning station is designated by 56.

The dairy farm system 1' further comprises a guiding system 57 with branches 58, such as to a sewer 59 and a central milk tank 21, as well as to a calves pen 41 with a calf drinking station 42.

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Dairy animals such as cows are milked on the rotary platform 50 by means of the milking machines 6'. When a milking place 52 is positioned near the handling system 53, a new milk receptacle 9 may be positioned on the milking place 52, in fluid connection with the milking machine 6', and a full milk receptacle 9' may be
10 taken from the milking place.

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The milk that has been milked by the milking machine 6' has undergone a quality check by means of the quality meter 54. This meter may comprise one or more meter devices, such as a milk conductivity meter, a milk color meter, a SCC meter and so on. Relevant information and data may be stored in the controller 51 and may also be marked on the filled milk receptacles 9'. Thereto, the marking station 55 may imprint a code or even the information itself onto the milk receptacle 9'. This may prevent that the contents of a milk receptacle 9' becomes worthless because its quality can no longer be ensured. If this quality, or a code that is
20 connected to that quality, is imprinted on the milk receptacle 9', even after a disturbance, such as a mains black-out or the like, the contents may be linked to the necessary information.

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In a non-shown option, the milk receptacle 9', or similarly the vehicle for the
25 receptacle 9, may be provided with at least one quality meter (or sensor) for measuring a milk quality parameter value, such as a somatic cell counter sensor. Now, the receptacle 9', or the vehicle 12 with the receptacle 9, can measure one or more milk quality parameters underway, in order to determine where the receptacle's milk should be transferred to. The at least one quality meter (or
30 sensor) may comprise a sampler, such as a syringe, or a sample bypass connected to the second connector or at any other desirable position.

30

On the basis of the quality as determined by means of the quality meter 54, the milk receptacles 9' will be moved along the guiding system 57 and one of its

branches 58 to a desired destination. One desired destination is the sewer 59, which may be selected for non-useful milk, such as mastitis milk or antibiotics milk. The milk is simply dumped into the sewer, and the empty milk receptacle will return.

5

Another destination is the central milk tank 21, for which a similar system has been shown in Figure 2 or 3 may be used.

Another possible destination is a calves pen 41 in which calves are held. In particular young calves should advantageously drink biestings or colostrum. Such milk is considered unfit for human consumption, but provides health benefits to calves. Thereto, a milk receptacle filled with colostrum is guided towards the calve drinking station 42, into which the colostrum will be supplied, and will be made available for drinking by the calves.

15

Another possible destination, not shown here, comprises one or more special milk tanks, in which consumption milk with a special quality may be stored, for example milk with a very low SCC number, for cheesemaking, or milk from one or more special cows that produce a special enzyme or the like. Note that such milk is not diluted or mixed in a long milk line, but may be brought to a separate tank without mixing at all.

20

In all cases, the now empty milk receptacle 9 will return in the direction of the handling system 53, but before arriving there will pass through the cleaning station 56. There, the milk receptacle will be cleaned, for example by connecting to a cleaning fluid supply. The milk receptacle will then be washed by filling with cleaning fluid and emptying it again. After cleaning, the milk receptacle will be ready for another use and will arrive at the handling system 53.

25

In the dairy farm system 1' as shown, the guiding system need not be a guide rail system as shown in Figure 3, but could also comprise a track for vehicles, or a set of beacons or other devices that can be followed by a device and a detector, such as a buried strip, or even comprise routes programmed into a navigation system of a vehicle.

30

Figure 5 diagrammatically shows a milk receptacle production unit 60. Here, empty milk receptacles 61 are connected to each other in a stock 62, that is moved by means of a conveyor roller 63. A movable knife 64 cuts along lines 65 for cutting.

5 Reference numeral 66 designates a pump and numeral 67 an air inlet.

The stock 62 of empty receptacles 61, each with a connector 10', is transported and provided one by one, by means of the conveyor roller 63. When another milk receptacle is needed, the knife 64 cuts off the foremost empty receptacle 61 along
10 a cutting line 65. Then the empty receptacle will be inflated by means of connecting its connector 10' to the counter connector 8" and pumping air into the receptacle 61 by means of the pump 66, via air inlet 67. Now, a new milk receptacle is ready for use.

