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- (71) Applicant (for all designated States except US):
DRAEGER MEDICAL SYSTEMS, INC. [US/US];
3135 Quarry Road, Telford, PA 18969 (US).
- (72) Inventor; and
- (75) Inventor/Applicant (for US only): CHILTON, Robert,
- (74) Agents: GAMBINO, Darius, C. et al.; DLA PIPER
LLP, One Liberty Place, 1650 Market Street, Suite 4900,
Philadelphia, PA 19103 (US).
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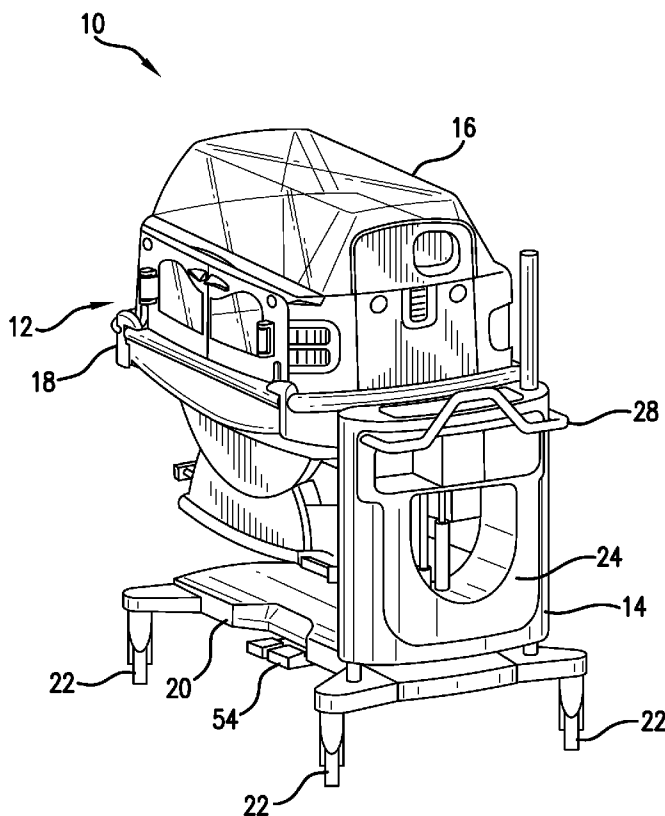


FIG. 1

(57) Abstract: Provided is a warming therapy device comprising a cart with at least one handle and a plurality of casters mounted thereon. The handle has a braking control mounted thereon, which is operable between a first position and a second position. The casters extend downwardly from the cart to engage a supporting surface. The casters have a braking system contained therein, which is adapted to restrict rotational movement of the caster when engaged. The braking system is biased in an engaged position when the braking control is in the first position and disengaged when the brake control is in the second position. Also provided is a method of moving a medical device including applying pressure to a braking control to disengage a braking system and facilitate movement of the medical device.

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HANDLE AND BRAKING SYSTEM FOR MEDICAL DEVICE

Cross Reference to Related Applications

[0001] This application claims priority to US Provisional Patent Application No. 61/005,359, filed December 4, 2007, the entire content of which is incorporated herein by reference, as if fully set forth herein.

Technical Field

[0002] This technical disclosure relates generally to apparatus used in the care of infants. Specifically, this technical disclosure relates to braking and steering systems use in infant care apparatus.

Background

[0003] Infant care apparatus, such as warming therapy devices in the form of incubators and radiant warmers, have been used to maintain the appropriate body temperature of small or premature infants. In many cases, warming therapy devices are mounted on wheeled carts. The carts are generally moved around areas such as hospitals by attendants by pulling or pushing the carts. In some cases, the wheels of the carts have casters with tabbed brakes. Tabbed brakes generally allow a user to lock a caster in position by stepping on a tab or pedal. While these may be effective in certain circumstances, it may be difficult to stop the device using the tabbed brakes. It would be desirable to provide an ergonomic handle for warming therapy device carts that incorporated controls for a braking system.

