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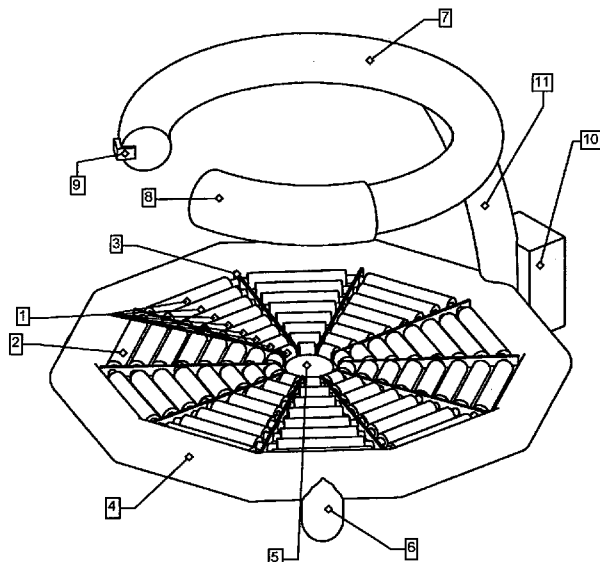


Fig. 1

(57) **Abstract:** A walking platform preferably for virtual reality systems, comprising a locomotion surface providing support for feet of a user, whereas said locomotion surface is associated with rotatable members for promoting the motion of the user's foot or feet and is arranged on a framework (4) providing for the unimpeded motion of the rotatable members. The platform comprises at least one sensor associated with at least one of the locomotion surface and the rotatable members for detecting a predetermined physical quantity, whereas the output of at least one sensor constitutes an electrical interface of the walking platform. The rotatable members are rollers (2), the respective rotation axes of which are perpendicular to a hypothetical radius drawn to the centre of the locomotion surface. The rollers (2) may be idle rollers operated by the user's foot or motor driven rollers. The proposed walking platform can be used first and foremost for the purpose of moving in a virtual space: with its help, by taking an actual step, the user can change position in virtual space in the direction and at the speed corresponding to that step, while his real spatial position remains unchanged.



## WALKING PLATFORM ESPECIALLY FOR VIRTUAL REALITY (VR) SYSTEMS

The object of the present invention is a walking platform preferably for virtual reality  
5 systems, comprising a locomotion surface for supporting the user's feet; said locomotion  
surface is associated with rotatable members to promote the motion of the user's foot; the  
locomotion surface is arranged on a frame which provides for the unimpeded motion of  
the rotatable members and, furthermore, a sensor detecting at least one pre-determined  
physical quantity is associated with at least one of the locomotion surface and the  
10 rotatable members, the output of which represents the electrical interface of the walking  
platform.

The proposed walking platform can be used first and foremost for the purpose of moving  
in a virtual space: with its help, by taking an actual step, the user can change position in  
virtual space in the direction and at the speed corresponding to that step, while his real  
15 spatial position remains unchanged. Thus the user can cover even major distances in  
virtual reality while physically remaining within a small area on the walking platform.  
The present invention furthermore allows to simulating motion, from small steps through  
walking to running, depending on the speed of the actual step taken and furthermore, as  
the case may be, to simulating virtual walls and obstacles and terrain conditions such as  
20 upward and downward slopes.

The scope of utilization of the invention includes every case when, in virtual reality,  
conventional, step-like (walking, running) motion is needed, such as, for example,  
computer games, simulations of military, police, fire brigade etc. situations, garden and  
building design and so forth, but it can also be set and used exclusively for sports  
25 purposes, similarly to a treadmill.

There are several known proposals and research results concerning virtual motion. One  
example is the invention US 6,152,854 A entitled "Omni-directional treadmill", the  
essence of which is that an endless treadmill surface of a larger size is assembled out of  
endless narrow belts positioned diagonally to one another. This way, while the user  
30 performs a real physical action of taking a step, walking or running on the platform, the  
actual position of the user can be maintained by proper control of the endless belts, i.e.,  
the user can be positioned forward and backward by the aid of the diagonal small belts in

one direction of the surface, and backward and forward in a direction which is perpendicular to the previous one with the big treadmill composed of the small belts. Through the computerized synchronization of the two controls, perpendicular to one another, it is possible to keep the physical position of the user walking about the surface  
5 by and large in the centre of the surface. This solution has the drawback that the apparatus is massive; the treadmill arrangement makes it heavy and complex, and the prompt movement of the belts requires high-performance driving means, motors.

Patent document US 2009/0111670 A1 describes a locomotion simulation platform, in short, walking platform, which is closest to the object of the present invention. This  
10 platform is a system comprising rotatable members arranged on a parabolic surface, upon which the feet of the user, while walking, keep sliding back to the centre of the parabolic surface under the effect of gravitation, and this is how the objective, namely that the physical position of the user must remain unchanged, is achieved. The platform comprises several balls arranged on a parabolic frame directly side by side, in touch with  
15 one another and with the user's foot or, more precisely, sole, which ensure, provided that friction is adequately reduced, that the user's sole should slide back to the lowest point of the parabolic frame. The use of balls as rotatable members makes it necessary to have a complicated mechanism to hold the balls in place and hindering the balls fall off from their respective places. The adequate lubrication of the balls is inevitably concurrent with  
20 the pollution of the user's footwear. A further shortcoming is that many sensors are needed to detect the motion of the balls since several sensors are needed, depending on the size of the platform surface, for the user's foot motion to be detected in a reliable way and for the computer which operates the virtual reality system to provide adequate control on that basis.

25 Another problem of the omni-directional treadmill type solution mentioned above is its large size and complicated structure and a further deficiency of the roller-bearing platform is the undampened motion trajectory, that is, in the absence of friction and constraint, the user's foot may slip out in any direction when he takes a step.

Generally speaking, the known solutions are either complicated, massive structures  
30 (multiple-engine structures the size of a room), or they can only simulate one aspect of the problem (they can simulate the action of walking, but do not address the problem of

the lateral slip of the foot). Furthermore, none of the currently known solutions allow to represent virtual walls or terrain conditions.

The object of the present invention is to create an apparatus which remedies the above shortcomings; prevents the lateral slip of the foot while walking; which is simple and  
5 easy to manufacture, and offers an extensive solution to the problem of simulation; which allows to simulate free movement in virtual space in a life-like manner; and to provide a good simulation of virtual obstacles, especially walls, and of virtual terrain conditions.

