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(54) Safety system for horseback riding

(57) The present invention relates to a safety system for horseback riding which keeps the rider balanced on the saddle, comprising:
- a belt (4)
- a clasp (6) consisting of an electromechanical mechanism that can be coupled to the ends of the belt,
- a position sensor (8) operatively connected with the clasp, such that it can open or close it, and
- an adjustable structure comprising two L-shaped sections (1) joined to one another at their top part, such that once they are connected to one another, they have a parallel horizontal sector (1'), and a vertical sector (1") at the end of which both L-shaped sections are joined; the adjustable structure comprising two rigs (2) where each rig is joined in an articulated manner to the free end of the horizontal sector of each L-shaped section by means of an anchoring element (3), such that the belt is joined to the rigs by means of at least one band (5) and the clasp is joined to the adjustable structure.

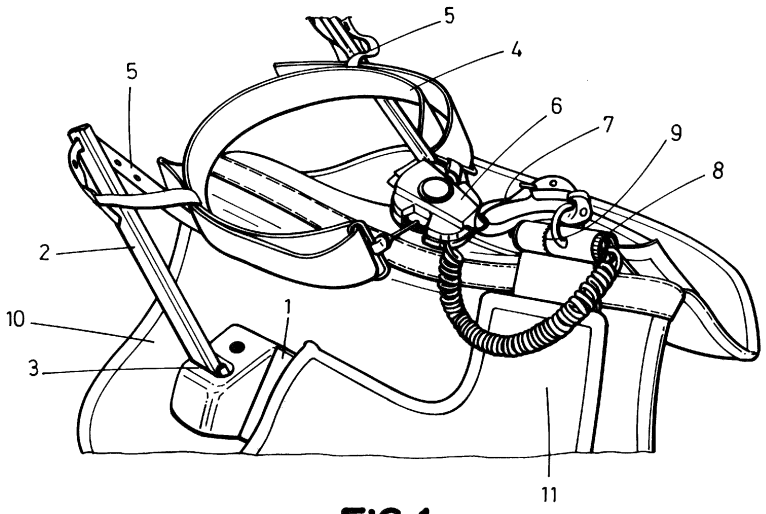

FIG.1

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Description

Technical Field of the Invention

[0001] The present invention relates to a safety system for horseback riding that can be applied in the field of learning to ride horseback and in practicing high-risk riding, which allows keeping the rider balanced in the saddle thereby preventing the rider from losing his/her balance and falling in any direction. The invention facilitates training inexperienced riders, preventing them from falling off the mount. The system securely fixes the rider to the saddle except in the event that the horse falls, in which case the system automatically, quickly and effectively releases the rider, preventing the rider from being trapped by the mount. The system also incorporates adjustment means which allow adapting it to different mount sizes and rider dimensions.

Background of the Invention

[0002] There are currently various devices intended for assuring horseback rider safety for the purpose of keeping said rider in the saddle.

[0003] French patent application no. FR-2552065-A1 describes a belt fixed to the saddle and to the rider's waist assuring balance against the risk of falling but which however prevents the rider from moving up and down while trotting, greatly limiting the rider's movement and learning in a rigid manner.

[0004] On the other hand, European patent application no. EP-0860397-A1 describes a safety belt for a rider which only has two anchors to the saddle, a front anchor and a rear anchor. The main drawback of this device is due to the fact that the securing straps have to be long enough to allow the rider to move up and down while trotting, so they in turn do not prevent said rider from being able to fall laterally to one side or the other, being suspended from said two straps. In the event of a lateral fall it is extremely difficult for the rider to get back up on the saddle, experiencing serious danger both if he/she should fall while jumping over an obstacle and in the event of the horse bolting, in addition to the fact that in said situation the rider cannot be released from the securing harness such that he/she inevitably falls together with the horse, with the subsequent risk of being crushed by the animal.

[0005] European patent application no. EP-0974549-A1 contemplates two rear anchors for anchoring the rider to the saddle, such that the rider is protected against lateral falls and against a forward fall, but isostatic equilibrium on the saddle is not assured, for example, in event of jumping over obstacles or in the event of the horse suddenly starting to gallop, such that the rider is not prevented from falling backwards. In addition to the fact that said system introduces added risk factors as it keeps the rider in suspension for an indefinite time over the horse's hindquarters without allowing him/her to recover his/her position on the saddle.

[0006] The use of two side reels for the belts for securing to the rider's saddle which belts allow being deployed when the rider stands up in the saddle while the horse is trotting and which belts are taken in when the rider moves downwards until sitting on the saddle is also contemplated in said application. However, taking into account how quickly said movements occur while riding, the real effect of the reels is that they delay or stop the rider's movement, given that it is precisely the rider who deploys them with his/her body by moving upwards, a brief delay of a fraction of a second being sufficient for the accumulated effect thereof while riding the horse to result in the rider's movement being out of step with the mount's movement, so this technical solution entails negative effects for the mount and prevent correct learning of an inexperienced rider.

[0007] The existence of a horse riding safety system described in international patent application no. WO-2009/125026-A1 is also known, which application describes, among others, an abdominal belt intended for being placed on the rider's waist, where said belt is anchored to the saddle itself by means of tensioning elements. In this case the securing means for securing the rider have to be incorporated in the saddle itself ex factory or they have to be incorporated "a *posteriori",* which can be complex and, in any case, will be part of the saddle, whether or not the rider requires this.

[0008] Finally, international patent application no. WO-2013/001104 describes a saddle safety device comprising a securing base arranged between the protective blanket and the saddle, such that with respect to said securing base they are linked for two rear bars which are joined by means of straps to a belt, intended for being placed on a rider's waist. This document additionally describes the use of a clasp which acts like a quick lock fastener which, in combination with position sensors, allows opening the clasp and therefore releasing the securing to which the rider is subjected when the rider falls off the mount, such that the rider being trapped is thus prevented.

[0009] However, this device does not allow regulation and adaptation to the size of each horse, such that each device serves only for one mount size and cannot be used correctly with other horses of a different size.

Description of the Invention

[0010] The present invention relates to a safety system for horseback riding which allows overcoming the drawbacks and limitations of the state of the art by means of the device defined by claim 1.

[0011] The safety system for horseback riding proposed by the invention comprises a belt which is joined to rear rigs or articulated bars by means of at least one band or belt.

[0012] The system additionally comprises a quick lock fastener or clasp that can be coupled to the ends of the

belt preferably by carabiners and to the adjustable structure preferably by means of a belt or strap. Said clasp is susceptible to instant manual opening to allow the rider to release himself/herself from the harness at will or for the automatic opening acting in the event of falling off the horse if said horse slips on the ground or stumbles in an obstacle jump, thereby preventing the rider from being crushed. An advantage of the clasp with respect to the earlier patent is that it has safety elements that detect anomalies in its operation or in the operation of the sensor and they act accordingly such that the rider does not use inoperative equipment. Said clasp is furthermore an electromechanical mechanism comprising an electromagnet among other things.

[0013] The system also comprises a horse position sensor protected by a plastic casing and operatively connected with the clasp such that it can act on the electromagnet, where the actuation of said electromagnet can open or close the clasp.

[0014] In that regard, according to the invention the system comprises an adjustable structure or securing base in turn comprising two L-shaped sections, also referred to as arms, joined to one another at their top part, such that once the L-shaped sections are connected to one another they have a parallel horizontal sector, and a vertical sector at the end of which both L-shaped sections are joined; the adjustable structure comprising two rigs or articulated bars, each of which is joined in an articulated manner to the free end of the horizontal sector of each L-shaped section by means of a hinge-like anchoring element. This adjustable structure is provided for being located between the saddle and the mount. Adjusting the structure allows adapting it to any horse, rider and type of riding.

[0015] The device of the invention allows learning how to ride horseback as well as the practice of high-risk riding, keeping the rider on the saddle in isostatic equilibrium and preventing the rider from losing his/her balance and falling in any direction.

[0016] It is contemplated that the two L-shaped sections are joined by means of a connection which allows adjusting the angle formed by said L-shaped sections. The adjustable structure can therefore be adapted to the morphological variations of each animal and offer support and a distribution of the stresses caused thereon by the rider when he/she loses his/her balance, without needing to provide a system for each size, for the purpose of covering the range of horses intended for riding, thereby preventing having to use different sizes.

[0017] According to this embodiment, the attachment of the two arms is located on the animal's withers. Each of the symmetrical arms of the securing base goes downwards from the animal's withers and with a curvature which is common in a staggering amount of horses an approximate distance of 230 mm, after which it makes a 90 degree turn and runs horizontally until passing the saddle skirt, where the hinges of the bars articulated to this securing base as taught in the original patent are located.

[0018] The possibility that the safety system comprises a protective blanket or saddle blanket comprising two coverings each of which can at least partially house each of the L-shaped sections, as a result of it having a zipper which allows opening each covering and facilitating the introduction of the L-shaped section is also contemplated. They have a specific active function active: to secure the structure under the saddle, eliminating the flexible parts of the structure of the second patent.