Summary

[0004] Provided is a warming therapy device comprising a cart with at least one handle and a plurality of casters mounted thereon. The handle has a braking control mounted thereon, which is operable between a first position and a second position. The casters extend downwardly from the cart to engage a supporting surface. The casters have a braking system contained therein, which is adapted to restrict rotational movement of the caster when engaged. The braking system is biased in an engaged position when the braking control is in the first position and disengaged when the brake control is in the second position.

[0005] Further provided is a method for moving a medical device. The method includes providing a medical device that has a cart with a handle and a plurality of casters. The handle has a braking control mounted thereon. The braking control is operable between a first position and a second position. The plurality of casters extend downwardly from a bottom portion of the cart to engage a supporting surface and have a braking system contained therein. The braking system is adapted to restrict rotational movement of the caster when engaged and is biased in an engaged position when the braking control is in the first position and disengaged when the brake control is in the second position. The method further comprises the steps of gripping the handle of the cart, applying pressure to the braking control and applying lateral force to the handle while maintaining pressure on the braking control system. The application of pressure to the braking control facilitates movement of the braking control from the first position to the second position.

[0006] Further provided is a medical device having a cart with a handle and casters. The handle has brake and steering controls, each operable between first and second positions. The cart has a braking system located within the caster and operable to brake the caster. The braking system is normally biased in an engaged position and operable to a non-engaged position. The braking system remains the engaged position when the brake control is in the first position and the braking system moves to the non-engaged position when the brake control is moved from the first position to the second position. The cart also has a steering system adapted to selectively restrict rotational movement of the caster about an axis that is generally perpendicular to the support surface. The steering system is linked to the steering control and the steering control does not restrict rotational movement of the caster when the steering control is in the first position and the steering system restricts rotational movement of the caster when the steering control is in the second position.

Brief Description of the Drawings

[0007] Figure 1 is a perspective view a first exemplary embodiment of a warming therapy device.

[0008] Figure 2 is a second perspective view of the warming therapy device shown in Figure 1.

[0009] Figure 3 is a top plan view of the warming therapy device shown in Figure 1.

[0010] Figure 4 is a side elevational view of the warming therapy device shown in Figure 1.

[0011] Figure 5 is a rear elevational view of the warming therapy device shown in Figure 1.

5 [0012] Figure 6 is a schematic view of a first exemplary embodiment of a handle incorporating brake and steering controls.

[0013] Figure 7 is a schematic view of a first exemplary embodiment of a braking system for use in connection with the warming therapy devices shown in Figure 1.

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Detailed Description

[0014] It will be appreciated that the following description is intended to refer to specific examples of structure selected for illustration in the drawings and is not intended to define or limit the disclosure, other than in the appended claims. The present application is drafted to discuss an incubator, however the disclosure is applicable to warming therapy devices generally, of which incubators are one example.

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[0015] Figures 1-5 show a warming therapy device 10, such as an incubator, radiant warmer or other type of warming therapy device, according to a first exemplary embodiment of the present invention. In the Figures, the warming therapy device 10 is in the form of an incubator shown having an incubation chamber 12 mounted on a cart 14. The incubation chamber 12 has a base 18 for supporting an infant and a cover portion 16 adapted to mate with the base 18. Preferably, the warming therapy device 10 is adapted to maintain a constant temperature and humidity within the incubation chamber 12. The cart 14 has a lower portion 20, which is generally flat and has four braking casters 22, with one braking caster 22 disposed at each corner. On one side of the cart 14, a vertical spine 24 extends upwardly from the lower portion 20 to support the base 18. It will be appreciated that other forms of warming therapy devices, such as radiant warmers or other open care devices, may also be provided. Preferably such other devices have at least a cart 14 with at least one braking caster 22 mounted on the cart 14.