The invention is based on the recognition that, given its biological nature, the action of human walking or running can be simulated by always forcing back the foot actually  
10 carrying the body weight to the same point of space, which procedure, although not fully identical with the real mechanism of walking and running, is well-applicable for simulation purposes. A suitable means for the constraint to the centre may be a system of fixed-axe rollers, said rollers being arranged, for example, on a circle plate, so as to cover the greatest possible proportion of the circle plate surface, and whereas the longitudinal  
15 axe – i.e., rotational axle – of each roller is perpendicular to a radius drawn from the same point in space, e.g. the centre point of a circular walking surface. Thus, under the effect of rolling and provided that moving away from the centre is prevented, the foot of the user walking on the surface of the circle composed of the rollers will move towards the centre of the circle whether he is moving forward, backward or sideward. Under the  
20 effect of the constraint acting towards this centre point, it is possible to achieve what is not a perfect, but a sufficiently life-like simulation of walking, so that, in the meantime, the position of the user remains within the area of the walking platform. With the method of constraint, as opposed to the solution known from patent document US 2009/0111670 A1, the foot carrying the weight of the body can always move in a  
25 single direction only.

Thus the solution according to the invention is a walking platform for facilitating motion in a virtual space, which is a system of freely rotating rollers arranged on a locomotion surface, in which the respective rotational axes of the rollers are perpendicular to a radius drawn from the centre of the locomotion surface.

30 In the simplest solution, a circular locomotion surface consists of roller groups, so that each roller group covers a certain sector of the circular plate. A roller group comprises rollers with parallel axes, arranged in the plane of the circle plate; the length of these

rollers diminishes towards the centre point of the circle plate, so that the ends of the rollers in the roller group on the same side fall in a straight line. The two lines defined by the respective ends of the rollers at the two sides intersect in the centre point of the circle plate, where they enclose a given angle, that is, the rollers are arranged approximately  
5 within a V-shape. The V-shape, that is, the growth of the width of the rollers, must be defined so that the integral multiple of the angle enclosed by the two lines defined by their respective end-points should be  $360^\circ$ . A number of roller groups identical with this integral multiple is arranged side by side along a circular path, so that the lines defined by their respective end-points should always intersect in the centre of the circle, and  
10 hence the roller systems should constitute a quasi-circle.

Some advantageous embodiments of the invention are enclosed in the sub-claims.

Where the goal is not to design what is a so-called 'passive' walking platform, it is advantageous according to the invention to connect at least one roller to a driving means.

Thus the roller groups which constitute the locomotion surface in form of a circle plate  
15 are expediently fixed in a frame which provides for the stable position and the free rotation of the rollers. As the case may be, a quasi-circular railing can be fastened at waist level to the said frame, which ensures that the user's body can only move away from the centre of the locomotion surface within a limit. The rotation of the rollers is measured by roller group, by optical, magnetic or other means, the simplest being an  
20 optical gate. The simplest solution is where the rollers within a roller group are mechanically connected to one another, in which case the rotation of any roller within the group entails the rotation of the same extent of the other rollers in the group and, as a result, it is sufficient to install one rotation-detecting sensor by roller group. Of course, the extent of the rotation can also be measured within a roller group by roller, in which  
25 case the rotations shall be aggregated by mathematical methods.

Although not directly related to the object of the invention, the extents of the rotations associated with each roller group can be collected and handled by a central computer. Distance covered in virtual space can be calculated on the basis of the extent of the rotation; the direction of movement in virtual space is determined by the physical  
30 location of the roller group associated with the rotation, that is, the circle sector to which it corresponds. If several roller groups are active, the actual direction is provided by the mean of the directions. Consequently, by increasing the number of the roller groups, that

is, by dividing the circle into ever smaller sectors, the number of the directions of the movement can be increased. The central computer transmits the results in appropriate format to the software which produces the virtual world, which returns the altered visual display signal corresponding to the movement to the user (through a VR helmet, eye-  
5 glasses or displays), and hence motion on the walking platform becomes motion in the virtual space.

Optionally, every roller group can be associated with a mechanical brake, the activation of which blocks every roller of the given group. If so, the user can move away from the centre point of the locomotion surface by stepping on the blocked rollers, but only to the  
10 point where he collides with the railings mounted above the locomotion surface. Collision with the railing simulates the feeling of colliding against a virtual wall. Those roller groups of the locomotion surface which are not in the direction of the wall keep rotating freely, and hence it is possible to go round the obstacle by moving sideways or backward.

15 The roller groups constitute a small area in the centre of the locomotion surface where, in the simplest case, an object having a disc shape is fixed, to fill the area in the centre point and also to provide a stable reference point for the foot.

In another preferred embodiment, instead of being fitted along a plane surface, the rollers are mounted in an ever higher position, linearly or along a curve, relative to the base  
20 plane of the locomotion surface, proportionally with their distance measured from the centre of the locomotion surface, and hence the locomotion surface, instead of being plane, will slope downwards towards the centre point from every direction. With this arrangement, the circular railing fitted above the locomotion surface at waist level serves mainly security purposes, as the user's movement away from the centre point is  
25 prevented by gravitation, not by the rail, since the user actually slides back to the centre point of the locomotion surface.

In a further preferred embodiment, the rollers are arranged along what is not an upward, but a downward curve as their distance from the centre point increases, and hence the surface of the platform keeps rising towards the centre point. Since the rollers can only  
30 rotate in one direction, namely towards the centre point which represents the reference point, this embodiment has the advantage that, under the effect of gravitation and the surface which slopes downwards from the centre point, the user's foot tends to slip

outward, in which direction the rollers cannot rotate, and hence the user's feet always remain in a stable position over the entire surface of the locomotion surface so long as the user stays put. When the user takes a step, his body leans slightly against the railing, and hence his foot overcomes the slight slope and the simulation of walking is realized.

- 5 In a further preferred embodiment, instead of freely rotating rollers, the roller groups mounted in the circle contain rollers the rotation of which can be controlled by a central driving means, for example an electric motor, in a way that every roller is rotated simultaneously towards the centre of the locomotion surface, so that the tangential velocity vector of the surface of the rollers on the top of the locomotion surface is always  
10 parallel to the perpendicular line constructed from the centre point of the locomotion surface to the roller axle and that it points towards the locomotion surface.

The movement of the body position of the user can be detected for example by one or more distance sensors installed on the railing mounted above the locomotion surface at waist level, by ultrasound, optical, magnetic or any other means. In case of magnetic  
15 detection, the user fastens a magnet belt on his waist. As the user's body approximates the railing, the speed of the rollers increases, and hence rotation pointing towards the centre point forces the user back to the centre point of the locomotion surface. This feedback control mechanism makes it possible for the user to move outward from the centre point of the locomotion surface in any direction, at a speed chosen at his  
20 discretion. It is a major advantage of this arrangement that a single motor is sufficient to drive every roller for, instead of driving only the roller groups in the direction of which the movement proceeds, all rollers can be controlled simultaneously, which simplifies the problem of control to a significant extent. The speed of motion can be determined on the basis of the rotation of the rollers and the direction of motion with the help of the  
25 pressure sensors or switches mounted on the rollers or the roller groups (more precisely: under them). Motion direction is determined by that roller group where the pressure sensor emits a signal or where the switch is on. With several roller groups, the actual direction is provided by the mean of the directions. In this case, the virtual wall simulation discussed above functions so that in case of collision against a wall, the  
30 central electric motor does not rotate the rollers, whereas the pressure sensor or switch of the roller groups in the direction of the wall is on, that is, the user wants to proceed in that direction.

