

**CONTROL INPUT DEVICE COMPRISING A MOBILE ABUTMENT FOR
ADJUSTING THE TRAVEL OF A CONTROL TRIGGER ASSOCIATED
WITH A LOCKING/UNLOCKING MECHANISM**

5 TECHNICAL FIELD

[0001] The present invention relates to control input devices, in particular game controllers, and more particularly joysticks, comprising at least one movable control trigger that can be actuated by a user, preferably by finger pressure. In
10 this field, it relates to an improvement allowing a user to adjust the travel of the control trigger.

PRIOR ART

15 [0002] In this text, the term "control input device" is generally used to refer to any device allowing at least one user to manually enter commands into an electronic and/or computer system.

[0003] Communication between the "*control input device*" and the electronic
20 and/or computer system can be either wired or wireless.

[0004] Game controllers, and more particularly joysticks, are particular control input devices, which are used, for example, to allow a user to interact with a video game, in particular to control a virtual character in a game or to interact
25 with a virtual environment.

[0005] The control input devices can also be used, for example, to allow a user to select audio and/or video content, or to control different types of electronic devices, such as a TV, computer, etc.

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[0006] More particularly, some control input devices comprise one or more movable, usually rotatable, control triggers which can be actuated by a user to

input a command and which generally can be more or less depressed by pressure exerted by a user. When the control input device is ergonomically designed to be held in one or two hands by a user, these control triggers are preferably digital, that is, they can be actuated by pressure using a finger, most often the user's index finger. In particular, when the control input device is a joystick that is ergonomically designed to be held by a user with two hands, it usually comprises two control triggers, left and right.

[0007] A control trigger can be used to enter an on/off binary command. Most often, however, it is used to enter a progressive and continuous command that depends on its position. For example, it can be used to modify the speed of movement of a virtual object or character in a virtual environment, such as a game, or for example to modify the rate of burst fire of a weapon in a fighting game or the like.

[0008] In particular, in order to adapt the responsiveness of the control trigger, for example to allow a user to enter commands more or less quickly, it is desirable for the user to be able to easily adjust the travel of the trigger movement.

[0009] Various solutions have been proposed to date.

[0010] A first type of solution, described for example in US patents US 10,188,940, US 10,596,455 and US 11,185,766, consists in mounting a fixed abutment inside the joystick body, which usually takes the form of a two-part shell, more commonly known as a "casing". This fixed abutment reduces the rotation travel of the control trigger. The major drawback of this solution is that it requires the user to open the joystick body to adjust the trigger travel.

[0011] A second type of solution, described for example in US patent US 9,504,911 or in patent application US 2012/032255, consists in implementing one or more adjusting screws with an adjustable abutment function to block

the rotation of a rotary control trigger, which adjusting screws are passed through the body of the joystick. Compared with the first type of solution described in US patents US 10,188,940, US 10,596,455 and US 11,185,766, the use of these screws makes it easier to adjust the trigger travel, but has at least the major disadvantage of requiring a suitable tool, such as a screwdriver, to carry out the adjustment, which makes adjusting the trigger travel impractical and tedious, and requires the user to interrupt play or the like for too long.

[0012] In order to make adjustment simpler and faster, and in particular to allow adjustment without interrupting the game in progress, technical solutions have already been proposed, for example in US patent application US 2012/0142418 and in European patent application EP 3 302 737, involving a finger-actuated slider-type adjustment knob that is easily accessible and manipulatable by the user.

[0013] In US patent application US 2012/0142418, the joystick features (Figs. 7A and 7B) a movable abutment that can be moved translationally between two positions, by means of a slider-type adjustment knob, in order to adjust the rotational travel of a rotary control trigger.

[0014] In European patent application EP 3 302 737, the joystick features an adjustment mechanism using a rotary cam with an abutment function, which can be rotated by means of an adjustment knob allowing a user to position the rotary cam in the path of the control trigger and to easily and quickly adjust the distance the control trigger is depressed.

[0015] US patent application US 2022/0347560 has also already proposed a joystick comprising a joystick body and at least one control trigger which is rotatable with respect to said body, and a mechanism for adjusting the travel of the movement of said control trigger. This adjustment mechanism, of the ballpoint pen type, comprises an adjustment abutment associated with a fixed cam, a coil spring and a movable actuating element, at least a portion of which

- is positioned outside the joystick body. This actuating element can be manually pushed in translation into the body of the joystick through said fixed cam and allows the adjustment abutment to be driven in translation. During its translation, this adjustment abutment is guided in rotation by the fixed cam.
- 5 When manual pressure on the actuating element is released, the coil spring pushes the adjustment abutment and the actuating element back into an adjustment position, in which the adjustment abutment is blocked by the fixed cam.
- 10 [0016] US patent application US 2019/0329127 has also already proposed a joystick comprising a joystick body and at least one control trigger which is rotatable with respect to said body, and a mechanism for adjusting the travel of the movement of said control trigger. This adjustment mechanism comprises an adjustment abutment and an actuating element, a portion of which is
- 15 accessible from outside the joystick body. This actuating element can be moved from left to right in a number of different adjustment positions, and as it moves it drives the adjustment abutment back and forth to adjust the travel of the control trigger.
- 20 [0017] In the aforementioned technical solutions disclosed in publications US 2012/0142418, EP 3 302 737, US 2022/0347560 and US 2019/0329127, there is a significant risk of the adjustment abutment being accidentally displaced when handling the joystick, particularly during play.
- 25 [0018] Furthermore, in the two technical solutions disclosed in publications US 2012/0142418 and EP 3 302 737, the control trigger travel adjustment is not stable and not robust, and these solutions also have the disadvantage of being not very mechanically robust. In particular, in the case of the joystick described in European patent application EP 3 302 737, in the event of repeated impacts
- 30 or excessive impacts on the control trigger or on the adjustment knob, for example when a user drops the joystick, the mechanical stresses exerted on the rotary cam result in a high risk of breakage of the adjustment system,

particularly at the cam rotation axis. The technical solution described in US patent application US 2012/0142418 is not very robust from a mechanical point of view, due in particular to the shearing stresses undergone by the adjustment knob when the control trigger presses on this movable abutment forming a lever arm with respect to the adjustment knob.

