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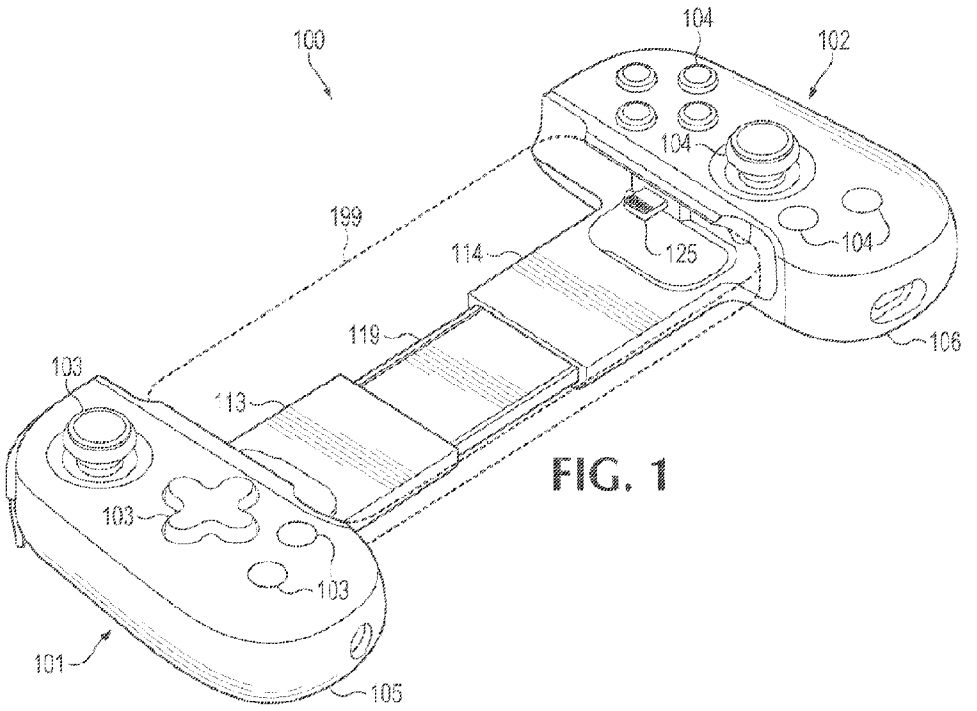

FIG. 1

(57) Abrégé/Abstract:
A game controller for a mobile device, the game controller having a first handle, a bridge, a first spring mechanism, and a first latch mechanism. The first handle is configured to contact and support a mobile device and includes a user-accessible, first hardware interface on a main body portion of the first handle. The bridge is in sliding engagement with the first handle. The bridge and the first handle are configured for the main body portion of the first handle to translate in a retraction direction toward a midline of the bridge and into a retracted configuration and also to translate in an extension direction away from the midline of the bridge into an extended configuration. The first spring mechanism is configured to bias the first handle toward the retracted configuration. The first latch mechanism is configured to temporarily lock the bridge in the extended configuration.

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Abstract:

A game controller for a mobile device, the game controller having a first handle, a bridge, a first spring mechanism, and a first latch mechanism. The first handle is configured to contact and support a mobile device and includes a user-accessible, first hardware interface on a main body portion of the first handle. The bridge is in sliding engagement with the first handle. The bridge and the first handle are configured for the main body portion of the first handle to translate in a retraction direction toward a midline of the bridge and into a retracted configuration and also to translate in an extension direction away from the midline of the bridge into an extended configuration. The first spring mechanism is configured to bias the first handle toward the retracted configuration. The first latch mechanism is configured to temporarily lock the bridge in the extended configuration.

GAME CONTROLLER FOR A MOBILE DEVICE WITH A HOLD-OPEN FEATURE

TECHNICAL FIELD

[0001] The subject matter is related to an apparatus and methods for a game controller for a mobile device.

BACKGROUND

[0002] A game controller is a device used to provide input to a video game, for example to control an object or character in the video game. The video game may be running on a computer, a specially designed gaming system, or a mobile device. In some prior art devices, the game controller is designed to mechanically couple to a mobile device.

[0003] Embodiments of the technology disclosed in this document address shortcomings in the prior art.

BRIEF DESCRIPTION OF THE DRAWINGS

[0004] FIG. 1 is a perspective view of a game controller, according to embodiments.