With the help of this embodiment it is also possible to simulate terrain conditions by altering the spatial position of the locomotion surface according to the terrain conditions in virtual space, that is, the entire locomotion surface can be tilted in any direction by a motor-driven or pneumatic or other procedure, to simulate upward or downward slopes  
5 of any angle or flat ground. Of course, tilting, raising or sinking can be realized also in regard of individual, selected, roller groups.

In a further preferred embodiment, every roller on the locomotion surface is of identical width, and the longitudinal axis of each roller is perpendicular to the radius drawn from the centre point of the locomotion surface. With this arrangement, the rollers divide the  
10 circle into much smaller sectors, and hence the direction-sensitiveness of the walking platform has a much higher resolution. In this arrangement, the rotation of the rollers must be measured individually, by induction, for example and, subsequently, it is possible to compute the direction and velocity of motion by mathematical methods.

In another preferred embodiment, the roller groups can be covered by an endless elastic  
15 ribbon, so that towards the tapering end of the roller groups, the ribbon is bent inwards under the rollers by guide rollers, which results in a thinning of the surface towards the centre point. With this arrangement – which may be effective for active as well as passive walking platforms – it is possible to create a smoother walking surface on the rollers, of course, the endless ribbon can also be fastened to the rollers by other methods.

20 It is to be understood that both the foregoing general description and the following detailed description of the present invention are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this application, illustrate  
25 embodiments of the invention and together with the description serve to explain the principle of the invention. In the drawings:

Figure 1 shows a schematic diagram of a possible passive embodiment of the walking platform according to the invention, i.e. one without a central motor;

Figure 2 shows a lateral view of the roller group of the walking platform according to  
30 Figure 1;

Figure 3 shows a schematic diagram of a possible active embodiment of the walking platform according to the invention, i.e. one driven by a central motor;

Figure 4 shows a lateral view of the roller group of the active walking platform;

Figure 5 shows the frame support plate which can be used with both forms of realization of the walking platform presented above;

Figure 6 is a perspective view of a roller group of the walking platform;

Figure 7 is the block diagram of a possible control system of an active walking platform;

Figure 8 is the block diagram of a possible control system of a passive walking platform;

Figure 9 shows an electromechanical braking system associated with a roller group of the passive walking platform, and

Figure 10 shows a schematic diagram of a possible utilization environment of the walking platform according to the invention.

Figure 1 shows a roller group 1 consisting of rollers 2 of any number, such a roller group 1 constitutes a standalone unit built into a frame 3 surrounding the rollers 2. Roller groups 1 are mounted fixedly into a framework 4 of the walking platform P, in a circular arrangement. A cover plate 5 for covering a central cavity formed in the centre of the walking platform P is arranged in that centre which, in the embodiment presented here, represents a reference point. The reference point, however, does not necessarily have to be designated and created in the centre point of the walking platform P. In the example presented here, the framework 4 rests on stands 6 which provide for the stable position of walking platform P and for the unimpeded rotation of rollers 2. A circular railing 7 is fastened to the top of at least one column 11 mounted on the framework 4, expediently equipped with a shock-proof soft coating or layer. On the circular railing 7, there is a safety gate 8 is fixed which can be slid to shut the entrance created on the circular railing 7. In present case, security gate 8 can be fastened by a magnetic lock 9. A computer providing for the control of walking platform P may be arranged in a box 10.

As shown in Figure 2, rollers 2 of roller group 1 consisting of any number of rollers 2 can rotate around their respective axles 12, said axles 12 being fastened into the frame 3

by welding or some other known method of fixing. Frame 3 is mounted on a support 16 by welding or some other fixing method. The angle of inclination of the frame 3 and hence of roller group 1 can be chosen at discretion by altering the difference in the heights of supports 16; of course, said angle can be horizontal, too. Attached to an auxiliary roller holding structure 15, auxiliary rollers 13 are connected to roller group 1 so that one auxiliary roller 13 may be interconnected with two adjacent main rollers 2 through the roller shells, by friction gear. Auxiliary rollers 13 rotate around their respective axles 14, which auxiliary roller axles 14 are fastened to the holding structure 15 by welding or some other method of fixing. As already mentioned, the auxiliary rollers 13 connect to roller group 1 by friction gear, and hence the rotation of any roller 2 of roller group 1 also forces auxiliary rollers 13 to rotate, under the effect of which every roller 2 of roller group 1 will rotate. Rotation *per se* and the extent of the rotation can be measured by a proper electro-optical rotation detection sensor 17, well known in the art.

In terms of structure, walking platform P represented in Figure 3 is similar to the walking platform P described in connection with Figure 1, with the difference that distance gauges 31 are installed on circular railing 7, and in its end region far from the centre of walking platform P, each roller group 1 is connected to a controllable pneumatic power cylinder 32, while the other end region of the roller group 1 is pivotably mounted to the framework 4 of the walking platform P.

The structure of the roller group 1 shown in Figure 4 is similar to that of roller group 1 described in Figure 2, with the addendum that the frame 3 is arranged horizontally and hence also roller group 1 is positioned horizontally. A further difference is that an auxiliary roller 22 provided with a driving surface on its end is driven by a motor via a flat belt 21 and pulley wheel 23. Pulley wheel 23 receives the driving moment from pulley 24, the axis of which is fixed in a freely rotating manner on a pulley axle holder 25. Pulley 24 receives the driving moment from a central cogwheel 26, driven by a central motor 27. The auxiliary roller 22 may have an external tothing on its end, in such case the flat belt 21 may be replaced by a drive chain. The frame 3 is attached to a base 18 of the framework 4, arranged on base plate 28 so that, at its end which is closer to the centre point of base plate 28, it rests on a spreader plate 20, whereas its other end rests on pressure sensor 19. The central motor 27 is fixed at the centre region of base plate 28.

Figure 5 shows a possible embodiment of the base plate 28, whereas it is designed with a rim 29 with as many sides as there are roller groups 1, with an orifice 30 in the centre, through which the central motor 27 is accessible in case of an active walking platform version.

5 Figure 6 is a perspective view of a roller group 1 similar to that in Figure 4, with the difference that base plate 28 and the components related to a central drive are missing from the figure.

