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(54) **BARRIER SYSTEM FOR CONTROLLING THE PASSAGE OF VEHICLES**

(57) The invention relates to a barrier system for controlling the passage of vehicles. comprising at least one module (1). The module comprises: one tubular body (2); tubular ribs (3) having a trapezoidal configuration with an upper side parallel to a lower side and two legs, wherein the body (2) is inside of the ribs (3); one longitudinal shaft (5) with spikes (7), rotatable between a first stable initial position and a second stable final position; a drive mech-

anism (9,11) of the rotation of the longitudinal shaft, to place the longitudinal shaft in the first position with the spikes concealed or in the second position in which the spikes protrude out of the module; and a rotary actuator (12) that drives the drive mechanism of the rotation of the longitudinal shaft. Wherein the lower side of the ribs (3) comprises grooves (22) and the two legs of the ribs comprises protrusions (27).

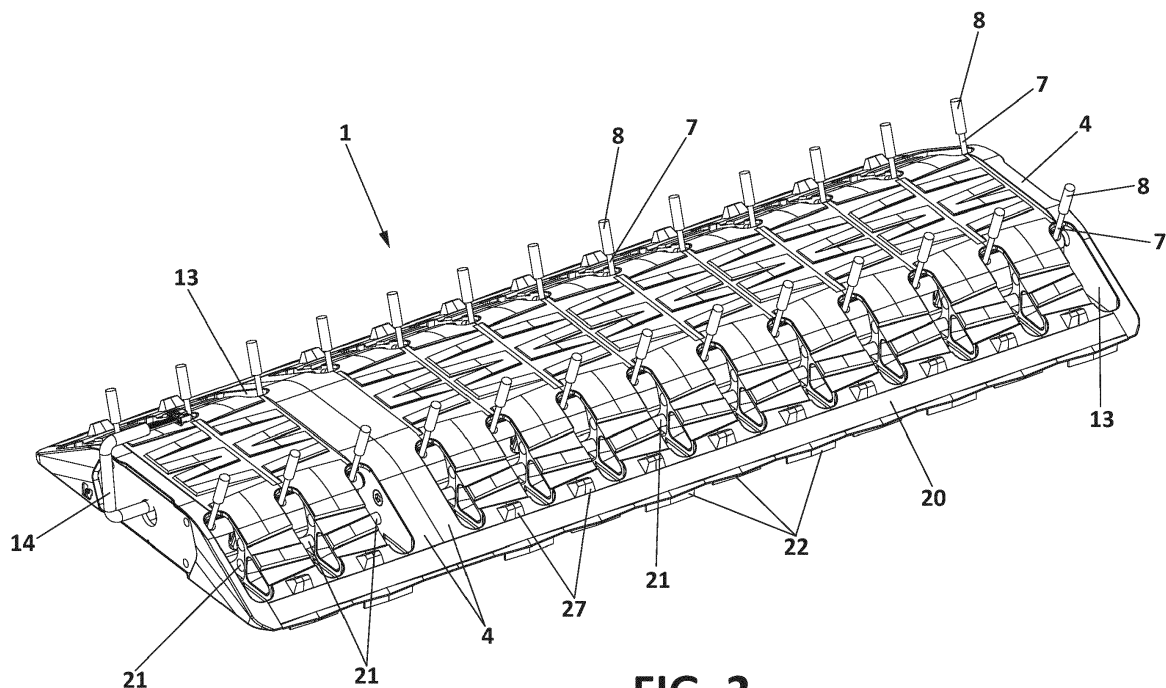


FIG. 2

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Description

Object of the invention

[0001] The invention consists of a barrier system for controlling the passage of vehicles comprising a barrier made up of independent interconnectable modules to obtain a barrier system of variable length depending on the needs required in each control to be carried out.

[0002] The barrier can be folded/unfolded, such that once folded it facilitates storage and transport, taking up minimal space.

[0003] In addition, the barrier system is equipped with a mechanism that allows spikes included in each module to be extracted/concealed so that, when activating the mechanism, if necessary, the spikes that are concealed in the module are placed in a protruding position, which causes the deflation of the wheels of the vehicles to take place when passing over the barrier system.

[0004] An object of the invention is to provide greater adherence of the barrier to the surface wherein it is mounted, preventing the movement thereof when a vehicle passes over it.

[0005] Another object of the invention is to provide the barrier with lighting in order to facilitate the visualisation thereof, especially in low visibility conditions.

[0006] An object of the invention is also to improve the adaptation of the barrier to terrain irregularities.

[0007] Another object of the invention is to facilitate activation of the system via cable or wirelessly.

Technical problem to be resolved and background of the invention

[0008] In the state of the art, the use of barriers is known which extend on the road on which vehicles must circulate in an area that requires a security control, breathalyser control, etc., to be carried out.

[0009] In this sense, there is a type of barrier that can be rolled up and that is made up of sections that enable the roll-up thereof to be performed when the barrier is to be transported and stored, such that they take up less space.

[0010] These barriers are equipped with retractable spikes arranged on respective shafts which are driven by two motors, such that the spikes are concealed between two sections and are extracted by means of the rotation of the motor when the passage of the vehicle are to be prevented. When the spikes are concealed, the barrier performs speed control functions.

[0011] This configuration exhibits the drawback that the make-up of the sections that form the barrier is integral thereto and, therefore, they cannot be independent. The length thereof cannot be modified depending on the needs of the type of controls for which it is intended.

[0012] In addition, this configuration exhibits the drawback that when performing the rolling, it is sometimes the case that the mechanical attachments between the

shafts of each module snap, as the rolling subjects them to stresses, so the barrier system becomes unusable from the breaking point.

[0013] Furthermore, the aforementioned roll-up barrier uses a rigid polymer, reinforced with fibre or similar, which does not allow complete adaptation or flexibility on the tarmac and this aspect can lead to sliding on the tarmac and a greater number of product breakages.

[0014] The above problems are solved in the Spanish utility model with publication number ES1202111 U, belonging to the same holder as the present invention, wherein a configuration is provided defined by independent modules attached by means of hinges that enable the length of the barrier to be modified and the folding thereof to be performed such that, in the folded position, the modules form a vertical alignment, wherein a module in a non-inverted horizontal position alternates over a module in an inverted horizontal position and so on, allowing the modules to occupy the minimum space in the folded position to perform the transport and storage of the barrier.

[0015] The modules of the utility model ES1202111U exhibit the drawback that the lower face thereof is smooth, which establishes that the retention on the surface on which it is mounted is not optimal when a vehicle passes over the barrier. The present invention incorporates a module the lower face of which is equipped with grooves, which together with the protrusions provided on the upper face thereof, provide greater adherence to the tarmac when a vehicle presses on the barrier, thus helping to "nail" the barrier to the ground, avoiding a possible slide, mainly at low speeds.

[0016] In addition, the barrier of the utility model ES1202111U lacks lighting that facilitates the visualisation thereof, especially in low light conditions. The present invention incorporates luminescent LED strips to facilitate the visualisation thereof in low light conditions.

