



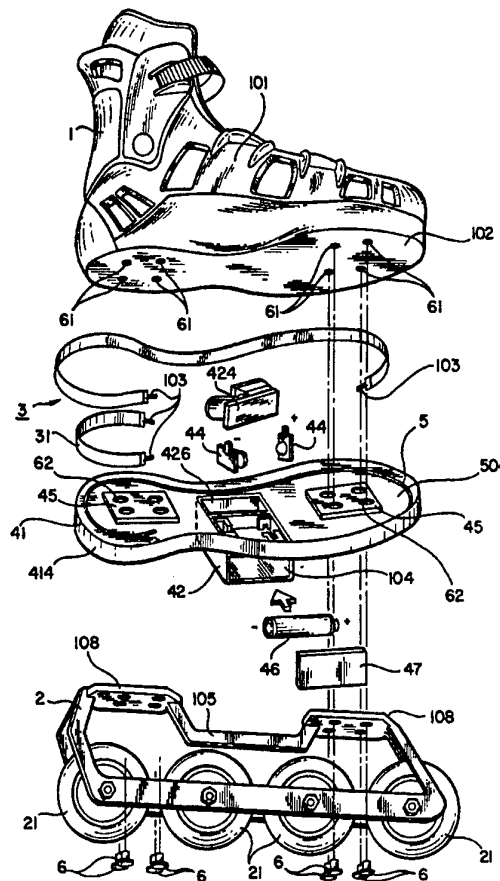
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(54) Title: SUPER-THIN LIGHTING ARRANGEMENT FOR A MOVING OBJECT

(57) Abstract

An illumination arrangement for a small moving object of the type which includes a main object arranged to be moved when an outside force is applied to the object and a moving base arranged to permit the main object to move when the outside force is applied to the main object by overcoming the resistance to movement of the main object which would otherwise be present. In the case of a skate, for example, the illumination arrangement (3) is mounted in a transparent outsole (41) which also contains a power supply (46) and all necessary circuitry (424), the lighting elements used therein being in the form of electro-luminescent strips or panels (31), and the outsole (41) being secured between the roller or blade mounting bracket (2) of the skate and the boot (1) by including openings for passage of the rivets or similar fasteners (6) used to attach the mounting brackets (2) to the boot (1).



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SUPER-THIN LIGHTING ARRANGEMENT FOR A MOVING OBJECT**BACKGROUND OF THE INVENTION****1. Field of the Invention**

This invention relates to apparatus made up of a main
5 object, which is moved when an outside force is applied to
the object, a moving base which permits the object to move
when the outside force is applied to the main object by
overcome the resistance to movement which would otherwise
be present, an illumination arrangement for the main object
10 and moving base, and an electrical system for the
illumination arrangement. The main object may, for
example, be the boot of a roller or ice skate, the board of
a skate board, or a toy such as a toy car or animal, and
the moving base can take the form of, for example, a roller
15 or ice skate bracket, or a bracket for mounting wheels on
a toy. The illumination arrangement may include super-thin
electro-luminescent (EL) or photo-luminescent (PL) strips
or panels.

2. Discussion of Related Art

20 Illumination of moving objects enhances the attractive
of the objects and, in the case where the object is to be

worn, protects the wearer by making the wearer more visible to motorists. Lighting arrangements for self-propelled vehicles such as automobiles and bicycles are of course well-known, but the present invention concerns illumination of relatively objects which are moved by an external force, including objects designed to be worn, such as skates, as well as objects such as skate boards and various toys which are pushed or pulled by the user.

The objects with which the invention is concerned have in common a "main object," i.e., an object to which the propelling force is to be applied, such as the boot of a skate, the board of a skate board, or the body of a toy car, and also some type of bracket-mounted "moving base" in the form of rollers, blades, or wheels positioned between the main object and the ground, for overcoming the resistance between the main object and the ground.

The traditional means of providing illumination for such objects, if illumination could be provided at all, has been to use incandescent bulbs or light emitting diodes (LEDs). While the present invention can actually be used in combination with conventional lighting, the invention is particularly suited to be implemented by means of EL strips or panels.

One of the problems with conventional lighting arrangements for a small moving object such as a roller

skate, in which incandescent bulbs or LEDs are placed on the outsole, upper surface, or wheel of the skate, is that the bulb or LED must be placed in recesses in order to protect it from damage, and it is to find room for providing such a recess into which the bulb or LED is fit so that the bulb or LED is not exposed to impact. The smallest commercially available incandescent bulbs or LEDs have a diameter of at least 3mm and a length or height of at least 10mm, which greatly limits the available areas to which the bulbs or LEDs can be applied.

In addition to the problem of placement of the bulb or LED itself, there is the problem of placement of the connecting wires, as well as the need for expensive tooling, in the case of roller or ice skates, to provide for the at least eight different standard shoe sizes four different sizes of roller or ice skate brackets. As a result, although the concept of lighting small movable objects such as skates, skate boards, toy cars, and the like is known, the use of conventional lighting arrangements in such objects is generally impractical and often impossible.

As discussed in greater detail below, one of the objectives of the invention is to provide an illuminated small movable object, including a main object and a moving base, which is easily assembled and yet which provides a wide variety of lighting design possibilities, including

flexibility in placement of the lighting, color choices, lighting effects, and so forth, in a package which is as durable as it is attractive. This involves, at least in part, the use of EL panels or strips as the lighting source.

By way of background, EL strips or panels have been proposed for use in a variety of products to enhance their safety and attractiveness, and have the advantages of being paper-thin, light in weight, flexible, easily attached to different surfaces by adhesives or by stitching, and relatively bright, colorful, and with a wide viewing angle in comparison with other lighting sources. Furthermore, although bright, the light from an EL strip or panel, like that of neon, is gentle and will not cause eye-strain, which is very important for roadside safety. In contrast, LEDs of reasonable cost and sufficient brightness are only available in red, which most European countries prohibit for non-emergency use because of potential confusion with official warning or stop signs, and with emergency or hazard warnings. Green and amber LEDs of brightness equivalent to red LEDs are too expensive for use in consumer products, while all LEDs suffer from the problem of a narrow viewing angle and cannot practically cover as a large an area as EL strips or panels.

Despite the relative advantages of EL strips or panels, however, a practical way of applying the EL strips

or panels, or equivalent photo-luminescent (PL) lighting elements, to small objects of the type discussed above has not previously been devised or even, to the inventor's knowledge, previously been proposed.

5

SUMMARY OF THE INVENTION

It is accordingly an objective of the invention to provide an illumination device for a movable object of the type which includes a main object to which an external force is applied in order to move the object, and a movable
10 base which facilitates movement of the object by overcoming ground-to-object resistance or friction, examples of which include various types of skates, skate board, and movable toys such as toy cars or wheeled dinosaurs, and which overcomes the above-mentioned problems of the prior art by
15 utilizing EL strips for the illumination, thereby making use of the EL strip's paper thinness and super bright neon-like color.

It is a further objective of the invention to provide an illumination arrangement for a movable object of the
20 above-mentioned type which is easily assembled, durable, and provides a wide variety of lighting effects, including placement of the lighting elements both on the object and in the movable base, without the use of bulky power supply and wiring arrangements which would interfere with the
25 operation and attractiveness of the object.

These objectives are achieved, in accordance with a preferred embodiment of the invention, by mounting the lighting arrangement power supply and illumination means in a transparent outsole, or in a similar transparent plate-like device, which utilizes the existing installation means for connecting the main object with its movable base and is shaped to be flush against the lower surface, e.g., the sole, of the main object. For example, in accordance with illustrated implementations of the preferred embodiment of the invention, the outsole can be provided with openings in a reduced thickness part of the outsole through which the bracket mounted rivets or bolts used in conventional skates and skate boards are passed, with circuitry, a power supply, and illumination strips being sandwiched between the outsole and the sole of a boot to protect the components from impacts and the environment. In other implementations of the invention, EL strips are placed elsewhere on the moving base and also on a soft textile liner which fits within the conventional hard plastic boot used in roller and ice skates, with the EL strips being visible through ventilation openings in the boot, or the boot itself is made of a transparent material and the EL strips are attached directly to the inside of the boot. In still further implementations of the preferred embodiment of the invention, the power supply housing is provided with quick-connect terminals for more easily connecting thereto a variety of different lighting elements.