Figure 7 shows a possible embodiment, as will be obvious for a person skilled in the art, of how the signals of distance gauges 31 and pressure sensors 19 can be conducted to a  
10 central computer 33, albeit that is beyond the scope of the invention. By processing the signals, it is possible to compute the direction and speed of motion, which is then provided in the form of control signals on an output channel 35 of an interface (not shown) to the outside world and to a central motor 36. Based on terrain information input received through input channel 34, in case of a virtual collision against a virtual wall or  
15 artefact, central computer 33 controls the motor 36 and, depending on the virtual terrain conditions, pneumatic power cylinders 32 are controlled so as to make the angle of walking platform P coincide with that of the terrain.

In Figure 8, signals of sensors 17 detecting the rotation of roller 2 are processed by the central computer 33 and transmitted to the outside world through an output channel 35.  
20 Based on terrain information received through input channel 34, electro-mechanical brakes 37 of known construction may be controlled so that, in case of collision, the electro-mechanical brakes 37 block roller groups 1 on the side of the virtual walls or solid bodies.

In the exemplary embodiment shown in Figure 9, a braking member 38 fixed in a  
25 rotating way on a brake-carrying axle 39 is connected to a support 16. Under the effect of electromagnetic actuator 40, the braking member 38 is pressed against auxiliary rollers 13, impeding thereby the rotation of the latter, and thus rollers 2 in the roller group 1 will be decelerated.

In Figure 10 a possible utilisation of the walking platform according to the invention is  
30 shown. A user 41 is wearing eye-glasses 42 belonging to a virtual reality system, not disclosed in more detail, by which he/she sees virtual reality objects 43, i.e. a house, a

tree, the pavement, etc., which in reality do not surround him, and amidst which he/she is “walking” with the help of the proposed walking platform P.

List of reference signs

1	roller group	30	orifice
5	2 roller	31	sensor
	3 frame	32	power cylinder
	4 framework	33	computer
	5 cover plate	34	input channel
	6 stand	35	output channel
10	7 railing	36	motor
	8 safety gate	37	brake
	9 magnetic lock	38	braking member
	10 box	39	axle
	11 column	40	actuator
15	12 axle	41	user
	13 auxiliary roller	42	eye-glasses
	14 axle	43	object
	15 holding structure	P	walking platform
	16 support		
20	17 sensor		
	18 base		
	19 pressure sensor		
	20 spreader plate		
	21 belt		
25	22 auxiliary roller		
	23 pulley wheel		
	24 pulley		
	25 holder		
	26 cog-wheel		
30	27 motor		
	28 base plate		
	29 rim		

**Claims**

1. A walking platform preferably for virtual reality systems,
- comprising a locomotion surface providing support for feet of a user, whereas
    - said locomotion surface is associated with rotatable members for promoting  
5 the motion of the user's foot or feet,
    - said locomotion surface is arranged on a framework (4) providing for the unimpeded motion of the rotatable members, and, furthermore,
    - at least one sensor (19, 31) associated with at least one of the locomotion surface and the rotatable members for detecting a pre-determined physical quantity,  
10 - whereas the output of at least one sensor (19, 31) constitutes an electrical interface of the walking platform (P),

***characterised in*** that

- the rotatable members are (2) rollers, the respective rotation axes of which are perpendicular to a hypothetical radius drawn to a predetermined reference point on  
15 the locomotion surface.

2. The walking platform according to claim 1, ***characterised in*** that the reference point is located in the geometrical centre of the locomotion surface.

3. The walking platform according to either of claims 1 or 2, ***characterised in*** that the reference point is a central area constituted by a cover plate (5) exceeding the dimensions  
20 of an average-size human foot.

4. The walking platform according to any one of claims 1 to 3, ***characterised in*** that it comprises rollers (2) arranged in a consecutive order one after the other from the reference point to the external circumference of the walking platform, whereas the length of each roller (2) exceeds that of the preceding adjacent roller (2).

25 5. The walking platform according to claim 4, ***characterised in*** that successive rollers (2) are arranged in an essentially V-shaped frame (3), the narrower end of which lies next to the reference point.

6. The walking platform according to claim 5, ***characterised in*** that the V-shaped frames (3) are arranged side by side, so as to form a full circle within the platform.

30 7. The walking platform according to any one of claims 1 to 6, ***characterised in that*** rollers (2) arranged in one and the same frame (3) are operationally interconnected.

8. The walking platform according to claim 7, **characterised in** that the operational interconnection is provided by a series of auxiliary rollers (13) positioned under the series of rollers (2), the auxiliary rollers (13) are arranged relative to one another at an interval which is identical to the interval between the main rollers (2), and the auxiliary  
5 rollers (13) are arranged relative to the upper main rollers (2) spaced by half of said interval, so that the shell surface of each lower auxiliary roller (13) is in contact with the shell surface of two upper main rollers (2).
9. The walking platform according to claim 7, **characterised in** that rollers (2) have external tothing on their one end face, said external teeth of the rollers (2) are connected  
10 via an intermediary cogwheel rotatably mounted between the rollers (2).
10. The walking platform according to claim 7, **characterised in that** the rollers (2) have external tothing on their one end face, said external teeth of the rollers (2) are operationally interconnected by a drive chain.
11. The walking platform according to any one of claims 1 to 10, **characterised in** that  
15 driving means is associated with at least one roller (2).
12. The walking platform according to claim 11, **characterised in** that the driving means is connected via a gearing to the at least one (2) roller.
13. The walking platform according to claim 11 or 12, **characterised in** that the driving means is an electric motor (27).
- 20 14. The walking platform according to claim 1, **characterised in** that a pressure sensor (19) is associated with at least one of the reference point and the roller group (1).
15. The walking platform according to any one of claims 1 to 14, **characterised in** that the end of each frame (3) next to the reference point is pivotably mounted in the framework (4) and the opposite end of each frame (3) is connected to a positioning unit  
25 adjusting the horizontal position of the frame (3).
16. The walking platform according to claim 15, **characterised in** that the positioning unit contains a pulley gearing.
17. The walking platform according to claim 15, **characterised in** that the positioning unit contains a hydraulic or pneumatic power cylinder (32).

18. The walking platform according to any one of claims 1 to 17, *characterised in* that at least one roller (2) has a roughened shell surface.
19. The walking platform according to any one of claims 1 to 18, *characterised in* that a railing (7) retaining the user (41) is connected to the frame (4).
- 5 20. The walking platform according to claim 19, *characterised in* that the railing (7) is provided with a shock-proof soft coating or layer.
21. The walking platform according to claim 19 or 20, *characterised in* that the railing (7) is a circular railing (7) containing an access gate (8) with security locking.
22. The walking platform according to any one of claims 1 to 21, *characterised in* that  
10 at least one of the framework (4) or the railing (7) is associated with a distance sensor (31) which detects the presence of a user (41), the output of said sensor (31) is connected to the electric interface of the walking platform (P).

