

HEIGHT ADJUSTABLE SPEED BUMP

FIELD OF INVENTION

- 5 The present invention relates to an adjustable speed bump for controlling speed of vehicles when placed on roadways and for serving as a barrier when used for blocking restricted areas.

BACKGROUND OF THE INVENTION

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Speed bumps are used for discouraging drivers from driving vehicles with excessive speed. These are typically comprised of concrete or solid humps that form a transverse ridge in the road and are generally above the road surface. The vehicles while passing over the hump undergo a jolt, hence the drivers are discouraged from traveling at high speed. Dynamic speed bumps are designed to get activated only if a vehicle is

15 travelling above a certain speed, such that other vehicles will not experience the discomfort of the speed bump. Similarly, dynamic speed bumps may also allow emergency vehicles to pass at higher speeds, by the use of speed sensors.

- 20 Retractable speed bumps are also common for being mounted in a street to provide different elevations for a selected section, such as in the patent US 4342525A. This discloses a generally rectangularly-shaped encasement containing upper and lower, relatively movable, wedge-shaped members that are slidably fitted in the encasement and are configured to cooperate by means of friction-reducing means such as ball
- 25 bearings, to selectively raise the top of the upper member above street or road level. The raise is responsive to activation of a hydraulic cylinder attached to the encasement and the lower member.

- US 5267808A discloses a selectively retractable and extendable electronically
- 30 controlled vehicle speed bump. It includes a sensor for detecting or sensing vehicle speed, a microprocessor responsive to the sensor for generating a signal to activate the speed bump, and an actuator for extending and retracting the speed bump.

Another design of a retractable speed bump is in the patent US 7011470 B1A. A

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housing is either buried in the roadway or is placed into a ramp that seats on top of the roadway. The housing has a retractable canister extending above the housing in response to the speed of a vehicle as detected by a speed sensor.

- 5 US 2003053860 A1 discloses a fluid-filled retractable speed bump that transfers fluid between a reservoir volume and an active volume to present or withdraw impedance to motor vehicles using a retractable restriction surface.

10 A variable speed bump apparatus comprising a pivoting ramp element hinged at one end is disclosed in US 6010277A. At least one piston and cylinder assembly supports the pivoting ramp element and a flow control valve. The flow control valve operates to control the response of the pivoting ramp element.

15 US 2002001505 A1 discloses an automatic speed sensitive speed bump having a base plate, a front plate hingedly connected to the base plate, and a spring that biases the front plate toward a raised position. A lock mechanism locks the front plate in the raised position when impacted by a vehicle tire traveling at a speed at or above a predetermined speed. When the vehicle travels below the predetermined speed, the front plate is not locked in the raised position and collapses to a horizontal position
20 such that the vehicle does not experience a bump.

As in the aforementioned discussions, various designs of speed bumps are available, for controlling traffic speed.

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SUMMARY OF THE INVENTION

According to an embodiment of the invention, a height adjustable speed bump is proposed, for controlling the speed of vehicles when placed on roadways and for
30 serving as a barrier when used for blocking restricted areas. The speed bump comprises a portable body. An elevation of the body is adjustable in dependence upon the usage as a speed bump or a barrier. The speed bump can be set up or removed easily.

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According to a preferred embodiment, the speed bump further comprises at least one sensor coupled onto the body, for tracking a number of objects passing over the sensor, the sensor thereby compiling a tracking information. This information can be utilized for several applications such as for analyzing how busy the traffic is, for controlling a vehicle parking area, and the like.

According to an embodiment, the sensor is a pressure sensor.

In yet another embodiment, the sensor is an optical sensor.

In yet another embodiment, the sensor further comprises a remote electronic receiving means for wirelessly receiving and storing the tracking information for further usage.

In a preferred embodiment, the body is modular for adjusting the elevation. At least two side portions mate with a middle portion while in use, the mating being through projections and holes between the two side portions and the middle portion. The two side portions are at a fixed distance apart and with the middle portion accommodated in between them. The middle portion has a first face more outwardly protruded than an opposite second face and is capable of mating with the two side portions with either face facing upwards, such that when the body is seated on the bottom layer with the first face facing upwards, the elevation is higher than when the second face is facing upwards. This arrangement provides a simple mechanism of achieving different elevations, depending on the requirement. The modular structure may be helpful while carrying and for storage.

In yet another embodiment, the middle portion may be elevated by changing the mating between the projections and the holes. The holes accommodated on each of the side portions are quantifiably more than the projections of the middle portion, by at least one, in order to raise the middle portion by a plurality of levels.