[0005] FIGs. 2–4 are each top views of the game controller of FIG. 1, collectively showing an example process of how the game controller may contact and support an example mobile device.

[0006] FIG. 5 is a front, partial sectional view of the game controller of FIG. 1 in an example of a retracted configuration of the game controller.

[0007] FIG. 6 is a front, partial sectional view of the game controller of FIG. 1 in an example of an extended configuration of the game controller.

[0008] FIG. 7 is a close-up of a portion of the game controller of FIGs. 5 and 6, illustrating an example latch mechanism in an unlatched configuration.

[0009] FIG. 8 is a close-up of a portion of the game controller of FIGs. 5 and 6, illustrating the example latch mechanism of FIG. 7 in a latched configuration.

[0010] FIG. 9 is a close-up of a portion of a first alternative arrangement for the game controller of FIGs. 5 and 6, illustrating an example latch mechanism in an unlatched configuration.

[0011] FIG. 10 is a close-up of a portion of a first alternative arrangement for the game controller of FIGs. 5 and 6, illustrating the example latch mechanism of FIG. 9 in a latched configuration.

[0012] FIG. 11 is a close-up of a portion of a second alternative arrangement for the game controller of FIGs. 5 and 6, illustrating an example latch mechanism in an unlatched configuration.

[0013] FIG. 12 is a close-up of a portion of a second alternative arrangement for the game controller of FIGs. 5 and 6, illustrating the example latch mechanism of FIG. 11 in a latched configuration.

[0014] FIG. 13 is a close-up of a portion of a third alternative arrangement for the game controller of FIGs. 5 and 6, illustrating an example latch mechanism in an unlatched configuration.

[0015] FIG. 14 is a close-up of a portion of a third alternative arrangement for the game controller of FIGs. 5 and 6, illustrating the example latch mechanism of FIG. 13 in a latched configuration.

[0016] FIG. 15 is a close-up of a portion of a fourth alternative arrangement for the game controller of FIGs. 5 and 6, illustrating an example latch mechanism in an unlatched configuration.

[0017] FIG. 16 is a close-up of a portion of a fourth alternative arrangement for the game controller of FIGs. 5 and 6, illustrating the example latch mechanism of FIG. 15 in a latched configuration.

DETAILED DESCRIPTION

[0018] As described in this document, embodiments are directed to a game controller for a mobile device with a hold-open feature.

[0019] Keeping the handles pulled apart while inserting the mobile device into a game controller can be difficult. For example, a user holding a mobile device in the user's right hand may need to use the user's left hand to pull the two handles apart when placing the mobile device between the two handles of the game controller. This difficulty with insertion may be exacerbated when the game controller connects to the mobile device via a connector, such as USB-C connector, because the user must also ensure that the mobile device is aligned with the connector when inserting it. The

removal of the mobile device may be equally vexing as the user must once again attempt to pull the two handles apart with one hand.

[0020] But in embodiments of the disclosed game controller, once the handles are pulled apart sufficiently, the handles lock in place, allowing the user to easily insert the mobile device. Then, by applying light pressure on the handles, the user can unlock the handles and snap the device shut, securing the mobile device to the game controller.

[0021] FIG. 1 is a perspective view showing portions of a game controller **100**, according to embodiments. As illustrated in FIG. 1, a game controller **100** may include a first handle **101**, a second handle **102**, and a bridge **119**. Each of the first handle **101** and the second handle **102** is configured to contact and support a mobile device **199**, though not all contemplated embodiments will include the second handle **102**. An exemplary mobile device **199** is shown in broken lines to illustrate how the game controller **100** may contact and support a mobile device **199** in some embodiments. The mobile device **199** may be, as examples, a smartphone or a tablet computer.

[0022] As illustrated in FIG. 1, the first handle **101** includes a guide portion **113** and a main body portion **105**. The guide portion **113** extends from the main body portion **105** and along a first end **115** of the span **120** of the bridge **119**. (See also FIGs. 5 and 6.) The guide portion **113** of the first handle **101** is configured to align the bridge **119** with the main body portion **105** of the first handle **101**.