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[0016] In many cases, infants remain in the incubation chamber 12 for extended periods of time. As a result, it may be necessary to move the warming therapy device 10 with the infant inside the incubation chamber 12. In some cases incubators 10 and warming therapy devices may weigh hundreds of pounds and be cumbersome to maneuver. However, when

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navigating a clinical environment, it is desirable that the warming therapy device 10 be as easy to handle and control as possible.

[0017] Ergonomic front and rear handles 26, 28 are provided on the warming therapy device 10 to facilitate gripping of the warming therapy device 10 during transport. The front handles 26 extend forward from the base 14 of the incubation chamber 12 and are preferably angled slightly from the horizontal, with the portion of the handles 26 closest to the center of the warming therapy device 10 raised above the outer portion of the handle 26. The angle of the front handles 26 reduce stress on a caretaker or attendant gripping the front handles 26 as it allows the wrist to be at a more natural angle during transport.

[0018] The angled configuration of the front handles 26 is suited to facilitate an attendant standing directly in front of the warming therapy device 10 (see position A in Figure 3) and place one hand on each of the front handles 26 for pushing the warming therapy device 10. The angle of the front handles 26 may also facilitate an attendant standing in front and to the side of the warming therapy device 10 (see position B in Figure 3) and pulling the warming therapy device 10 with one hand on the nearest front handle 26.

[0019] As best seen in Figure 3, the rear handle 28 preferably spans across most, if not all, of the width of the vertical spine 24. The rear handle 28 extends outwardly from the vertical spine 24 to provide a sufficient spacing for an attendant's hands to fit between the rear handle 28 and the vertical spine 24. As best seen in Figure 5, the rear handle 28 is preferably configured in a generally horizontal manner with side portions 30 being generally horizontal and a raised center portion 32 extending upwardly from the side portions 30 in an arcuate configuration. Like the front handles 26, the rear handle 28 facilitates an attendant using one or two hands to push or pull the warming therapy device 10.

[0020] The front and rear handles 26, 28 preferably have brake controls 34, 36 respectively mounted on the inner portion of the handles 26, 28. The brake controls 34, 36 are preferably resiliently mounted to their respective handles 26, 28 and depressible, towards the front or rear handles 26, 28 while gripping the handles 26, 28, such as by squeezing the handles 26, 28 and braking controls 34, 36 together. As shown in with the front handles, the brake controls 34 may be fitted within the handles and are preferably biased in a first, non-depressed position. As shown with the rear handles, the brake control 36 may also be a separate bar or tab that is mounted adjacent the rear handle 26. Squeezing the braking

controls 34, 36 towards the handles 26, 28 moves the braking controls 34, 36 to a second, depressed position.

[0021] In a preferred embodiment, braking systems 38 are located within the braking casters 22 and mechanically connected to the braking controls 34, 36. Alternatively, there may be an electrical, pneumatic or some other type of connection between the braking controls 34, 36 and the braking system 38. As will be described in more detail below, when the braking controls 34, 36 are in the first position, the braking system 38 is engaged, thereby restricting rolling movement of the warming therapy device 10. When the brake controls 34, 36 are in the second position, the braking system 38 is released, allowing rolling movement of the braking casters 22.

[0022] Figure 6 shows a schematic view of a first exemplary embodiment of a handle 26 for use with the warming therapy device 10. The numeral for the front handle 26 will be used for ease of explanation, but the handle 26 in Figure 6 may be either of the front or rear handles 26, 28 described herein. The brake control 34 may be mounted along a longitudinal side of the handle 26 with a post mechanism 56. The post mechanism allows the brake control and is operable between a first position 58 and a second position 60 (shown in phantom). A steering control 62 is also mounted on the handle 26 and is linked to a steering system. The steering control 62 is operable between a first position 64 and a second position 66 (shown in phantom). Preferably the steering control is spring loaded with detents, such that a single press of the steering control 62 will operate a steering control system. By way of example, when the steering control is in the first position 64, the casters 22 will be allowed to rotate freely about a vertical axis. However, when the steering control 62 is operated into the second position, the steering control system will lock the caster 22 into position such that the caster 22 will only facilitate movement in the forward and backward directions, rather than being freely rotatable about the vertical axis. In the embodiment pictured, a user may press the steering control 62 towards the handle 26 to operate the steering control 62 from the first position 64 and second position 66. Likewise, a user may operate the steering control 62 from the second position 66 to the first position 64 with another inward push to clear an internal detent and then allow an internal spring to push the steering control 62 back to the first position 66.