[0017] The hinge configuration has been modified to provide a rotation that allows two movements; the torsion-displacement between modules and the vertical articulation between them, which provides greater adaptability to the terrain. The previous model did not allow it.

[0018] Another improvement is that the system is allowed to operate by means of a wireless controller.

Description of the invention

[0019] To achieve the objectives and solve the aforementioned drawbacks, the invention provides a barrier system comprising at least one module, which in turn comprises at least one tubular body, tubular ribs and at least one longitudinal shaft, that is rotatable between a first stable position and a second stable position. The longitudinal shaft comprises with a series of spikes arranged along the longitudinal shaft itself. The tubular ribs have an "isosceles trapezoid" configuration, that is, with an upper side parallel to a lower side and two legs joining

the upper and lower sides. The upper side is shorter than the lower side. The tubular ribs cover the tubular body, that is, the tubular body is disposed internally in the tubular ribs.

[0020] Throughout the present description, "tubular" should be understood to mean "internally hollow" regardless of the outer shape.

[0021] In addition, the module further comprises a drive mechanism of the rotation of the longitudinal shaft, to place it in the first or in the second position. In the first stable position of the longitudinal shaft, the spikes are concealed in the module and in the second position, the spikes protrude outside of the module, such that, in the event that the operator of the barrier system sends an activation signal, the spikes cause the puncturing of the wheels.

[0022] The module comprises a rotary actuator, with two stable positions, by means of which the drive mechanism of the rotation of said longitudinal shaft is actuated, to cause the rotation of said longitudinal shaft, placing it in one of the two stable positions. Preferably, the rotary actuator is of the electromechanical type.

[0023] Advantageously, the present invention comprises grooves on the lower face of the module, and protrusions on the upper face of the module. The grooves and the protrusions are configured to provide greater adherence to the tarmac, such that when the protrusions are pressed on, this helps the grooves of the barrier to be fixed to the ground and to prevent the barrier from sliding, mainly at low speeds. Preferably, the protrusions are on the leg sides of the ribs and the grooves are on the lower side of the ribs. Even more preferably, the protrusions are located on the leg sides of the ribs close (in the third closest to the apex of the leg side length) to the vertex of connection between the leg side and the bottom side, and the grooves on the lower side of the ribs close (in the third closest to the vertex of the length of the lower side) to the vertex of connection between the lower side and the leg side. The protrusions have an inverted "V" shape that together with the leg side of the ribs forms a "V" where the wheel of a vehicle that steps on the module is positioned in such a way that the weight of the vehicle falls on the grooves exerting a force perpendicular to the surface where the module rests (and consequently the barrier system of the present invention), thereby increasing the adhesion of the module to the surface.

[0024] Furthermore, the module comprises at least one LED strip to facilitate the visualisation of the module. The strip is arranged parallel to the shaft of the barrier.

[0025] In the preferred embodiment of the invention, it is envisaged that the system comprises a plurality of independent modules attached at the ends thereof by means of hinges for folding/unfolding said modules. The hinges are configured so that, in the folded position, the modules form a vertical alignment, wherein a module in a non-inverted horizontal position alternates over a module in an inverted horizontal position and so on, such that the modules occupy the minimum space in the folded

position to perform the transport and storage of the barrier.

[0026] In addition, the hinges are configured to cause the relative movement between modules in a linear and rotational direction, allowing the torsion between adjacent modules, in both directions, to facilitate the adaptation of the barrier to terrain irregularities, while facilitating that it can withstand the weight of vehicles when they pass over the barrier.

[0027] The hinges are hingedly fixed to supports, which in turn are removably fixed to the ends of the modules, so that they enable the number of consecutive modules that make up the barrier to be modified and consequently the length of the barrier system to vary, which also enables a module to be removed in case it is damaged. In this way, the barrier system can still be used with the entire length thereof, except that of the damaged module, until it can be repaired.

[0028] The hinges comprise two parallel bodies, attached in a slidable manner by means of two screws, housed in a slot, of each one of said bodies, through which they can run, allowing relative sliding between both bodies, which allows the torsion and the linear movement between modules. In addition, each of these parallel bodies has a rotation shaft, by means of which they are retained in the supports on which the folding/unfolding articulation between modules is allowed.

[0029] In one embodiment, each module comprises at least one tubular body of rigid material, for example aluminium, which is covered by a series of tubular ribs, preferably trapezoidal, of non-slip elastomer material, and the juxtaposition of which forms holes through which the spikes pass when moving from the first stable position to the second stable position; and through which they pass when concealing from the second stable position to the first stable position. This configuration enables the weight of heavy vehicles to be withstood without damage. The lower face of the ribs comprises the grooves, and the upper face of said ribs comprises the aforementioned protrusions.

[0030] The at least one LED strip is arranged inside the module, and the diodes thereof are located so that they protrude through the holes defined between ribs to facilitate the visualisation thereof.

[0031] In the preferred embodiment of the invention, it comprises a pair of rotatable longitudinal shafts, to allow the operation thereof in both directions of traffic circulation, one for each direction of circulation, which are related to each other by means of the drive mechanism that causes the rotation of both shafts simultaneously, to place them in a position selected between the first stable position and the second stable position, such that the spikes are concealed or protrude simultaneously in each one of the modules that make up the barrier.

[0032] The drive mechanism of the rotation of the two longitudinal shafts comprises a wheel, which is attached to respective connecting rods, to each of which is fixed each of the longitudinal shafts. The wheel is driven by

the rotary actuator so that it produces the simultaneous rotation of the two longitudinal shafts.

[0033] Each module comprises a control block (PCB), which governs the operation of the rotary actuator, such that the control blocks of the different modules are interconnected, in a known manner, to allow the activation of the rotary actuators at the same time with a small lag. In order to enable this connection between modules to be performed, the parallel bodies of the hinges are equipped with through holes, through which the connection wiring between modules runs.

[0034] The system is powered by means of a rechargeable battery included in at least one of the modules.

[0035] The system further comprises a remote control, from which the operation of at least one of the control blocks of one of the modules is governed to cause the movement of the spikes as previously stated. This remote control can communicate with the control block via cable or wirelessly.

[0036] At all times, the control circuit is configured to perform an operation test of the system and to signal the result of said test, indicating whether there is a fault or the test has been performed correctly. This indication is made, for example, by means of optical indicators.

[0037] In order to provide greater robustness to the modules, the tubular body of each module is sealed at the ends thereof by means of a cover, which in turn seals the end ribs of each module. Additionally, the closure of the cover on the ends of the tubular body is performed by means of a gasket that provides an airtight closure of each module.

[0038] Furthermore, in order to provide greater robustness and consistency to the independent modules, as well as a greater length, the invention envisages that each module comprises two tubular bodies covered by the tubular ribs, which are flexible made of elastomer material, so that each of said tubular bodies is closed at the ends thereof by means of a cover, as those already described, so that the adjacent covers of the two tubular bodies are configured to house the drive mechanism of the at least one longitudinal shaft. This configuration allows the module mechanism to be closed and protected between the covers of the tubular bodies.