[0023] As illustrated, the first handle **101** includes a user-accessible, first hardware interface **103** on the main body portion **105** of the first handle **101**. The first hardware interface **103** could be a button, an analog stick, a touchscreen, a touchpad, a knob, a slider, a switch, a wheel, a dial, a directional pad, or another such feature configured to accept touch inputs from a user's finger or a stylus. As shown in FIG. 1, the first hardware interface **103** may include multiple such hardware interfaces.

[0024] Likewise, the second handle **102** includes a guide portion **114** and a main body portion **106**. The guide portion **114** extends from the main body portion **106** and along a second end **116** of the span **120** of the bridge **119**. (See also FIGs. 5 and 6.) The guide portion **114** of the second handle **102** is configured to align the bridge **119** with the main body portion **106** of the second handle **102**.

[0025] As illustrated, the second handle **102** further includes a user-accessible, second hardware interface **104** on the main body portion **106** of the second handle **102**. As above for the first hardware interface **103** of the first handle **101**, the second hardware interface **104** could be a button, an analog stick, a touchscreen, a touchpad, a knob, a slider, a switch, a wheel, a dial, a directional pad, or another such feature configured to accept touch inputs from a user's finger or a stylus. The second hardware interface **104** may include multiple such hardware interfaces, as illustrated in FIG. 1.

[0026] One or both of the first handle **101** and the second handle **102** may include a connector **125** for physical and electrical connection to the mobile device **199**. The connector **125** may be, for example, a USB-C connector.

[0027] FIGs. 2–4 are top views of the game controller **100** of FIG. 1, showing an example process of how the game controller **100** may contact and support an example mobile device **199**. As illustrated in FIG. 2, the mobile device **199** may be placed over the bridge **119**, between the first handle **101** and the second handle **102** of the game controller **100**. As illustrated in FIG. 3, the connector **125** of the game controller **100** may be joined with a corresponding connector on the mobile device **199**. FIGs. 2 and 3 show examples of an extended configuration of the game controller **100**. In FIG. 4, the mobile device **199** is secured between the first handle **101** and the second handle **102** of the game controller **100**. FIG. 4 illustrates an example of a retracted configuration of the game controller **100**. The extended configuration and the retracted configuration of the game controller **100** will be described in more detail below. The reader will note, though, that there is more than one retracted configuration. For example, FIG. 4 illustrates an example of a retracted configuration when the game controller **100** is securing a mobile device **199**. As another example, FIG. 5 (described below) illustrates an example of a retracted configuration when the game controller **100** is not securing a mobile device **199**.

[0028] FIG. 5 is a front, partial sectional view of the game controller **100** of FIG. 1 in an example of a retracted configuration of the game controller **100**. FIG. 6 is a front, partial sectional view of the game controller **100** of FIG. 1 in an example of an extended configuration of the game controller **100**. As illustrated in FIGs. 5–6, a game controller **100** may include a first handle **101**, a second handle **102**, and a bridge **119**, each as described above for FIGs. 1–4. In each of FIGs. 5–6, external portions of the

first handle **101**, the second handle **102**, and the bridge **119** are not shown to make certain internal features visible.

[0029] As illustrated, the bridge **119** is in sliding engagement with the first handle **101**. As illustrated, the bridge **119** is not telescoping, meaning that segments of the bridge **119** do not slide within another segment of the bridge **119** to allow for lengthening or shortening of the bridge **119**. The bridge **119** has a span **120** extending away from the main body portion **105** of the first handle **101**, and the span **120** has a transverse midline **121**.

[0030] The bridge **119** and the first handle **101** are configured to allow the main body portion **105** of the first handle **101** to translate in a retraction direction **122** toward the midline **121** of the bridge **119** and into a retracted configuration, such as one of the example retracted configurations illustrated in FIGs. 4 or 5. The bridge **119** and the first handle **101** are configured to allow the main body portion **105** of the first handle **101** to also translate in an extension direction **123** away from the midline **121** of the bridge **119** into an extended configuration, such as one of the example extended configurations illustrated in FIGs. 2 or 6.

[0031] As used in this disclosure, the transverse midline **121** of the bridge **119** is a reference datum used to define the extension direction **123** and the retraction direction **122**. That is, the retraction direction **122** is toward the transverse midline **121**, while the retraction direction **122** is away from the transverse midline **121**. Accordingly, the transverse midline **121** of the bridge **119** may or may not coincide with a physical structure on the game controller **100**.