The use of a transparent outsole of the type described above has the advantage of providing a "module" which can be used in a variety of contexts. In addition, the transparent outsole edge can be used to add special optical effects, such as a prism effect, to increase the attractive of the interior components, for example by making the curve shape have a convex lens effect to magnify the light strips.

Also preferably, by making the plates or plate portions containing openings (through which the installation means are passed) thin enough, the invention minimizes the distance between the main object and movable base, whether in the form of a skate, skateboard, or wheeled toy, small enough to use existing rivets, bolts, screws, or other installation means without the need for re-tooling.

Because an EL strip only requires two connecting wires, the power pack and connections can easily be made to achieve any desired pattern and performance. For example, where the main object is the boot of a skate, the EL strip can easily be bent into any curve on the boot to follow the edge of the outsole placed between the boot and the roller bracket or blade mounting bracket which constitutes the moving base of the movable object. The EL panel or strips can be designed for any desired length and width, and only need contact two upper layers and the bottom layer with a

sufficient voltage drop to cause photons in the phosphor to be triggered continuously or intermittently, depending on the arrangement and material of the phosphor, using only the two wire connection, thus solving connection problems associated with bulbs or LEDs.

Advantageously, the wire connections for the EL strips or panels can be involve two terminals at opposite ends, at the same end, or be of the type in which contact can be obtained at any location on the backside of the EL panel or strip, using conductive rubber to connect the electric power pack directly to the backside of the EL panel or strip, as disclosed in copending US Patent Application Serial No. 08/383,404, filed February 3, 1995. Also, the individual EL strips can be mono or multi-colored and can consist of a single strip or multiple strips connected in series or in parallel to have different turn-on times to form a motion effect, and the individual EL strips or panels, or portions thereof, can be controlled by a conventional trigger circuit or by integral IC design to allow a variety of special effects. Preferably, the power source is a simple DC power source, such as a combination of batteries, which is converted to AC voltage at a required frequency to obtain the desired voltage level.

As noted above, the outsole with its self-contained housing for loading all electric components, batteries, and a switch can be designed to protect the components against

a variety of hazards, including impacts, scratches, and water. Furthermore, by mounting the EL strips or panels in grooves in the transparent outsole, or inside the main object itself utilizing the main object's ventilation openings or transparency to view the EL strips or panels, or other lighting devices, the EL strips or panels themselves can be protected from damage.

Those skilled in the art will appreciate, upon reading the following description, that the above described advantages of the advantage are by no means exhaustive, and that the invention involves numerous unique concepts which nevertheless combine to form a novel and non-obvious whole. Among the key overall concepts is, however, as indicated above, the application of the invention to a main object of the type which is movable upon application of an external force and a movable base which overcome the resistance to movement of the main object, and in particular the provision of an illumination means whose power supply and control circuit is providing in a member which is attached to the main body and the movable base by installation means for attaching the main body to the movable base.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of an illuminated main object and moving base in the form of an in-line roller skate constructed in accordance with the principles of a preferred embodiment of the invention.

Figure 2 is a perspective view of an illuminated main object and moving base in the form of a conventional roller skate constructed in accordance with the principles of a preferred embodiment of the invention.

5 Figure 3 is a perspective view of an illuminated main object and moving base in the form of an ice skate constructed in accordance with the principles of a preferred embodiment of the invention.

10 Figure 4 is a perspective view of an illuminated main object and moving base in the form of a skate board constructed in accordance with the principles of a preferred embodiment of the invention.

15 Figure 5 is an exploded perspective view of the main object and moving basing implementation illustrated in Figure 1.

 Figure 5A is an exploded perspective view of a variation of the power pack arrangement shown in Figure 5, including a variety of alternative power pack mounted illumination means.

20 Figure 6 is a side view of the outsole of Figure 5, illustrating the manner in which the mounting brackets are inset into the outsole for flush mounting.

Figure 7 is a block diagram of electrical components which may be used in the implementations of the preferred embodiment illustrated in figures 1-6.

5 Figure 8 is a circuit diagram illustrating in greater detail the electrical circuitry used in the block diagram of Figure 7.

Figure 9 is a perspective view of a main object illumination arrangement which can be used with the implementations of the preferred embodiment illustrated in
10 Figures 1-6.

Figure 10 is a perspective view illustrating a moving base lighting arrangement which can be used with the implementations of the preferred embodiment illustrated in Figures 1-6.

15 Figure 11 is a top view of a variation of the preferred embodiment illustrated in Figures 1-6.

Figure 12 is a perspective view of an illuminated main object and moving base in the form of an in-line roller skate constructed in accordance with the principles of an
20 alternative preferred embodiment of the invention.

Figure 13 is a perspective view of an illumination means mounting fixture and power supply housing for use in the embodiment illustrated in Figure 12.

Figure 14 is a perspective view illustrating a
5 modification of the fixture and housing arrangement shown in Figure 13.

Figure 15 is a perspective view of an illuminated main object and moving base in the form of an in-line roller skate constructed in accordance with the principles of yet
10 another alternative preferred embodiment of the invention.

Figure 16 is a perspective view of yet another alternative power pack arrangement for use with implementations of any of the preferred embodiments of the invention.

15 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Figures 1-4 show four implementations of an illuminated main object and moving base constructed in accordance with the principles of a preferred embodiment of the invention. Although Figures 1-4 respectively
20 illustrate an in-line roller skate, a conventional side-by-side roller skate, an ice skate, and a skate board, those skilled in the art will appreciate that the principles of the invention are applicable to a wide variety of similar objects having a main body and moving base, including

various toys such as toy cars or dinosaurs having roller devices attached thereto. Consequently, portions of the invention will be described in terms of "means" and it is to be understood that these means can have a variety of forms other than the forms specifically illustrated, so long as they perform the functions described in connection therewith.

Each of the implementations illustrated in Figures 1-4 has in common a main body 1 and moving base 2. The forms of the main body 1 and moving base 2 differ between the implementations shown in the respective drawings, but for purposes of the invention may be considered equivalent since details of the main body and moving object, which are a boot or board and a roller bracket or blade in the respective implementations, are known and not a part of the invention, the invention instead concerning the manner in which an illumination means 3, power pack are attached thereto. The remaining figures shown these features in greater detail.

The main object and moving body in the form of an in-line skate as shown in Figure 1 is shown in greater detail in the exploded perspective view of Figure 5. In this implementation, the main body 1 is a boot having an upper portion 101 of conventional construction and a sole 102 which includes a plurality of openings 61 for accommodating installation means for mounting the main body 1 to the base

2. In the illustrated implementation, the installation means 6 is in the form of rivets by which the moving base 2, which in this implementation is in the form of a roller bracket set on which are mounted rollers 21, is attached to the sole 102.

Those skilled in the art will appreciate that the use of rivets to attach a roller bracket set to the sole of a boot in an in-line skate is conventional, which in fact is an advantage of the present invention because it make use of the existing rivets thereby avoiding the need for a separate assembly dedicated to this purpose. Nevertheless, the use of the terminology "installation means" is intended to convey that it is also within the scope of the invention to utilize a variety of different mounting arrangements for the main object-to-moving base installation and for mounting the outsole 41 which supports the electrical componentry and certain of the lighting means used in the present invention, as described below.

In the illustrated embodiment, the illumination means 3 is in the form of EL strips which are especially suited for this application for the reasons mentioned above in terms of performance and connectability, as well as flexibility which permits the EL strips to extend around the periphery of the outsole if desired. The exact pattern by which the EL strips, illustrated as a main EL strip and also an additional strip 31, are arranged in the outsole 41

may of course be freely varied using the mounting arrangement described below.

Outsole 41, as illustrated, is preferably made of a transparent material having an EL strip attachment means 5. In this implementation, attachment means 5 is in the form of a groove extending in a desired pattern from an upper surface 504 of the outsole 41. When the outsole 41 is attached to the boot, the EL strip groove will be protected from shocks as well as moisture, dust, and so forth, because the groove is only exposed at the surface which faces and engages sole 102 of the boot. In addition, the transparent outsole edge 414 can be used to add special optical effects, such as a prism effect, to increase the attractive of the interior components, for example by making the curve shape have a convex lens effect to magnify the light strips.