[0039] The spikes are preferably hollow in configuration, so that the self-sealing tires also deflate, with the bevelled end thereof; and they are covered with a cap that is configured to break when a wheel passes over the spikes. The spikes are attached to the longitudinal shaft by means of an elastic element that allows the spikes to detach from the barrier and be lodged in the wheel.

[0040] Each module can include one or more reflective strips to facilitate the visualisation thereof, especially at night.

Description of the figures

[0041] To complete the description, and for the purpose of helping to make the features of the invention

more readily understandable, this specification is accompanied by a set of drawings constituting an integral part of the same, wherein, by way of illustration and not limitation, the following has been represented:

Figure 1 is an exploded perspective view of the configuration of an exemplary embodiment of the independent module of the invention from which the barrier system of the invention is formed.

Figure 2 is a perspective view of the module of Figure 1 but mounted, wherein the spikes are in the stable external position of the module to puncture the wheels of a vehicle if necessary.

Figure 3 is a perspective view of a barrier made up of a plurality of modules connected to each other, in the extended position on a floor to perform a control, wherein the spikes are in the stable external position of the module to puncture the wheels of a vehicle if necessary.

Figure 4 is a view equivalent to the preceding figure with the modules folded and the spikes are in the stable internal position, to perform the transport and storage thereof.

Figure 5 is an exploded view of the hinge configuration.

Figure 6 is an unexploded view of the hinge of the preceding figure.

Figure 7 is a perspective view of two modules that have started folding.

Figure 8 is a perspective view of an example of the sliding of the parallel bodies of the hinges of two consecutive modules, causing the torsion between modules to adapt to the surface on which they are mounted, and at the same time to allow the modules to better withstand the weight of the vehicles.

Preferred embodiment of the invention

[0042] The invention is described below based on the aforementioned figures.

[0043] The barrier comprises at least one independent module 1 that is equipped with at least one tubular body 2, which is covered with a series of ribs 3, also of tubular configuration. The ends of the tubular body 2 are sealed by means of covers 4.

[0044] The tubular body 2 comprises at least one longitudinal shaft 5 with the ability to rotate, which runs outside the tubular body 2, and wherein it is supported by means of side parts 10 riveted to the tubular body 2. In the exemplary embodiment, the tubular body is of a rigid configuration, for example made of aluminium, and it exhibits a rectangular cross section; and the ribs are made of elastic material, for example elastomer and with a trapezoidal cross section, so that the covers 4 also exhibit a trapezoidal configuration complementary to that of the ribs 3, such that the covers 4 perform the closure, both of said end ribs 3 of the module 1, and of the tubular body 2. The closing of the covers 4 on the tubular body 2 is

performed by means of an airtight gasket 6 that keeps it sealed. The module is manufactured to withstand the weight of heavy vehicles without suffering damage to the internal components.

[0045] There are a plurality of stainless steel, hollow spikes 7 inserted in the longitudinal shaft 5, the free end of which is cut to a bevel and is covered with a protection cap 8, which breaks when the wheel of a vehicle passes over the spike, enabling said wheel to deflate, since the spike is hollow.

[0046] The fixing of the spikes on the longitudinal shaft is performed in a conventional way by means of an elastic element 28 that allows the spikes to detach from the barrier and be lodged in the wheel, performing their deflation.

[0047] The barrier allows vehicles to circulate in both directions, so that, in the preferred embodiment, the module comprises two longitudinal shafts 5, arranged on each side of the tubular body 2, and supported, with the ability to rotate by means of the side parts 10.

[0048] The internal ends of the longitudinal shafts 5 are fixed to a connecting rod 9, which in turn are attached to a wheel 11, which is actuated by an electromagnetic rotary actuator 12 with two stable positions, so that the first position maintains the spikes 7 concealed between the ribs 3 and in the second position the spikes protrude outward from the ribs 3 through holes 13 that are generated between the ribs 3. In this second position, the spikes are arranged in an inclined position perpendicular to the inclined surface sections of the ribs 3. The actuator 12 is housed in the tubular body 2 and is connected to the wheel 11 by means of the gasket 6 and the cover 4, to perform the simultaneous movement of the longitudinal shafts 5 as described.

[0049] Furthermore, the module comprises a control block 19 (PCB), by means of which the activation of the rotary actuator 12 is governed, from the outside of the module, as described below.

[0050] In the embodiment of the invention, the module 1 comprises two tubular bodies 2, one of them being, in the example, of greater length than the other. Both include their corresponding covers 4 and ribs 3, such that in the attachment area of the two tubular bodies, the covers 4 thereof are attached by interposing a gasket 18. Said covers 4 are configured to house and retain the wheel 11 together with the connecting rods 9. This configuration enables a greater length of the module to be achieved and greater resistance to be provided. Furthermore, the interior of the tubular bodies comprises wiring 14 and connectors 15, to connect the control block 19 with the rotary actuator 12 and to enable the connection between different modules to be performed, as described below. The second tubular body enables the wiring to be collected in the inside thereof after performing the connection to an adjacent module, being protected and concealed. The entire module mechanism is closed and protected between the covers of the tubular bodies. In this case, the longitudinal shafts 5 are made up of two sections, corresponding to the length of each tubular body,

and which are interconnected by means of the connecting rods 9, to secure the described operation.

[0051] As it has been commented, the invention envisages that the barrier system comprises a plurality of modules 1 interconnected with each other by means of hinges 16, which are equipped with two parallel bodies 29, attached with the ability to slide by means of two screws 30, which are fixed to the opposite body in a threaded blind hole 32, such that the screws are housed in a slot 31 of each one of the bodies through which they can move. These grooves 31 are substantially parallel and allow relative sliding between both bodies, allowing the torsion and relative movement between modules. Said sliding between the bodies is guided and limited by the length of the slots 31. In addition, each one of the bodies 29 exhibits a rotation shaft 33, by means of which they are retained in respective supports 17 on which they are articulated. The two supports of one of the parallel bodies 29 are fixed on the covers 4 of a module and the other two supports 17 of the other parallel body 29 are fixed on the covers 4 of an adjacent module, such that by means of this configuration the vertical articulated movement between modules around the rotation shafts 33 is allowed, and sliding between parallel bodies 29 is further allowed, such that the adjacent modules are also able to rotate with torsion angles in both directions, by means of the described sliding of the parallel bodies 29, facilitating the adaptation of the barrier to the terrain irregularities, at the same time enabling it to withstand the weight of the vehicles when they pass over the area wherein a hinge is arranged. The folding of the modules 1 is started as shown in Figure 7, to obtain the position represented in Figure 4, wherein the modules 1 are vertically aligned, alternating a module in an inverted horizontal position over a module in a non-inverted horizontal position and so on such that it takes up minimum space in storage and transport. Figure 3 shows the barrier system in the extended position. In order to facilitate folding, a flap 35 has been arranged in the even modules that enables each pair of modules to be easily lifted and without pinching the fingers.