15 Figure 6 very diagrammatically shows a milk receptacle for use in the dairy farm system according to the invention, in a diagrammatic side view. The receptacle has a milk receptacle 9 on a vehicle 12. The vehicle 12 has a frame 70 with wheels 14 and electro motors 71. The milk receptacle 9 has a locking protrusion 72, while the vehicle 12 has a locking device 73, for locking the milk receptacle 9
20 onto the vehicle 12. The vehicle 12 also has a vehicle controller 13 and a marking nozzle 74 and a camera 75. Furthermore, a communication device is designated by 76 and load cells by 77. The milk receptacle 9 is removably connected on the vehicle 12, and can be locked by means of the locking protrusion 72 and the locking device 73.

25

The marking nozzle 74 is arranged to imprint information on the milk receptacle 9. Thereto, the marking nozzle 74 may for example be arranged as a set of printing nozzles. The information to be printed on the milk receptacle 9 may be of different sources, such as received by means of the communication device 76, and derived
30 from a quality meter or the like. The information may also be (partly) processed by means of the vehicle controller 13. It is also possible to generate information on the vehicle 12 itself, such as by means of the load cells 77, arranged to determine the weight of the milk in the milk receptacle 9.

The vehicle 12 furthermore comprises a camera 75. This camera may be arranged for navigational purposes, such as by means of object recognition, or route recognition. Furthermore, the camera 75 may obtain images that are used by the vehicle controller 13 for connecting and disconnecting the milk receptacle 9 from a milking device or the like. Information as to the destination of the vehicle and the milk receptacle 9 carried by it may also be received by means of the communication device 76.

CONCLUSIES

1. Melkveehouderijsysteem omfattende:
 - een niet-mobiel melksysteem met een melkmachine, en in het bijzonder
5 een melkrobot, voor uitvoeren van een melking op een melkdier,
 - een melkopvangvat dat verwijderbaar in stromingsverbinding brengbaar is met het melksysteem en is ingericht om, indien verbonden met het melksysteem, melk van de melking te ontvangen,
 - een centrale melktank, afzonderlijk van het melksysteem, voor opslaan van
10 melk van meerdere melkingen,
 - een automatisch hanteringssysteem voor hanteren van het melkopvangvat, en ingericht om het melkopvangvat af te koppelen van het melksysteem na elke melking en om het melkopvangvat van het melksysteem naar de centrale melktank te verplaatsen,
15 waarbij ten minste één van het hanteringssysteem, het melkopvangvat en de centrale melktank is ingericht om de melk van het melkopvangvat over te brengen naar de centrale melktank.
2. Melkveehouderijsysteem volgens conclusie 1, waarbij het niet-mobiele melksysteem een of meer melkplaatsen omvat, in het bijzonder een of
20 meer melkboxen, zoals een draaimelkstal of een visgraatmelkstal.
3. Melkveehouderijsysteem volgens enige voorgaande conclusie, waarbij het melkopvangvat en de centrale melktank verwijderbaar in stromingsverbinding brengbaar zijn.
4. Melkveehouderijsysteem volgens enige voorgaande conclusie,
25 waarbij ten minste één van het melkopvangvat en de centrale melktank een pomp omvat die is ingericht om de melk vanuit het melkopvangvat tot in de centrale melktank te pompen, in het bijzonder via de stromingsverbinding.
5. Melkveehouderijsysteem volgens enige voorgaande conclusie, voorts omfattende ten minste één aanvullend melkopvangvat dat verwijderbaar in
30 stromingsverbinding brengbaar is met de melkinrichting en is ingericht om, wanneer verbonden met de melkinrichting, melk van de melking te ontvangen, en dat verwijderbaar in stromingsverbinding brengbaar is met de centrale melktank.
6. Melkveehouderijsysteem volgens enige voorgaande conclusie, waarbij het hanteringssysteem een verplaatsbare drager omvat voor dragen van

het melkopvangvat en voor verplaatsen van het melkopvangvat naar de centrale melktank.

7. Melkveehouderijsysteem volgens conclusie 6, waarbij de drager een grijperinrichting omvat voor grijpen van het melkopvangvat.

5 8. Melkveehouderijsysteem volgens conclusie 6 of 7, waarbij het hanteringssysteem een, bij voorkeur vertakt, geleidingsrailsysteem omvat dat is ingericht tussen het melksysteem en de centrale melktank, waarbij de drager verplaatsbaar is langs het geleidingsrailsysteem.

9. Melkveehouderijsysteem volgens een van de conclusies 6-8, waarbij
10 de drager een voertuig met voortbewegingsinrichting omvat, in het bijzonder wielen of eindloze banden, welk voertuig is ingericht om zich autonoom te verplaatsen tussen het melksysteem en de melktank.