Power to the EL strips in this implementation is supplied via terminals 103 at ends of the EL strips via wires (not shown) from a power pack made up of a housing 42 having two compartments, one of which contains battery terminals 44 and is accessed through an opening 104 for permitting insertion of a battery 46, the opening being closed by a cover 47. The second compartment, which may be sealed, includes a circuit board 424 and all circuit components (described in more detail below) necessary to convert the DC power supplied by the battery to AC power of

an appropriate frequency to trigger the EL strip, and also to provide such special effects as flashing or varying illumination of the respective EL strips if desired.

In this implementation, the power pack is located
5 below the insole, in a space provided by a lowered portion
105 of the moving base or roller bracket set 2, with the
top 426 of the housing 42 being open through the outsole
for the purpose of facilitating assembly of the electrical
components in the housing. When the outsole 41 is affixed
10 to the sole 102 by being sandwiched between the moving base
2 and main object 1 via installation means 6, then the
components will be completely sealed within the housing,
particularly if a gasket is provided as an environmental
seal (not shown) around the outsole.

15 By including all sensitive components within the
outsole, and sealing the outsole as mentioned above, the
outsole form a module which is easily replaceable, can be
used in a variety of applications, and yet can protect the
components against a variety of hazards, including impacts,
20 scratches, and water. Advantageously, for example, the
battery compartment may be provided with two waterproof
battery terminals on each end, and two terminals may be
pre-assembled from inside of the outsole to prevent the
user from removing these two terminals, and a waterproof
25 door 47 can be used to provide access and easy replacement
of the battery. The compartment door 47 can be designed

for a hinge or snaps, or be of a sliding type to allow the user to easily operate it when needed.

Alternative to the power pack installation shown in Figure 5, the power pack may be provided, as shown in Figure 5A, in "snap-on" form and itself illuminated, by providing a thin mounting plate 48 between the rivet or other installation means locations 106, and which is attached to the power pack by means of an interference fit or snap fit arrangement made up of openings 52 and corresponding post/terminals 51. As in the implementation illustrated in Figure 5, the housing of the implementation of Figure 5A includes two compartments, one for the battery, including an access door or gate 47, and one for the electric circuitry, but this implementation does away with the need for wires because the "posts" are also terminals pre-wired to through the housing to the appropriate power supply circuitry. The use of a combination mounting post/terminal arrangement also permits mounting of EL strips or other lights on the power pack itself, for example by means of alternatively mountable holders 32-36 which consist of an outer terminal 201 to which is directly attached one of the terminals, the remaining terminal being electrically connected anywhere on the surface of the respective EL strips 3A-3D in the manner described for example in the above-mentioned copending US Patent Application Serial No. 08/383,404. Those skilled in the art will appreciate from Figure 5A the flexibility

which this design provides, since one can easily change the shape of the lighting means by simply snapping a different one of holders 32-36, all of which have different shapes into terminal openings 52 on the side of the housing.

5 Returning to Figure 5, and also as shown in Figure 6, outsole 41 is preferably provided with recessed areas 45 defined by indentations 107 which contain the openings through which the rivets, in this implementation, are passed so as to connect main object in the form of a boot
10 1 and moving base in the form of a roller bracket set 2. By using indentations 107 which extend into the outsole from the moving base side of the outsole, the mounting portions 108 of the roller bracket set are flush with or set into the outsole so that the overall height of the
15 arrangement, when assembled together, is not greatly increased, as is apparent from Figure 6, and the need for longer rivets or other non-standard installation means is eliminated.

Those skilled in the art will appreciate that although
20 only the in-line skate implementation has been illustrated in detail using exploded views, the construction of the conventional side-by-side roller skate, ice skate, and skateboard all can be similar since all share the features of brackets on which either rollers or a blade is mounted,
25 and a sole or board which can be provided with holes for the installation means, such as rivets. Essentially,

adaptation of the invention to these embodiments will simply involve exchanging a different type of moving base, whether with rollers, a blade, or other means of locomotion for the illustrated roller bracket set, and exchanging a
5 different main object, whether in the form of a boot, a board, a body of a toy, or something else having a surface to which the moving base and a clear structure corresponding to the outsole can be mounted.

As shown in Figures 7 and 8, the DC power supply 303
10 is a dry cell battery (which can take the form of battery 46 shown in Figure 5, but can also take other forms) which can easily be attached to the backpack or waistpack because of its small size and weight. In order to operate the electro-luminescent light panel, the DC current supplied by
15 the battery must be converted to AC power and, consequently, as shown in Figures 7 and 8, the DC power source 303 is electrically connected to the electro-luminescent light strip 2 via a circuit including a DC/AC converter 401 electrically connected with a transformer
20 402, transformer 402 being further electrically connected with a function interface 403 and, via parallel connected switch 301, with the electro-luminescent strip 2.

In operation, the direct current supplied by DC power source 303 is thus converted into an alternating current of
25 a desired frequency by DC/AC converter 401 to the transformer 402 for increasing the voltage of the

alternating current, and then transmitted from the transformer 402 to the function interface 403. Function interface 403 provides a number of preset or switchable options for turning on the electro-luminescent light strip 2, e.g., steady, flash, sequential or random, and may take any desired form from a simple flasher circuit illustrated in Figure 5 to a microprocessor, depending on the complexity of the special effects to be exhibited. Those skilled in the art will appreciate that the number of options is greatly increased if a multiple element strip such as the one disclosed in the above-mentioned U.S. Patent Application Ser. No. 08/305,294 is utilized. Also, while the electro-luminescent light strip can be turned on and off by means of a manual push button switch 301, it may also be desired to include or substitute a photosensitive, vibration-sensitive, tilt-sensitive, or motion-sensitive switch to automatically turn the light on and off upon the occurrence of external events such as nightfall or various movements by the wearer.

Turning now to Figure 9, which shows the same main object 1 in the form of a boot as is shown in Figure 1, in assembled form, but with the particularly advantageous feature of providing illumination of the upper portion of the main object. As is conventional, the main object in this implementation is a hard surfaced boot containing a plurality of ventilation holes, openings, or apertures 3K-3P. However, these ventilation holes are uniquely used as

part of the main object illumination arrangement by providing, on the soft textile liner 7 of the boot, a plurality of EL strips 3F-3J, which are conveniently attached to the lining by stitching, gluing, Velcro™ or any other desired means such as a leather insert or pocket. One of the advantages of EL strips or panels is that they can easily be attached to other surfaces by a variety of means, and because of their flexibility can in particular be attached to a soft surface. The EL strips can in particular use the quick-connect arrangement of Figure 5A to allow replacement of insoles or liners as necessary without having to replace the entire boot. In addition to attaching the EL strips to the soft textile liner of the main object, additional EL strips 3Q and 3R may also be attached to the moving base, as shown in Figure 10.

Finally, with respect to the implementations of the preferred embodiment shown in Figures 1-11 and described above, the illumination means of the present invention are not necessarily limited to EL strips, although EL strips or panels are particularly advantageous for the embodiments shown in Figures 1-6 and 9. The manner in which the power pack is arranged on an "outsole" positioned between the sole of the boot and the roller or skate bracket is itself a unique feature apart from the use of EL strips or panels, and thus it is contemplated that some of the EL strips could be replaced in certain implementations by bulbs, either incandescent, LED, photoluminescent or other type of

lighting such as fiber optics. For example, as shown in Figure 11, a plurality of bulbs 35 are molded or inserted into openings in the hard plastic boot, and in addition illumination 36 of the laces is provided.

5 In a variation of the above embodiments, a bracket such as is illustrated in Figures 12-14 could be used to mount the power pack and associated circuitry. In this embodiment, the power pack 42' has extending therefrom two relatively thin mounting plates 42" which fit between the
10 openings 126 by which the moving base is mounted to the main object, and extending downwardly therefrom an EL fixture 123 which contains an EL strip 3S and associated electrical connections. Fixture 123 can either extend directly from housing 42' or from an extension bracket 122
15 depending on the configuration of the main object and moving base to which the housing and fixture are to be attached.