OBJECT OF THE INVENTION

[0019] The invention offers a new technical solution allowing a user to adjust the movement travel of a control trigger of a control input device, in particular of the game controller or joystick type.

SUMMARY OF THE INVENTION

[0020] The object of the invention is thus a control input device, in particular a game controller or joystick, comprising a body and at least one control trigger which is movable with respect to said body, and a mechanism for adjusting the movement travel of said control trigger, which adjustment mechanism comprises at least one adjustment abutment adapted to be movable into at least one first adjustment position, wherein it is adapted to block the control trigger so as to reduce the movement travel of the control trigger, and into at least one second adjustment position, wherein the movement travel of the control trigger is greater than that obtained with the first adjustment position.

[0021] Said adjustment mechanism comprises a locking/unlocking mechanism comprising an actuating element, of which at least one portion is positioned outside the body, and which is movable between at least one unlocked configuration, wherein the actuating element is able to be moved by driving the adjustment abutment in each of said adjustment positions, and at least one locked configuration, wherein the actuating element blocks the adjustment abutment with respect to the body of the device at least in said first adjustment position.

[0022] In the device of the invention, when the actuating element is in the locked configuration, to modify the adjustment position of the adjustment abutment, the actuating element must first be brought into said unlocked
5 configuration so as to unlock the adjustment abutment from the body of the device, and once in said unlocked configuration, the actuating element can be moved by driving the adjustment abutment.

[0023] The adjustment mechanism of the invention allows a user to easily and
10 quickly adjust the movement travel of said control trigger manually, without having to use any tools.

[0024] This adjustment mechanism also makes it possible to adjust the movement travel of said control trigger, without releasing the control input
15 device when the latter is adapted to be held with one or two hands, such as a joystick.

[0025] More particularly, the adjustment of the movement travel of said control trigger can be carried out, if necessary, without interrupting the use of the
20 control input device, and in particular when the device is a joystick, without interrupting play.

[0026] The locking/unlocking mechanism of the invention provides a stable and robust control trigger travel adjustment, and advantageously reduces the risk
25 of unintentional movement of the adjustment abutment when manipulating the control input device, which is particularly important when this device is a joystick.

[0027] More particularly, the control input device of the invention may comprise
30 the following additional and optional features, each additional and optional feature being combinable with any of the other technical features of the device:

- The actuating element is adapted to, in its locked configuration, block the adjustment abutment with respect to the body of the device in each of the adjustment positions of the adjustment abutment.
- The actuating element is movable with respect to the adjustment abutment
5 between said locked configuration and said unlocked configuration.
- When the actuating element moves with respect to the adjustment abutment between the unlocked and locked configuration, the actuating element does not drive the adjustment abutment.
- The actuating element is associated with a resilient return element and is
10 adapted to be brought into and maintained in an unlocked configuration by manual pressure allowing the actuating element to be pushed into the body of the device and to constrain the resilient return element; the resilient return element allows in the absence of manual pressure on the actuating element to resiliently return said actuating element to its locked configuration.
- 15 - The resilient return element is prestressed so as to exert on the actuating element a return force holding it in the locked configuration, in the absence of manual pressure exerted on this actuating element.
- The actuating element is movable with respect to the adjustment abutment between said locked configuration and said unlocked configuration and the
20 resilient return element is positioned between the adjustment abutment and the actuating element.
- The adjustment abutment comprises a housing in which the resilient return element and a portion of the actuating element are positioned.
- The resilient return element is attached inside the body, the adjustment
25 abutment and the actuating element being movable with respect to the resilient return element for positioning the adjustment abutment in each adjustment position.
- The resilient return element comprises a spring, preferably a coil spring, or comprises a resiliently deformable abutment.
- 30 - In the locked configuration, the actuating element cooperates with the body to block the adjustment abutment with respect to the body at least in said first adjustment position.

- 5 - The adjustment abutment is translationally movable, and preferably only translationally movable, for its positioning in each adjustment position and in its locked configuration, the actuating element cooperates with the body to translationally block the adjustment abutment with respect to the body at least in said first adjustment position.
- 10 - The adjustment abutment is translationally movable, and preferably only translationally movable, for its positioning in each adjustment position and the actuating element is translationally movable between said locked configuration and said configuration transversely, and preferably perpendicularly, to the translation of the adjustment abutment.
- 15 - The adjustment abutment is rotatable about an axis of rotation for positioning in each adjustment position, and preferably is movable only in rotation, and in the locked configuration, the actuating element cooperates with the body to rotationally block the adjustment abutment with respect to the body at least in said first adjustment position.
- 20 - The actuating element is translatable between said locked configuration and said configuration parallel to the axis of rotation of the adjustment abutment.
- 20 - The actuating element comprises locking elements of the male or female type adapted to cooperate with complementary locking elements of the body, in order to block the adjustment abutment with respect to the body when the actuating element is brought into the locked configuration.
- 25 - The locking elements of the actuating element and the complementary locking elements of the body are provided to block the actuating element with respect to the body in an indexed manner, in each of the adjustment positions of the adjustment abutment, when the actuating element is brought into the locked configuration.
- 25 - The device has at least one adjustment position for the adjustment abutment, in which the control trigger can be moved into abutment with the body.
- 30 - The device has at least two adjustment positions for the adjustment abutment, in which the adjustment abutment is able to block the control trigger in such a way as to obtain two different travels for the movement of the control trigger.