[0023] Referring now to Figure 7, a schematic view of first exemplary embodiment of a braking caster 22 is shown. The braking caster 22 may include a spring loaded braking

system 38, including a brake drum 40, a brake cable 46, and brake contactor, such as a brake pad 42, that is biased against the brake drum 40, when in an engaged position, by a spring 44. The brake cable 46 has a first end 50 connected to the brake pad 42 and a second end 52 that extends towards and is eventually connected to the braking controls 34, 36. A hub 48 may be
5 located between the first and second ends 50, 52. The hub 48 can serve as a pulley to redirect tension from the direction T to a direction that is away from the surface of the brake drum 40 where the brake pad 42 engages the brake drum 40. Although a brake pad 42 is mentioned here, other brake contactors may be used, including pins, or a brake disc and caliper configuration without departing from the scope of the present invention.

10 [0024] As mentioned above, the brake pad 42 is normally biased against the brake drum 40 to restrict movement of the warming therapy device 10. Upon depression of the braking controls 34, 36, tension is exerted on a braking cable 46 in a direction T. The braking cable 46 pulls the brake pad 42 away from the brake drum 46 when sufficient tension is applied to the braking cable 46 to overcome the pressure exerted by the spring 44.

15 [0025] The spring rates may be progressive to avoid having the warming therapy device 10 come to a sudden stop if the brake controls 34, 36 are inadvertently released during motion or released too quickly when coming to a stop. As a result, spring rates are chosen to allow gradual exertion of pressure on the brake drum 40 by the brake pad 42 to allow the
20 warming therapy device 10 to slow down before coming to a complete stop. The spring rate may be adjusted, such as by turning a tuning screw (not shown) or some other form of mechanical or electromechanical adjustment. Adjustment of the spring 44 may also be done to compensate for wear of the brake pad 42 and / or brake drum 40, such that a relatively constant braking pressure can be maintained, even as parts wear down. The braking controls 34, 36 may be connected to the braking system by mechanical means, such as a cable 46, or
25 by electrical, pneumatic or other desirable connections.

[0026] During use, when a caretaker or attendant grips one of the handles 26, 28 and depresses any one of the brake controls 34, 36, the engagement of the brake pad 42 and brake drum 40 is released and the warming therapy device 10 may then be rolled. Also, the brakes are preferably adapted to fail into an engaged state, such that if a brake control 34, 36 is
30 released or some part of the system breaks, while the warming therapy device 10 is moving, the warming therapy device 10 will come to a controlled stop.

[0027] Although a braking caster 22 is shown here having a braking system 38 with a brake cable 46, brake pad 42 and brake drum 40, the braking control system discussed herein can be used in connection with various other designs of braking casters. Preferably, which ever type of braking caster is used, the brake is adapted to be engaged when the braking controls 34, 36 are in the first position (i.e. there is no depression of the braking controls 34, 36) and released when the braking controls 34, 36 are in the second position (i.e. the braking controls 34,36 are depressed).

[0028] The brake controls 34, 36 may also be mechanically linked to a connection for docking an exterior apparatus (not shown) to the warming therapy device 10. Although not shown, the docking connection may be disposed on the vertical spine 24 of the cart 14. The exterior apparatus will also have a docking connection for mating to the docking connection on the warming therapy device 10. When the warming therapy device 10 is docked to the exterior apparatus, the brake controls 34, 36 on the warming therapy device 10 may also be used to control braking systems on the exterior apparatus, such that anything docked to the warming therapy device 10 may be braked in unison. Additional locking of the braking system 38 may be provided by tabbed brakes, which serve as a redundant braking mechanism. Preferably pressing a tab 54, seen in Figure 1, facilitates a mechanical lock on the movement of at least one of the braking casters 22 in addition to the bias of the brake pad 42 against the brake drum 40.