 In yet another variation of the above implementations, the hard surface boot or other hard main object may be made
20 of a completely transparent material, so that the EL strips or panels on the soft-textile liner can be placed anywhere and have any desired size or shape, with appropriate wires and terminals molded into the main object material. Alternatively, as shown in Figure 12, EL strips 3T-3Y could
25 simply be glued or otherwise affixed to the inner surface of the hard plastic boot and still have any desired shape

and size, and be placed at any desired location. Such EL strips 3T-3Y could be connected with the power pack by drilling holes somewhere in the sole to permit connection to the power pack.

5 Finally, in a still further variation of the power pack, the power pack 42 could be affixed to indentations in a bracket 124 by gluing or by using double-sided tape 128 in the configuration shown in Figure 13.

10 Having thus described a preferred embodiment of the invention and a number of different variations and modifications of the preferred embodiment, it is anticipated that still further variations and modifications will undoubtedly occur to those skilled in the art upon reading the above description, and it is therefore intended
15 that the invention be interpreted, in accordance with the appended claims, to cover all such variations and modifications which fairly fall within the scope of the invention.

I claim:

1. In an apparatus, comprising:

a main object arranged to be moved when an outside force is applied to the object;

a moving base arranged to permit the main object to
5 move when the outside force is applied to the main object by overcoming a resistance to movement of the main object which would otherwise be present, the improvement wherein

an illumination arrangement including a power supply and controlling circuitry is mounted to the main object or
10 moving base.

2. Apparatus as claimed in claim 1, further comprising installation means for attaching the moving base to the main object, and wherein the illumination arrangement includes opening through which the installation means
15 extend when the moving base is attached to the main object.

3. Apparatus as claimed in claim 2, wherein the installation means consists of fasteners selected from the group consisting of rivets, bolts, or screws.

4. Apparatus as claimed in claim 3, wherein the
20 illumination means includes a transparent plate containing attachment means for attaching lighting elements within the plate.

25 5. Apparatus as claimed in claim 4, wherein the lighting elements are electro-luminescent strips, and the attachment means comprises grooves which open into a surface of the plate which faces the main object, the EL strips being sealed within the grooves upon sandwiching of the plate between the moving base and the main object when the moving base is attached to the main object.

30 6. Apparatus as claimed in claim 5, further comprising a housing containing a power supply and a electrical circuitry extending from said plate and open towards said main object facing surface of the plate so as to be sealed when the moving base is attached to the main object.

35 7. Apparatus as claimed in claim 6, wherein said housing has extending therefrom mounting post/terminals for supporting and electrically connecting a plurality of different lighting arrangements to electrical components within said housing.

40 8. Apparatus as claimed in claim 4, wherein said plate is recessed in a vicinity of said openings so as minimize an amount by which the installation means must be extended when the plate is added to an existing installation.

45 9. Apparatus as claimed in claim 4, wherein said main body is a boot, said moving base is a skate mounting

bracket, and said plate is an outsole arranged to fit between a sole of the boot and the skate mounting bracket.

10. Apparatus as claimed in claim 1, wherein said main body is selected from the group consisting of a boot,
50 board, or toy, and said moving base is selected from the group consisting of a roller skate bracket, an ice skate blade mounting bracket, or a wheel mounting bracket of a toy.

11. Apparatus as claimed in claim 10, wherein the
55 illumination arrangement includes at least one electro-luminescent strip.

12. Apparatus as claimed in claim 9, wherein the main object is a boot and the moving base is a skate mounting bracket, and further comprising installation means for
60 attaching the skate mounting bracket to a sole of the boot, wherein the illumination arrangement includes an opening through which the installation means extend when the moving base is attached to the main object.

13. Apparatus as claimed in claim 12, wherein the
65 installation means consists of fasteners selected from the group consisting of rivets, bolts, or screws.

14. Apparatus as claimed in claim 13, wherein the illumination means includes a transparent outsole

70 containing attachment means for attaching lighting elements
within the outsole.

15. Apparatus as claimed in claim 14, wherein the lighting
elements are electro-luminescent strips, and the attachment
means comprises grooves which open into a surface of the
plate which faces the main object, the EL strips being
75 sealed within the grooves upon sandwiching of the plate
between the mounting bracket and the sole of the boot when
the moving base is attached to the main object.

16. Apparatus as claimed in claim 12, further comprising
a housing containing a power supply and a electrical
80 circuitry extending from an outsole and open towards a sole
of the boot so as to be sealed when the mounting bracket is
attached to the boot.

17. Apparatus as claimed in claim 1, wherein said
illumination arrangement includes a housing for a power
85 supply and electrical circuitry having extending therefrom
mounting post/terminals for supporting and electrically
connecting a plurality of different lighting arrangements
to electrical components within said housing.

18. Apparatus as claimed in claim 1, wherein said main
90 body includes a plurality of ventilation openings and a
soft textile liner which fits inside the main body, and
wherein the illumination arrangement includes a plurality

of electro-luminescent lights strips attached to the soft
textile liner and visible through said ventilation
95 openings.

19. Apparatus as claimed in claim 18, wherein said main
body is a hard surface boot of a skate.

20. Apparatus as claimed in claim 1, wherein said main
body is transparent and said illumination arrangement
100 includes a plurality of electro-luminescent strips attached
to an inside surface of the main body.

21. Apparatus as claimed in claim 1, wherein the
illumination arrangement includes a plurality of bulbs
positioned in openings in the main object.

105 22. Apparatus as claimed in claim 1, wherein said main
object is a boot, and wherein the lighting arrangement
includes means for illuminating laces of the boot.

23. In an apparatus, comprising:

110 a main object arranged to be moved when an outside
force is applied to the object;

a moving base arranged to permit the main object to
move when the outside force is applied to the main object
by overcoming a resistance to movement of the main object
which would otherwise be present, the improvement wherein

115 an illumination arrangement is attached to the main
object, and a power supply and controlling circuitry for
the illumination arrangement are mounted between the main
object and moving base.

24. Apparatus as claimed in claim 23, wherein the main
120 object includes ventilation openings, and wherein the
illumination arrangement is arranged to be visible through
said ventilation openings.

25. Apparatus as claimed in claim 23, wherein said
illumination arrangement comprises a plurality of lighting
125 elements arranged at a plurality of locations on said main
object.

26. Apparatus as claimed in claim 23, wherein said main
object is transparent and said illumination arrangement is
positioned on an inside surface of said main object so as
130 to be visible through the main object.

27. In an apparatus, comprising:

 a main object arranged to be moved when an outside
force is applied to the object;

 a moving base arranged to permit the main object to
135 move when the outside force is applied to the main object
by overcoming a resistance to movement of the main object
which would otherwise be present, the improvement wherein

an illumination arrangement is attached to the moving base, and a power supply and controlling circuitry for the illumination arrangement are mounted between the main object and moving base.

28. In an apparatus, comprising:

a main object arranged to be moved when an outside force is applied to the object;

a moving base arranged to permit the main object to move when the outside force is applied to the main object by overcoming a resistance to movement of the main object which would otherwise be present, the improvement comprising:

an illumination arrangement; and

a bracket positioned between the main object and the moving base to which is mounted a power pack and associated circuitry for controlling the illumination arrangement.

29. Apparatus as claimed in claim 28, wherein the illumination arrangement is contained in a fixture extending from the bracket.