[0019] On the other hand, it is contemplated that the inclination of each articulated bar can be modified by means of incorporating a Hirth coupling being adapted to the width of the rider's waist.

[0020] On the other hand, it is contemplated that the length of the articulated bar can be modified in length by means of forming each bar like a telescopic element. This modification can be fixed or variable according to the rider while riding.

[0021] It is contemplated that the system comprises adjustment means which allow adjusting the path of each articulated bar by means of incorporating an adjustable stop.

[0022] The sequence of steps to be followed when incorporating the system and adapting it to the size of each mount is the following:

Step 1.- Determining the size of the horse. To assure physical integrity of the horse, the horse must be measured and the system suitably adjusted to the animal's size. The system therefore adapts to the shape of the horse and prevents the horse from noticing it is there and altering the animal's behavior. To that end a gauge can be placed to measure the width in the area where the bridge of the saddle will contact the horse.

Step 2.- Recharging the control unit. The clasp has a battery that must be electrically recharged periodically for it to work correctly. To that end it has a connection where a cable with a transformer is plugged in, which transformer is in turn plugged into the power grid. Using disposable batteries is also possible.

Step 3.- Assembling the system. This is preferably done on a saddle rack or a table, not on the horse. The L-shaped sections or left and right sides are joined using a lock screw with its nut, a washer and a centering collar. The angle between the left and right sides is adjusted according to the measurement taken in step 1, for example by means of a gauge, such that it coincides and adapts to the shape of the horse since it will determine the correct operation of the device. The assembly is fixed in that position by means of the screw. The zippers of the blanket are open to introduce the assembly therein, starting with the articulated bars. The zippers of the blanket are completely closed, such that the structure is integrated in the blanket. The belt is fixed to the ends of the

articulated bars by means of the straps of the belt. The straps are introduced through the holes of the articulated bars and the buckles of the straps fixing the belt are closed. The position sensor located inside the circular plastic casing in the sleeve of the Hirth axis is introduced and leveled with the incorporated scale. The clasp is fixed to the structure by passing the strap between a ring that said clasp has and the hoop of the structure.

The device is therefore prepared for being used. The saddle and its girth are placed and fixed as usual, assuring that it is well tightened because the girth and the saddle are what provide the final securing between the horse and the structure of the system object of the patent.

Step 4.- Adjusting the path of the articulated bar on the axis of rotation as a result of the stop at the base thereof. In the event of there being equipment with rigs with a Hirth axis, the nut is unscrewed such that it allows rotating the attachment, the width suited to the waist is chosen and tightened again. In the event of there being equipment with telescopic rigs and the length of such rigs is to be limited, the suitable length is chosen and fixed by means of a setscrew.

Step 5.- Start up of the device. Once the horse is saddled up with the learning device under the saddle, the device is started up. The equipment is switched on by pushing the button of the clasp for a few seconds until a color LED switches on. The clasp is loaded by simultaneously pressing the side closures of the device. The rider gets in the saddle, and hooks the ends of the belt to the releasing mechanisms of the clasp by means of the carabiners of the ends of the belt. The belt is correctly placed around the rider's waist, adjusting the size of the belt to the rider's waist. Once in operation, the LED light blinking means that the device is working correctly or that there is a problem. If there is a problem or fault, the clasp cannot be closed, preventing the use of the system.

[0023] The same button on the clasp for switching it on is pushed to manually release the rider, therefore the side releasing mechanisms will be released and therefore the carabiners of the belt will be free from the clasp. Once the riding session is over, it is necessary to remove the clasp-sensor assembly so it can be recharged. To that end the clasp is removed by releasing the buckle joining it to the hoop of the structure and the plastic in which the sensor is located inside the Hirth sleeve of the structure is removed.

[0024] The invention solves the main problems involved in learning to ride horseback and extremely difficult riding with horses that have a nervous temperament, offering the rider means that can be adapted to saddles of any kind.

[0025] The object of the system is multiple:

First, it prevents the rider from falling off the horse if he/she should lose his/her balance for any reason. That is very practical, for example, in teaching how to ride horseback.

[0026] In the event that it is the horse that loses its balance and falls, there are means which allow automatically releasing the rider from the securing harness. Those means consist of a fall sensor, which sends a signal to the quick lock fastener or clasp to which the ends of the belt are joined so that it opens quickly and automatically and the rider is free from the belt.

[0027] The means of the device are such that they allow the rider to have the necessary mobility for practicing horseback riding at both teaching and competitive levels. Therefore the bars are articulated on the securing base and joined to the belt by means of bands, and therefore the clasp is also joined to the securing base by means of a strap in the front attachment.

Description of the Drawings

[0028] To complement the description that is being made and for the purpose of aiding to better understand the features of the invention according to a preferred practical embodiment thereof, a set of drawings is attached as an integral part of said description in which the following has been depicted with an illustrative and non-limiting character:

Figure 1 shows a perspective view of a preferred embodiment of the safety system for horseback riding proposed by the invention.

Figure 2 shows a perspective view of the safety system of the invention, in which the clasp and the belt are not depicted, the L-shaped sections being inserts in the coverings incorporated in the protective blanket, and the position sensor being housed inside the Hirth coupling joining each L-shaped section, also being able to see the covering elements located in the anchoring elements for anchoring the rigs to the L-shaped sections.

Figure 3 shows an exploded view of the elements depicted in the preceding figure, being able to see the elastic elements that keep the rigs towards the rear position, the path of rotation thereof being limited by contact of the adjustable stops with the anchoring elements.

Figure 4 shows a perspective view like the view in Figure 2, but without the protective blanket.

Figure 5 shows an exploded detail of the zone corresponding to the Hirth coupling between both L-shaped sections from a rear viewpoint.

Figure 6 shows a front perspective view of the system of the invention, where the zippers of the cases housing the L-shaped sections are open, such that the housed sections can be seen; the housing located in the Hirth coupling for introducing the cap containing the position sensors can also be seen.

Figure 7 shows a perspective detail of the anchoring element for anchoring one of the articulated bars with one of the L-shaped sections, being able to see the adjusting screw for adjusting the path of the bar, which allows adjusting the maximum angle of rotation of the bar, the recovery spring keeping the bar towards the rear position, such that it is the rider's body that moves the bar towards the forward position, as well as the receiving flat bar where the adjusting screw strikes, where the arrangement of an elastic element, such as rubber, has been envisaged for damping said striking.

Figure 8 shows a detail like the detail of Figure 7, where the adjustable stop is in contact with the receiving flat bar, which prevents the articulated bar from continuing to rotate towards the forward positions.

Figures 9 and 10 show two views similar to the views depicted in Figures 7 and 8, but in which a casing or covering or protective element for the anchoring element has been depicted, such that the adjustable stop is protected inside said casing.

Figures 11 and 12 show two views of an embodiment variant of the articulated bar, showing an articulated bar in two sectors by means of a Hirth coupling, which allows better adaptation to each type of rider and mount characteristics.

Figure 13 shows an exploded view of the clasp with the main elements described in the preceding patent and the added elements where the actuation of the safety solenoid which prevents the clasp being able to be loaded when the trigger is retained must be mentioned. The safety solenoid releases the trigger so that the clasp can be loaded if the microcontroller verifies that the electric and mechanical elements work correctly. The microcontroller also has recorded in memory acceptable mount parameters (values of angular velocities and accelerations, and the derivatives thereof) such that if these parameters or the derivatives of these are out of range, the microcontroller sends a release command to the main solenoid, the carabiners being released from the belt.

Figures 14 and 15 show a longitudinal section and a perspective view, respectively, of the cap housing the position sensor.

Preferred Embodiment of the Invention

[0029] In view of the drawings, the preferred embodiment of the invention can be observed, comprising an adjustable structure in turn comprising two L-shaped sections (1), also referred to as arms, joined to one another at their top part, such that once the L-shaped sections (1) are connected to one another they have a parallel horizontal sector (1'), and a vertical sector (1 '') at the end of which both L-shaped sections (1) are joined; the adjustable structure comprising a rig (2) or articulated bar which is joined in an articulated manner by means of a hinge-like anchoring element (3) to the free end of the horizontal sector (1') of each L-shaped section (1). This adjustable structure is envisaged for being located between the saddle and the horse.

[0030] The system also comprises a belt (4) which is joined to the articulated bars (2) by means of at least one band (5) or belt. The system additionally comprises a quick lock fastener (6) or clasp that can be coupled to the ends of the belt (4), where said clasp (6) is joined to the adjustable structure, preferably by means of a belt or strap (7), where said clasp (6) is a electromechanical mechanism comprising an electronic circuit board, a releasing electromagnet or solenoid as the main actuator main and a safety solenoid preventing the clasp from being able to be closed or loaded if there is any anomaly in the operation of the clasp or the sensors, rendering the unit inoperative.