[0032] Likewise, the bridge **119**, as illustrated, is in sliding engagement with the second handle **102**, and the span **120** of the bridge **119** extends away from the main body portion **106** of the second handle **102**. The bridge **119** and the second handle **102** are configured to allow the main body portion **106** of the second handle **102** to translate in the retraction direction **122** toward the midline **121** of the bridge **119** and into the retracted configuration. The bridge **119** and the second handle **102** are configured to allow the main body portion **106** of the second handle **102** to also translate in the extension direction **123** away from the midline **121** of the bridge **119** into the extended configuration.

[0033] As illustrated in FIGs. 5–6, the game controller **100** may also include a first spring mechanism **107**, a second spring mechanism **108**, a first latch mechanism **109**, a second latch mechanism **110**, a first linear rack **111**, a second linear rack **112**, and a pinion **124**. These are described below.

[0034] The first spring mechanism **107** is configured to bias the first handle **101** toward the retracted configuration. In addition, the first spring mechanism **107** exerts a first retraction force on the first latch mechanism **109** in the retraction direction **122**. As illustrated, the first spring mechanism **107** may be attached to the first handle **101** through a shaft **117** and is also attached to the bridge **119**. The first spring mechanism **107** may be or include a first constant-load spring connecting the first handle **101** to the bridge **119**. The first constant-load spring is configured to exert a substantially constant force on the first handle **101** in the retraction direction **122**. As used in this disclosure, "substantially constant" means largely or essentially invariable, yet without requiring perfect constancy, as the game controller **100** transitions from the retracted configuration to the extended configuration and from the extended configuration to the retracted configuration.

[0035] The second spring mechanism **108** is configured to bias the second handle **102** toward the retracted configuration. In addition, the second spring mechanism **108** exerts a second retraction force on the second latch mechanism **110** in the retraction direction **122**. As illustrated, the second spring mechanism **108** is attached to the second handle **102** through a shaft **118** and is also attached to the bridge **119**. The second spring mechanism **108** may be or include a second constant-load spring connecting the second handle **102** to the bridge **119**. The second constant-load spring is configured to exert a substantially constant force on the second handle **102** in the retraction direction **122**.

[0036] The first latch mechanism **109** is configured to temporarily lock the bridge **119** in the extended configuration. The first latch mechanism **109** is further configured to require a first disengagement force in the retraction direction **122** to unlock the bridge **119** from the extended configuration. The first disengagement force is greater than the first retraction force exerted by the first spring mechanism **107** in the retraction direction **122**. The additional force (that is, that portion of the first disengagement force that exceeds the first retraction force) may be provided by, for example, pressure from the user's hands exerted in the retraction direction **122**.

[0037] Likewise, the second latch mechanism **110** is configured to temporarily lock the bridge **119** in the extended configuration. The second latch mechanism **110** is further configured to require a second disengagement force in the retraction direction **122** to unlock the bridge **119** from the extended configuration. The second disengagement force is greater than the second retraction force exerted by the second spring mechanism **108** in the retraction direction **122**. The additional force (that is, that portion of the second disengagement force that exceeds the second retraction force) may be provided by, for example, pressure from the user's hands exerted in the retraction direction **122**.

[0038] As illustrated, the first linear rack **111** is coupled to the first handle **101** and is in sliding engagement with the bridge **119**. The first linear rack **111** extends substantially along the span **120** of the bridge **119**. As used in this disclosure, "substantially along" means largely or essentially in the direction of, without requiring perfect conformity. The first linear rack **111** may further include a step **126** or indentation, which may engage with the first latch mechanism **109** as described more fully below. As used in this disclosure, "to engage" means "to interlock with; to fit together."

[0039] The second linear rack **112** is coupled to the second handle **102** and is in sliding engagement with the bridge **119**. The second linear rack **112** extends substantially along the span **120** of the bridge **119**. The second linear rack **112** may further include a step **126**, which may engage with the second latch mechanism **110** as described more fully below.

[0040] As illustrated, the pinion **124** is affixed to the bridge **119**. The pinion **124** is in contact with each of the first linear rack **111** and the second linear rack **112**. The pinion **124** is configured to rotate relative to the bridge **119** as the first linear rack **111** is translated relative to the pinion **124**. The pinion **124** is also configured to rotate as the second linear rack **112** is translated relative to the pinion **124**.