FIG. 3

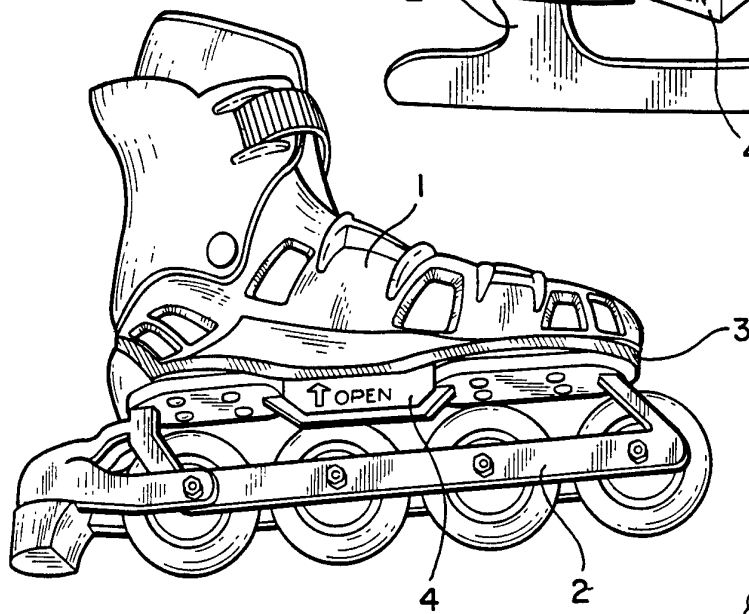
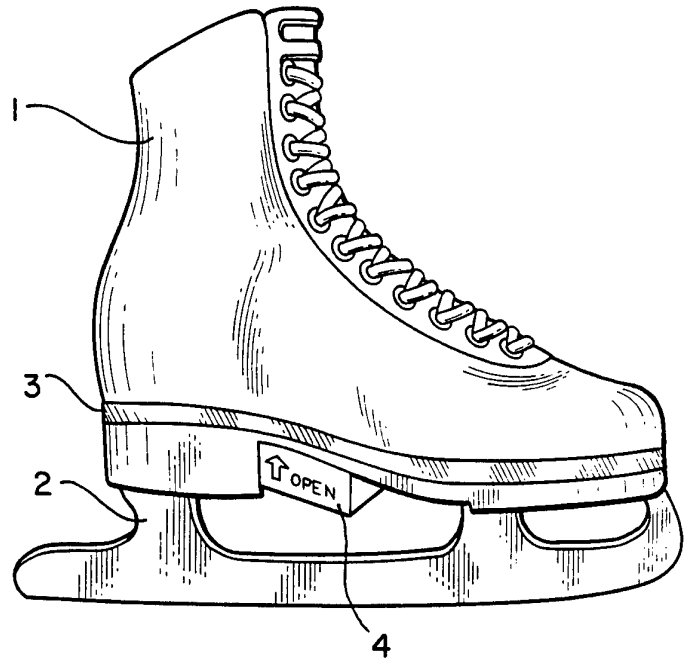


FIG. 1

FIG. 2

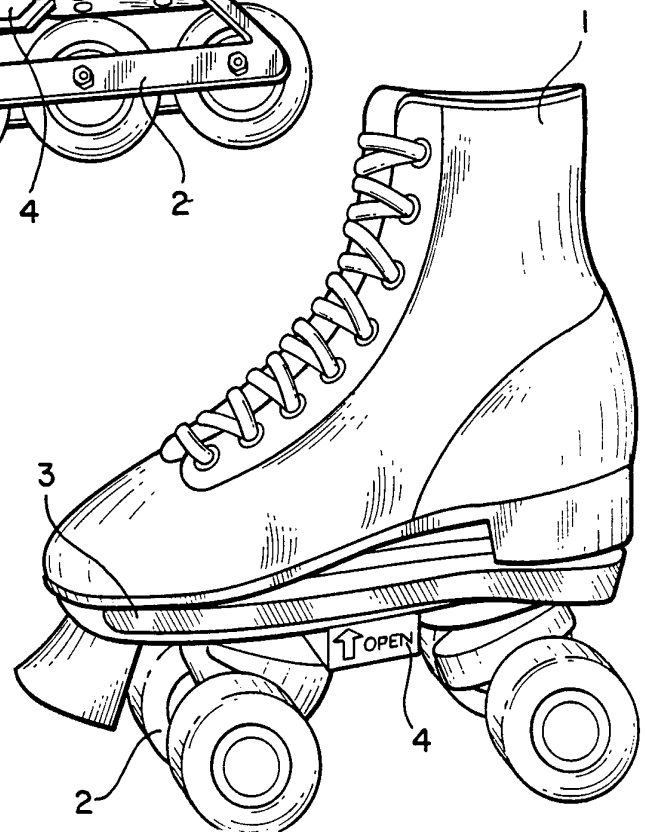
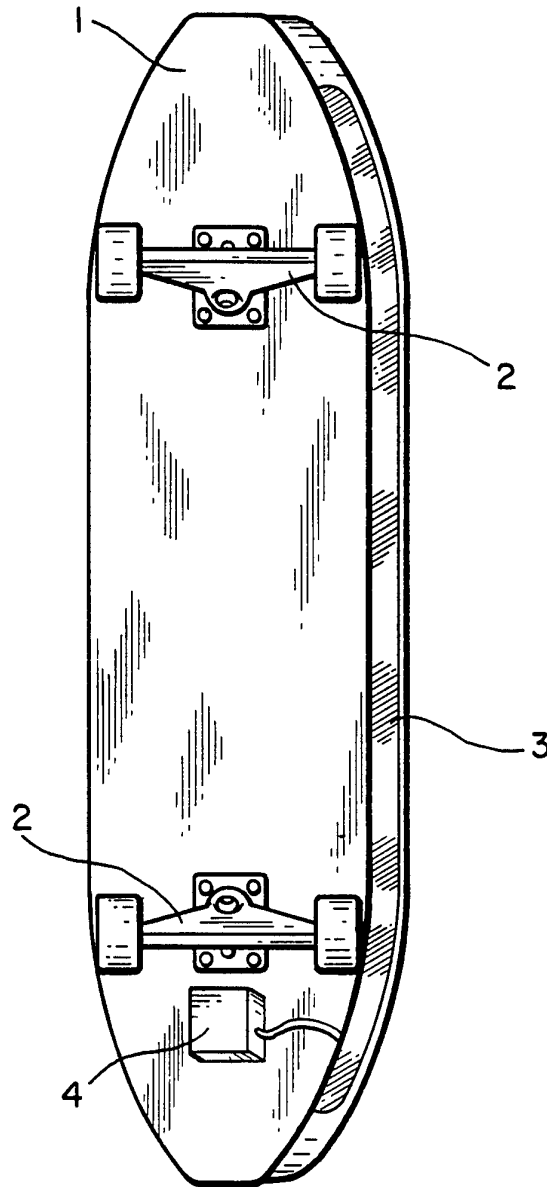
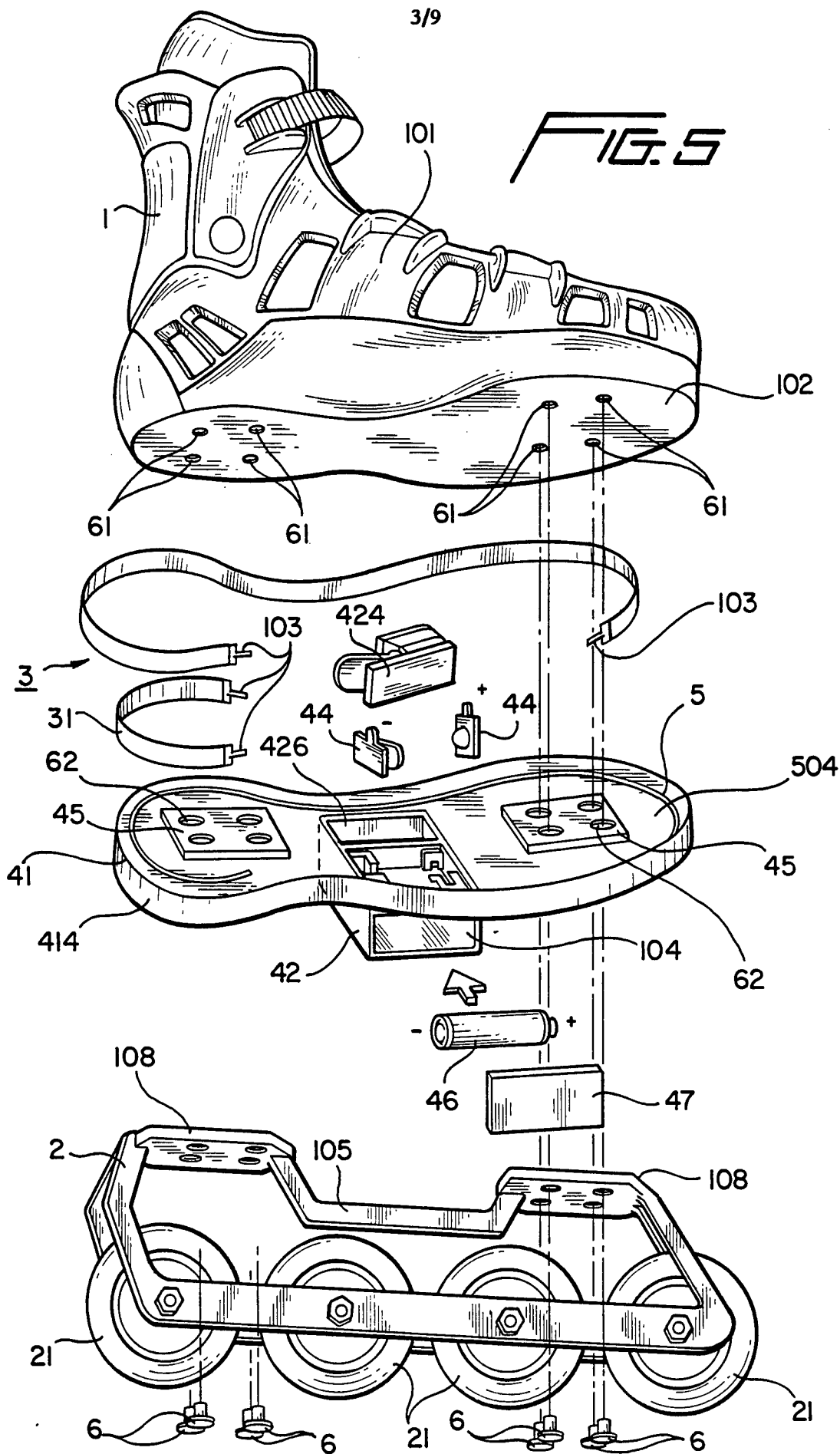