- The control trigger can be partially pressed into the body.
 - The control trigger rotates with respect to the body.
 - The adjustment abutment is translatable, preferably rectilinear, for positioning in each adjustment position.
- 5 - The adjustment abutment is slidably mounted on a guide rail attached inside the body and guiding the adjustment abutment in translation.
- The control trigger is rotatable with respect to the body and the axis of translation of the adjustment abutment is transverse, and preferably perpendicular, to the axis of rotation of the control trigger.
- 10 - The translation axis (A_{70}) of the adjustment abutment is parallel to the direction of the thrust exerted on the adjustment abutment by the control trigger.
- The actuating element is translatable, preferably in rectilinear translation, with respect to the adjustment abutment between said locked configuration and
- 15 said unlocked configuration.
- The adjustment abutment is translationally movable for positioning thereof in each adjustment position and the actuating element is translationally movable with respect to the adjustment abutment between said locked configuration and said unlocked configuration, transversely, and preferably perpendicularly,
- 20 to the translation axis (A_{70}) of the adjustment abutment.
- The actuating element is mounted on the adjustment abutment in alignment with the translation axis of said adjustment abutment.
 - The adjustment abutment can be rotated to position it in each adjustment position.
- 25 - Said at least one control trigger is hollow and a portion of the adjustment abutment is positioned inside the control trigger at least when the adjustment abutment is in an adjustment position in which it acts as an abutment to the movement of the control trigger.
- The control trigger is resiliently returned to a rest position.
- 30 - The adjustment abutment is positioned at least partly inside the body, and preferably entirely inside the body, whatever its adjustment position.

- The device has at least one additional adjustment abutment and the actuating element is mechanically connected to this additional adjustment abutment so as to be able to drive said additional adjustment abutment into each of its adjustment positions simultaneously with the other adjustment abutment.
- 5 - In its locked configuration, the actuating element blocks each adjustment abutment with respect to the device body in each of the adjustment positions of these adjustment abutments.
- The additional adjustment abutment is positioned at least partly inside the body, and preferably is positioned entirely inside the body, whatever its
- 10 adjustment position.
- The additional adjustment abutment is rotatable.
- The device constitutes a game controller which is adapted to be held in one or two hands by a user, and preferably in which the control trigger or triggers are digital.

15 [0028] The invention also relates to a method for adjusting a control input device as set out above, in particular a game controller or joystick, comprising the following steps: in a first step, unlocking the locking/unlocking mechanism by manual action on the actuating element so as to move the actuating element

20 into said unlocked configuration; in a second step, moving, by means of the actuating element, the adjustment abutment into one of the adjustment positions, the actuating element of the locking/unlocking mechanism being held manually in the unlocked configuration; then in a third step, locking the locking/unlocking mechanism by moving the actuating element into the locked

25 configuration so as to block the adjustment abutment in said adjustment position.

[0029] Preferably, the locking/unlocking mechanism is locked by releasing the actuating element.

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BRIEF DESCRIPTION OF THE DRAWINGS

[0030] The features and advantages of the invention will become more clearly apparent on reading the detailed description below of several particular alternative embodiments of the invention, which particular alternative embodiments are described by way of non-limiting and non-exhaustive examples of the invention, and with reference to the appended drawings, in which:

- Figure 1 is a top view of a particular embodiment of a joystick according to the invention.
- Figure 2 is a bottom view of the joystick shown in Figure 1.
- 10 - Figure 3 is a bottom view of the joystick, showing the interior of the joystick of Figure 1 with the lower half-shell of the joystick removed.
- Figure 4 is an isometric perspective view of the joystick shown in Figure 1, with one of the control triggers partially removed to show the mechanism that rotates the control trigger and resiliently returns it to its rest position.
- 15 - Figure 5 is an isometric, exploded perspective view of an example of a locking/unlocking mechanism according to the invention.
- Figure 6 is a partial view showing a control trigger of the joystick of Figure 1 in its initial rest position (no manual pressure exerted by a user on the control trigger), with the locking/unlocking mechanism in its locked configuration, and
- 20 the actuating button of the locking/unlocking mechanism in an adjustment position allowing maximum rotational travel of the control trigger.
- Figure 7 is a cross-sectional view of the joystick shown in Figure 6.
- Figure 8 is a partial view showing a control trigger of the joystick of Figure 1, maximally depressed by manual pressure exerted by a user on the control
- 25 trigger, with the locking/unlocking mechanism in its locked configuration, and the actuating button of the locking/unlocking mechanism in an adjustment position allowing maximum rotational travel of the control trigger.
- Figures 9 and 10 are cross-sectional views, in two different cross-sectional planes, of the control trigger and the locking/unlocking mechanism of the
- 30 joystick of Figure 8.
- Figure 11 is a partial view showing a control trigger of the joystick of Figure 1 in its initial rest position (no manual pressure exerted by a user on the control

trigger), with the locking/unlocking mechanism in its locked configuration, and the actuating button of the locking/unlocking mechanism in an adjustment position allowing a rotational travel of the control trigger which is reduced and less than that of Figures 9 and 10.

- 5 - Figure 12 is a partial view showing the control trigger of the joystick of Figure 11, when it is fully depressed by manual pressure exerted by a user on the control trigger.
- Figures 13 and 14 are cross-sectional views, in two different cross-sectional planes, of the control trigger and the locking/unlocking mechanism of the
10 joystick of Figure 12.
- Figure 15 is a cross-sectional view of the control trigger and the locking/unlocking mechanism of the joystick shown in Figure 1, when the locking/unlocking mechanism is in its unlocked configuration, and the actuating button of the locking/unlocking mechanism is in a translation position
15 intermediate between two positions for adjusting the rotational travel of the control trigger.
- Figure 16 is an isometric perspective view of a second variant embodiment with a remote actuating element.
- Figure 17 shows a third variant embodiment with a rotating adjustment
20 abutment.
- Figure 18 shows a fourth variant embodiment wherein the resilient return element is attached to the inside of the joystick shell.
- Figures 19 and 20 show a fifth variant embodiment with an additional rotary adjustment abutment.