[0052] Figure 8 shows a possible case of sliding of the parallel bodies of the hinges of two consecutive modules, causing the torsion between modules to adapt to the surface on which they are mounted, and at the same time enabling the modules to better withstand the weight of vehicles when they pass over the area wherein the hinge is arranged.

[0053] The supports 17 are removable, allowing the hinges to be removed, so that a variable number of modules can be attached, depending on the length of the barrier that is required in the control, such as, for example, obtaining a barrier that crosses the entire width of the road. Furthermore, this configuration allows the removal of a damaged module.

[0054] As indicated, the different control blocks 19 are interconnected with each other in cascade by means of the wiring 14 and the connectors 15, such that all the

rotary actuators 12 are activated at the same time, with a minimum lag. In order to enable this connection between modules, the parallel bodies 29 of the hinges 16 are equipped with through holes 34, through which the wiring 14 runs.

[0055] The folded modules are fixed by means of straps (not shown), obtaining a single body, and they are stored in a suitcase (not shown), specially designed to store the folded modules without allowing movement therein. This suitcase also has the ability to connect to enable a barrier battery to be recharged, as discussed below.

[0056] The control block 19 of the first module is of the master type and the rest of the slave type, to activate the rotary actuators at the same time. Furthermore, the master block is connected to an on/off button 25, and to a charging connector 36 of the internal battery (not shown), which has been included in the first module.

[0057] The master block comprises a wireless communication module, for example Bluetooth, for communication with a wireless controller (not shown) for activation from the outside of the spikes. The possibility is envisaged that this wireless controller can further be connected by means of a cable to the master control block, through the connector 36 and thus function in a wired manner.

[0058] In addition, the battery recharge can also be performed by means of the suitcase, for which a connector is included therein, which in turn connects to the connector 36 of the first module, so that the suitcase performs the function of charger.

[0059] The barrier further comprises LED strips 21, which are parallel to the shaft of the barrier, such that the LEDs of the strips are illuminated through the holes 13 generated between the different ribs 3, through which the spikes 7 protrude, which facilitates visibility of the barrier in low light conditions. For example, when powering the LEDs, by means of the cables 14', they light up, for example in amber and intermittently.

[0060] The ribs 3 are provided with grooves 22 on the lower face thereof, and with protrusions 27 on the upper face thereof, configured to provide greater adherence to the tarmac, so that when the barrier is pressed on, this helps the barrier to be fixed to the ground and to prevent the sliding thereof, mainly at low speeds.

[0061] Furthermore, the modules 1 comprise a strip of reflective material 20, to facilitate the visualisation thereof, especially at night.

[0062] The first module comprises a handle 23, and the last module is equipped with wheels 24 that facilitate the transport and handling of the barrier.

Claims

1. A barrier system for controlling the passage of vehicles, comprising at least one module (1), which in turn comprises:

- at least one tubular body (2);
- tubular ribs (3) having a trapezoidal configuration with an upper side parallel to a lower side and two legs, wherein the tubular body (2) is placed in the interior of the tubular ribs (3);
- at least one longitudinal shaft (5), rotatable between a first stable initial position and a second stable final position, wherein the longitudinal shaft (5) comprises spikes (7) arranged along the longitudinal shaft (5);
- a drive mechanism (9,11) of the rotation of the longitudinal shaft (5), to place the longitudinal shaft (5) in a position selected between the first stable initial position and second stable final position, wherein in the first stable initial position of the longitudinal shaft (5), the spikes (7) are concealed in the module (1) and in the second stable final position, the spikes (7) protrude out of the module (1); and,
- a rotary actuator (12) that drives the drive mechanism (9,11) of the rotation of the longitudinal shaft (5);

characterised in that the lower side of the tubular ribs (3) comprises grooves (22) and the two legs of the tubular ribs (3) comprises protrusions (27).

2. The system according to claim 1, wherein it comprises a plurality of independent modules (1) attached at the ends thereof by means of hinges (16) for folding/unfolding the modules (1), which are configured so that, in the folded position, the modules (1) form a vertical alignment, alternating a module in non-inverted horizontal position over a module in inverted horizontal position and so on, wherein the hinges are further configured to allow relative sliding between adjacent modules in both the rotational direction, in both directions of torsion between modules, and in the linear direction.
3. The system according to claim 2, wherein the hinges (16) are hingedly fixed to a support (17) removably fixed at the ends of the modules, to form the barrier system with a variable number of modules.
4. The system according to claim 3, wherein the hinges (16) comprise two parallel bodies (29), attached in a sliding manner by means of two screws (30), housed in a slot (31), of each one of the bodies, through which they can run, allowing relative sliding between both bodies in both rotational and linear directions, wherein each one of the parallel bodies (29) has a rotation shaft (33), by means of which they are retained in the supports (17) on which they are articulated.
5. The system according to claim 1, wherein the tubular ribs (3) are configured so that when the tubular ribs

- (3) are joined together, holes (13) are formed through which the spikes (7) cross when passing from the first stable initial position to the second stable final position and through which the spikes are concealed when passing from the second stable final position to the first stable initial position. 5
6. The system according to claim 5, wherein the module (1) comprises at least one LED strip (21) to facilitate the visualisation of the module, and wherein diodes of the LED strip (21) are arranged inside the module and protrude through the holes (13). 10
7. The system according to claim 1, wherein the ribs (3) are made of slip-resistant elastic material. 15
8. The system according to any of the preceding claims, wherein the module (1) further comprises a pair of rotatable longitudinal shafts (5), one for each direction of vehicles circulation, related by means of the drive mechanism to rotate both shafts (5) simultaneously. 20
9. The system according to claim 1 or 8, wherein the drive mechanism of the rotation of the longitudinal shafts (5) comprises a wheel (11), driven by the rotary actuator (12), and which is connected to respective connecting rods (9), wherein each connecting rod (9) is attached to one of the rotatable longitudinal shafts (5). 25 30
10. The system according to claim 1 or 9, wherein each module comprises a control block (19) that governs the operation of the rotary actuator (12), and are interconnected to drive the rotary actuators (12) at the same time and to respond to external control signals. 35
11. The system according to claim 10, wherein it comprises a remote control controller, for governing the at least one control block (19) of a module (1), wherein the remote controller is selected from a remote controller that communicates with the control block via cable and a remote controller that communicates with the control block wirelessly. 40 45
12. The system according to any of the preceding claims, wherein the module (1) comprises at least one element selected from the group consisting of a rechargeable power supply battery, one strip of reflective material (20) and a combination of both of them. 50
13. The system according to any of the preceding claims, wherein the tubular body (2) of each module is sealed at the ends thereof by means of a cover (4), which in turn closes the end ribs (3) of each module, by means of an airtight sealing gasket (6) of the tubular body (2). 55
14. The system according to claim 1, wherein the spikes (7) exhibit a hollow bevelled-end configuration, said end of the spikes being covered with a cap (8) that breaks when a wheel passes over said spikes.
15. The system according to claim 14, wherein the spikes are attached to the longitudinal shafts by means of an elastic element (28) so that they are lodged in a wheel when passing over the spikes.