[0029] While the foregoing detailed description of this disclosure has been described in relation to certain representative structures thereof, and many details have been set forth for purposes of illustration, it will be apparent to those skilled in the art that the disclosure can be varied considerably without departing from the basic principles of the disclosure.

CLAIMS

What is claimed is:

1. A warming therapy device comprising:
a cart;
5 at least one handle mounted on the cart, said handle having a braking control mounted thereon, said braking control being operable between a first position and a second position; and
a plurality of casters mounted on the cart, said casters extending downwardly from the cart and having a braking system contained therein, said braking system adapted to
10 restrict rotational movement of the caster when engaged and being biased in an engaged position when the braking control is in the first position and disengaged when the brake control is in the second position.
2. The warming therapy device according to claim 1, wherein the braking system comprises a brake drum and a brake contactor for engaging the brake drum.
- 15 3. The warming therapy device according to claim 2, further comprising a spring and wherein the brake contactor is biased against the brake drum by the spring.
4. The warming therapy device according to claim 1, wherein the first position of the braking control is a non-depressed position and the second position of the braking control is a depressed position, and wherein movement from the first position to the second position
20 requires the application of force to the braking control by a user.
5. The warming control device according to claim 4, wherein said braking control system is adapted to return to the first position when force on the braking control is no longer applied.
6. The warming therapy device according to claim 1, wherein movement of the
25 device is restricted by the braking system in a normal state and wherein movement of the device is unrestricted when a user moves the braking control from the first position to the second position.
7. The warming therapy device according to claim 1, wherein the braking control is disposed at least partially within the handle.
- 30 8. The warming control device according to claim 1, wherein the braking control is spaced from the handle in a first position and movable towards the handle, and wherein the second position is closer to the handle than the first position.

9. The warning control device according to claim 1, wherein the bias of the braking system in the engaged position is adjustable.

10. The warning control device according to claim 1, wherein said handle is angled with respect to a horizontal plane, thereby facilitating ergonomic gripping of the handle by a user.

11. A method for moving a medical device comprising:

providing a medical device having

a cart including a handle and plurality of casters mounted on the cart,

said handle having a braking control mounted thereon, said

braking control being operable between a first position and a second position; and

said plurality of casters extending downwardly from a bottom portion of the cart and having a braking system contained therein, said braking system adapted to restrict rotational movement of the caster when engaged and being biased in an engaged position when the braking control is in the first position and disengaged when the

brake control is in the second position;

gripping the handle of the cart;

applying pressure to the braking control thereby moving the braking control from the first position to the second position; and

applying lateral force to the handle while maintaining pressure on the braking

control system.

12. The method according to claim 11, further comprising the step of removing the pressure to the braking control, wherein movement of the medical device gradually ceases when said pressure to the braking control is released.

13. The method according to claim 12, wherein said cessation of movement of the medical device is gradual, regardless of whether the removal of pressure from the braking control is instantaneous.

14. The method according to claim 11, wherein said handle comprises first and second handles and said step of gripping the handles comprises using a first hand to grip the first handle and a second hand to grip the second handle.

15. The method according to claim 14, wherein the step of applying pressure to the braking control comprises applying pressure with one of the first and second hands.

16. The method according to claim 11, further comprising the step of gradually releasing the pressure on the braking control, wherein gradually releasing the pressure on the braking control causes the braking system to gradually restrict rotational movement of the casters, thereby slowing down the movement of the medical device prior to stopping the
5 medical device.

17. A cart comprising:

at least one handle mounted on the cart, said handle having a braking control mounted thereon, said braking control being operable between a first position and a second position; and

10 a plurality of casters mounted on the cart, said casters extending downwardly from the cart and having a braking system contained therein, said braking system adapted to restrict rotational movement of the caster when engaged and being biased in an engaged position when the braking control is in the first position and disengaged when the brake control is in the second position.