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DETAILED DESCRIPTION

- [0031] Figure 1 shows a particular example of a joystick 1 comprising an assembled shell 2, commonly known as a "casing", which forms the body of
30 the joystick.

[0032] In this particular example, this shell 2 is ergonomically shaped to make it easier for a user to hold with both hands.

5 [0033] In another variant, the joystick could be adapted to be held in one hand or to be manipulated by a user by being placed on a support such as a table.

[0034] This shell 2 comprises, for example, an upper half-shell 2a (also commonly referred to as "*front casing*"), which is assembled by any means, such as screws or the like, and/or by gluing and/or welding, with a lower half-shell 2b (also commonly referred to as "*back casing*").

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[0035] In the particular variant shown in Figure 2, the half-shell 2b consists of two discrete parts. It can also be made in one piece.

15 [0036] In the usual way, this joystick 1 has on its top face (Fig.1) several control elements that can be actuated manually by a user, including two pivoting joysticks 3 of the "*thumbstick*" type, a directional pad 4 and control buttons 5.

[0037] This joystick 1 also includes (Fig.2) two digital control triggers 6 (commonly referred to as "*triggers*"), which are positioned respectively on a front side of the joystick, preferably symmetrically, in the left and right portions of the joystick 1.

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[0038] These two control triggers 6 are movable with respect to the shell 2 and are preferably rotatable.

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[0039] These two control triggers 6 can be actuated individually by a user, by pressing a finger on each hand when the user holds the joystick 1 with both hands.

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[0040] In this example embodiment, each control trigger 6 can be depressed more or less into the shell 2 by pressure exerted by a user, in particular by means of one of his fingers, usually his index finger.

5 [0041] More particularly, with reference to Figure 4, a portion 60 of the trigger 6 is usually mounted inside the half-shell 2a on a shaft 61, so that it can rotate with respect to the shell 2 about an axis of rotation 61a.

[0042] The trigger 6 is resiliently returned to its rest position, for example by
10 means of one or more return springs 62 mounted on the shaft 61. This rest position is shown in Figures 2, 3, 6 and 7 and corresponds to the position in which it is depressed least deeply into the shell 2.

[0043] In another variant, the joystick could comprise a single control trigger or
15 more than two control triggers.

[0044] With reference to Figure 2, each control trigger 6 is associated with an adjustment mechanism 7 which, in this particular example, is easily accessible
20 from the underside of the joystick 1.

[0045] A particular variant embodiment, in accordance with the invention, of a control trigger 6 and its associated adjustment mechanism 7 will now be detailed with reference to Figures 3 to 14.

25 [0046] In this variant, the adjustment mechanism 7 comprises an adjustment abutment 70, a locking/unlocking mechanism 71 and a support 72 for mounting the abutment 70 and the locking/unlocking mechanism 71.

[0047] The support 72 (Fig.5) is, for example, a plastic insert and is adapted to
30 be attached to the inside of the half-shell 2a, for example by means of at least one attachment screw V (FIG.3).

[0048] In another variant, the support 72 can be assembled from several parts.

[0049] In another variant, the support 72 can be replaced by a support which is an integral part of the half-shell 2a.

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[0050] In this particular variant, this support 72 comprises a portion 720 adapted to receive the adjustment abutment 70 and form a straight translation guide rail for the adjustment abutment 70.

10 [0051] More specifically, this guide rail 720 has (Fig.5) two walls at its front end, serving as front fixed abutments 720a, and two walls at its rear end, serving as rear fixed abutments 720b. The front fixed abutments 720a are adapted to block the adjustment abutment 70 in translation, when the adjustment abutment is brought into the first adjustment position described below. The rear
15 fixed abutments 720b are adapted to block the adjustment abutment 70 in translation when the adjustment abutment is brought into the second adjustment position described below.

[0052] The adjustment abutment 70 (Fig.5) is a linear part with a longitudinal
20 axis 70a, for example a plastic part, comprising a front portion 70b with an abutment function for locking the trigger 6, a rear portion 70c, and a central portion 70d adapted to receive the locking/unlocking mechanism 71.

[0053] The adjustment abutment 70 is a plastic part, for example. In another
25 variant, the adjustment abutment 70 can be assembled from several parts.

[0054] The adjustment abutment 70 is adapted to be slidably mounted inside the shell 2 on the guide rail portion 720 of the support 72, so as to be able to slide in straight translation in the direction of its longitudinal axis 70a
30 (translation axis T/Figures 9 and 13), while being guided in translation. It can thus slide in a straight line in either direction between two extreme adjustment positions:

- a first adjustment position, shown in particular in Figure 13, in which its front portion 70b, which acts as an abutment, makes it possible to block the rotation of the control trigger 6 when the control trigger 6 has rotated by a predefined maximum angle A1 with respect to its initial rest position, thereby reducing the rotational travel of the control trigger 6;
- a second adjustment position, shown in particular in Figure 9, in which the rotational travel of the control trigger 6 is generally greater than that obtained with the first adjustment position, the control trigger 6 being able to pivot with respect to its initial rest position by a predefined maximum angle A2 greater than the aforementioned angle A1.

[0055] In another variant, the translation of the adjustment abutment 70 may not be rectilinear. Furthermore, the movement of the adjustment abutment 70 is not necessarily a translation.

[0056] In this particular embodiment, in the above-mentioned first adjustment position, the central portion 70d of the adjustment abutment 70 is in abutment with the front fixed abutments 720a; in the above-mentioned second adjustment position, the central portion 70d of the adjustment abutment 70 is in abutment with the rear fixed abutments 720b. These abutments 720a and 720b facilitate adjustment of the position of the movable abutment 70.