10. Melkveehouderijsysteem volgens een van de conclusies 6-9, waarbij de drager en het melkopvangvat vast verbonden zijn.

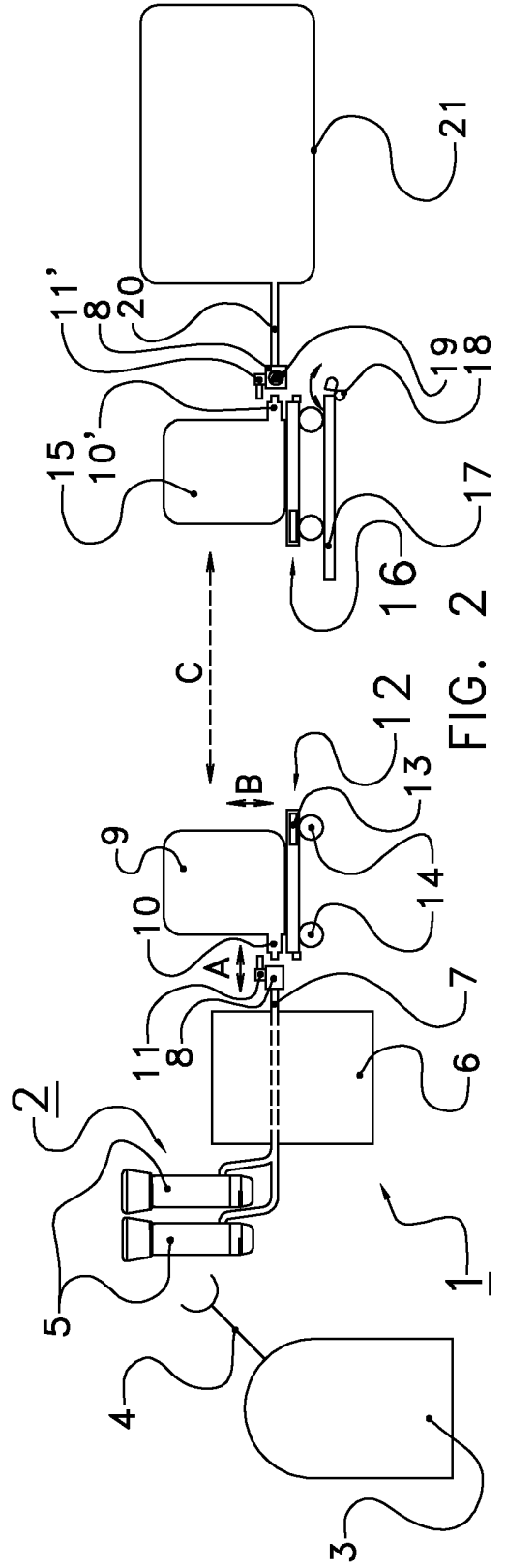
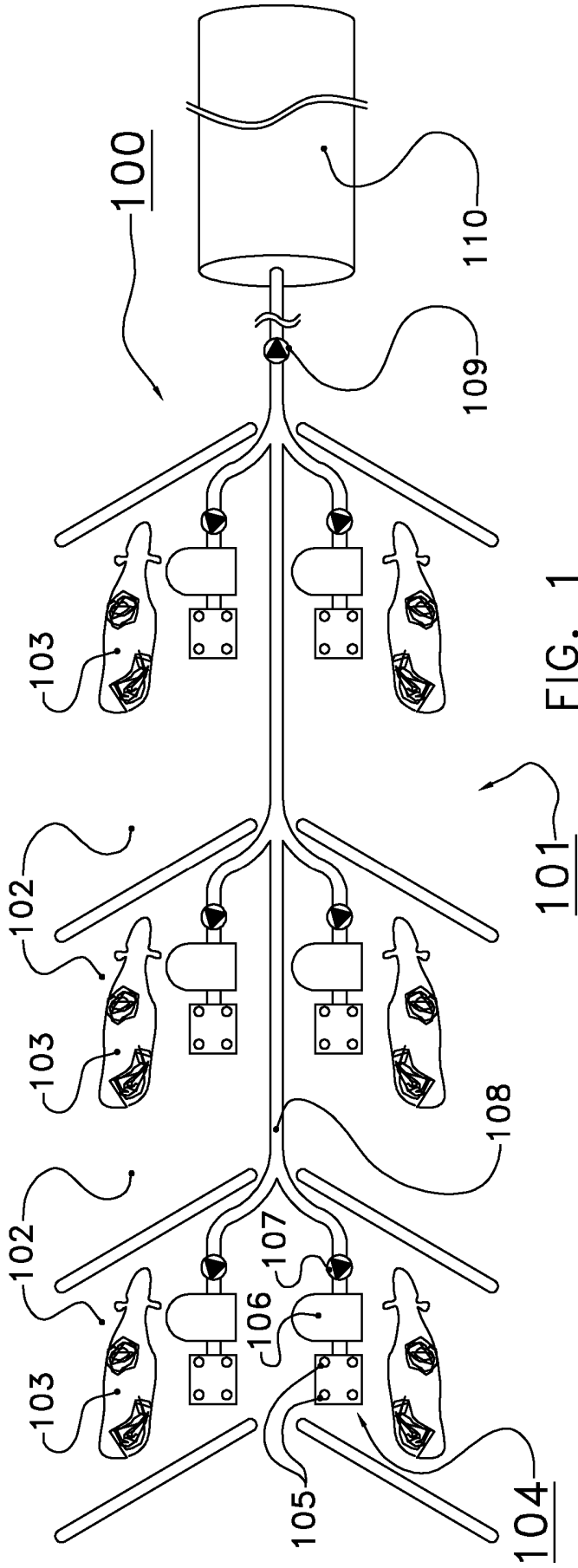
15 11. Melkveehoudersysteem volgens een van de conclusies 6-9, waarbij het melkopvangvat verwijderbaar is van de drager, en waarbij het hanteringssysteem een laad-lossysteem omvat voor automatisch laden en lossen van het melkopvangvat op/van de drager.