[0031] The two L-shaped sections (1) are joined by means of a connection which allows adjusting the angle formed by said L-shaped sections (1). The adjustable structure can therefore be adapted to the morphological variations of each animal and offer support and a distribution of the stresses caused thereon by the rider when he/she loses his/her balance, without needing to provide a system for each size, for the purpose of covering the range of horses intended for riding, thereby preventing having to use different sizes.

[0032] The connection between the two L-shaped sections (1) preferably consists of a Hirth coupling (9) the teeth of which are cut in two hollow cylinders each of which is welded to each of the arms such that they are aligned with one another, offering symmetry to the structure. By changing the relative position of a toothed cylinder with respect to the other, the angle that the arms have with respect to one another increases or decreases, being adapted to narrower or wider horses. To join both parts in a specific position inside one of the sleeves (first sleeve) a concentric screw has been welded and aligned with both axes. This screw is welded almost at the end of the sleeve, such that for the most part the sleeve is hollow. The shank of this screw completely traverses the other sleeve (second sleeve) until surpassing it. When a nut is screwed on this shank and supported on the second sleeve, both sleeves will be firmly joined, preventing the relative rotation of the two arms with respect to one another as a result of the meshing of the front teeth of both sleeves. Therefore, the alignment of both sleeves is aided by means of a central inner tube.

[0033] Two other variants of a Hirth coupling are contemplated, such as:

- A ribbed male shaft welded to one of the L-shaped sections and another shaft with inner ribbing, or female shaft, welded to the other one.
- A male shaft with several keyways and another female shaft also with keyways made, where the distance between keyways is not constant, such that when choosing the placement of the key in one from

among the different keyways made both in the female shaft and in the male shaft, the relative position of both parts with respect to one another is varied, and therefore the angle between the two L-shaped sections is also varied.

[0034] The system comprises a position sensor (8) for sensing the mount which is operatively connected with the electronic circuit board located in the clasp (6). This electronic circuit board has a microcontroller which, among other things, receives signals from the sensor, analyzes them with specific software and compares them with the parameters recorded in memory. It is therefore determined that the horse is falling or is in an unstable situation and it acts on the main releasing electromagnet or solenoid, where the actuation of said electromagnet opens the clasp (6). Said connection between the electronic circuit board of the clasp (6) and the position sensor (8) is performed by means of a coiled cable for greater comfort in its possible extension during use. In turn, the sensor is made up of these position sensing elements: accelerometers and gyroscopes, which measure angular velocity and acceleration in three orthogonal axes, i.e. in the three dimensions. The data they record and send to the microcontroller of the electronic circuit board of the clasp is:

- acceleration in three axes of space consisting of a vertical axis passing through the withers of the mount, a horizontal axis running in the longitudinal direction of the mount (2) in the forward movement direction and a horizontal axis in the transverse direction of the mount, and
- angular rotation velocity on the three axes of space.

[0035] According to a preferred embodiment, the position sensor (8) is housed inside the Hirth coupling (9) of the structure, on the animal's withers. A cylindrical plastic part is tightly introduced inside the hollow gap remaining in the first sleeve, which part has the sensor inside it. A scale is made between the sleeve and the plastic part so that said part can always be placed level with respect to a horizontal axis despite changing the position of one arm with respect to the other and the sleeve therefore being rotated. This scale references a normalized angle meter for measuring the width of horses. This plastic part is the support which locates, seals and protects the sensor detecting the movements of the animal. A cable which is connected with the clasp comes out of the front part.

[0036] The possibility that the safety system comprises a special protective blanket (10) or saddle blanket comprising two cases or coverings (11) which, when opened and closed with two zippers, each of them can at least partially house each of the L-shaped sections (1), is also contemplated. Said coverings (11) have the same measurements as the structure formed by the two L-shaped sections (1). The entire assembly forms the securing base. The saddle blanket (10) is an active part in fixing the structure in the correct position on the animal and is responsible for it not sliding. That is because the support of the saddle and of its girth is to a large extent on the saddle blanket (10), which means that both saddle and saddle blanket (10) become integral, and this positions and fixes the structure introduced in the cases (11) in the precise location. The possibility of placing a girth at the end of the horizontal sector of the L-shaped sections (1) therebehind, at the height of the animal's belly, with one strap joining the two L-shaped sections above the horse's back and another strap with an adjustable buckle acting like a girth and joining the two L-shaped sections (1) on the animal's underside is also included.

[0037] On the other hand, it is contemplated that the inclination of each articulated bar (2) can be modified by means of incorporating a Hirth coupling (12) between two sectors comprised by the bar (2), which allows adjusting the inclination of each bar (2) to better adapt it to the different waist widths of different riders. It is also contemplated that the length of each bar (2) can be modified by means of forming each bar (2) as a telescopic element. For the purpose of improving the efficacy of the equipment, the bar (2), and with it the securing of the rider, are sought to be adapted to the different types of riding and rider morphology. Aesthetics of the product is also improved by reducing the length of the bar (2) in situations in which it is not needed. Three, two or one of them, depending on client needs, can be applied on the same bar (2). The distance at the end of the articulated bar (2) to the rider's waist is therefore kept constant regardless of the rider's hip width. To that end, the bar (2) can be adjustable changing the angle of its two previously mentioned sectors. It is characterized by being manufactured on an oval tube in two parts, the upper part and the lower part, which have a Hirth sleeve (12) in their attachment zone, each having a central hole. The two Hirth sleeves (12) joined to their respective parts face one another, making the toothing match up in a specific position, more open or more closed according to the measurement of the rider's waist using it. A screw passes through the central hole, traversing the joint of the two parts. The head of the screw is outside at one end. The threaded part projects at the other end where a nut is housed, making the joint rigid. The toothing of the two Hirth sleeves (12) prevents any relative movement or rotation between the parts, getting them to work as if they were a single part.

[0038] In the telescopic case, the objective is to develop smaller bars (2) but with the same functionality. This allows being better adapted to children and large adults without having to use several interchangeable sets in the equipment or avoiding the unaesthetic situation in which a bar size that an adult would use is used for a child. Two oval tubes have been envisaged to that end, one of which tubes is introduced with little clearance inside the thicker one such that it acts as a runway. It is a telescopic system similar to folding fishing poles. The inner tube always

projects a little from the outer tube to be able to house the element joining it with the belt. It further has a stop so that it cannot come out entirely, compromising its purpose.

[0039] Two different forms can be used:

- Adjustable in height according to the needs of each rider as a result of a height scale. In this case when the telescopic bar is in operation it works like a rigid element as a result of a setscrew which allows the rider to adjust the extension at will.
- Adjustable in height while practicing horseback riding. In this case the bar moves up and down a fixed and calculated distance, which coincides with the upward and downward movement of the rider when trotting, suspension galloping or jumping. In order to be in the minimum usable path, it has a return with a spring inside both tubes that works by driving the inner one inwards. It also has a stop so that the inner one never comes out of its runway, a situation which would render the safety equipment useless.

[0040] It is contemplated that the system comprises adjustment means which allow adjusting the path of each bar (2) by means of incorporating an adjustable stop (13) formed by a screw and a nut .The bars (2) can freely rotate towards the rear position, but their path towards the forward position is limited by means of the adjustable stop (13). Therefore they offer correct follow-up of the rider depending on the type of riding that will be done. Some types of riding require a more forward position of the rider on the saddle and others less forward. The adjustable stop described below allows the tip of the bar to be moved forward more or less, allowing the rider to move forward more or less with respect to his/her sitting position. A nut is thus fixed in the front lower part of the bar. A screw, the tip of which will move downwards more or less according to the number of turns of the screw to pass it through the nut, is screwed on said nut. The bar will rotate about its axis until the tip of the screw abuts with the L-shape of the structure. The effect caused by a screw more tightly screwed on will be to limit the rotation of the bar sooner and therefore move the position of the tip back more in comparison with the effect caused by a screw that is less tightly screwed on, which will allow rotating said bar more until abutting, thereby allowing the rider to move forward more with respect to his/her sitting position. This last modality is more common in jumping over obstacles. Rubber is vulcanized at the end of the screw to make the collision between it and the structure less impacting.

[0041] In turn, as already mentioned, the clasp is the electromechanical assembly which anchors or releases the rider with respect to the horse. The clasp is susceptible to instant manual opening by means of the button to allow the rider to be released from the harness at will or is susceptible to automatic opening in the event of falling off the horse if said horse slips on the ground or stumbles in an obstacle jump.

[0042] To that end it has a button that activates the manual opening and an electromagnet that activates the automatic opening in the event that the signals from the sensor analyzed by the microcontroller give such a command. According to the present invention, the clasp has a second function: it cannot be loaded or opened if it is already loaded in response to a failure in an electronic component of the sensor or if the cells of the rechargeable battery have been used up. To that end the electronic circuit board has electronic elements and two limit switches that analyze the position of the mechanical elements of the clasp. These detectors are connected with the aforementioned microcontroller and these anomalies are detected with suitable software, processing them and acting on the main electromagnet or the secondary safety electromagnet, according to the case of opening the clasp if it is loaded or keeping it open if it is unloaded. The manner in which the secondary safety electromagnet blocks the load of the clasp is by immobilizing the trigger, preventing it from being able to block the piston. Like the trigger and piston, the mechanical elements are referred to in the preceding patent.