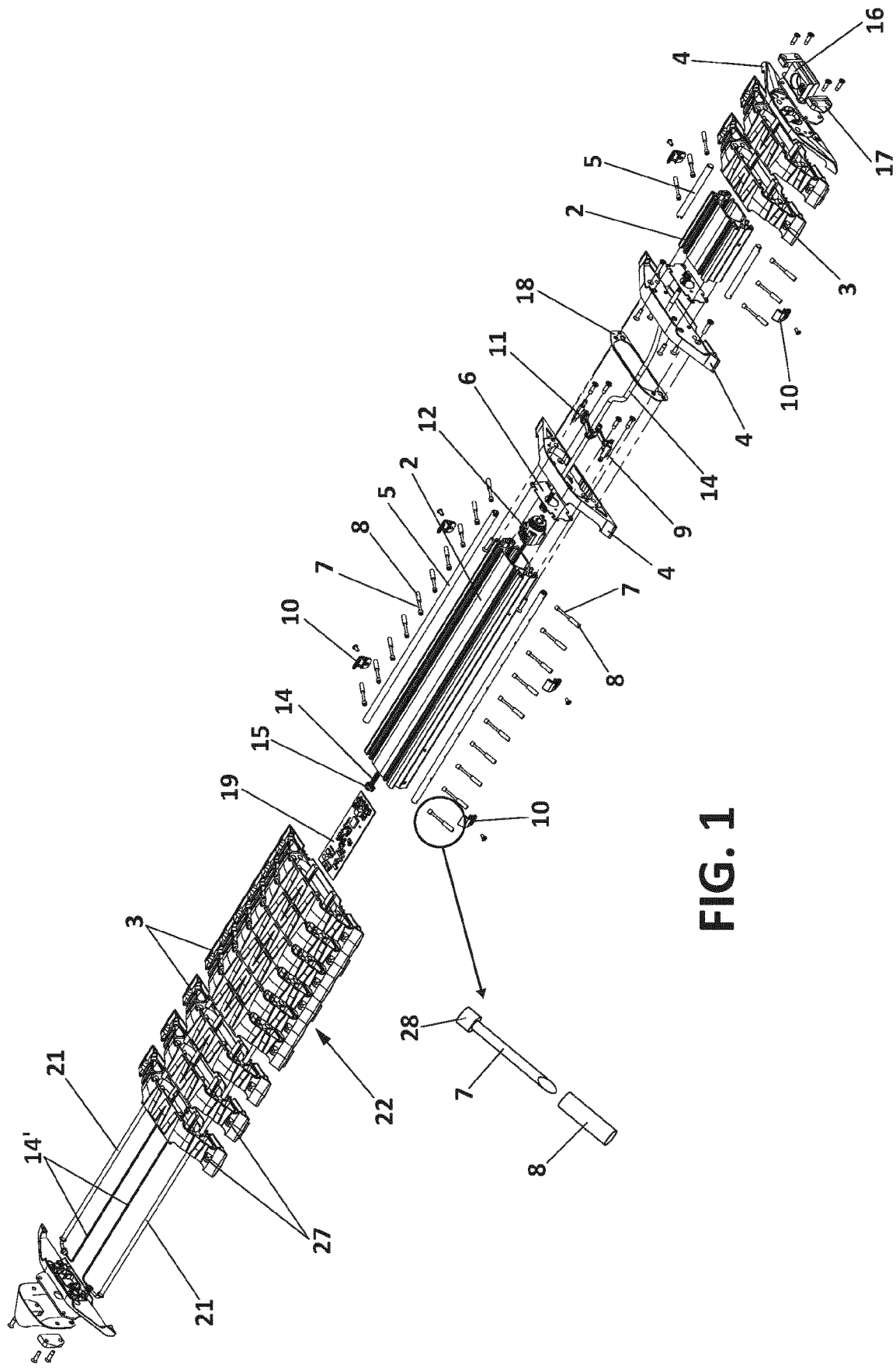


FIG. 1

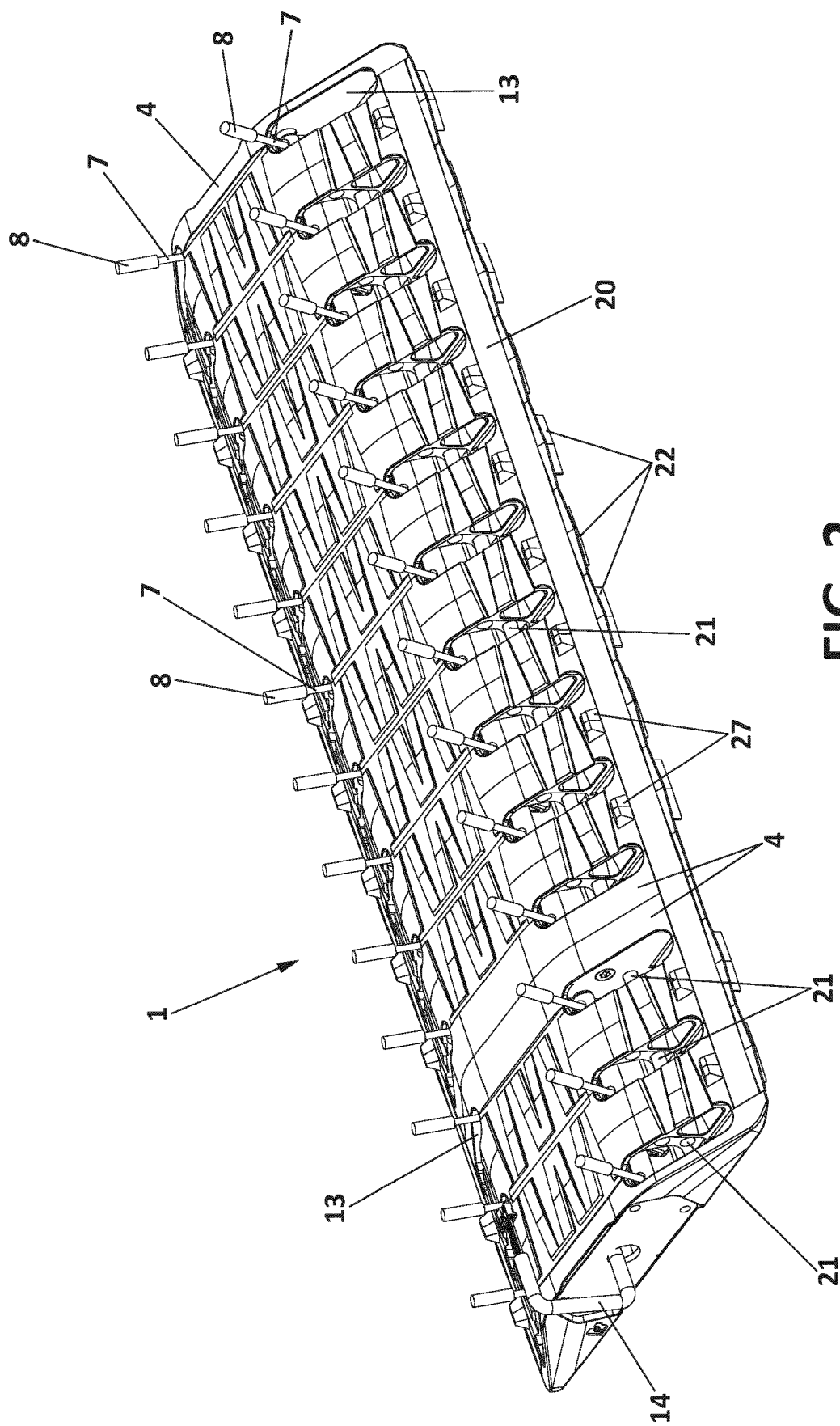


FIG. 2

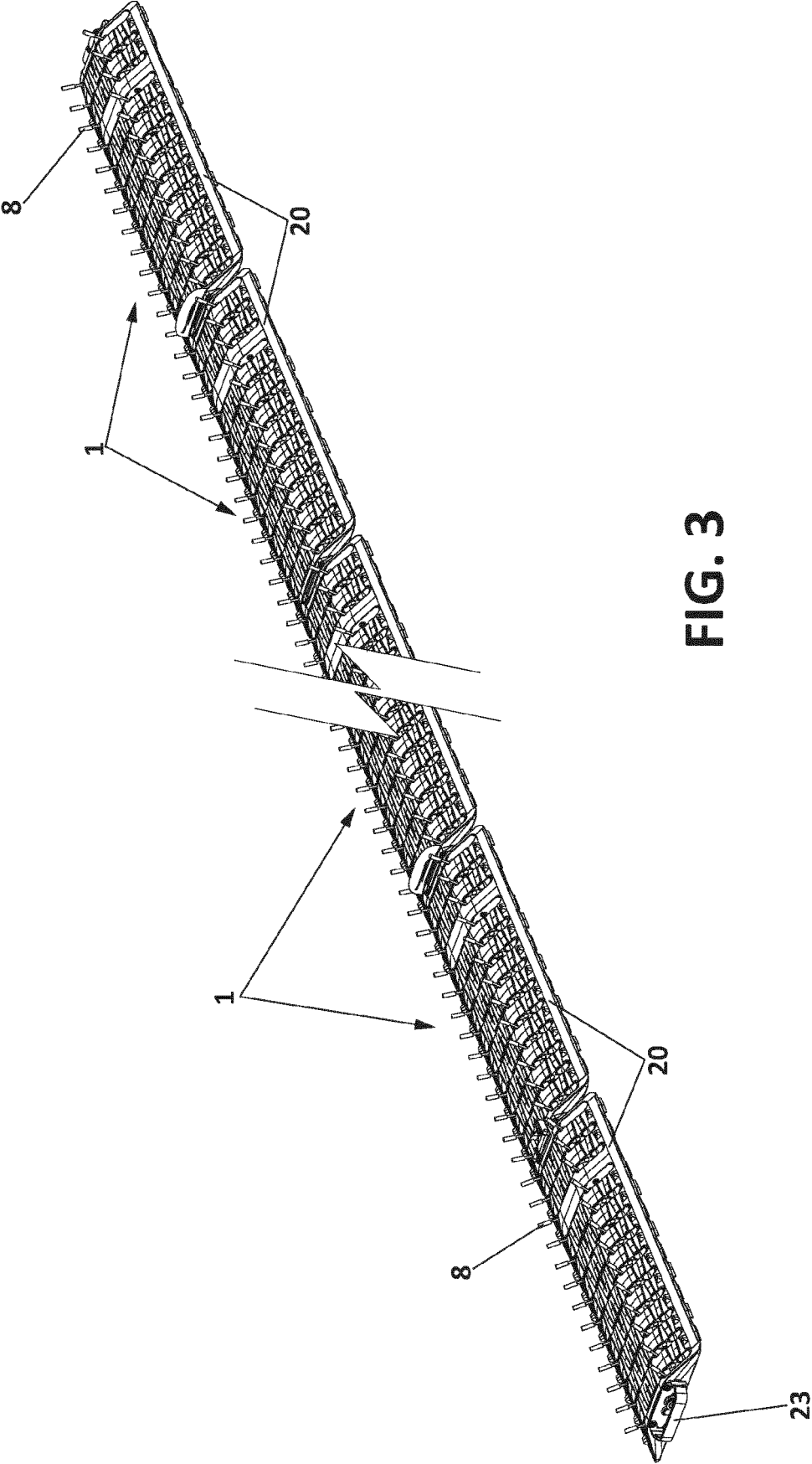


FIG. 3