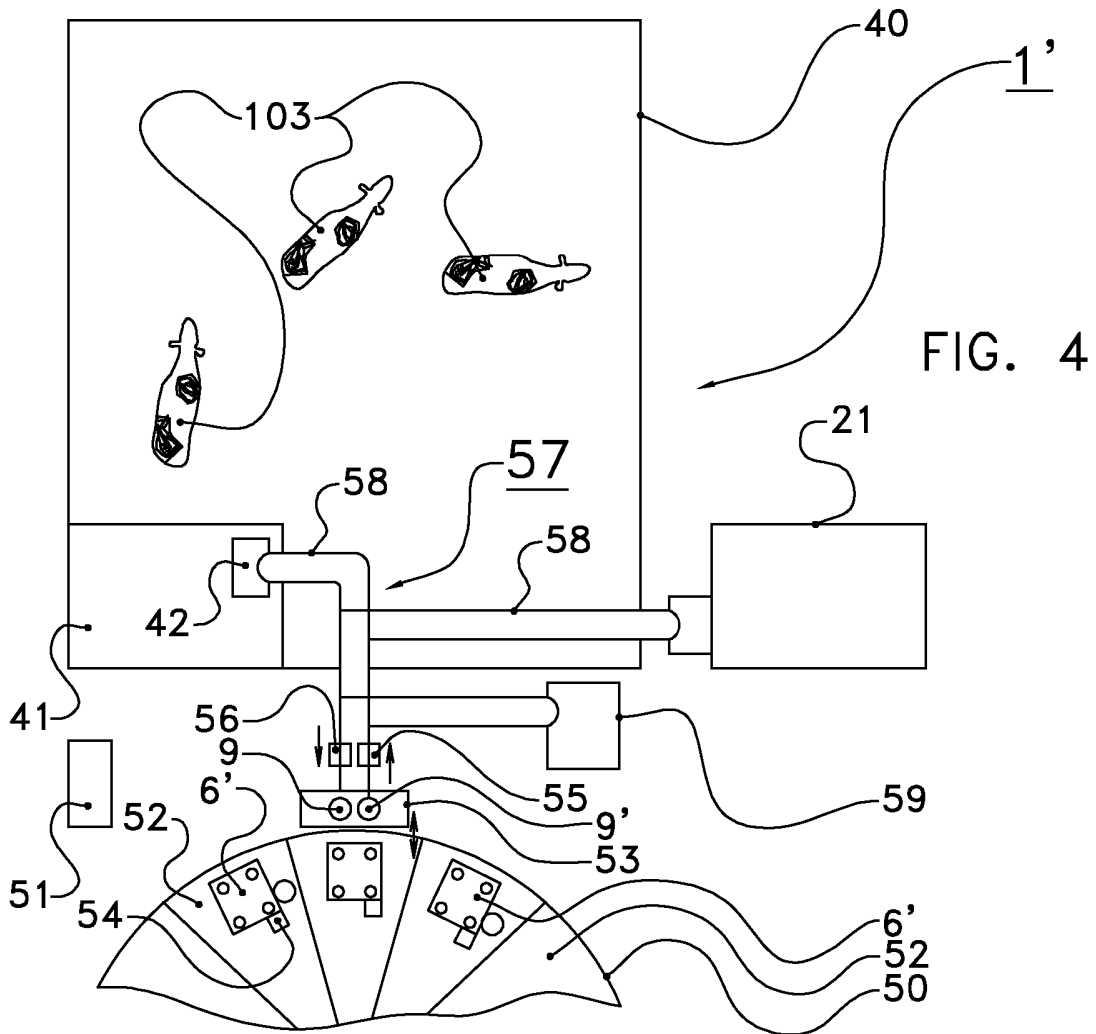
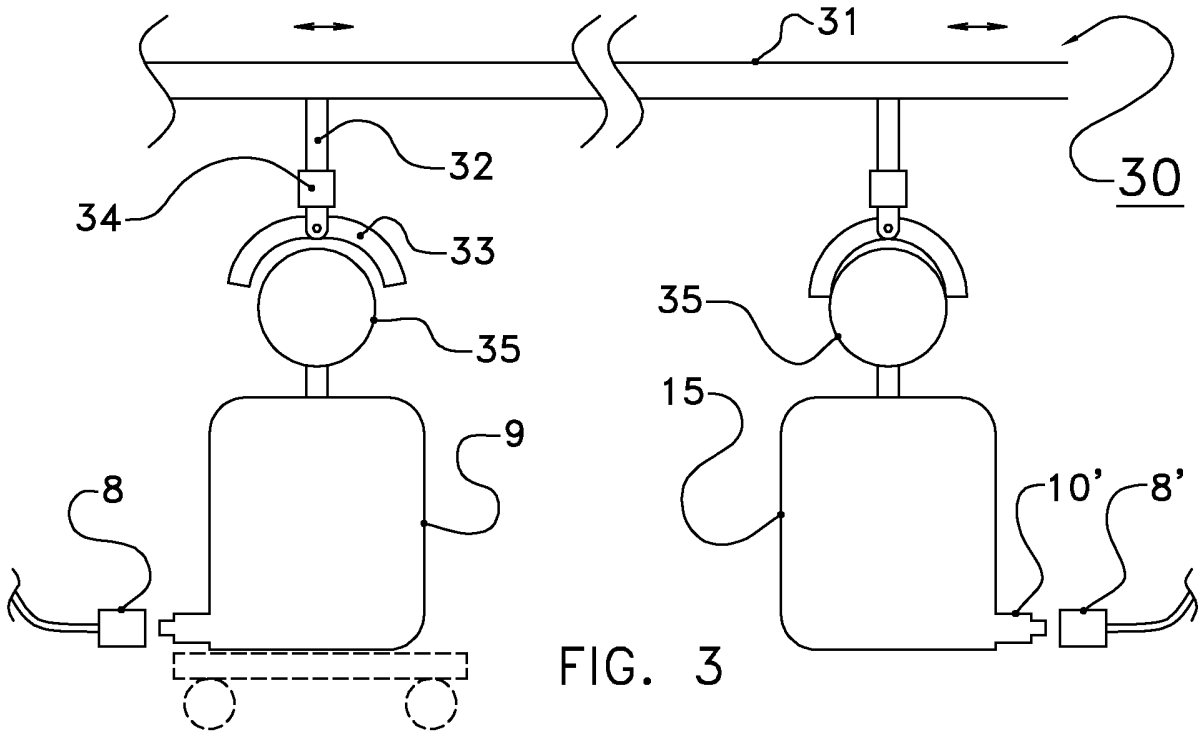
12. Melkveehouderijsysteem volgens een van de voorgaande
20 conclusies, omvattende een melkopvangvatproductie-eenheid, ingericht voor produceren van het melkopvangvat uit voorraadmateriaal, in het bijzonder omvattende een voorraad plastic materiaal en een opvangvatscheider, meer in het bijzonder een mes dat is ingericht om een gedeelte van het voorraadmateriaal af te snijden alsmede een seal-middel ingericht voor sealen van het afgesneden
25 gedeelte tot een melkzak.