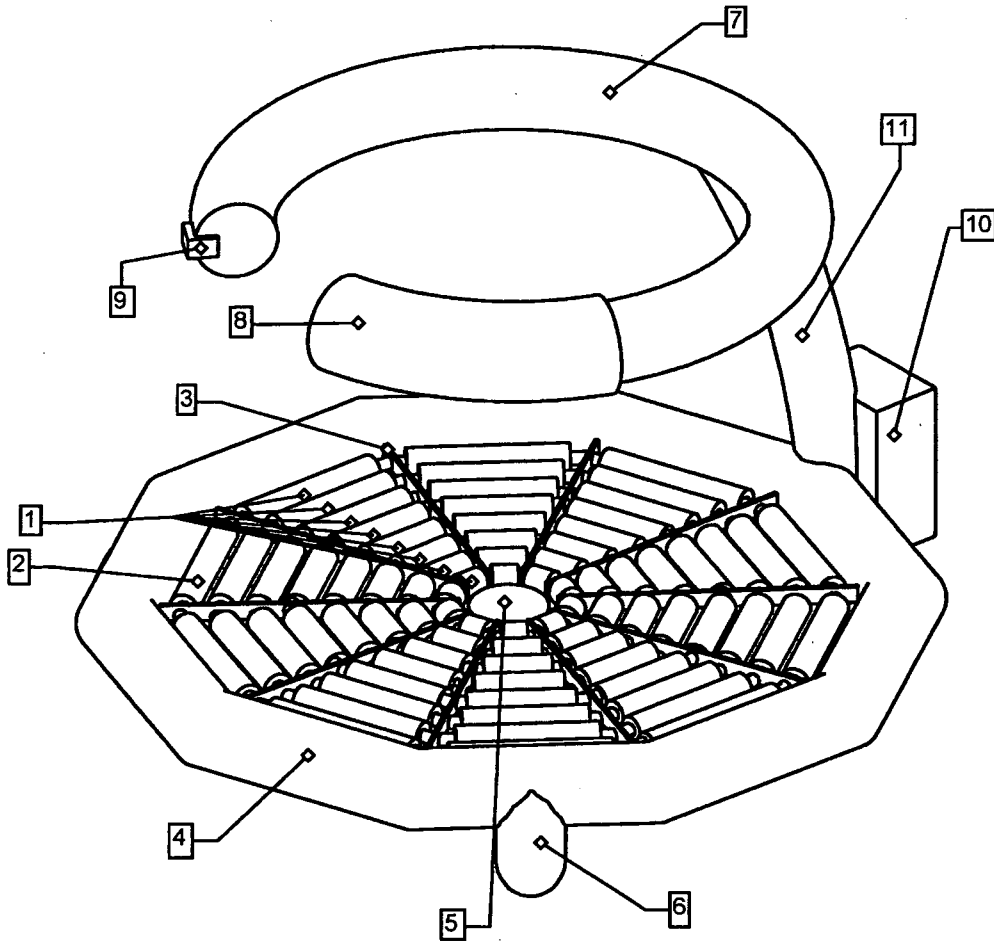


Fig. 1

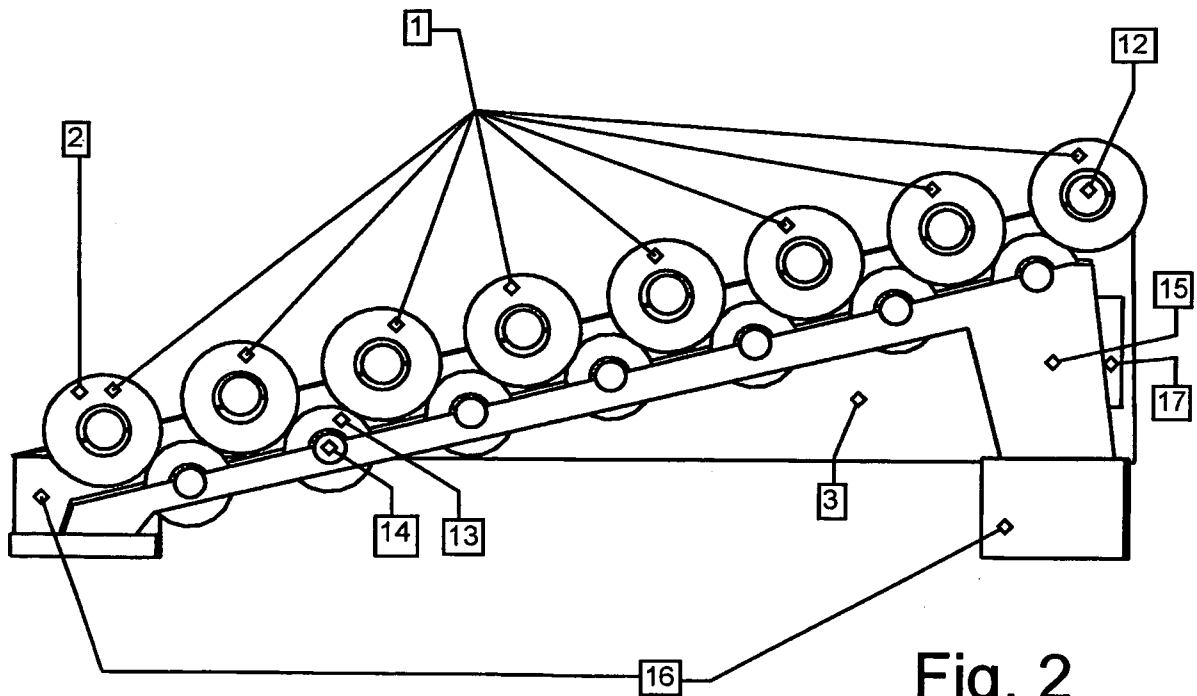


Fig. 2

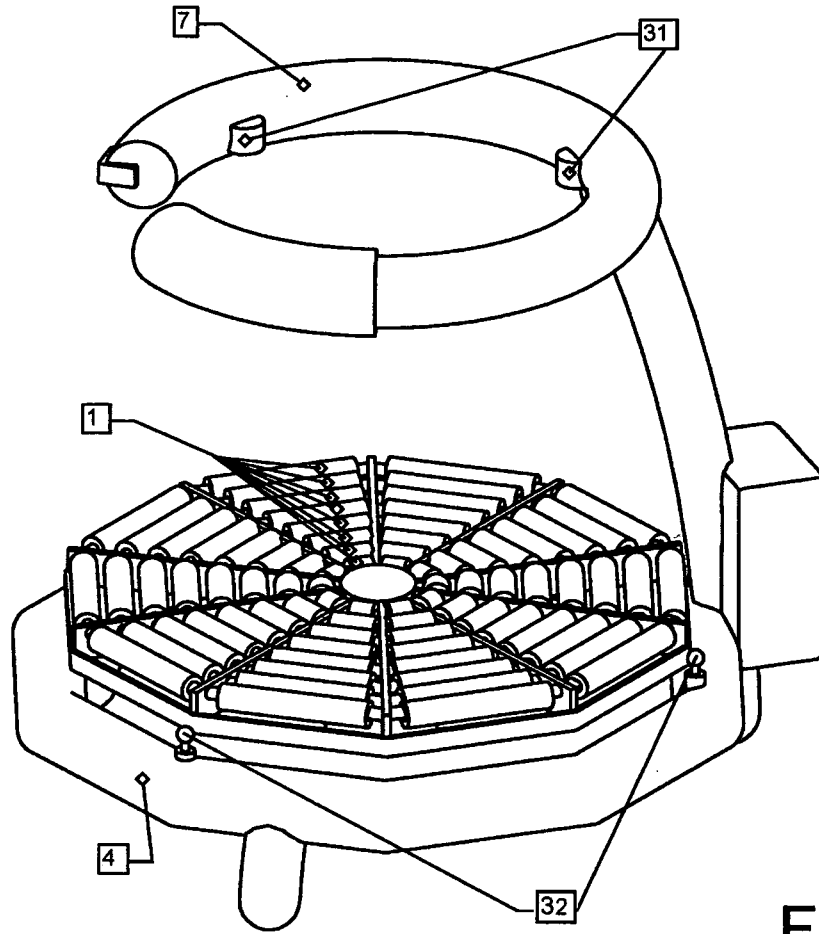