[0057] In the particular examples shown, but not limiting the invention, angle A2 corresponds to the maximum depression of the control trigger 6 and angle A1 is equal to 50% of angle A2.

[0058] Advantageously, the adjustment abutment 70 is positioned entirely inside the shell 2, whatever its adjustment position. In another variant, the adjustment abutment 70 can be only partly positioned inside the shell 2, in particular when it is in its first aforementioned adjustment position, the front portion 70b in particular being able to be positioned outside the shell 2.

[0059] More particularly, in this embodiment, and in a manner not imitative of the invention, in said second adjustment position, the front portion 70b of the adjustment abutment 70 is sufficiently far from the control trigger 6 to never block it in rotation; the blocking at the end of travel of the control trigger 6, which corresponds to the maximum depression of the control trigger 6, is obtained by abutting the control trigger 6 against a fixed abutment 20 inside the half-shell 2b.

[0060] This fixed abutment 20 is preferably an integral part of the half-shell 2b. It may also consist of an insert attached to the inside of the half-shell 2b. The face of this abutment 20 intended to be in contact with the control trigger can also be protected by a protective material which can preferably be replaced, such as a deformable foam pad, and which generally reduces wear on the abutment 20 and the trigger 6, and more particularly dampens impacts between the abutment 20 and the control trigger 6.

[0061] Preferably, for greater compactness, the trigger 6 is hollow and at least in the first adjustment position, shown in Figure 13, the front portion 70b of the adjustment abutment 70 is positioned inside the trigger 6 and is adapted to cooperate with a counter abutment 63 positioned inside the control trigger 6.

[0062] In the particular examples shown, but by no means limiting the invention, the axis of translation A_{70} (Figures 9 and 13) of the adjustment abutment 70 is transverse, and in this case preferably perpendicular, to the axis of rotation 61a of the control trigger 6, and is parallel to the direction of the thrust P exerted on the adjustment abutment 70 by the control trigger 6 (Figure 13) when a user exerts pressure on the control trigger 6 bringing it into contact with the adjustment abutment 70.

[0063] In another variant embodiment, the translation axis A_{70} can have a different orientation, and can for example be transverse, and in particular

perpendicular to the direction of the thrust exerted on the adjustment abutment by the control trigger.

5 [0064] The locking/unlocking mechanism 71 allows a user to manually lock the control abutment 70 in each of the two aforementioned adjustment positions. It also allows a user to manually unlock the control abutment 70 in each of the two adjustment positions and to manually drive the adjustment abutment 70, when unlocked, into the desired adjustment position.

10 [0065] In the particular variant embodiment shown in the figures, the locking/unlocking mechanism 71 comprises an actuating element 710 (Figure 4), which is mounted on the adjustment abutment 70 and is movable with respect to the adjustment abutment 70 between:

- at least one locked configuration, in which it blocks the adjustment abutment
15 70 with respect to the shell 2 of the joystick 1, in each of the adjustment positions of the abutment 70 [Figures 9 and 10 - locking in the second adjustment position) / Figures 13 and 14 - locking in the first adjustment position]

- and at least one unlocked configuration, as shown in Figure 15, in which it is
20 able to be moved and to translate the adjustment abutment 70 in a straight line into each of said adjustment positions.

[0066] More particularly, in this particular variant embodiment, the actuating
25 element 710 is translatable in a straight line with respect to the adjustment abutment 70, between said locked configuration and said unlocked configuration, along a translation axis A_{71} (Figures 9 and 13) which is transverse to, and preferably perpendicular to, the translation axis A_{70} of the adjustment abutment.

30 [0067] More particularly, in the example shown, but not limiting the invention, the translation axis A_{71} is also transverse, and in this case perpendicular, to the rotation axis 61a of the control trigger 6. In another variant, it can have a

different orientation and, for example, can be parallel to the axis of rotation 61a of the control trigger 6.

5 [0068] The actuating element 710 is made, for example, of plastic. In another variant, it can be assembled from several parts.

[0069] More particularly, the actuating element 710 is mounted on the adjustment abutment 70, preferably aligned (Figure 3) with the translation axis A₇₀ of said adjustment abutment 70, resulting in a more compact and robust
10 construction.

[0070] The locking/unlocking mechanism 71 also comprises (Figure 4) a resilient return element 711, which is generally used to resiliently return the actuating element 710 to its locked configuration.
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[0071] When assembled with the adjustment abutment 70, the actuating element 710 can be brought into and held in the unlocked configuration by manual pressure, so as to depress the actuating element 710 and constrain, and in this particular case compress, the resilient return element 711.
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[0072] In the absence of manual pressure on the actuating element 710, the resilient return element 711 resiliently returns said actuating element 710 to its locked configuration, thus avoiding additional manipulation by the user, who needs only release pressure on the actuating element 710 for it to
25 automatically return to its locked configuration.

[0073] This resilient return element 711 also facilitates indexed adjustment of the position of the movable abutment 70 and makes it easier for a user to blindly adjust the travel of a control trigger 6 without looking at the actuating
30 button 710b,

[0074] Preferably, the resilient return element 711 is prestressed so as to exert a return force on the actuating element 710, keeping it in the locked configuration, in the absence of manual pressure exerted on this actuating element 710, which advantageously reinforces locking and further reduces the risk of accidental unlocking.

[0075] In this particular variant embodiment, and in a non-limiting manner, the resilient return element 711 comprises a coil spring 711a.

[0076] The invention is not limited to the use of a coil spring, but said coil spring can be replaced by any equivalent resilient return means which, in the absence of manual pressure on the actuating element 710, resiliently returns said actuating element 710 to its locked configuration.

[0077] For example, in another variant embodiment, the resilient return element 711 may comprise a resiliently deformable leaf spring.

[0078] Furthermore, in the particular example shown, the resilient return element 711 (spring 711a) is designed to work in compression. In another variant, the resilient return element 711 can be designed to work in tension.