[0043] The rechargeable battery is also incorporated in a gap inside the clasp. A single coiled cable connecting with the sensor, in its circular plastic jacket which is introduced in the structure, starts out from said gap. This makes the clasp-sensor assembly easily removable from the structure.

[0044] In view of this description and set of drawings, the person skilled in the art will be able to understand that the embodiments of the invention that have been described can be combined in many ways within the object of the invention. The invention has been described according to preferred embodiments thereof, but it will be evident for the person skilled in the art that many variations can be introduced in said preferred embodiments without exceeding the object of the claimed invention.

Claims

1. Safety system for horseback riding, comprising:

- a belt (4)
- a clasp (6) that can be coupled to the ends of the belt (4), where said clasp (6) is an electromechanical mechanism comprising an electromagnet, and
- a position sensor (8) operatively connected with the clasp (6) such that it can act on the electromagnet, where the actuation of said electromagnet can open or close the clasp (6),

characterized in that the system comprises:

- an adjustable structure in turn comprising two L-shaped sections (1) joined to one another at

their top part, such that once the L-shaped sections (1) are connected to one another they have a parallel horizontal sector (1'), and a vertical sector (1") at the end of which both L-shaped sections (1) are joined; the adjustable structure comprising two rigs (2) where each rig (2) is joined in an articulated manner to the free end of the horizontal sector (1') of each L-shaped section (1) by means of an anchoring element (3), such that the belt (4) is joined to the rigs (2) by means of at least one band (5) and the quick lock fastener (6) is joined to the adjustable structure.

2. Safety system according to claim 1, wherein the two L-shaped sections (1) are joined by means of a connection which allows adjusting the angle formed by said L-shaped sections (1).

3. Safety system according to claim 2, wherein the connection between the two L-shaped sections (1) consists of a Hirth coupling (9).

4. Safety system according to claim 3, wherein the position sensor (8) is housed inside the Hirth coupling (9).

5. Safety system according to any of the preceding claims comprising a protective blanket (10) comprising two coverings (11) each of which can at least partially house each of the L-shaped sections (1), these coverings have a zipper to facilitate introducing the two L-shaped sections.

6. Safety system according to any of the preceding claims, wherein the length of each rig (2) can be modified by means of incorporating a Hirth coupling (12) between two sectors comprised in the rig (2).

7. Safety system according to any of claims 1 to 5, wherein the length of each rig (2) can be modified, for which purpose each rig (2) is formed as a telescopic element.

8. Safety system according to any of the preceding claims, wherein the inclination of each rig (2) is adjusted by means of incorporating an adjustable stop (13).

9. Safety system according to any of the preceding claims, wherein the structure can be secured with a girth at the end of the horizontal sector of the L-shaped sections (1) formed by two straps, one strap joining the two L-shaped sections above the horse's back and another strap with an adjustable buckle acting like a girth and joining the two L-shaped sections (1) on the animal's underside.

10. Safety system according to any of the preceding claims, wherein the clasp (6) comprises a rechargeable battery located in an electronic circuit board which the equipment microcontroller has, two limit switches, a signaling LED, a main releasing electromagnet and the safety solenoid or electromagnet the pin of which acts by being introduced or not being introduced in a gap in the trigger, whereby it can mobilize it as appropriate, preventing it from interlocking the piston and thereby loading the clasp.

11. Safety system according to claim 10, wherein the microcontroller picks up, in addition to the signals from the sensor on the animal's withers, the following:

- the signals from the limit switches to know the internal state of the mechanism of the clasp,
- the state of charge of the battery,
- the correct operation of key electronic elements, such as the accelerometers and gyroscopes.