Fig. 3

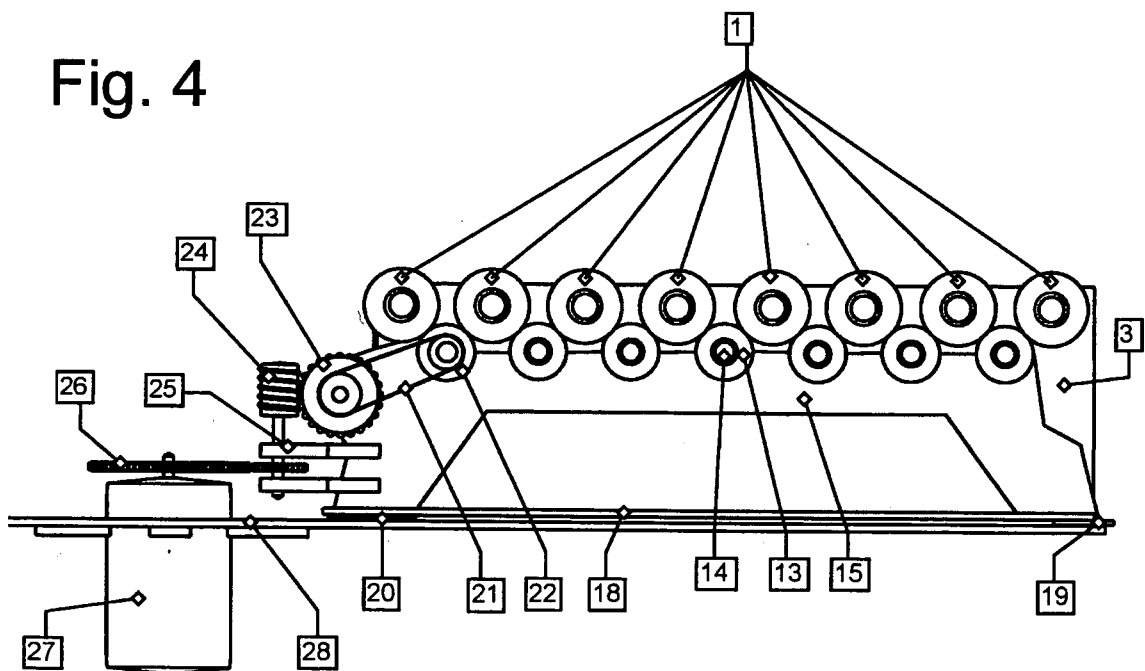


Fig. 4

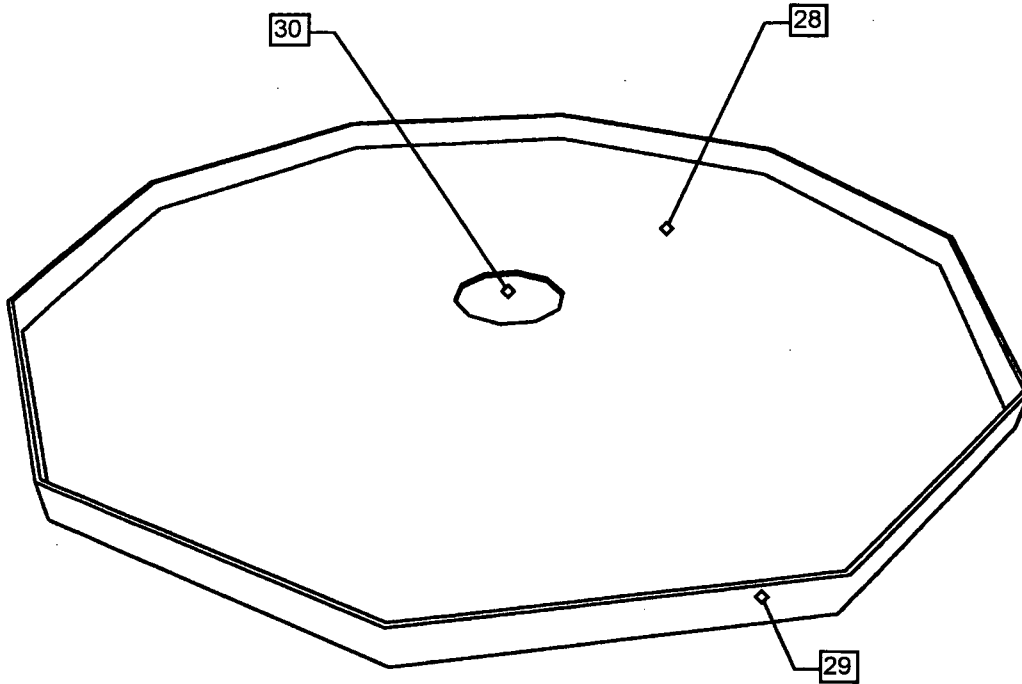


Fig. 5