In yet another embodiment, the modular body comprises at least two side portions and a middle portion. The two side portions are at a fixed distance apart and with the middle portion accommodated in between them, when in use. At least one jackscrew that is operable by a leadscrew is provided within the middle portion with the middle

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portion resting on a top node of the jackscrew, such that the middle portion can be raised or lowered independent of the two side portions by turning the leadscrew.

5 Raising the middle portion higher would help in order to force vehicles to slow down faster. All these can be done by a switch of the control equipment inside. And at the same time the middle portion can also be returned to its original position by pushing another switch. When being used as a barrier, typically, more the elevation, better is the protection of the restricted area.

10 Another embodiment of raising the middle portion is achievable by a pneumatic lift mechanism.

Yet another embodiment of raising the middle portion is achievable by a spring and cable mechanism.

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In yet another aspect, a method of controlling a vehicle parking area using the speed bump is proposed. The method comprises the steps of laying the bump cum barrier at the entrance of the vehicle parking area and tracking the number of objects such as vehicles passing over the sensor. A vacancy status of the vehicle parking area is indicated by an indicating means in the parking area.

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In yet another embodiment, a method of monitoring a traffic at a specific location by using the speed bump is proposed. The speed bump is laid at the specific location for tracking the number of objects such as vehicles passing over it and analyzing the tracking information for implementing improvement measures for the traffic.

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The present invention consists of certain novel features and a combination of parts hereinafter fully described and illustrated in the accompanying drawings and particularly pointed out in the appended claims; it being understood that various changes in the details may be possible without departing from the scope of the invention or sacrificing any of the advantages of the present invention.

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BRIEF DESCRIPTION OF THE DRAWINGS

In the following drawings, same reference numbers generally refer to the same parts throughout. The drawings are not necessarily to scale, instead emphasis is placed upon illustrating the principles of the invention. The various embodiments and advantages of the present invention will be more fully understood when considered with respect to the following detailed description, appended claims and accompanying drawings wherein:

- 10 Fig. 1 illustrates a top view of the speed bump, according to an embodiment of the invention.

Fig.2a and 2b illustrate a cross-sectional view of the speed bump along the cut-line X-X' of Fig.1, according to an embodiment, showing a first arrangement for adjusting the elevation.

- 15 Figs. 2c and 2d illustrate a cross-sectional view of the speed bump along the cut-line X-X' of Fig.1, according to another embodiment, showing an alternative to Fig. 2a and 2b.

- Figs. 3a and 3b illustrate cross-sectional views of the speed bump along the cut-line Y-Y' of Fig.1, according to an embodiment, showing a second arrangement for adjusting the elevation, with at least one jackscrew.
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Fig.4a illustrates a cross-sectional view of the speed bump along the cut-line X-X' of Fig.3a, when there is no elevation caused by the jackscrew.

Fig.4b illustrates a cross-sectional view of the portable speed bump along the cut-line X-X' of Fig. 3b, when there is elevation caused by the jackscrew.

- 25 Fig. 5 illustrates a third arrangement for adjusting the elevation, using a pneumatic lift means.

Fig. 6 illustrates a fourth arrangement for adjusting the elevation, using a spring and cable mechanism.

DETAILED DESCRIPTION OF THE INVENTION

The following description presents several preferred embodiments of the present invention in sufficient detail such that those skilled in the art can make and use the invention.

Before describing in detail embodiments that are in accordance with the present invention, it should be noted that all of the figures are drawn for ease of explanation of the basic teachings of the present invention only. The extension of the figures with respect to the number, position, relationship and dimension of the parts of the preferred embodiment will be within the skill of the art after the following teachings of the present invention have been read and understood. Further, the exact dimensions and dimensional proportions to conform to specific force, weight, strength and similar requirements will likewise be within the skill of the art after the following teachings of the present invention have been read and understood.

As in Fig.1 a top view of the speed bump, according to an embodiment of the invention, is illustrated. Fig.2 illustrates a cross-sectional view of the speed bump along the cut-line X-X' of Fig.1, according to an embodiment, showing a first arrangement for adjusting the elevation. As illustrated, the speed bump shows a portable body (100). An elevation (290) of the body (100) is adjustable in dependence upon the usage as a speed bump or a barrier. In an embodiment, at least one sensing means (130) is coupled onto the body (100), for tracking a number of objects passing over the sensing means (130) and compiling a tracking information. The sensing means (130) may be a pressure sensor or an optical sensor, or any other type of sensor that can detect objects passing over it. The sensing means (130) may further comprise a remote electronic receiver for wirelessly receiving and storing the tracking information. The tracking information can be redirected by radio waves to any designated location or station for analyzing or evaluating how busy a particular road is in order to determine improvement measures.