13. Melkveehouderijsysteem volgens een van de voorgaande conclusies, waarbij het melkveehouderijsysteem is voorzien van een kwaliteitscontrole-inrichting voor toekennen van een kwaliteitsaanduiding aan de melk van de melking.

30 14. Melkveehouderijsysteem volgens conclusie 13, voorts omvattende een markeringsinrichting voor markeren van het opvangvat met informatie met betrekking tot de toegekende kwaliteitsaanduiding, in het bijzonder met de kwaliteitsaanduiding.

15. Melkveehouderijsysteem volgens conclusie 13 of 14, voorts
omvattende ten minste één aanvullende melkbestemming, en waarbij het
hanteringssysteem is ingericht om het melkopvangvat naar hetzij de melktank of
5 één van de ten minste ene aanvullende bestemming te verplaatsen in
afhankelijkheid van de kwaliteitsaanduiding.
16. Melkveehouderijsysteem volgens een van de conclusies 13-15,
waarbij de kwaliteitscontrole-inrichting een of meer melkkwaliteitssensoren omvat,
die is/zijn ingericht op het opvangvat, in het bijzonder op het voertuig, en voor
bepalen van een kwaliteitsparameterwaarde van de melk in het opvangvat.
- 10 17. Melkveehouderijsysteem volgens een van de voorgaande
conclusies, waarbij het melkveehouderijsysteem voorts voorzien is van een
reinigingssysteem voor reinigen en/of desinfecteren van het melkopvangvat.