FIG. 4



3/9

FIG. 5



SUBSTITUTE SHEET (RULE 26)

4/9

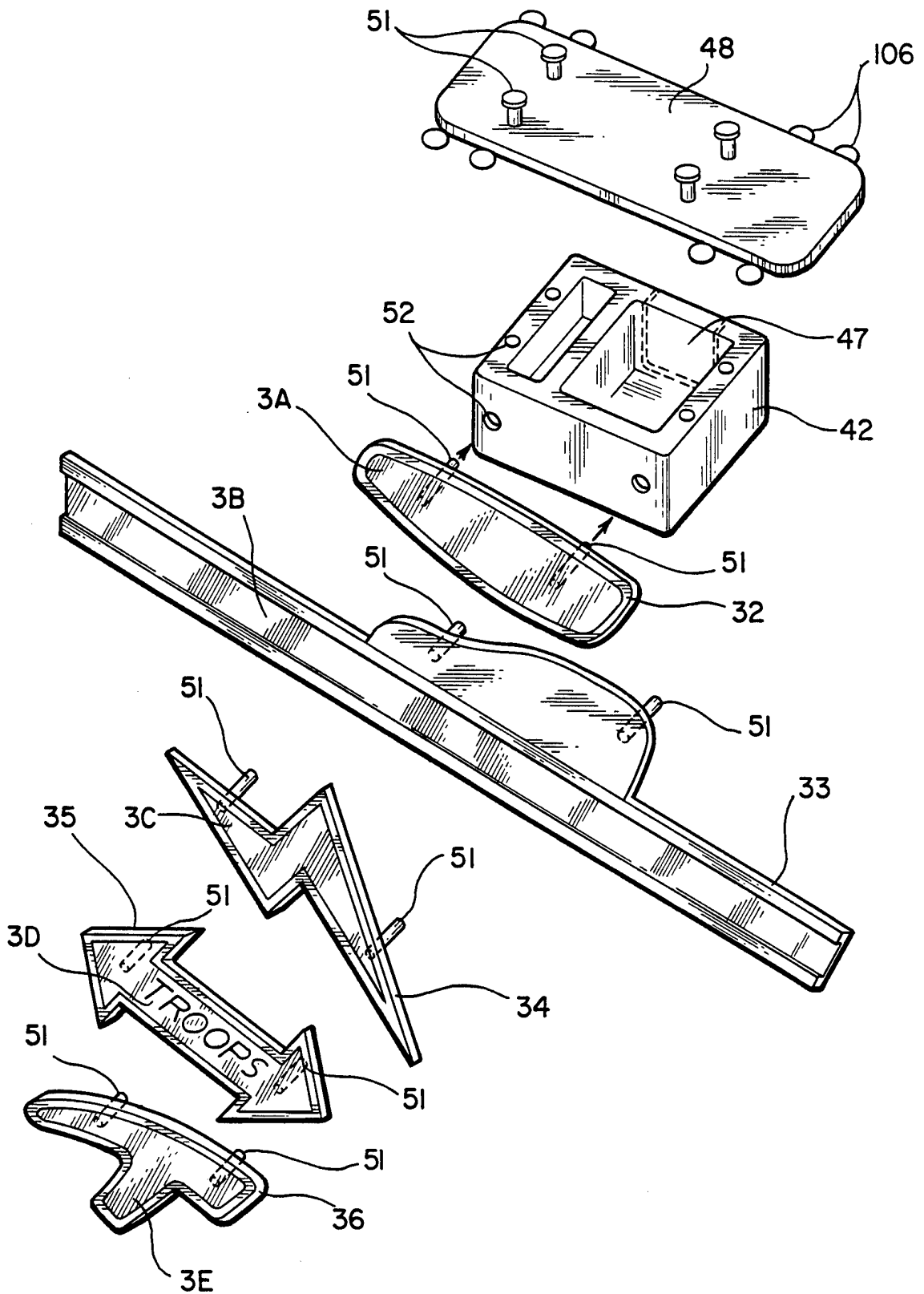


FIG. 5A

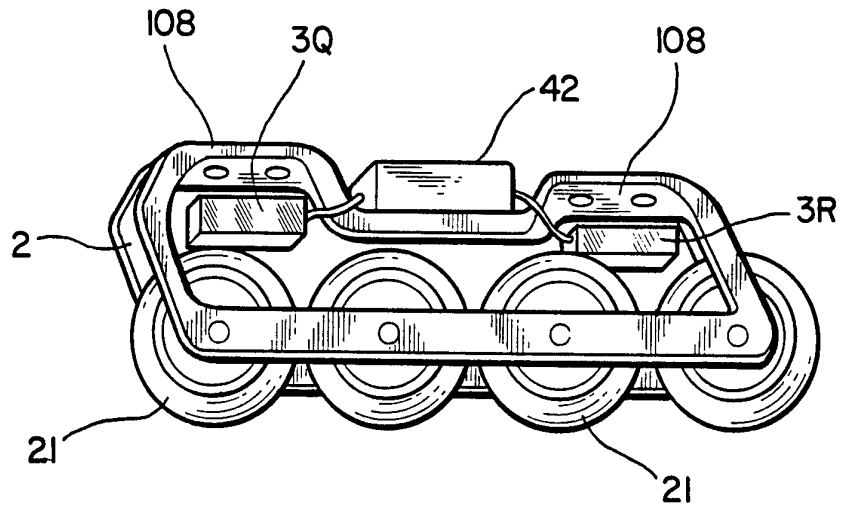


FIG. 10