[0079] More particularly, in this particular variant embodiment, the actuating element 710 comprises (Fig.5) a base 710a, the upper face of which is surmounted by an actuating button 710b. This actuating button 710b is designed to be positioned at least partly outside the shell 2 (Figures 2, 6, 8, 11 and 12) so that it can be manipulated by the user of the joystick 1.

[0080] The actuating element 710 also includes male-type locking elements 710c on either side of the actuating button 710b, which project with respect to the upper face of the base 710a. These locking elements 710c, of the male type, are designed to engage in complementary locking housings 21 (Figures 6, 8 and 10) provided in the half-shell 2b to lock the actuating element 710 with

respect to the shell 2 (locked configuration of the mechanism 71) in an indexed manner in each of the adjustment positions of the movable abutment 70.

5 [0081] In another variant embodiment, the locking elements 710c of the actuating element 710 can be of the female type, and the locking housings 21 in the shell 2 can be replaced by male-type locking elements complementary to the female-type locking elements of the actuating element 710.

10 [0082] For mounting on the adjustment abutment 70, the actuating element 710 also has a central guide cylinder 710d below this base 710a, onto which the spring 711a can be threaded, and two resilient lugs 710e positioned on either side of the guide cylinder 710d.

15 [0083] In this particular variant, the central portion 70d of the adjustment abutment 70 comprises a cylindrical housing 701 (Fig.5), which opens into the upper face of the adjustment abutment 70 and is adapted to receive the guide cylinder 710d of the actuating element 710 and the spring 711a threaded onto this guide cylinder 710d.

20 [0084] The central portion 70d of the adjustment abutment 70 also has two through openings 702 (Fig.5), positioned on either side of the cylindrical housing 701, through which the resilient locking lugs 710 can be inserted to secure the actuating element 710 to the adjustment abutment 70.

25 [0085] When the actuating element 710, the resilient return element 711 (spring 711a) and the adjustment abutment 70 are assembled and the two half-shells 2a, 2b are assembled, the actuating button 710b of the actuating element 710 protrudes outside the shell 2 by being positioned through an oblong through-opening 22 (Figures 2, 6, 8, 11 and 12) in the half-shell 2b, and
30 is thus accessible and can be easily manipulated by a user of the joystick 1.

[0086] In the absence of pressure exerted by the user on the actuating button 710b, the male-type locking elements 710c of the actuating element 710 are engaged in the locking housings 21 (Figures 10 and 14) provided in the shell 2, so that the adjustment abutment 70 is locked in position (locked configuration) with respect to the shell 2 of the joystick in one of the
5 aforementioned adjustment positions.

[0087] Preferably, in the locked configuration, the return spring 711a is prestressed, being in this particular example slightly compressed, so as to
10 exert on the actuating element 710 a pressure allowing the locking elements 710c, of the male type, to be held in the locking housings 21, and thus to maintain locking by preventing unintentional unlocking when the joystick 1 is manipulated.

[0088] In order to move the adjustment abutment to another adjustment position, the user of the joystick first simply has to unlock the adjustment abutment 70 to move it to the unlocked configuration, by exerting sufficient pressure on the actuating button 710b of the actuating element 710 to compress the resilient return element 711 (spring 711a) and depress the
15 actuating element 710 sufficiently to completely disengage the male-type locking elements 710c from the locking housings 21.
20

[0089] Then, in a second step (Fig.15), by keeping the actuating element 710 depressed, the user translates the actuating element 710, which is integral with
25 the adjustment abutment 70, in a direction parallel to the axis 70a of the adjustment abutment 70, allowing the adjustment abutment 70 to be translated rectilinearly in the direction of its axis 70a, as far as said desired adjustment position.

[0090] During this translational movement, the adjustment abutment 70 slides
30 with respect to the guide rail 720 of the support 72, while being held and guided in translation by said guide rail 720.

[0091] In a third step, when the adjustment abutment 70 is in the desired adjustment position, the user releases the pressure on the actuating element 710, which is pushed back by the resilient return element 711 (spring 711a) so that the locking elements 710c of the actuating element 710 are positioned in the locking housings 21 in the shell 2, the adjustment abutment 70 is thus securely and stably locked in this adjustment position (Figure 14 - first adjustment position - Figure 10 - second adjustment position).

[0092] The invention is not limited to the particular embodiment shown in Figures 1 to 15, and also extends to the following additional embodiments.

[0093] The control input device of the invention is not limited to an adjustment abutment having two adjustment positions, but the adjustment abutment can be adapted to have three or more different adjustment positions each defining a different travel for the movement of the control trigger.

[0094] The actuating element 710 is not necessarily mounted on the adjustment abutment 70 in alignment with the translation axis A_{70} of said adjustment abutment 70. In another variant embodiment, shown for example in Figure 16, the actuating element 710' can be mechanically connected to the translatable adjustment abutment 70', being offset relative to the translatable axis A_{70} of said adjustment abutment 70'. In this variant of Figure 16, identical to the variant of Figures 1 to 15, the actuating element 710' is associated with a helical return spring 711a and comprises locking elements 710c suitable for cooperating with locking housings (not shown) in the joystick shell; the operation of the actuating element 710' associated with the helical return spring 711a for locking and unlocking the abutment 70' with respect to the joystick shell is identical to the variant shown in Figures 1 to 15.

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[0095] In the context of the invention, the adjustment abutment is not necessarily translationally movable, but can be rotationally movable for positioning in each adjustment position.