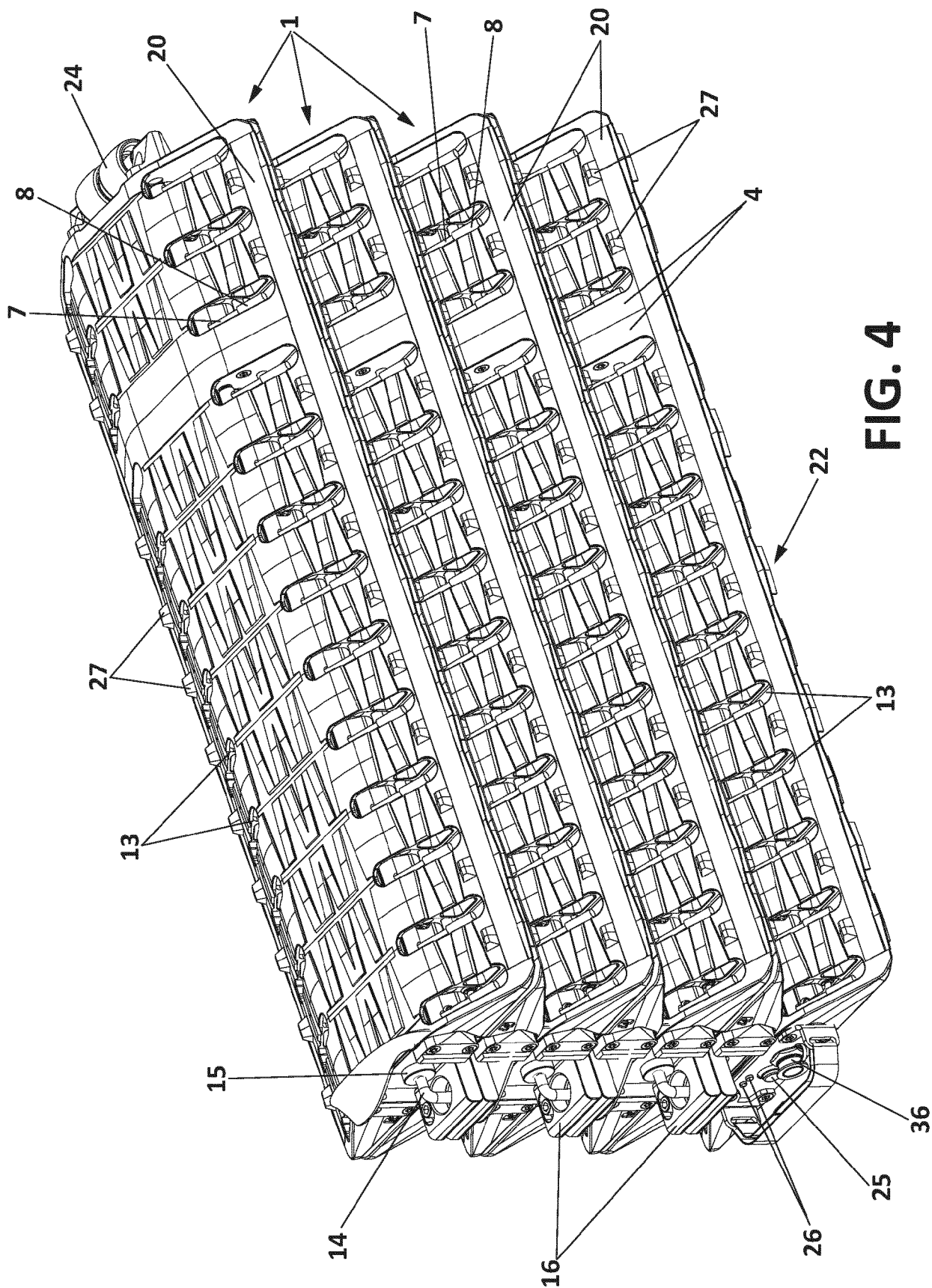


FIG. 4

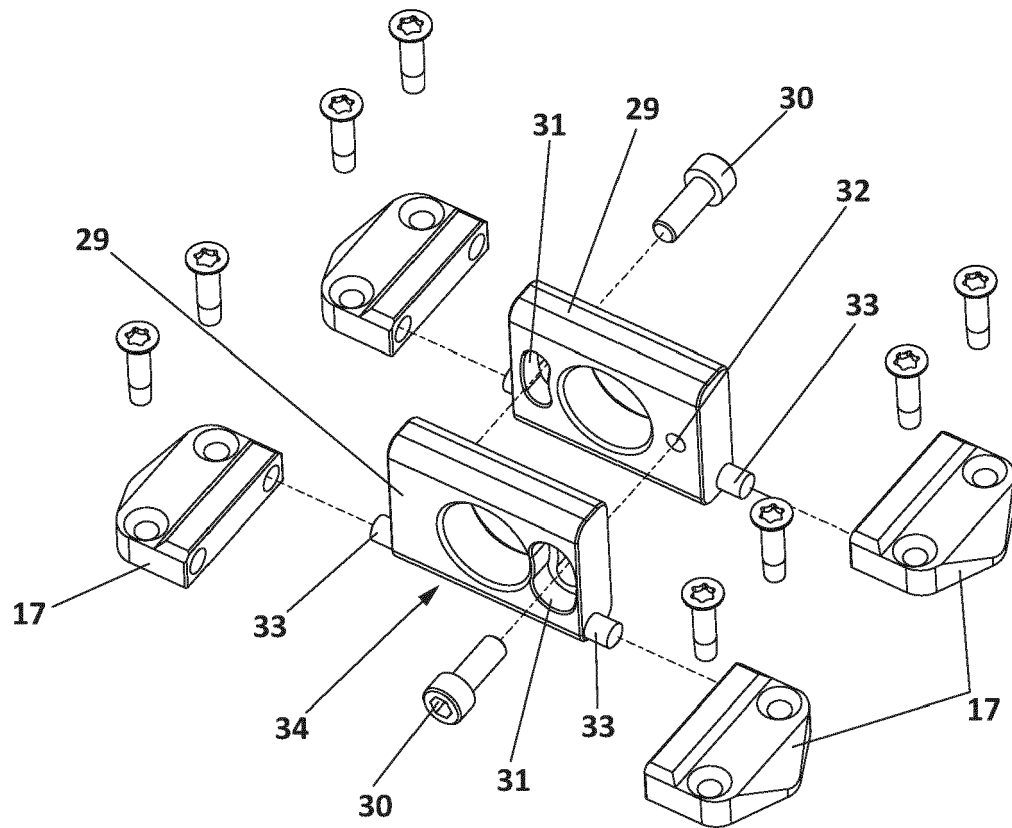


FIG. 5

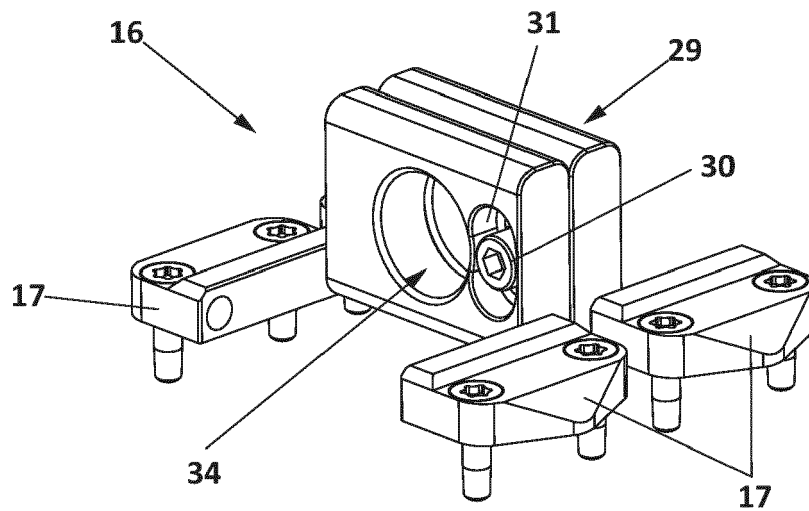


FIG. 6

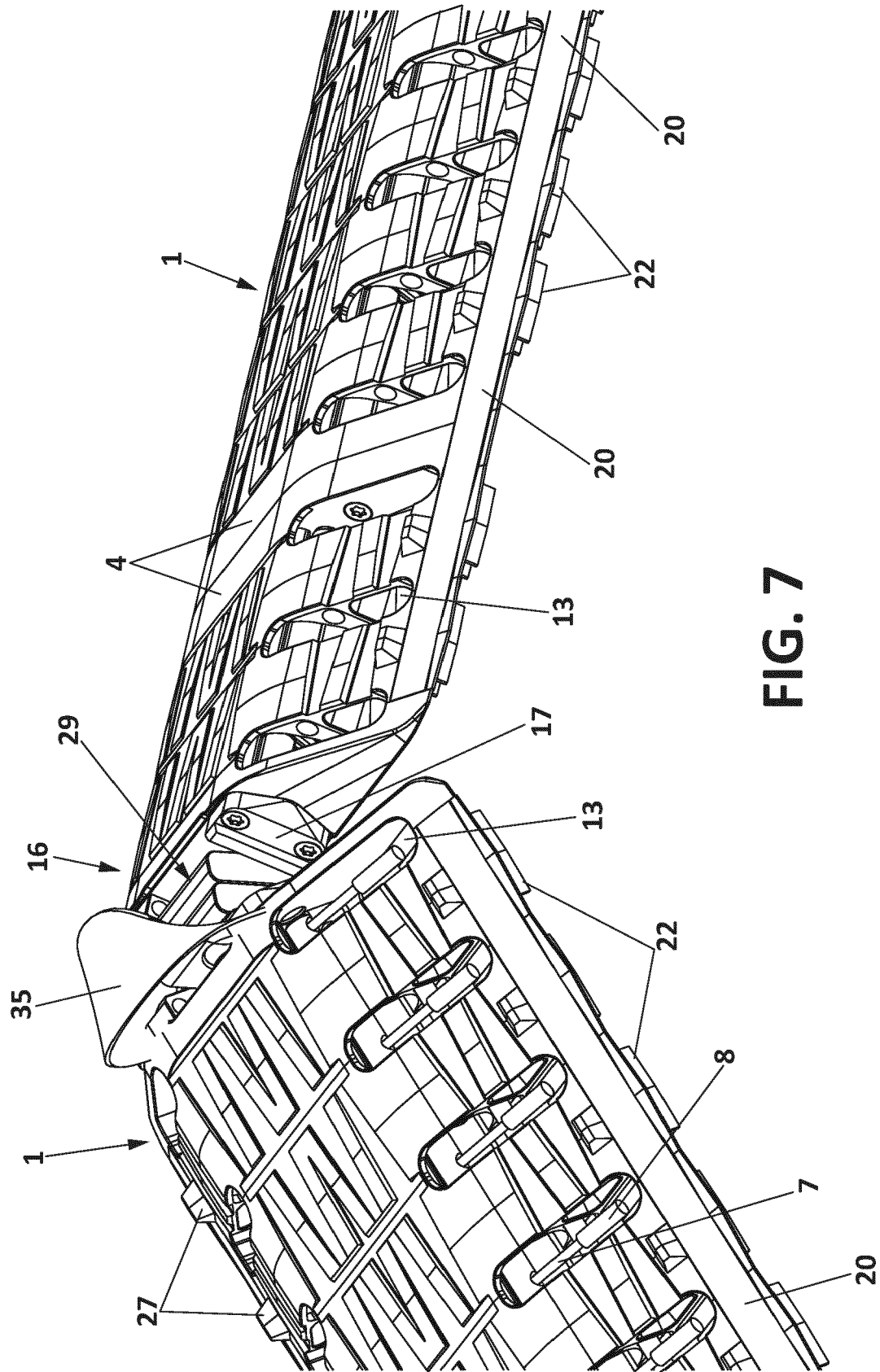