Preferably, the body (100) is modular for adjusting the elevation (290). The modularity may be achieved by a first mechanism as shown in Fig.2a to Fig. 2d. At least two side portions (110a, 110b) mate with a middle portion (120) while in use. The mating is

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through projections (270) and holes (275) between the two side portions (110a, 110b) and the middle portion (120). The two side portions (110a, 110b) are at a fixed distance apart and with the middle portion (120) accommodated in between them. The middle portion (120) has a first face (250) more outwardly protruded than an opposite
5 second face (260) and is capable of mating with the two side portions (110a, 110b) with either face facing upwards, such that when the body (100) is seated on the bottom layer (240) with the first face (250) facing upwards, the elevation (290) is higher than when the second face (260) is facing upwards as shown by Fig. 2b. This is a very simple arrangement for manually changing the orientation of the middle portion (120)
10 in order to achieve two different elevations for use with two different applications. Different elevations are chosen for restricting incoming vehicle speed by different extent. Similarly, different elevations are also required for restricting protected areas by varying extents. Different pieces of the middle portion (120) providing different elevations (290) may also be used for the body (100).

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In an alternative embodiment of the present invention according to Fig. 2a and 2b, the middle portion (120) may be elevated by changing the mating between the projections (270) and the holes (275) as portrayed by Fig. 2c and Fig. 2d. In this embodiment, the holes (275) accommodated on each of the side portions (110a, 110b) are to be
20 quantifiably more than the projections (275) of the middle portion (120), by at least one, in order to raise the middle portion (120) by at least one level. The embodiments of Fig. 2a – 2d are achievable by enabling the the side portions (110a, 110b) to be retractable, preferably by means to facilitate movement of the side portions (110a, 110b), to adjust the mating between the projections (270) and the holes (275).

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A second arrangement for adjusting the elevation is shown in Figs. 3a and 3b. Herein, cross-sectional views of the speed bump along the cut-line Y-Y' of Fig.1 are presented, wherein the elevation (290) is adjusted with at least one jackscrew (410). Fig. 4a illustrates a cross-sectional view of the speed bump along the cut-line X-X' of Fig.4a,
30 when there is no elevation caused by the jackscrew, while Fig. 4b illustrates the case when there is elevation caused by the jackscrew. As illustrated in Figs.3a and 3b, the elevation (290) in the modular body (100) is adjusted by at least one jackscrew (410) operable by a leadscrew (420). The jackscrew (410) is provided within the middle portion (120), with the middle portion (120) resting on a top node (430) of the

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5 jackscrew (410) such that the middle portion (120) can be raised or lowered independent of the at least two side portions (110a, 110b), by turning a knob (440), connected to the leadscrew(420). The knob (440) may be turned by manual or automatic means. The height of the middle portion (120) is thus variable consistently based on the pitch of the leadscrew (420). Every rotation of the knob (440) cause a linear change in the height of the middle portion (120). The knob (440) may also be associated with a gear system (not shown) that is constructed from gears of different gear ratio to allow speed variations in linearly adjusting the height of the middle portion (120). The gear system (not shown) may be associated with a plurality of
10 jackscrew (120) to adjust the elevation of different parts of the middle portion (120). With the gear system, a more continuous height variation of the speed bump is achievable.

15 Raising the middle portion (120) higher would help in order to force vehicles to slow down faster. All these can be done by a switch (not shown) of the control equipment inside. And at the same time the middle portion (120) can also be returned to its original position by pushing another switch (not shown).

20 In another embodiment of the invention, the middle portion (120) may be raised to a much higher level than the height of a speed bump, thus, used as a barrier to prevent vehicle entrance or exit. The height of the middle portion (120) is substantially higher than the height of the side portions (110a, 110b) and may be embedded into the ground prior to elevating the middle portion (120). Such elevation of the middle portion (120) is achievable by the jackscrew (410) mechanism as described in the previous
25 paragraphs. Other means of achieving a higher elevation of the middle portion is by using a pneumatic lift mechanism (500) or a spring and cable mechanism (600) as shown by Fig. 5 and Fig. 6.

30 The spring and cable mechanism (600) is constructed from a plurality of resilient means (610), preferably compression spring to force the middle portion (120) upwards. An electric motor (630) is mechanically coupled to a pulley (640) to adjust the length of a cable (620). The cable (620) which is preferably stainless steel wire cable, is attached to the middle portion (120) to hold it against the biasing of the resilient means (610). The height of the middle portion (120) in this embodiment is

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thus determined by the length of the cable (620) released from the pulley (640) as illustrated by Fig. 6.