- 5 [0096] Figure 17 shows an example of a rotating adjustment abutment 70" with an axis of rotation R. In this variant, the actuating element 710" is translatable between said locked configuration and said configuration parallel to the axis of rotation R of the adjustment abutment. Once the actuating element 710" has been unlocked by pressure compressing the spring associated with it, the
- 10 actuating element 710" can be translated in a straight line along a translation axis A_{70} perpendicular to the rotation axis R of the adjustment abutment 70", in either direction so as to rotate the adjustment abutment 70" between at least two different adjustment positions, by means of a rack-and-pinion gear E mechanically connecting the rotary abutment 70" to the actuating element
- 15 710":
- a first adjustment position, such as that shown in Figure 17, wherein the adjustment abutment 70" is rotatably positioned with respect to the control trigger 6, so as to form an abutment in the path of this control trigger 6 and to reduce the rotational travel of the control trigger 6;
 - 20 - a second adjustment position, wherein the adjustment abutment 70" is rotated relative to the control trigger 6, outside the path of this control trigger 6, so as not to impede the rotational movement of the control trigger 6.

[0097] Although rotational movement for the control trigger is the simplest and

25 most frequently implemented for a game controller or joystick, in the context of the invention the control trigger need not be rotational, as the invention can be applied more generally to other types of control trigger movement. For example, the control trigger can be designed to be actuated manually by being moved and guided in translation, in particular so as to be more or less

30 depressed in the shell 2.

[0098] The resilient return element 711 is not necessarily mounted on the adjustment abutment 70. In another variant, the resilient return element may be attached inside the body 2 of the joystick 1, the adjustment abutment 70 and the actuating element being movable with respect to the resilient return element for positioning the adjustment abutment in each adjustment position.

[0099] The adjustment positions of the movable abutment 70 are not necessarily spaced apart, and movable abutment 70 can also be designed to allow continuous, non-indexed adjustment of its positioning.

10

[0100] In another variant, the actuating element 710 and the adjustment abutment can be rigidly connected to one another, with the actuating element 710 being fixed with respect to the adjustment abutment. In this case, locking and unlocking of the adjustment abutment is achieved by moving the assembly consisting of the actuating element and the adjustment abutment with respect to the body (shell 2) of the device. However, this variant is mechanically more complex.

[0101] Figure 18 shows another variant wherein the resilient return element 711 is a resiliently deformable abutment 711b, of the leaf spring type, which is attached inside the joystick body 2. The adjustment abutment 70''' and the actuating element 710''' are movable with respect to the resilient abutment 711b for positioning the adjustment abutment in each adjustment position.

[0102] In Figure 18, this resilient abutment 711b is at rest and the actuating element 710''' is in its locked configuration. When manual pressure is exerted on the actuating element 710''' to depress it (left-hand displacement in Figure 18) to its unlocked configuration, the actuating element 710''' slides through the adjustment abutment 70''' and exerts pressure on the resilient abutment 711b, deforming it resiliently. When this manual pressure on the actuating element 710''' is released, the resilient abutment 711b returns to its rest position, pushing said actuating element 710''' back into its locked

configuration, thus avoiding additional handling by the user, who needs only to release the pressure on the actuating element 710''' for it to return automatically to its locked configuration.

- 5 [0103] Figure 19 shows a further variant which differs from the variant shown in Figures 1 to 15 in that an additional adjustment abutment 70A is used.

[0104] This additional adjustment abutment 70A is mounted inside the shell 2 so as to be rotatable about an axis of rotation R. The actuating element 710 is
10 mechanically connected to this adjustment abutment 70A in such a way as to be able to rotate said additional adjustment abutment 70A into each of its adjustment positions, simultaneously with the other adjustment abutment 70, that is, in this particular case between the adjustment position of Figure 19, in which the trigger 6 cannot be blocked against rotation by the abutment 70A
15 and has a maximum rotational travel (angle A2 mentioned above), and the adjustment position of Figure 20, wherein the adjustment abutment 70A allows the rotational travel of the trigger 6 to be reduced by blocking a portion 64 of the trigger 6 (angle A1 mentioned above).

- 20 [0105] In the particular case of Figures 19 and 20, the mechanical connection between the actuating element 710 and the adjustment abutment 70A comprises an arm 710A, which is attached to or forms an integral part of the actuating element 710 and which has an oblong slot 710B in which is positioned a drive pin 710C attached to the adjustment abutment 70A or
25 forming an integral part of the adjustment abutment 70A.

[0106] The actuating element 710, in its locked configuration, blocks each adjustment abutment 70, 70A with respect to the joystick body 2 in each of the adjustment positions of these adjustment abutments 70, 70A.

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[0107] When the two adjustment abutments 70 and 70A are brought simultaneously by means of the actuating element 710 into their adjustment

position shown in Figure 20, they allow the rotational travel of the trigger 6 (angle A1 mentioned above) to be reduced by blocking said trigger 6 at two different, spaced-apart abutment points, thereby improving the mechanical stability of the trigger 6.

Claims

1. A control input device, in particular game controller or joystick (1), comprising a body (2) and at least one control trigger (6) which is movable with respect to said body, and a mechanism (7) for adjusting the movement travel of said control trigger (6), which adjustment mechanism (7) comprises at least one adjustment abutment (70; 70'; 70"; 70''') adapted to be movable into at least one first adjustment position, wherein it is adapted to block the control trigger (6) so as to reduce the movement travel of the control trigger, and into at least one second adjustment position wherein the movement travel of the control trigger (6) is greater than that obtained with the first adjustment position, wherein said adjustment mechanism (7) comprises a locking/unlocking mechanism (71) comprising an actuating element (710; 710'; 710"; 710'''), at least a portion of which (710b) is positioned outside the body (2), and which is movable between at least one unlocked configuration wherein the actuating element is capable of being moved by driving the adjustment abutment (70; 70'; 70"; 70''') in each of said adjustment positions, and at least one locked configuration wherein the actuating element blocks the adjustment abutment (70, 70'; 70"; 70''') with respect to the body (2) of the device at least in said first adjustment position.
2. The device according to claim 1, wherein the actuating element (710; 710'; 710"; 710''') is adapted to, in its locked configuration, block the adjustment abutment (70; 70'; 70"; 70''') with respect to the body (2) of the device in each of the adjustment positions of the adjustment abutment (70).
3. The device according to any one of claims 1 or 2, wherein the actuating element (710; 710'; 710"; 710''') is movable with respect to the adjustment abutment (70; 70'; 70"; 70''') between said locked configuration and said unlocked configuration.