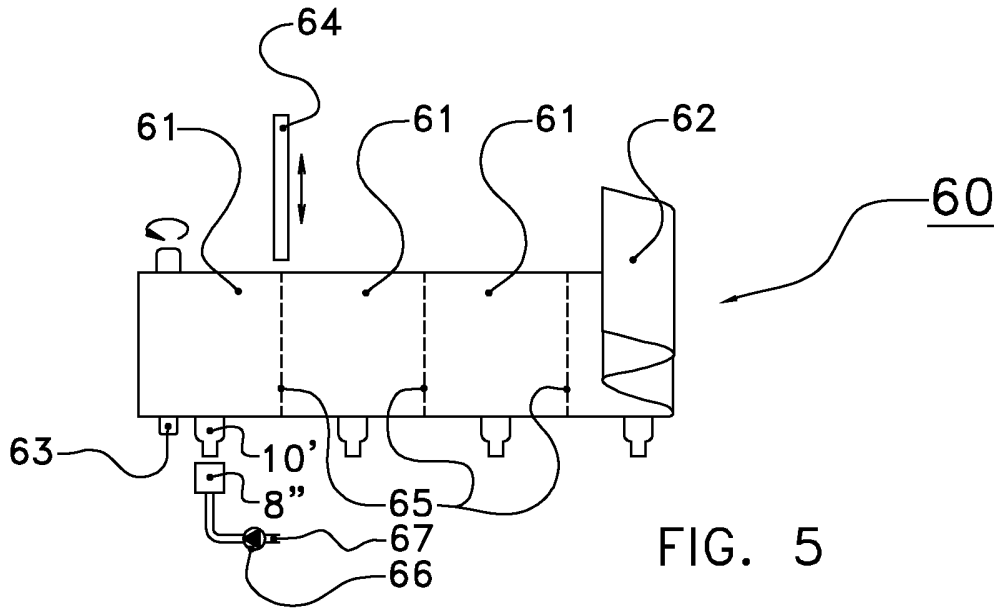


FIG. 5

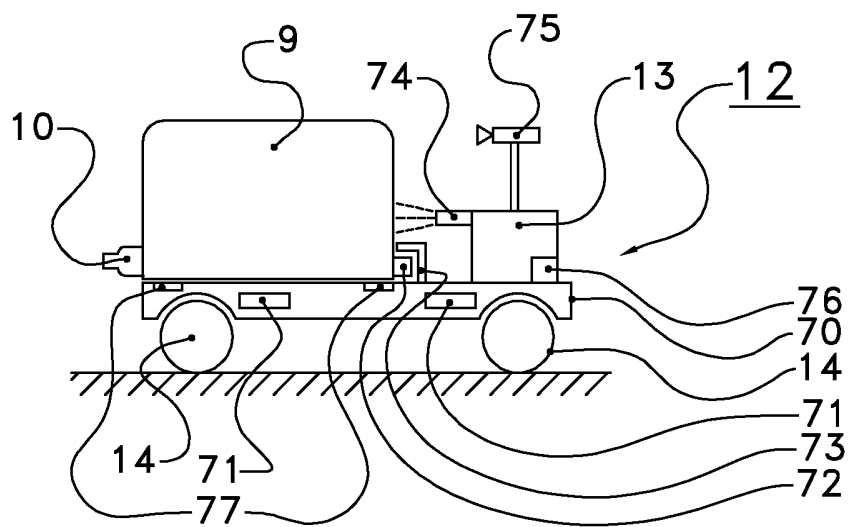


FIG. 6

UITTREKSEL

Dairy farm system (1) comprising a non-mobile milking system (2) with a milking machine (6), a milk receptacle (9) that is removably fluidly connectible to the milking system, a central milk tank (21), separate from the milking system, for storing milk from a plurality of milkings, an automatic handling system (11, 12) for handling the milk receptacle, and arranged to disconnect the milk receptacle from the milking system after each milking and to move the milk receptacle from the milking system to the central milk tank, wherein at least one of the handling system and the milk receptacle is arranged to transfer the milk from the milk receptacle to the central milk tank. The handling system transferring the (filled) milk receptacles to a destination such as the central milk tank ensures that the milk is handled very gently, thereby improving milk quality.

Figure 2

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE D4705/NLP
Nederlands aanvraag nr. 2012473	Indieningsdatum 19-03-2014
	Ingeroepen voorrangsdatum
Aanvrager (Naam) Lely Patent N.V.	
Datum van het verzoek voor een onderzoek van internationaal type 03-05-2014	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr. SN61960
I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)	
Volgens de internationale classificatie (IPC) A01J5/003;A01J5/007;A01J9/00	
II. ONDERZOCHE GEBIEDEN VAN DE TECHNIEK	
Onderzochte minimumdocumentatie	
Classificatiesysteem	Classificatiesymbolen
IPC	A01J
Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen	
III. <input type="checkbox"/>	GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES (opmerkingen op aanvullingsblad)
IV. <input type="checkbox"/>	GEBREK AAN EENHEID VAN UITVINDING (opmerkingen op aanvullingsblad)

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Nummer van het verzoek om een onderzoek naar
de stand van de techniek

NL 2012473

<p>A. CLASSIFICATIE VAN HET ONDERWERP INV. A01J5/003 A01J5/007 A01J9/00 ADD.</p>		
<p>Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC.</p>		
<p>B. ONDERZOCHE GEBIEDEN VAN DE TECHNIEK</p>		