[0041] FIG. 7 is a close-up of a portion of the game controller **100** of FIGs. 5 and 6, illustrating an example latch mechanism in an unlatched configuration. FIG. 8 is a close-up of a portion of the game controller **100** of FIGs. 5 and 6, illustrating the example latch mechanism of FIG. 7 in a latched configuration. While illustrated and described for the first-handle side of the game controller **100**, the discussion for FIGs. 7 and 8 applies equally to the second-handle side of the game controller **100**. Hence,

the example latch mechanism of FIGs. 7 and 8 may be the first latch mechanism **109** described above for FIGs. 5 and 6, the second latch mechanism **110** described above for FIGs. 5 and 6, or both the first latch mechanism **109** and the second latch mechanism **110**.

[0042] As illustrated in FIGs. 7 and 8, the example latch mechanism may include a catch **127** coupled to the bridge **119**. The catch **127** is configured to contact and engage the step **126** on the first linear rack **111** in the extended configuration and disengage from the step **126** on the first linear rack **111** in the retracted configuration. To facilitate the engagement and disengagement of the catch **127** from the step **126**, the step **126** may be angled or rounded, or a portion of the catch **127** facing the step **126** may be angled or rounded, or both.

[0043] As illustrated, the catch **127** is coupled to the bridge **119** through a pivot **128**. The first latch mechanism **109** may also include a cantilevered spring **129** configured to apply a torque to the catch **127** about the pivot **128** to bias the catch **127** against the first linear rack **111**. The cantilevered spring **129** may be coupled to the bridge **119** by one or more attachment points **130**.

[0044] With particular reference to FIGs. 2–8, in use the game controller **100** may initially be in a retracted configuration, such as the retracted configuration illustrated in FIG. 5. In the retracted configuration, the catch **127** is disengaged from the step **126** on the first linear rack **111**. In versions having a catch **127** on a second linear rack **112** (also or instead of the catch **127** on the first linear rack **111**), in the retracted configuration, the catch **127** is disengaged from the step **126** on the second linear rack **112**.

[0045] Then, the user may apply a force (using, for example, the user's hands) to the first handle **101** or the second handle **102**, or both, in the extension direction **123** to move the game controller **100** into an extended configuration, such as the extended configurations illustrated in FIGs. 1, 2, and 6. In other words, the user may pull the first handle **101** and the second handle **102** apart from each other.

[0046] In transitioning to the extended configuration, the first linear rack **111** slides relative to the catch **127** for the first end **115** of the span **120** until that catch **127** is aligned with the step **126** in the first linear rack **111**. During the transition, the first spring mechanism **107** continues to bias the first handle **101** toward the retracted

configuration and exerts a first retraction force on the first latch mechanism **109** in the retraction direction **122**. The cantilevered spring **129** then causes the catch **127** for the first end **115** of the span **120** to engage the step **126** of the first linear rack **111** by forcing the catch **127** into the step **126**. The first latch mechanism **109** is now temporarily locking the bridge **119** in the extended configuration by way of the catch **127**.

[0047] In versions having a catch **127** on a second linear rack **112** (also or instead of the catch **127** on the first linear rack **111**), in transitioning to the extended configuration, the second linear rack **112** slides relative to the catch **127** for the second end **116** of the span **120** until the catch **127** is aligned with the step **126** in the second linear rack **112**. During the transition, the second spring mechanism **108** continues to bias the second handle **102** toward the retracted configuration and exerts a second retraction force on the second latch mechanism **110** in the retraction direction **122**. The cantilevered spring **129** then causes the catch **127** for the second end **116** of the span **120** to engage the step **126** of the second linear rack **112** by forcing the catch **127** into the step **126**. The second latch mechanism **110** is now temporarily locking the bridge **119** in the extended configuration by way of the catch **127**.

[0048] With the bridge **119** temporarily locked in the extended configuration, the user may then insert a mobile device **199** into the game controller **100** by placing the mobile device **199** over the bridge **119**, such as illustrated in FIG. 2. If necessary, the connector **125** of the game controller **100** may then be joined with a corresponding connector on the mobile device **199**, such as illustrated in FIG. 3.