The speed bump may be used for controlling a vehicle parking area, by laying the same at the entrance of the vehicle parking area for tracking the number of vehicles passing over it as sensed by the sensing means (130). A vacancy status of the parking area is indicated by an indicating means in the parking area. Likewise, the speed bump may be used for monitoring a traffic at a specific location for analyzing the compiled tracking information, particularly for implementing improvement measures for the traffic. The speed bump can be used for various applications as a barrier, like as a 'no parking' barrier for private parking lots or as road dividers or for redirecting traffic or for protecting secured areas. The elevation can be adjusted as required, manually or by using remote control, such as when stopping a fleeing car. In private use, major car park owners can monitor the number of cars that are going into their car park area and leaving therefrom, and from there they can redirect the signal to certain signboards to inform car park users of how many car parks are still available, etc.

As to further discussion of the manner of usage and operation of the present invention, the same should be apparent from the above description. Accordingly, no further discussion relating to the manner of usage and operation will be provided.

While the foregoing description presents preferred embodiments of the present invention along with many details set forth for purpose of illustration, it will be understood by those skilled in the art that many variations or modifications in details of design, construction and operation may be made without departing from the present invention as defined in the claims. The scope of the invention is as indicated by the appended claims and all changes that come within the meaning and range of equivalency of the claims are intended to be embraced therein.

CLAIMS

1. An adjustable speed bump for controlling speed of vehicles when placed on roadways and for serving as a barrier when used for blocking restricted areas,
5 comprising a portable body (100), wherein the body (100) having:
a middle portion (120);
at least two side portion (110a, 110b)
whereby an elevation (290) of the middle portion (100) is adjustable in dependence upon the usage as a speed bump or a barrier.
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2. The speed bump according to claim 1, further comprising:
at least one sensing means (130) coupled onto the body (100), for tracking a number of objects passing over the at least one sensing means (130), the at least one sensing means (130) thereby compiling a tracking information.
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3. The speed bump according to Claim 2 wherein the at least one sensing means (130) comprises a pressure sensor.
4. The speed bump according to Claim 2 wherein the at least one sensing means (130)
20 comprises an optical sensor.
5. The speed bump according to Claim 2 wherein the at least one sensing means (130) further comprises a remote electronic receiving means for wirelessly receiving and storing the tracking information.
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6. The speed bump according to Claim 1 wherein the body (100) is modular for adjusting the elevation (290), the speed bump further comprising:
a plurality of projections (270);
a plurality of holes (275) wherein the plurality of holes (275) and the
30 plurality of projections (270) are accommodated to the middle portion (120) and the side portion (110a, 110b) respectively or vice versa;
the middle portion (120) having a first face (250) more outwardly protruded than an opposite second face (260) and being capable of mating with the side portions (110a, 110b) through the plurality of

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projections (270) and holes (275) with either face facing upwards.

7. The speed bump according to Claim 1 wherein the body (100) is modular for adjusting the elevation (290), the speed bump further comprising:
- 5 a plurality of projections (270);
a plurality of holes (275) wherein the plurality of holes (275) and the plurality of projections (270) are accommodated to the middle portion (120) and the side portion (110a, 110b) respectively or vice versa;
whereby the plurality of holes (275) are quantifiably more than the
10 plurality of projections (270) to raise the middle portion (120) by at least one level.
8. The speed bump according to Claim 1 wherein the body (100) is modular for adjusting the elevation (290), the speed bump further comprising:
- 15 at least one jackscrew (410) operable by a leadscrew (420), the jackscrew (410) provided within the middle portion (120) with the middle portion (120) resting on a top node (430) of the jackscrew (410), such that the middle portion (120) can be raised or lowered independent of the at least two side portions (110a, 110b) by turning a knob (440).
- 20 9. The speed bump according to Claim 1 wherein the body (100) is modular for adjusting the elevation (290), the speed bump further comprising:
a pneumatic lift mechanism (500) accommodated below the middle portion (120) to elevate the middle portion (120).
- 25 10. The speed bump according to Claim 1 wherein the body (100) is modular for adjusting the elevation (290), the speed bump further comprising:
a plurality of resilient means (610);
a cable (620) attached to the middle portion (120)
30 a pulley (640) coupled to the cable (620);
a motor (630) mechanically coupled to the pulley (640) to adjust the length of the cable (620) releasable from the pulley (640);
whereby the plurality of resilient means (610) forces the middle portion (120) upwards while the cable (620) hold the middle portion (120)

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against the biasing of the resilient means (610) in which the height of the middle portion (120) is determined by the length of the cable (620) releasable from the pulley (640).

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