<p>Onderzochte minimum documentatie (classificatie gevolgd door classificatiesymbolen) A01J</p>		
<p>Onderzochte andere documentatie dan de minimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen</p>		
<p>Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden) EPO-Internal, WPI Data</p>		
<p>C. VAN BELANG GEACHTE DOCUMENTEN</p>		
Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
X A	<p>WO 00/74472 A1 (PROLION BV [NL]; OOSTERLING PIETER ADRIAAN [NL]) 14 december 2000 (2000-12-14) * bladzijde 9 - bladzijde 11; figuren 1-6 *</p>	<p>1-7, 10, 11, 13, 15-17 8, 9, 12, 14</p>
A, D	<p>----- EP 1 523 878 A1 (LELY ENTPR AG [CH] MAASLAND NV [NL]) 20 april 2005 (2005-04-20) in de aanvraag genoemd * kolom 3 - kolom 4; figuren 1a-2 *</p>	<p>1-17</p>
A	<p>----- DE 26 23 499 A1 (ALFA LAVAL AGRAR GMBH) 8 december 1977 (1977-12-08) * figuren 3, 4 *</p> <p>-----</p>	<p>1-17</p>
<p><input type="checkbox"/> Verdere documenten worden vermeld in het vervolg van vak C. <input checked="" type="checkbox"/> Leden van dezelfde octroofamilie zijn vermeld in een bijlage</p>		
<p>° Speciale categorieën van aangehaalde documenten</p>		
<p>"A" niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft</p> <p>"D" in de octrooiaanvraag vermeld</p> <p>"E" eerdere octrooi(aanvraag), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven</p> <p>"L" om andere redenen vermelde literatuur</p> <p>"O" niet-schriftelijke stand van de techniek</p> <p>"P" tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur</p>		<p>"T" na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvraag, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding</p> <p>"X" de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur</p> <p>"Y" de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht</p> <p>"&" lid van dezelfde octroofamilie of overeenkomstige octrooipublicatie</p>
<p>Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid</p> <p>11 november 2014</p>		<p>Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type</p>
<p>Naam en adres van de instantie</p> <p>European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016</p>		<p>De bevoegde ambtenaar</p> <p>Moeremans, Benoit</p>