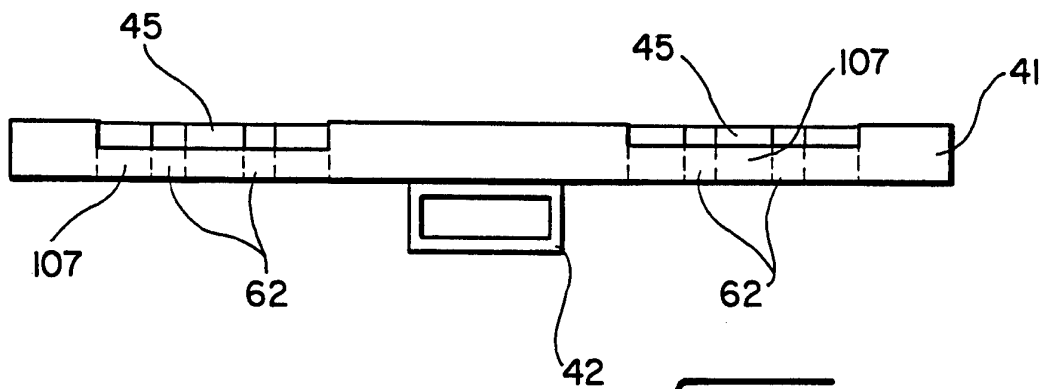


FIG. 6

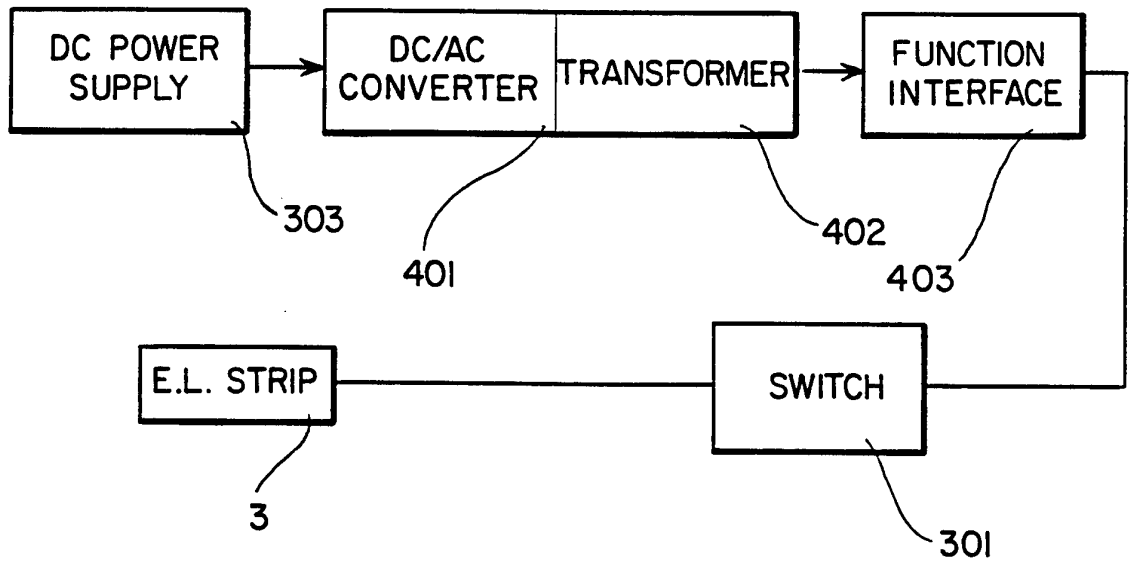


FIG. 7

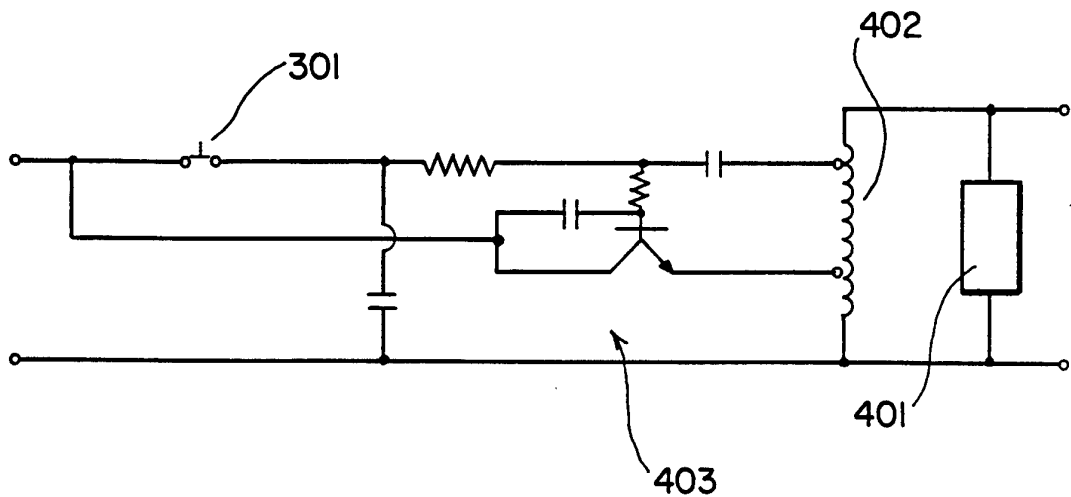
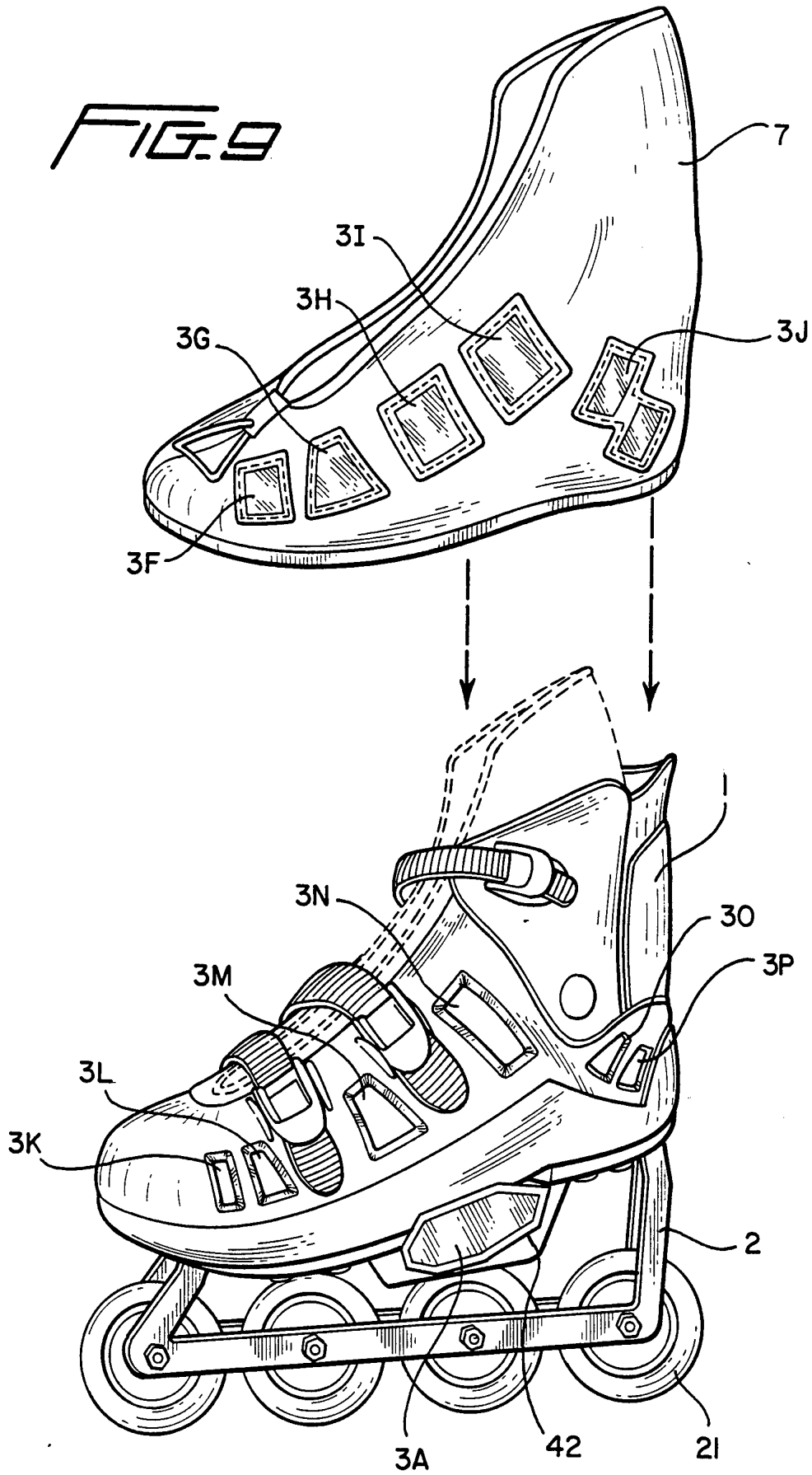