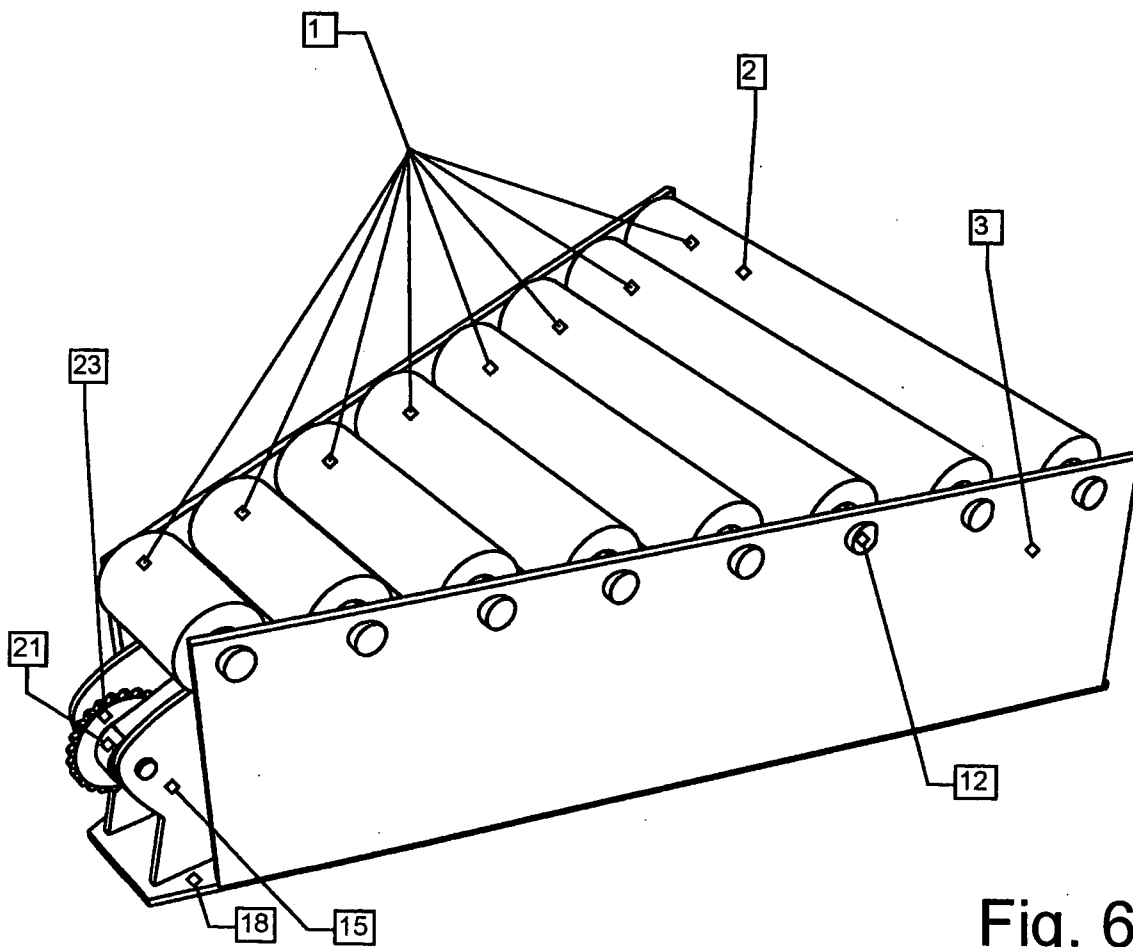


Fig. 6

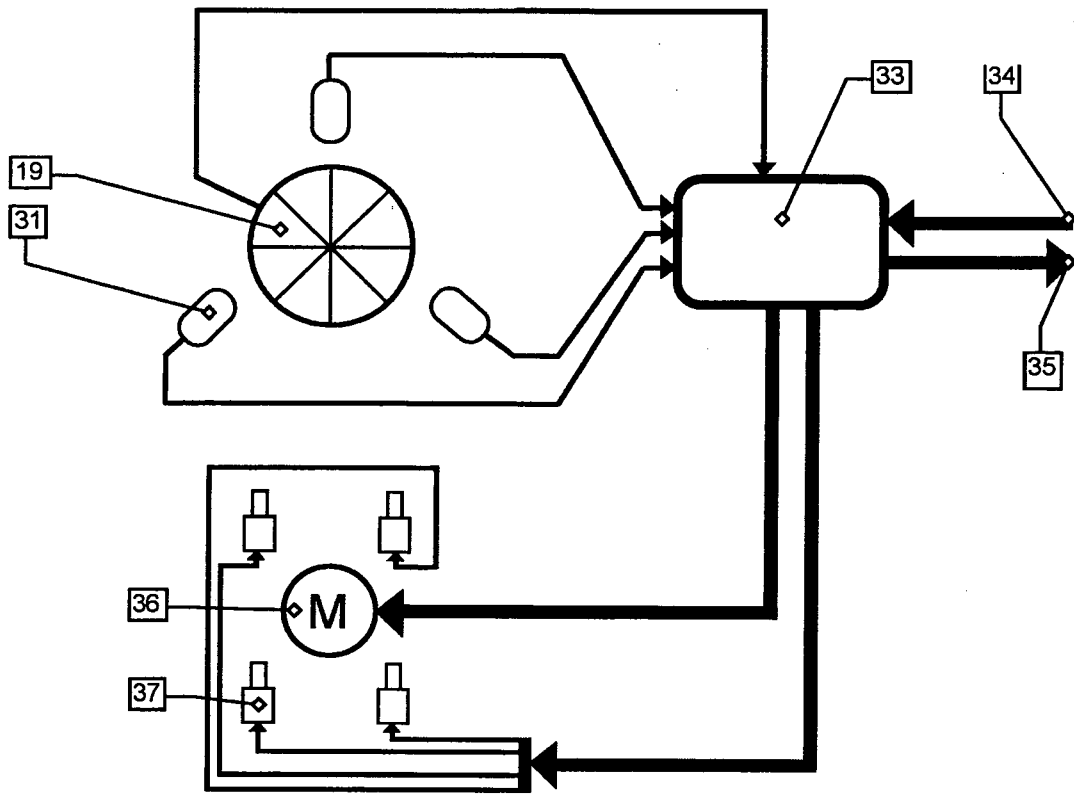


Fig. 7

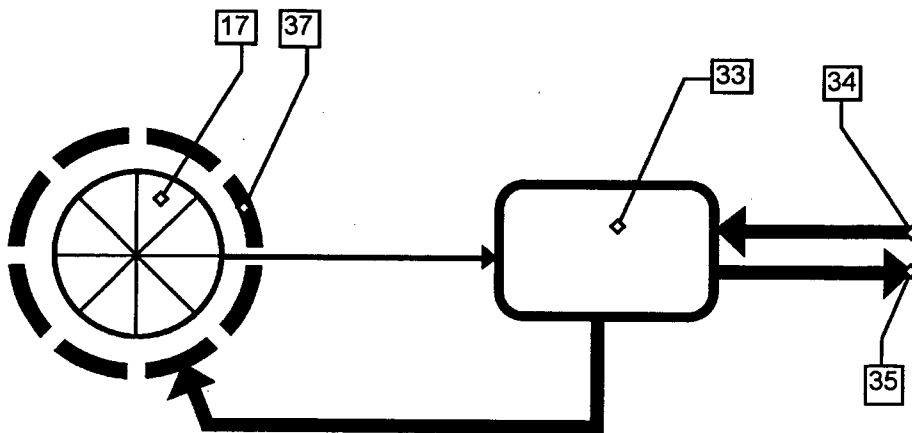