**ONDERZOEKSRAPPORT BETREFFENDE HET
RESULTAAT VAN HET ONDERZOEK NAAR DE STAND
VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE**

Informatie over leden van dezelfde octrooifamilie

Nummer van het verzoek om een onderzoek naar
de stand van de techniek

NL 2012473

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
WO 0074472	A1	14-12-2000	NL 1012276 C2 12-12-2000
			WO 0074472 A1 14-12-2000
EP 1523878	A1	20-04-2005	AT 340496 T 15-10-2006
			AU 2004218730 A1 28-04-2005
			AU 2010201852 A1 27-05-2010
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			DE 602004002538 T2 16-05-2007
			DK 1523878 T3 29-01-2007
			EP 1523878 A1 20-04-2005
			EP 1695616 A2 30-08-2006
			ES 2273153 T3 01-05-2007
			IL 164348 A 29-12-2008
			JP 4404741 B2 27-01-2010
			JP 2005118042 A 12-05-2005
			KR 20050035507 A 18-04-2005
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			NZ 535845 A 30-06-2006
			US 2005076841 A1 14-04-2005
			US 2007209596 A1 13-09-2007
DE 2623499	A1	08-12-1977	GEEN

WRITTEN OPINION

File No. SN61960	Filing date (day/month/year) 19.03.2014	Priority date (day/month/year)	Application No. NL2012473
International Patent Classification (IPC) INV. A01J5/003 A01J5/007 A01J9/00			
Applicant Lely Patent N.V.			

This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the application
- Box No. VIII Certain observations on the application

	Examiner Moeremans, Benoit
--	-------------------------------

WRITTEN OPINION

Box No. I Basis of this opinion

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - a sequence listing
 - table(s) related to the sequence listing
 - b. format of material:
 - on paper
 - in electronic form
 - c. time of filing/furnishing:
 - contained in the application as filed.
 - filed together with the application in electronic form.
 - furnished subsequently for the purposes of search.
3. In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Yes: Claims	4, 5, 7-9, 11, 12, 14, 16
	No: Claims	1-3, 6, 10, 13, 15, 17
Inventive step	Yes: Claims	8, 9, 12, 14
	No: Claims	1-7, 10, 11, 13, 15-17
Industrial applicability	Yes: Claims	1-17
	No: Claims	

2. Citations and explanations

see separate sheet

WRITTEN OPINION

Application number
NL2012473

Box No. VII Certain defects in the application

see separate sheet

Box No. VIII Certain observations on the application

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following document:

D1 WO 00/74472 A1

1 The present application does not meet the criteria of patentability, because the subject-matter of independent claim 1 is not new.

D1 discloses:

Melkveehouderijsysteem (see figures 1-5) omvattende:

- een stationair (see section 5 here-below) melksysteem (see figures 3-5: the milking system is stationary relative to the animal) met een melkmachine (18, 49, 42, 43) voor uitvoeren van een melking op een melkdier,
- een melkopvangvat (57) dat verwijderbaar in stromingsverbinding (via 56) brengbaar is met het melksysteem (see figure 5) en is ingericht om, indien verbonden met het melksysteem, melk van de melking te ontvangen (see figure 5; see page 11, lines 20-27),
- een centrale melktank (via 64), afzonderlijk van het melksysteem, voor opslaan van melk van meerdere melkingen,
- een automatisch hanteringssysteem (58) voor hanteren van het melkopvangvat (57), en ingericht om het melkopvangvat af te koppelen van het melksysteem na elke melking en om het melkopvangvat van het melksysteem (see figure 5) naar de centrale melktank te verplaatsen (the container 57 is lowered towards the central milk tank), waarbij het melkopvangvat (57) is ingericht om de melk van het melkopvangvat over te brengen (via 59, 62, 63) naar de centrale melktank (**claim 1**).

2 Dependent **claims 2-7, 10, 11, 13, 15-17** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of novelty or inventive step, see D1.

3 The combination of the features of dependent **claims 8, 9, 12, 14** is neither known from, nor rendered obvious by, the available prior art.

Re Item VII

Certain defects in the application

- 4 The features of the claims are not provided with reference signs placed in parentheses.

Re Item VIII

Certain observations on the application

- 5 Claim 1 is not clear.

Indeed, the disclaimer "*een niet-mobiel melksysteem*" stands in contradiction with the *de facto* mobile milking robot.

Consequently, the subject-matter of claim 1 was interpreted as follows:
"*Melkveehouderijsysteem omvattende:*

- *een stationair melksysteem met een melkmachine, ...*"