18. The cart according to claim 17, further comprising a warming therapy device mounted thereon.

19. A medical device comprising:

a cart having a handle mounted thereon and a plurality of casters extending downwardly therefrom;

20 a brake control mounted on the handle and being operable between first and second positions;

a steering control mounted on the handle and being operable between first and second positions;

25 a braking system located within the caster and operable to brake the caster, the braking system being normally biased in an engaged position and operable to a non-engaged position,

wherein the braking system remains the engaged position when the brake control is in the first position and the braking system moves to the non-engaged position when the brake control is moved from the first position to the second position; and

30 a steering system adapted to selectively restrict rotational movement of the caster about an axis that is generally perpendicular to the support surface,

wherein the steering system is linked to the steering control and the steering control does not restrict rotational movement of the caster when the steering control is in the first position and the steering system restricts rotational movement of the caster when the steering control is in the second position.

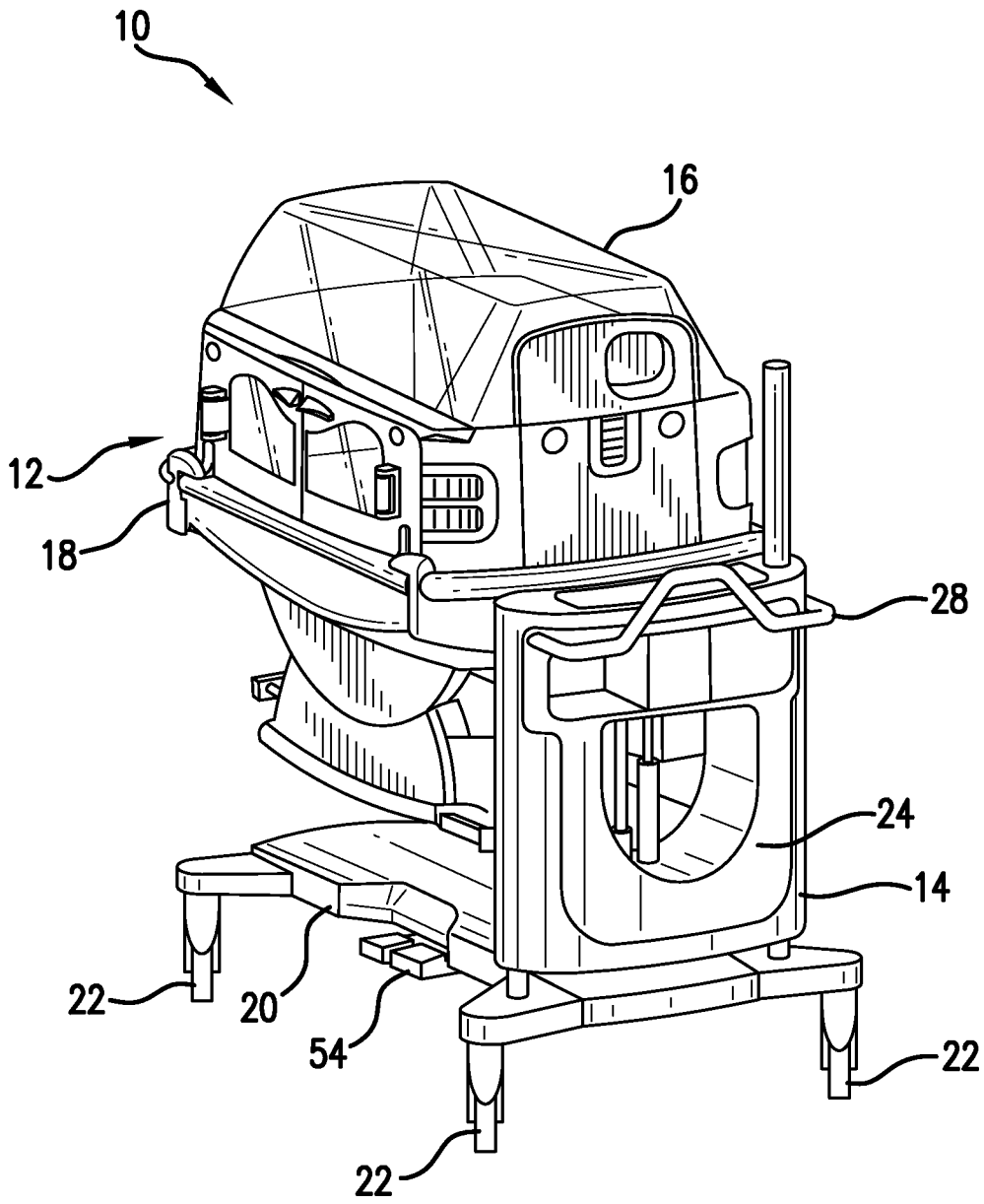


FIG. 1

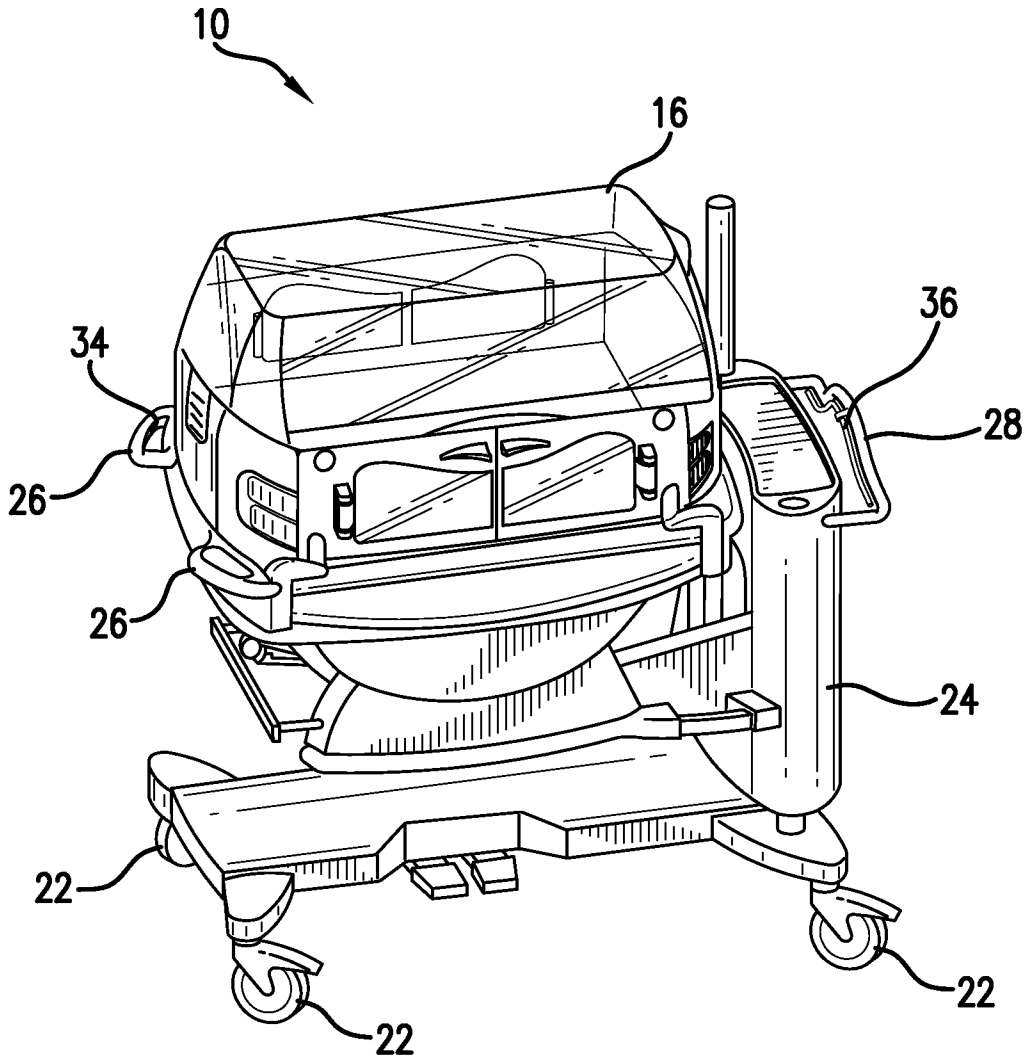


FIG.2

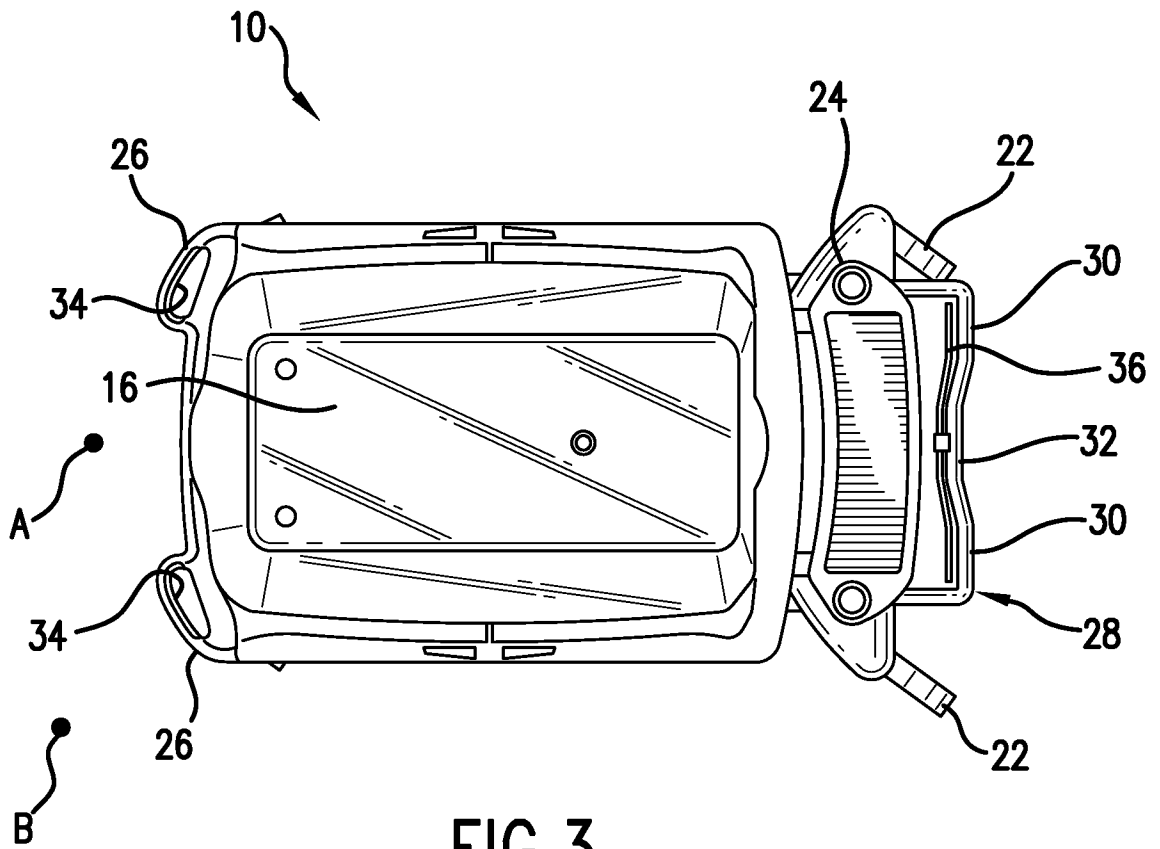


FIG. 3

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