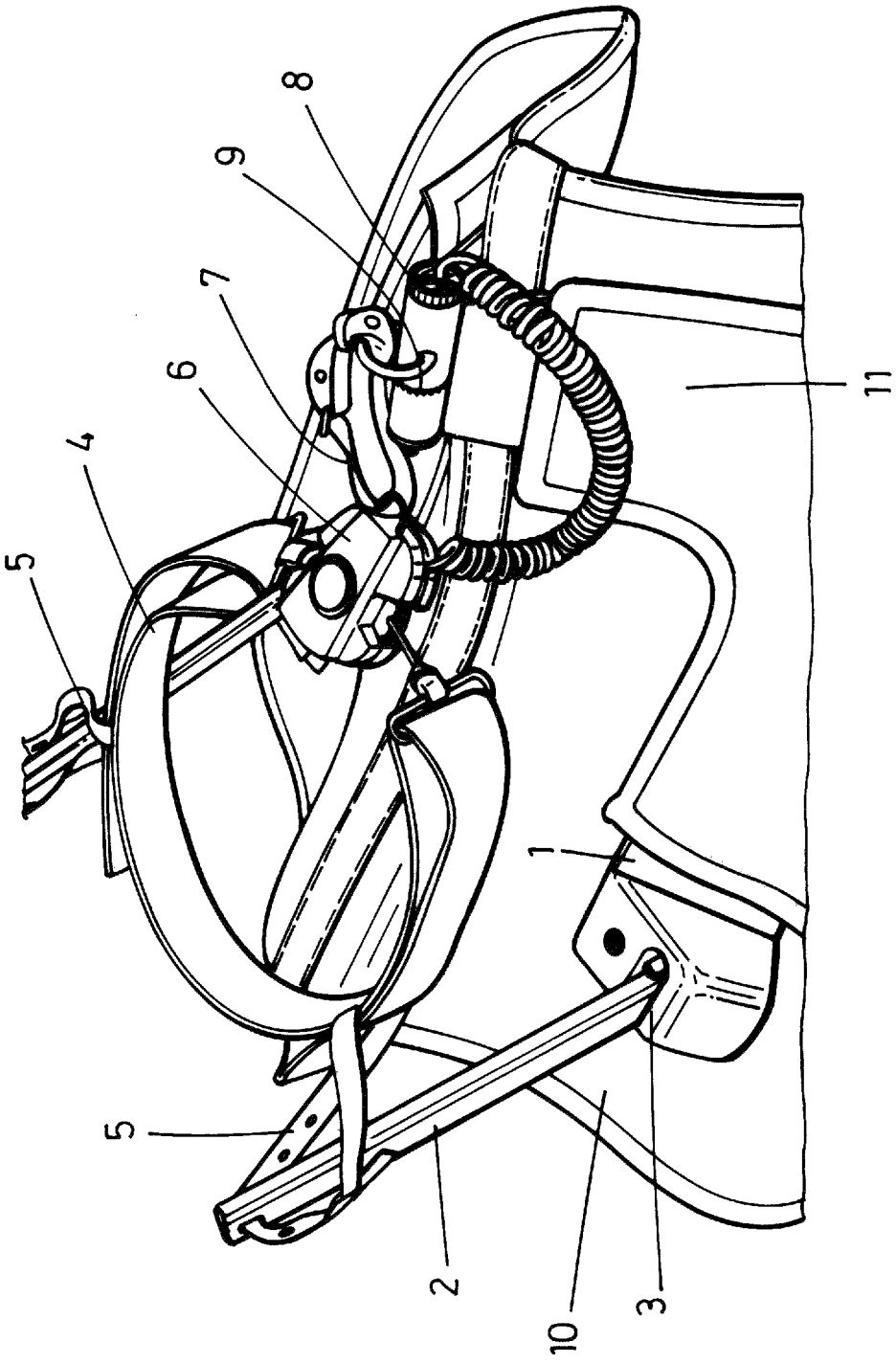

FIG.1

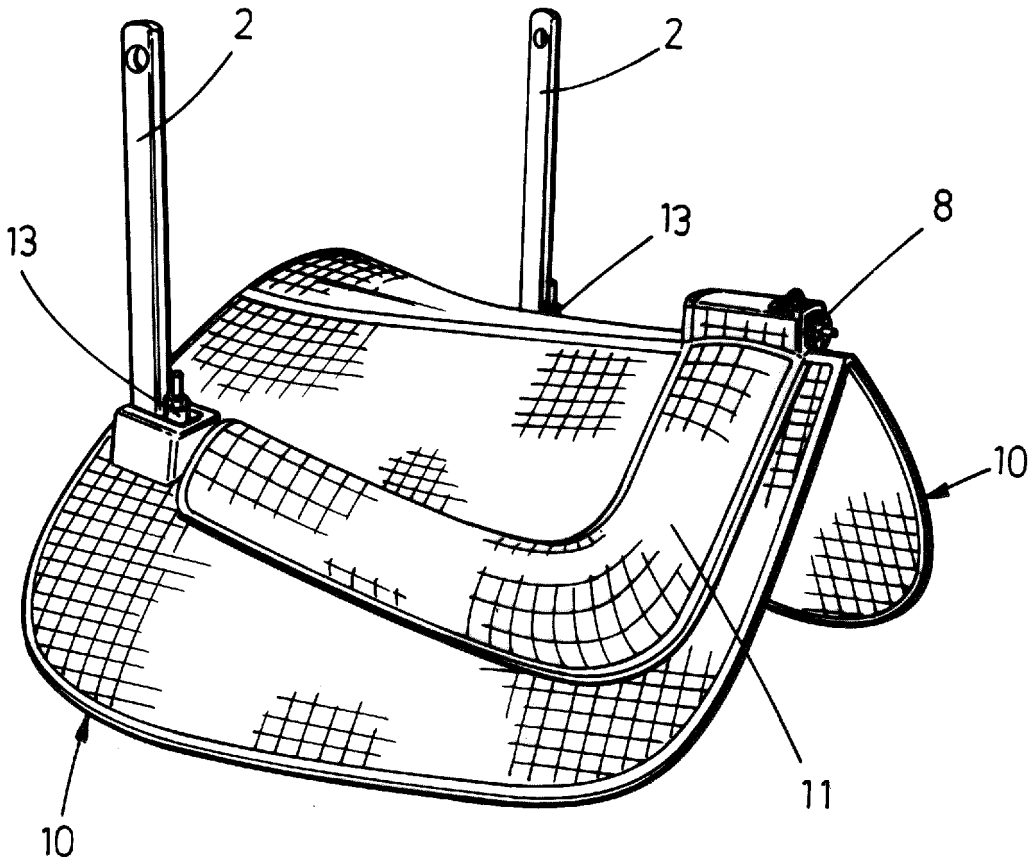

FIG. 2

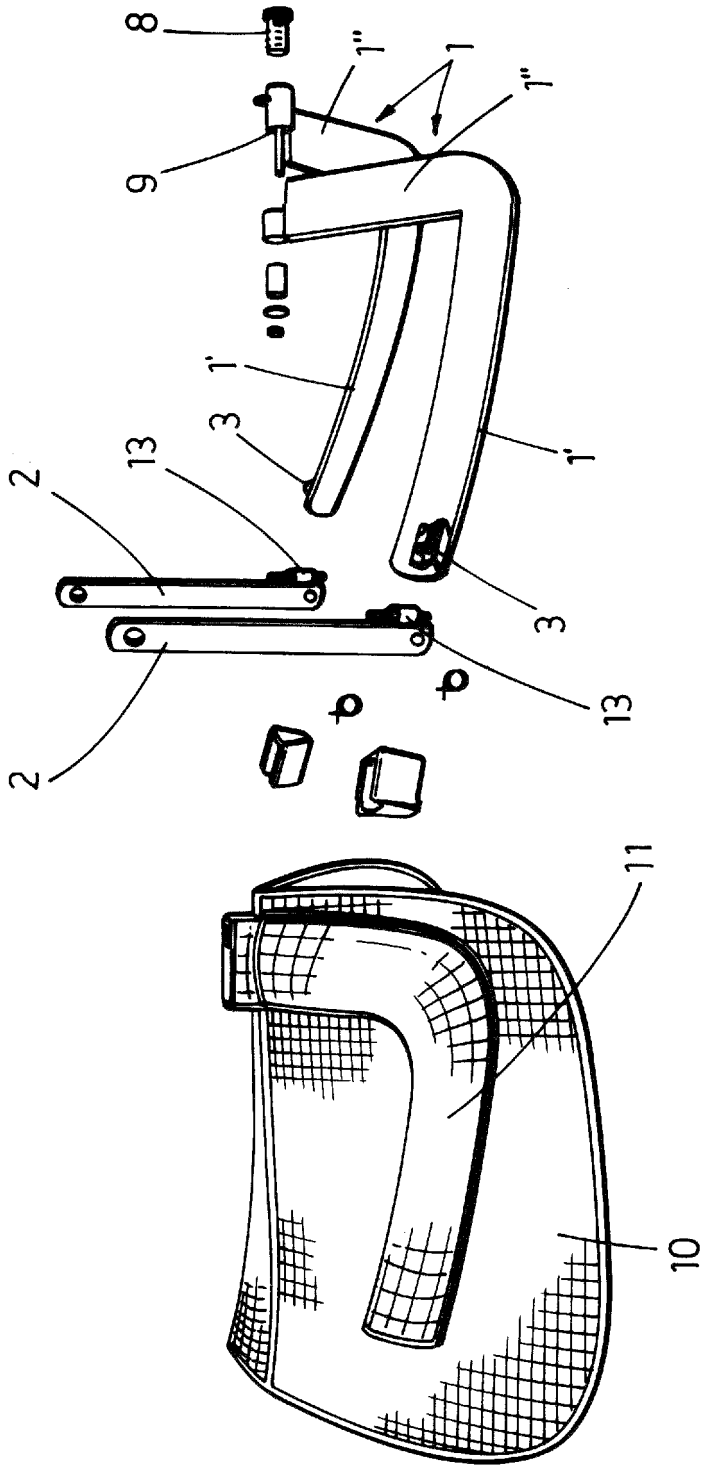

FIG.3

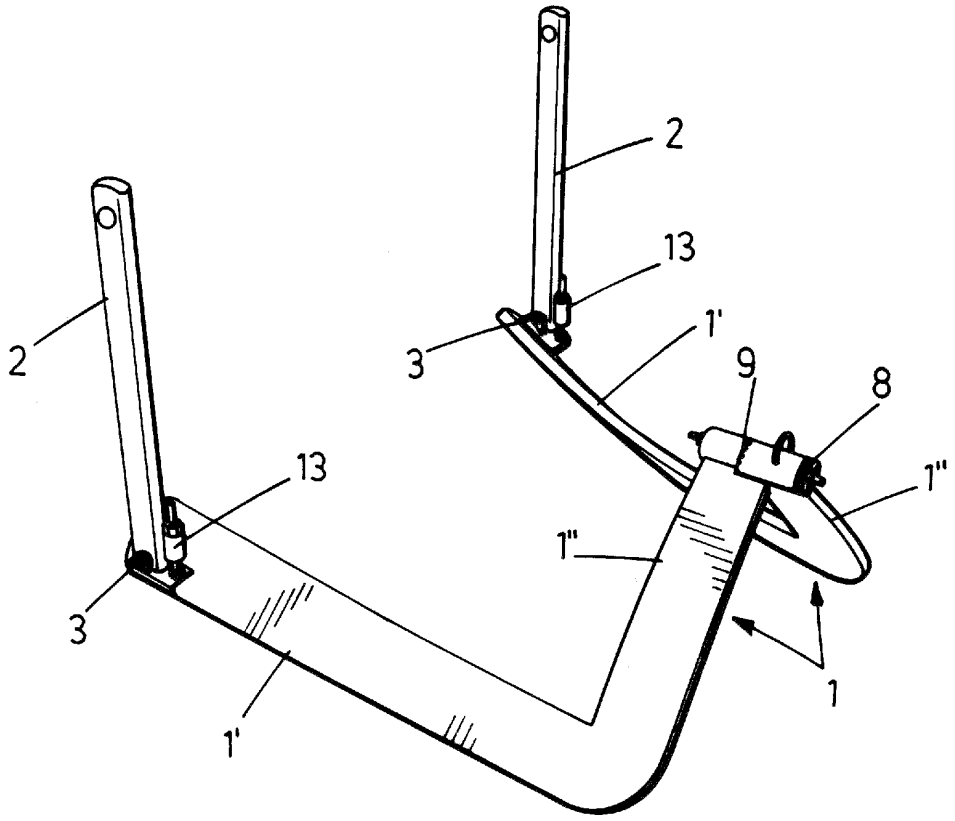

FIG.4

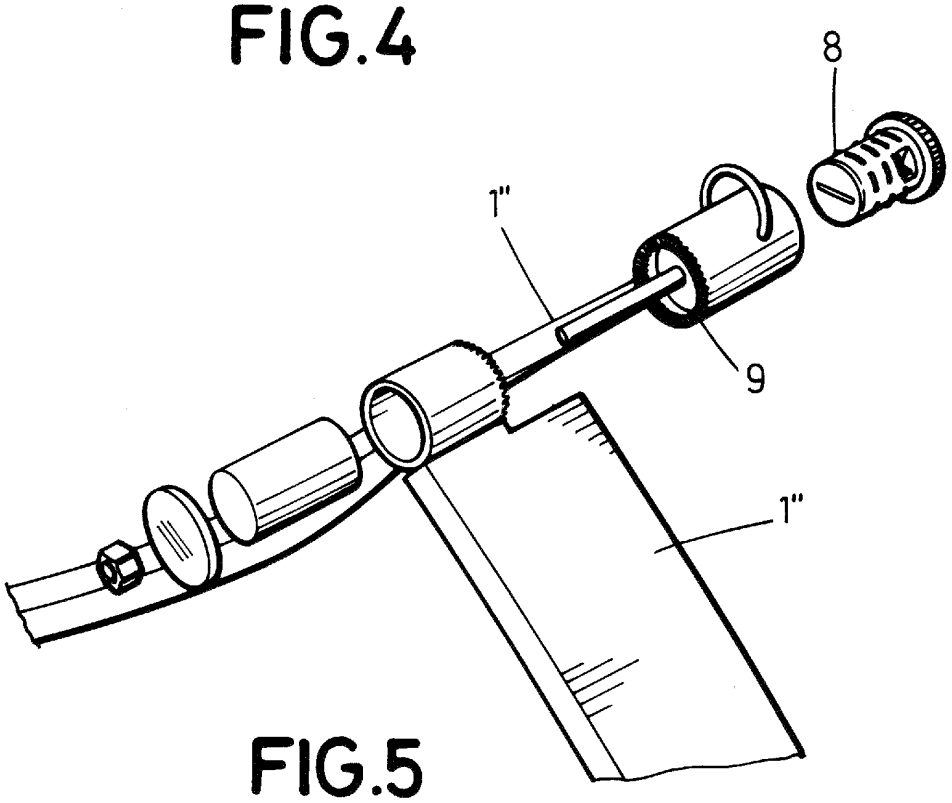

FIG.5

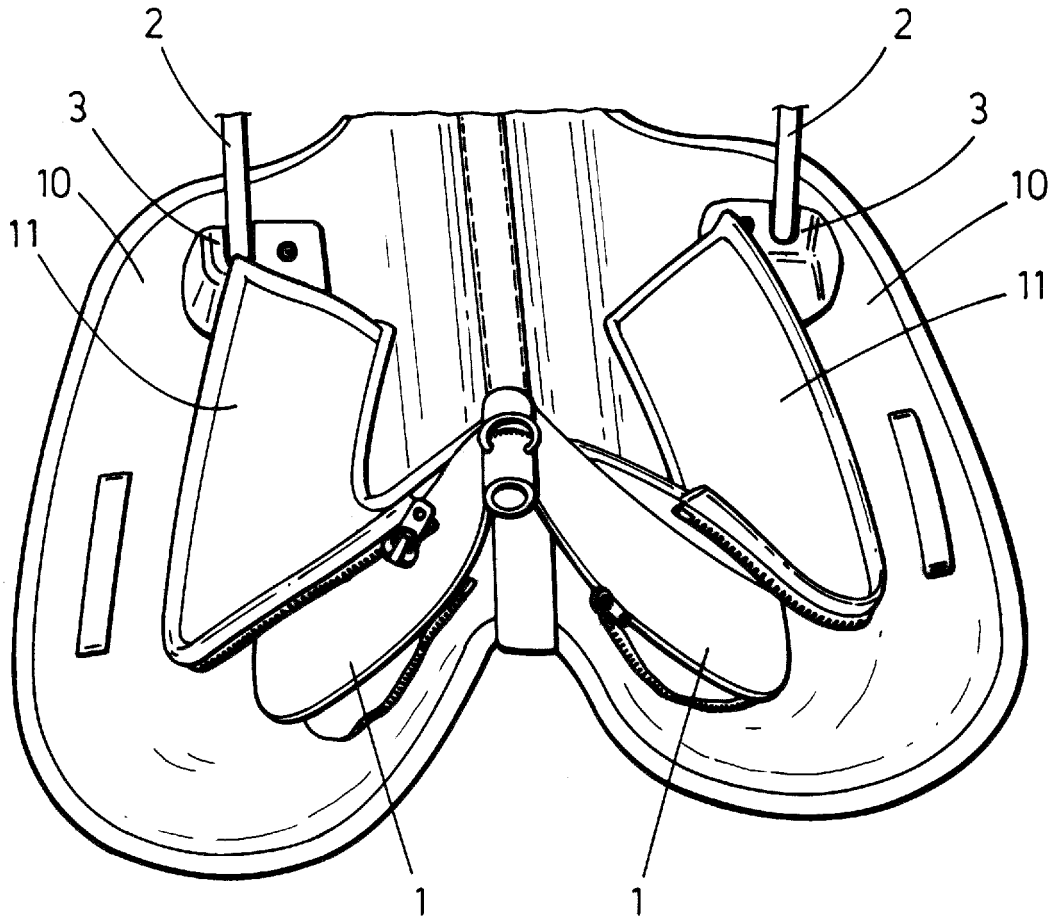

FIG.6

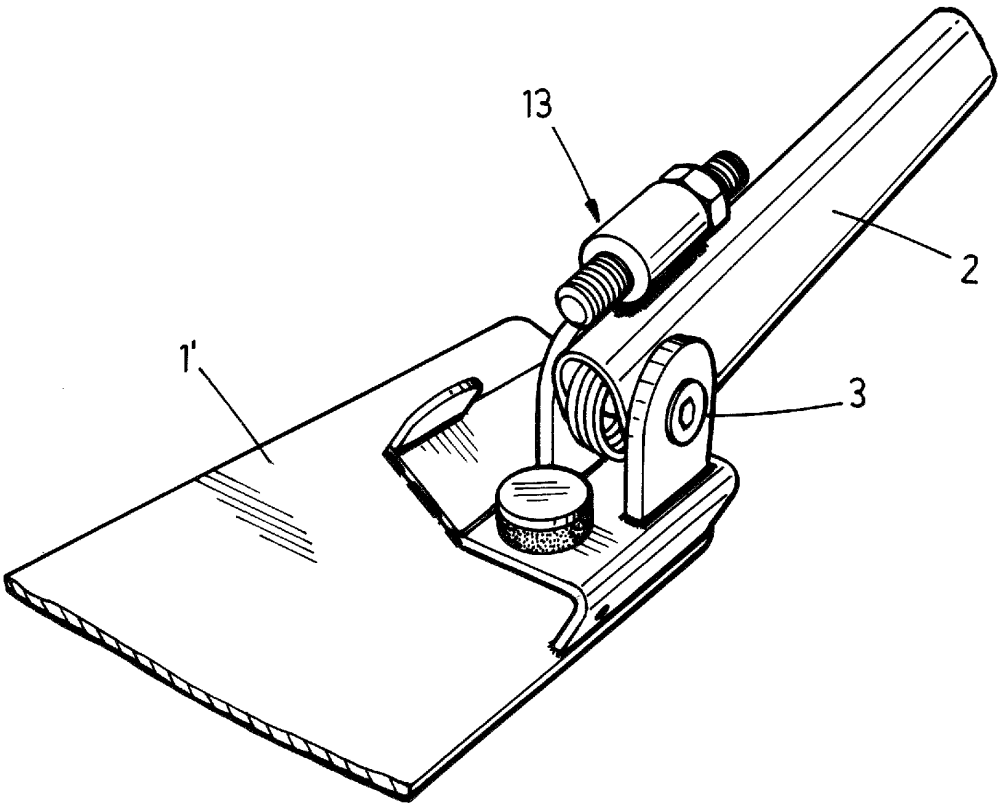

FIG.7

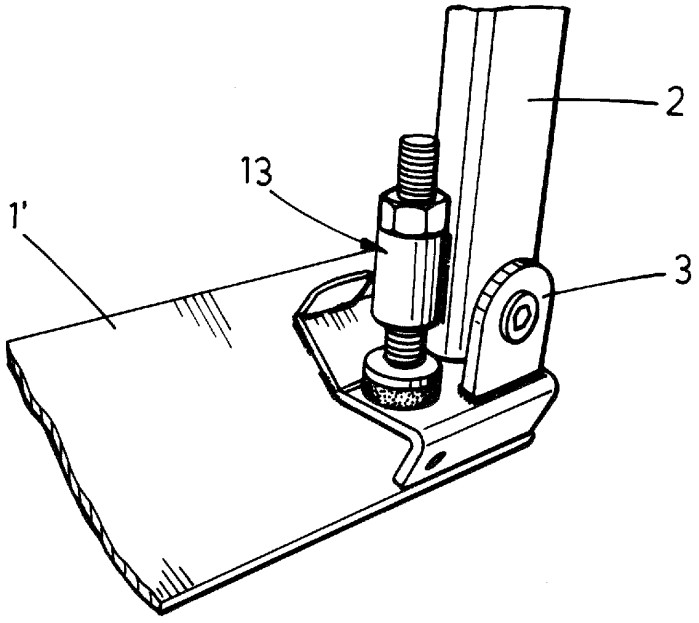

FIG.8