FIG. 7

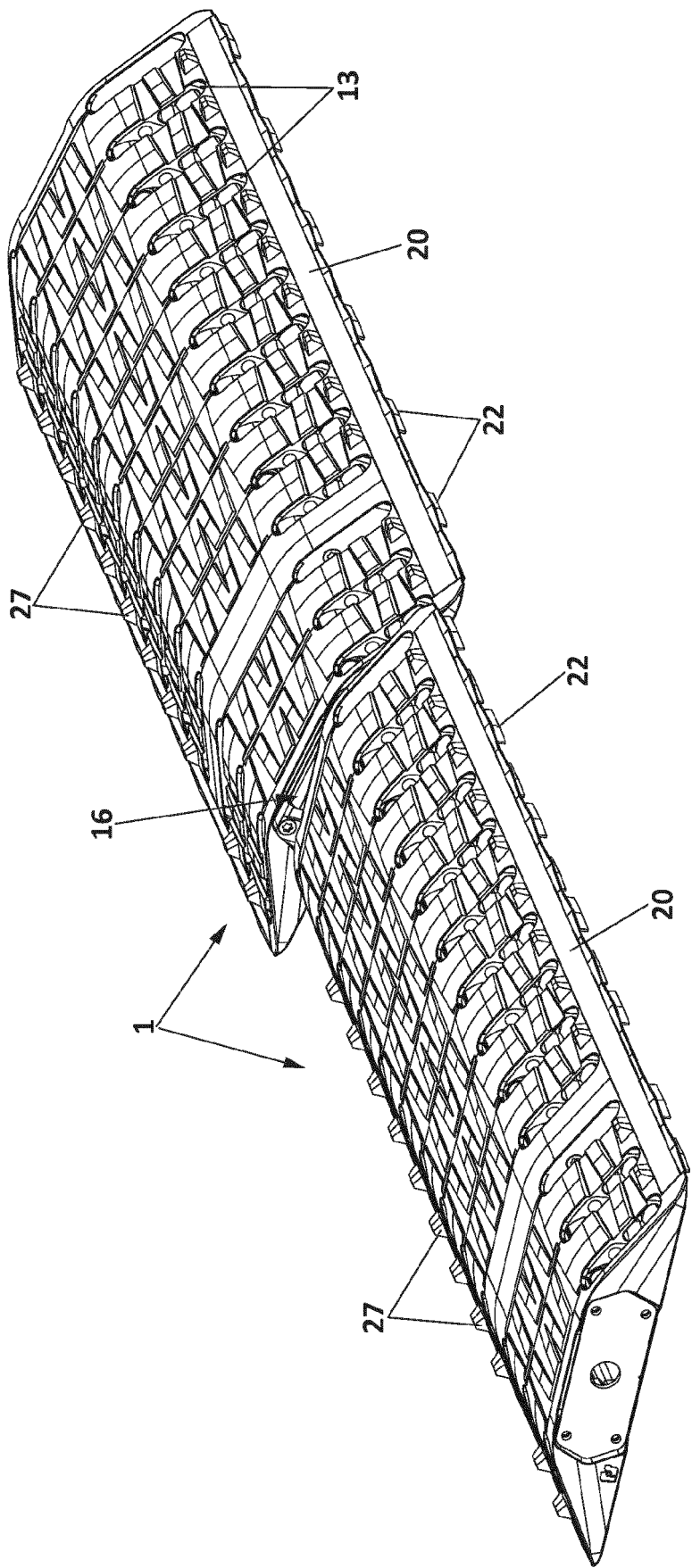


FIG. 8



EUROPEAN SEARCH REPORT

 Application Number
 EP 21 16 3920

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X,D	ES 1 202 111 U (FEDERAL SIGNAL VAMA [ES]) 28 December 2017 (2017-12-28) * the whole document *	1-3	INV. E01F13/12
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