FIG. 8



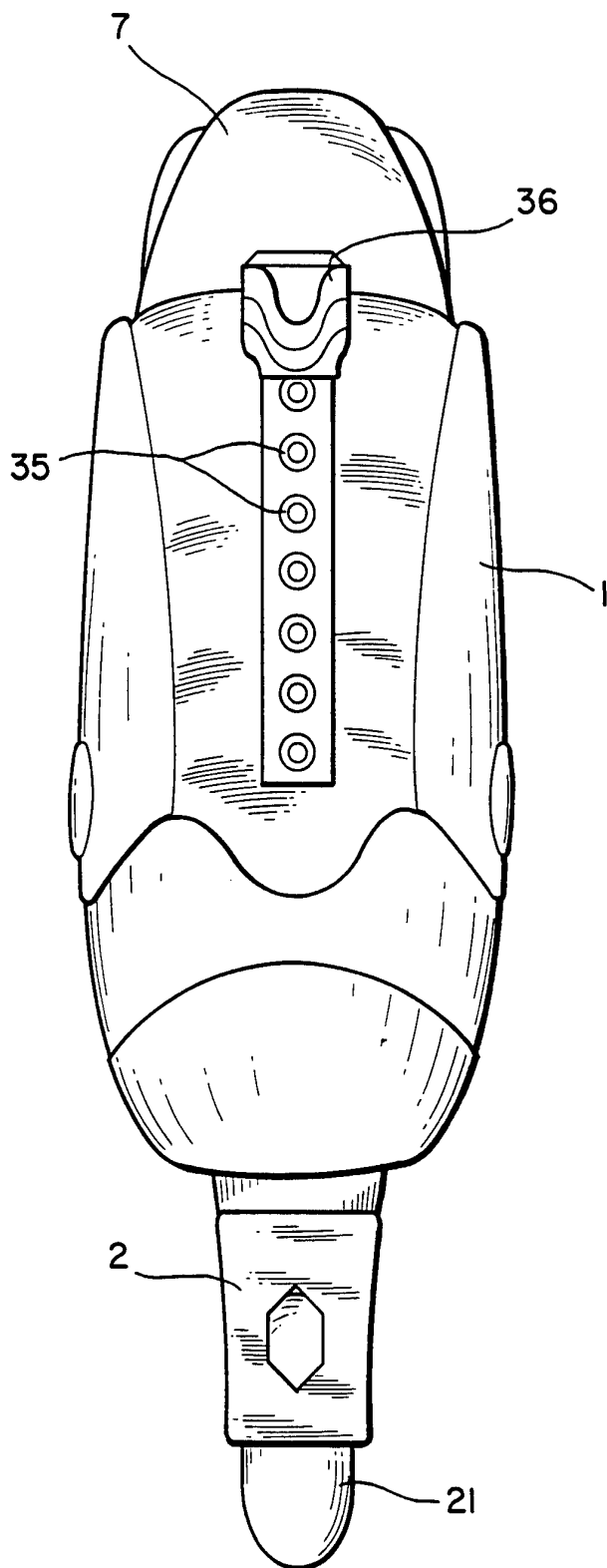


FIG. 11

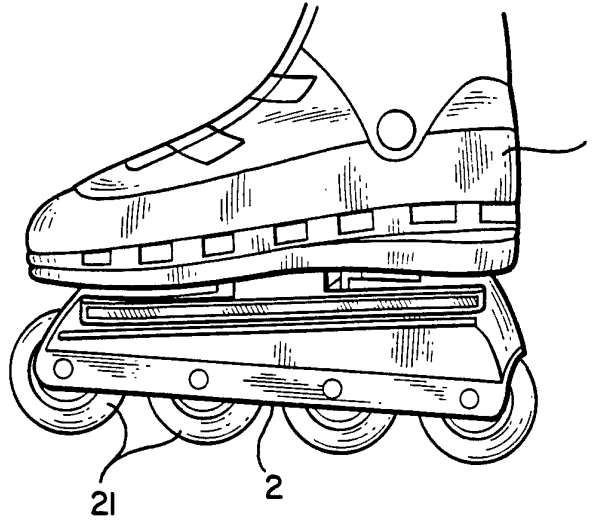


FIG. 12

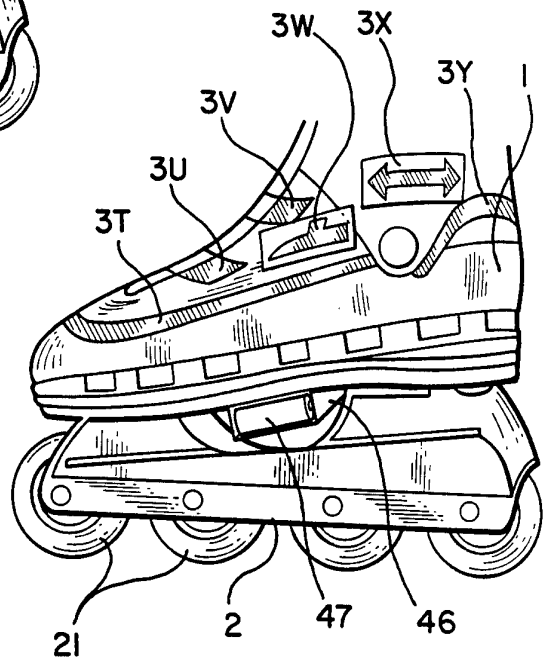


FIG. 15

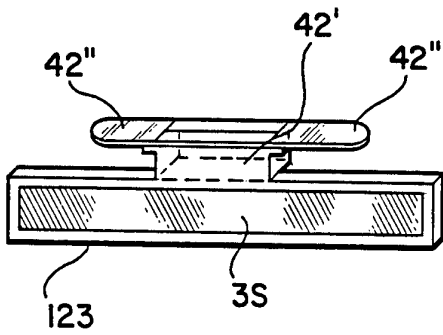


FIG. 13

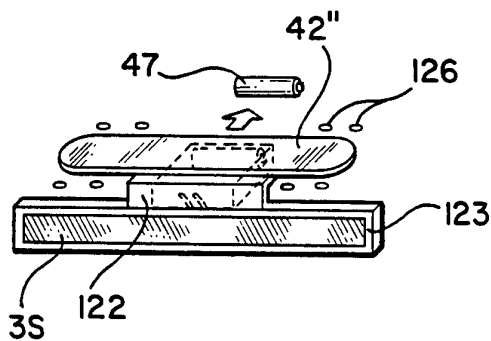


FIG. 14

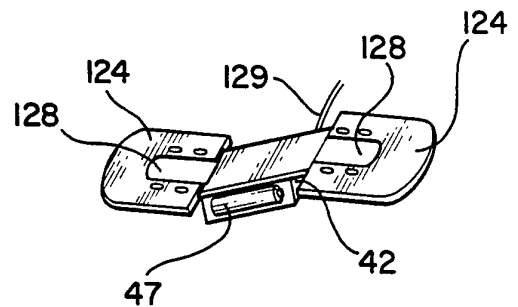


FIG. 16

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/05922

A. CLASSIFICATION OF SUBJECT MATTER
 IPC(6) :B60Q 1/00
 US CL :362/61, 78, 103, 234; 280/811, 816
 According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
 Minimum documentation searched (classification system followed by classification symbols)
 U.S. : 362/61, 78, 83.3, 103, 234; 280/811, 816

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 5,119,277 (COPLEY ET AL.) 02 JUNE 1992, SEE FIGURES 1-5.	1-4,8,10,17
X	US, A, 4,997,196 (WOOD) 05 MARCH 1991, SEE FIGURE 1.	21
X	US, A, 5,327,329 (STILES) 05 JULY 1994, SEE FIGURE 1 AND COL.4, LINES 1-27.	27-29
X --P Y	US, A, 5,513,080 (MAGLE ET AL) 30 APRIL 1996, SEE FIGURE 6 AND COL.5, LINES 46-62.	1,10,11 ----- 22,24
Y, P	US, A, 5,430,621 (RASKAS) 04 JULY 1995, SEE FIGURE 1 AND ABSTRACT.	22

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 20 JUNE 1996	Date of mailing of the international search report 11 JUL 1996
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Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer STEPHEN F. HUSAR Telephone No. (703) 308-1932
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Stacia Simcik
for

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US96/05922

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y,P	US, A, 5,484,164 (MCINERNEY ET AL.) 16 JANUARY 1996, SEE FIGURE 1 AND COLUMN 2, LINES 30-36.	24
X --	US, A, 4,991,066 (MCCOWAN) 05 FEBRUARY 1991, SEE FIGURES 1 AND 2 AND COL. 3, LINES 1-18.	23,25 -----
Y		26
Y	US, A, 4,997,196 (WOOD) 05 MARCH 1991, SEE FIGURE 3.	26