4. The device according to any one of claims 1 to 3, wherein the actuating element (710; 710'; 710"; 710''') is associated with a resilient return element (711) and is adapted to be brought into and maintained in an unlocked configuration by manual pressure allowing the actuating element (710; 710'; 710"; 710''') to be pushed into the body (2) and to constrain the resilient return element (711), and wherein the resilient return element (711) allows in the absence of manual pressure on the actuating element (710; 710'; 710"; 710''') to resiliently return said actuating element (710; 710'; 710"; 710''') to its locked configuration.

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5. The device according to claim 4, wherein the resilient return element (711) is prestressed so as to exert on the actuating element (710; 710'; 710'') a return force holding it in the locked configuration, in the absence of manual pressure exerted on this actuating element (710; 710'; 710'').

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6. The device according to claim 4 or 5, wherein the actuating element (710; 710'; 710'') is movable with respect to the adjustment abutment (70; 70'; 70'') between said locked and said unlocked configuration and the resilient return element (711) is positioned between the adjustment abutment (70; 70'; 70'') and the actuating element (710; 710'; 710'').

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7. The device according to claim 6, wherein the adjustment abutment (70; 70'; 70'') comprises a housing (701) in which the resilient return element (711) and a portion of the actuating element (710; 710'; 710'') are positioned.

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8. The device according to claim 4 or 5, wherein the resilient return element (711b) is attached inside the body (2), the adjustment abutment (70'') and the actuating element (710'') being movable with respect to the resilient return element (711b) for positioning the adjustment abutment in each adjustment position.

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9. The device according to any one of claims 4 to 8, wherein the resilient return element (711) comprises a spring (711a), preferably a coil spring, or comprises a resiliently deformable abutment (711b).
- 5 10. The device according to any one of claims 1 to 9, wherein in the locked configuration, the actuating element (710; 710'; 710"; 710''') cooperates with the body (2) to block the adjustment abutment (70; 70'; 70"; 70''') with respect to the body (2) at least in said first adjustment position.
- 10 11. The device according to any one of claims 1 to 10, wherein the adjustment abutment (70) is translationally movable for positioning in each adjustment position and wherein in the locked configuration, the actuating element cooperates with the body (2) to translationally block the adjustment abutment (70; 70'; 70"; 70''') with respect to the body (2) at least in said first
15 adjustment position.
12. The device according to any one of claims 1 to 11, wherein the adjustment abutment (70) is translationally movable for its positioning in each adjustment position and wherein the actuating element (710) is translationally
20 movable between said locked configuration and said configuration transversely, and preferably perpendicularly, to the translation of the adjustment abutment (70).
13. The device according to any one of claims 1 to 10, wherein the
25 adjustment abutment (70") is rotatable about an axis of rotation (R) for positioning in each adjustment position and wherein in the locked configuration, the actuating element cooperates with the body (2) to rotationally block the adjustment abutment with respect to the body (2) at least in said first adjustment position.
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14. The device according to claim 13, wherein the actuating element (710") is translatable between said locked configuration and said configuration parallel to the axis of rotation (R) of the adjustment abutment (70").
- 5 15. The device according to any one of claims 1 to 14, wherein the actuating element (710; 710'; 710"; 710''') comprises locking elements (710c) of the male or female type adapted to cooperate with complementary locking elements (21) of the body (2), in order to block the adjustment abutment (70; 70'; 70"; 70''') with respect to the body (2) when the actuating element is brought into
10 the locked configuration.
16. The device according to claim 15, wherein the locking elements (710c) of the actuating element and the complementary locking elements (21) of the body (2) are provided to block the actuating element with respect to the body
15 (2) in an indexed manner, in each of the adjustment positions of the adjustment abutment, when the actuating element is brought into the locked configuration.
17. The device according to any one of claims 1 to 16, wherein said at least one control trigger (6) is hollow and a portion (70b) of the adjustment abutment
20 is positioned inside the control trigger (6) at least when the adjustment abutment is in an adjustment position in which it acts as an abutment to the movement of the control trigger.
18. The device according to any one of claims 1 to 17, comprising at least
25 one additional adjustment abutment (70A), and the actuating element (710) is mechanically connected to this additional adjustment abutment (70A) so as to be able to drive said additional adjustment abutment (70A) into each of its adjustment positions simultaneously with the other adjustment abutment (70).
- 30 19. The device according to any one of claims 1 to 18, constituting a joystick which is adapted to be held in one or two hands by a user, and preferably wherein the control trigger or triggers (6) are digital.

20. A method of adjusting a control input device, in particular a game controller or joystick (1), according to any one of claims 1 to 19, comprising the following steps: in a first step, unlocking the locking/unlocking mechanism (71)
5 by manual action on the actuating element (710; 710'; 710"; 710''') so as to move the actuating element (710; 710'; 710"; 710''') into said unlocked configuration; in a second step, moving, by means of the actuating element (710; 710'; 710"; 710'''), the adjustment abutment (70; 70'; 70"; 70''') into one of the adjustment positions, the actuating element (710; 710'; 710"; 710''') of
10 the locking/unlocking mechanism (71) being held manually in the unlocked configuration; then in a third step, locking the locking/unlocking mechanism (71) by moving the actuating element into the locked configuration so as to block the adjustment abutment (70; 70'; 70"; 70''') in said adjustment position.
- 15 21. The method according to claim 20, wherein the locking/unlocking mechanism (71) is locked by releasing the actuating element (710; 710'; 710"; 710''').