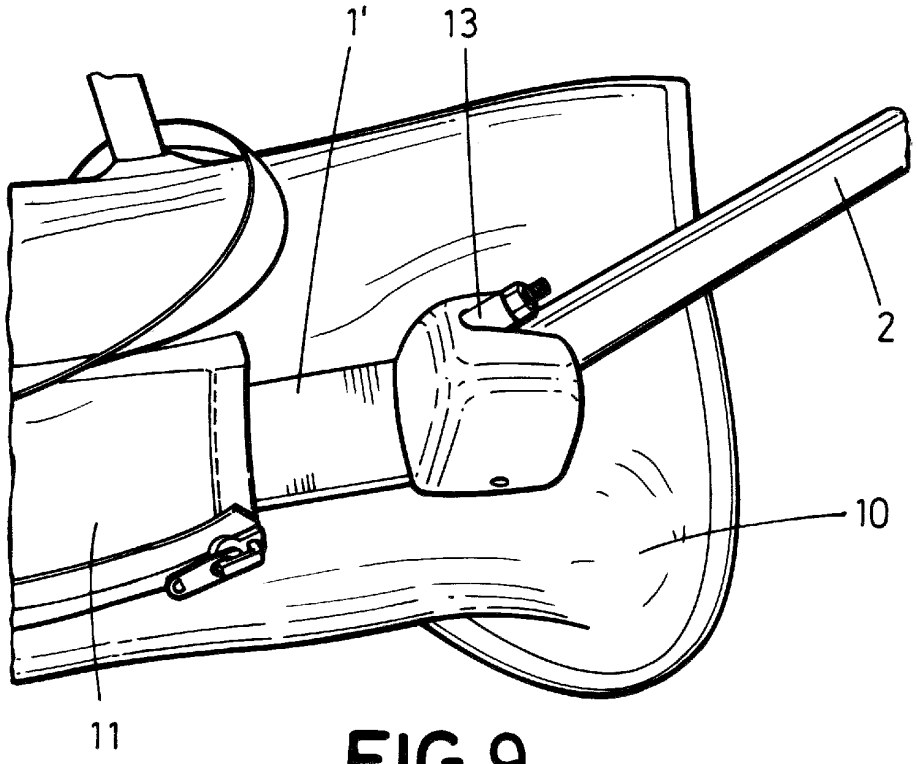

FIG.9

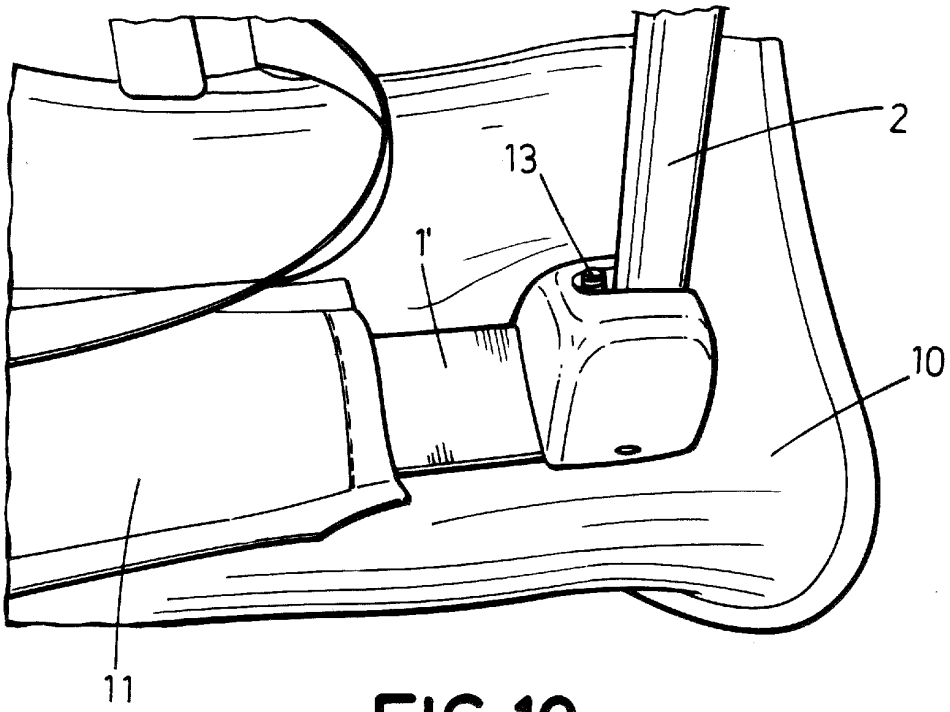

FIG.10

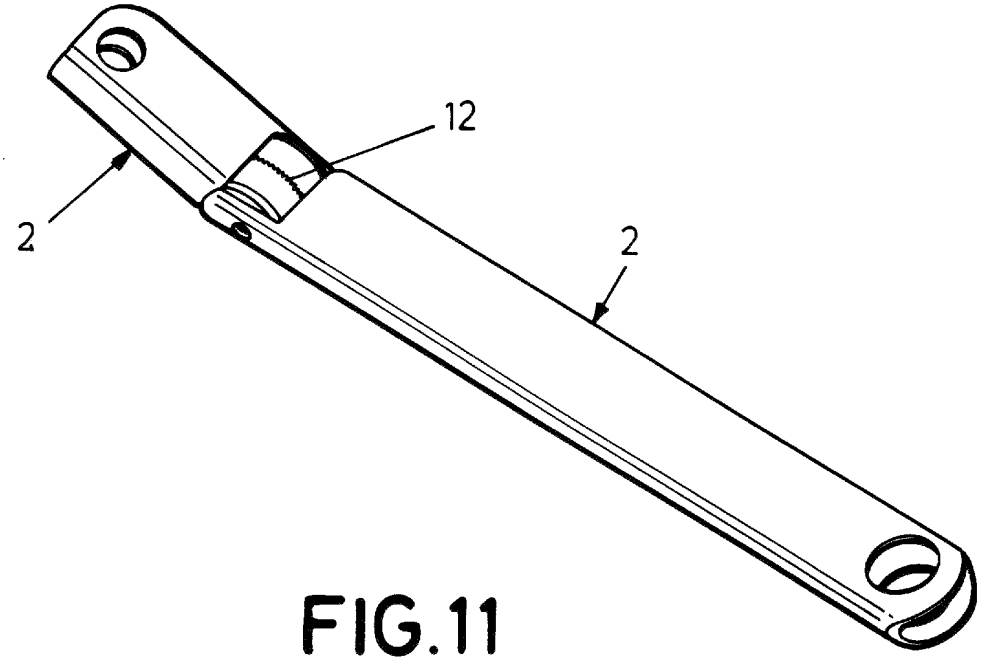

FIG.11

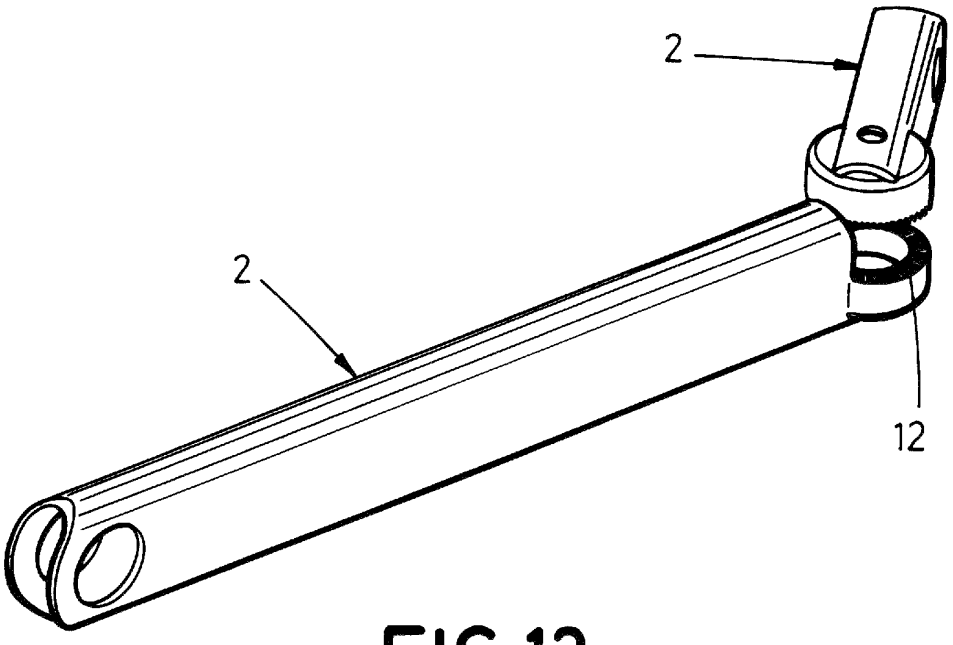

FIG.12

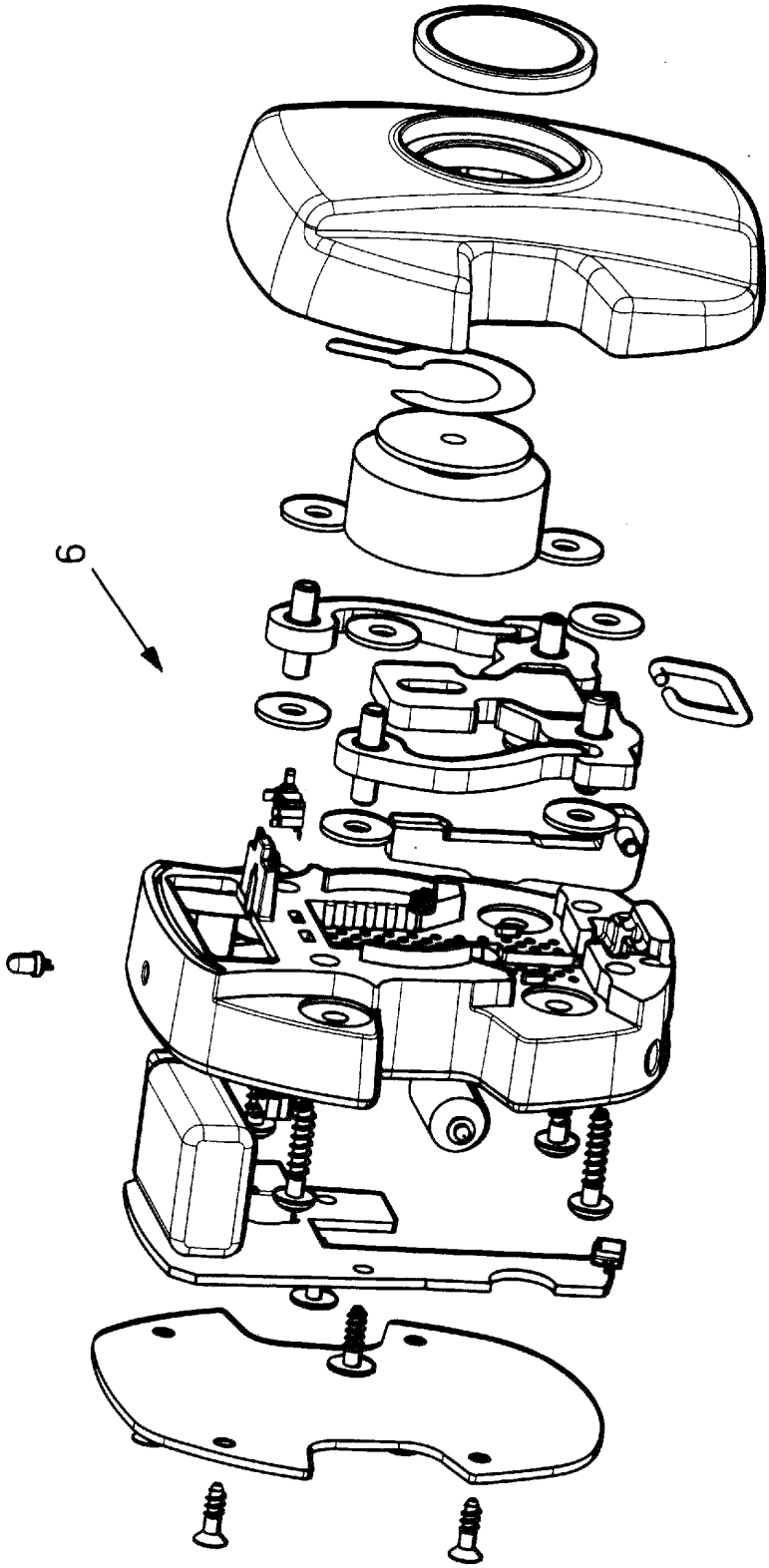

FIG.13

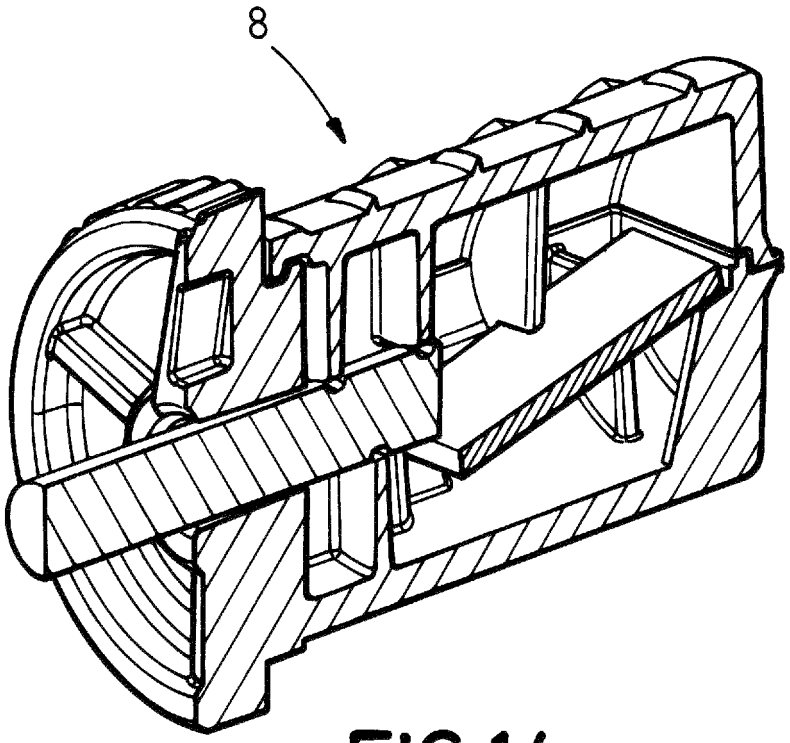

FIG.14

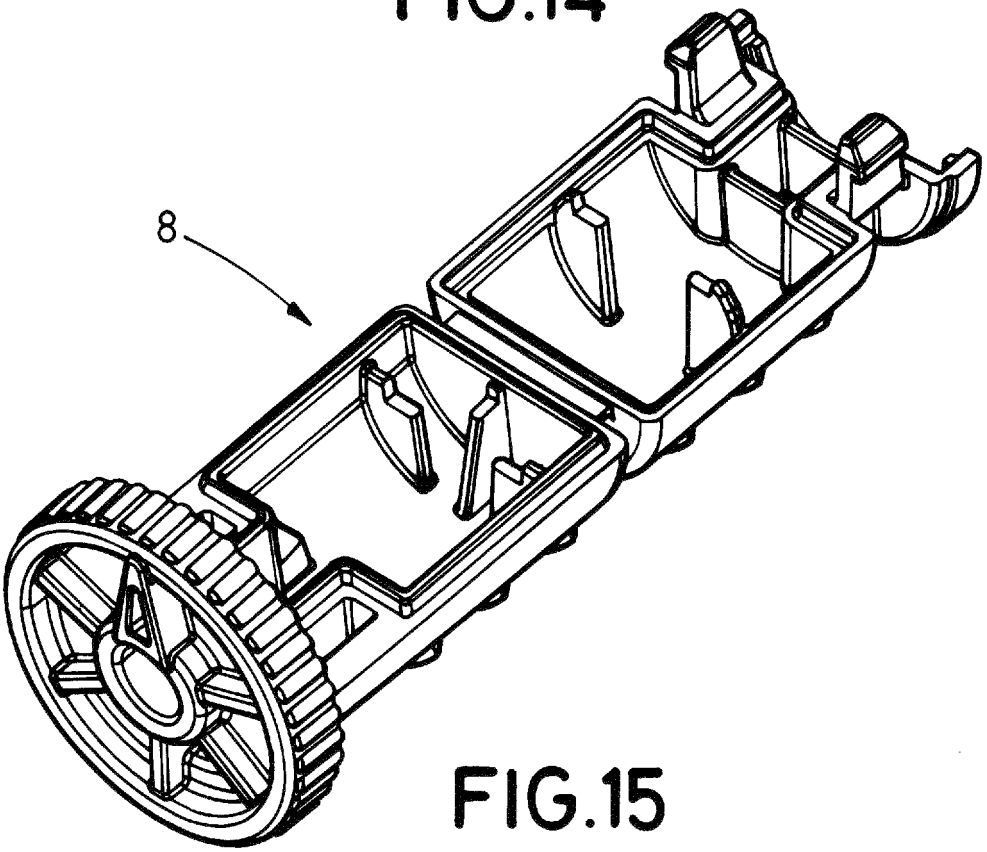

FIG.15

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EUROPEAN SEARCH REPORT

Application Number
EP 13 38 2054

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	WO 2013/001104 A1 (RODRIGUEZ OJEDA RODRIGO [ES]) 3 January 2013 (2013-01-03) * the whole document *	1-11	INV. B68C1/14
A	WO 03/020632 A2 (EARNHART EILEEN [US]) 13 March 2003 (2003-03-13) * abstract *	1	
A	DE 299 15 316 U1 (FARKAS REMIG [DE]) 27 April 2000 (2000-04-27) * abstract *	1	
			TECHNICAL FIELDS SEARCHED (IPC) B68C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	8 August 2013	Espeel, Els

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L : document cited for other reasons

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08-08-2013

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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- WO 2009125026 A1 **[0007]**
- WO 2013001104 A **[0008]**