Fig. 8

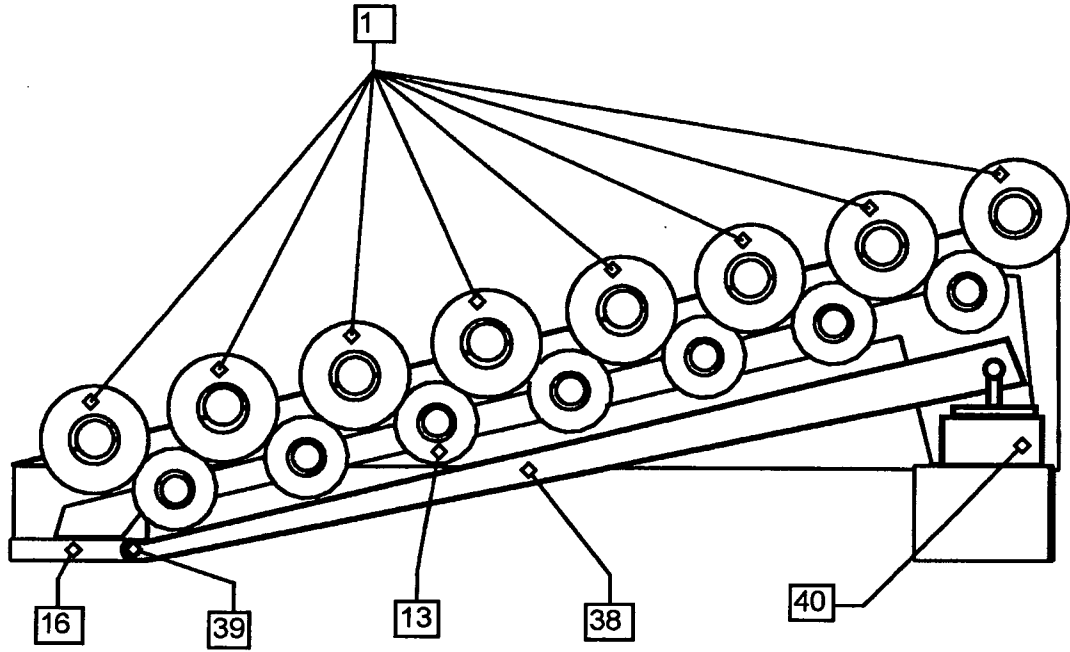


Fig. 9

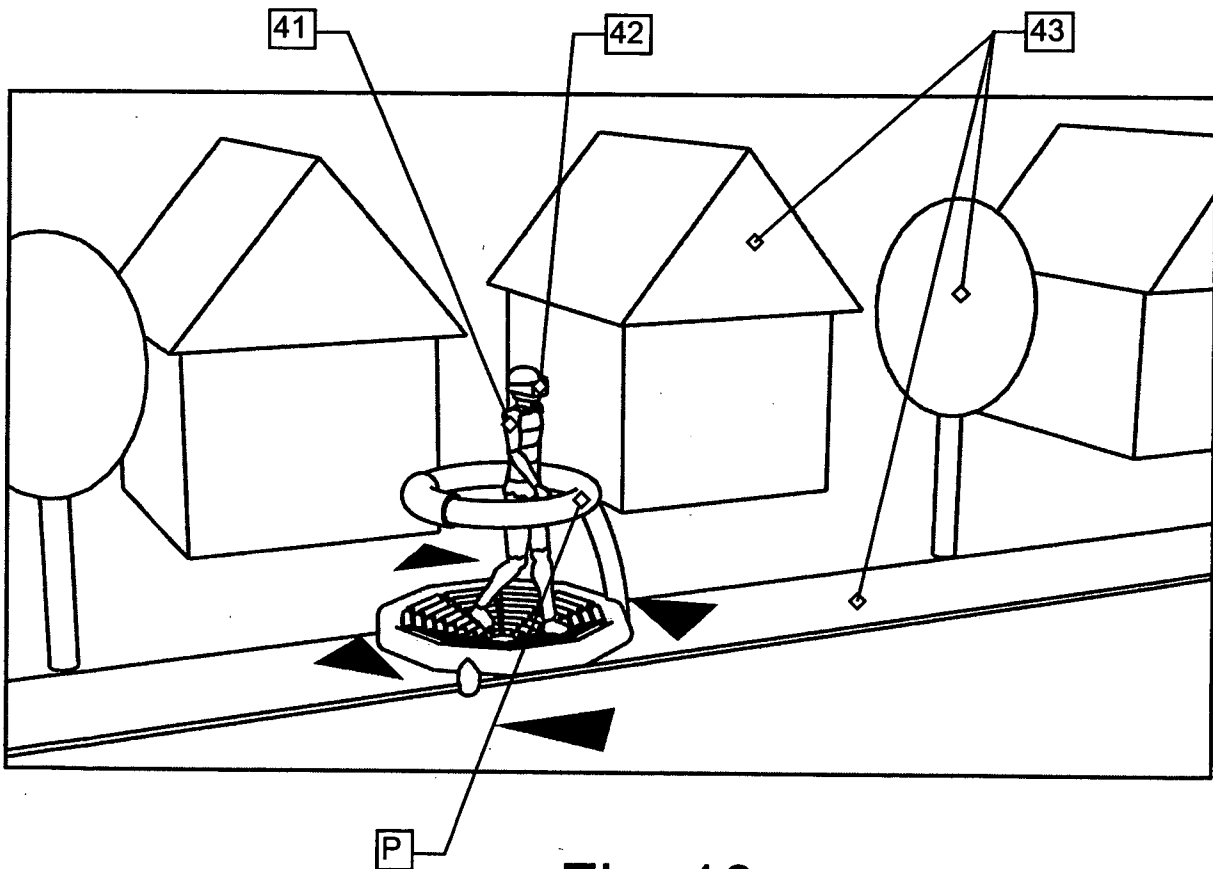


Fig. 10