[0049] To unlock the hold-open feature, where the bridge **119** is temporarily locked in the extended configuration, and return the game controller **100** to a retracted configuration, the user typically applies a force to the first handle **101** in the retraction direction **122**. This user-applied force, coupled with the first retraction force exerted by the first spring mechanism **107**, causes the catch **127** for the first end **115** of the span **120** to disengage from the step **126** in the first linear rack **111**. Once disengaged, the first retraction force exerted by the first spring mechanism **107** causes the game controller **100** to transition to a retracted configuration.

[0050] In versions having a catch **127** on a second linear rack **112** (also or instead of the catch **127** on the first linear rack **111**), the user may apply a force to the second handle **102** in the retraction direction **122**. This user-applied force, coupled with the

second retraction force exerted by the second spring mechanism **108**, causes the catch **127** for the second end **116** of the span **120** to disengage from the step **126** in the second linear rack **112**. Once disengaged, the second retraction force exerted by the second spring mechanism **108** causes the game controller **100** to transition to a retracted configuration.

[0051] Since moving the game controller **100** from the retracted configuration to the extended configuration is often done by using both of the user's hands (such as, for example, one hand on each of the first handle **101** and the second handle **102**), the hold-open feature allows the user—once the game controller **100** is temporarily locked in the extended configuration—to remove one or both of the user's hands from the game controller **100** (such as, for example, from either the first handle **101** or the second handle **102**, or both) to manipulate the mobile device **199** into position, such as the position illustrated in FIG. 2. Hence, embodiments of the disclosed technology allow the user to efficiently and easily insert and remove a mobile device **199** from the game controller **100**.

[0052] FIG. 9 is a close-up of a portion of an alternative arrangement for the game controller **100** of FIGs. 5 and 6, illustrating an example latch mechanism in an unlatched configuration. FIG. 10 is a close-up of a portion of an alternative arrangement for the game controller **100** of FIGs. 5 and 6, illustrating the example latch mechanism of FIG. 9 in a latched configuration. While illustrated and described for the first-handle side of the game controller **100**, the discussion for FIGs. 9 and 10 applies equally to the second-handle side of the game controller **100**. Hence, the example latch mechanism of FIGs. 9 and 10 may be the first latch mechanism **109** described above for FIGs. 5 and 6, the second latch mechanism **110** described above for FIGs. 5 and 6, or both the first latch mechanism **109** and the second latch mechanism **110**.

[0053] As illustrated in FIGs. 9 and 10, the example latch mechanism may include a tension spring **132** coupled to the bridge **119**. An engagement portion **131** of the tension spring **132** is configured to contact and engage the step **126** on the first linear rack **111** in the extended configuration and disengage from the step **126** on the first linear rack **111** in the retracted configuration. To facilitate the engagement and disengagement of the catch **127** from the step **126**, the step **126** may be angled or rounded.

[0054] As illustrated, the tension spring **132** is coupled to the bridge **119** through one or more attachment points **133**. The tension spring **132** is configured to bias the engagement portion **131** of the tension spring **132** against the first linear rack **111**. The engagement portion **131** is configured to engage the step **126** in the extended configuration.

[0055] Accordingly, in transitioning from the retracted configuration (an example of which is illustrated in FIG. 9) to the extended configuration (an example of which is illustrated in FIG. 10), the first linear rack **111** slides relative to the engagement portion **131** of the tension spring **132** until the engagement portion **131** is aligned with the step **126** in the first linear rack **111**. The tension spring **132** then causes the engagement portion **131** to engage the step **126** of the first linear rack **111** by forcing the engagement portion **131** into the step **126**. Likewise, in transitioning from the extended configuration to the retracted configuration, the engagement portion **131** of the tension spring **132** is disengaged from the step **126** in the first linear rack **111**. Otherwise, operation of this example latch mechanism is substantially as described above for FIGs. 2–8.

[0056] FIG. 11 is a close-up of a portion of an alternative arrangement for the game controller **100** of FIGs. 5 and 6, illustrating an example latch mechanism in an unlatched configuration. FIG. 12 is a close-up of a portion of an alternative arrangement for the game controller **100** of FIGs. 5 and 6, illustrating the example latch mechanism of FIG. 11 in a latched configuration. While illustrated and described for the first-handle side of the game controller **100**, the discussion for FIGs. 11 and 12 applies equally to the second-handle side of the game controller **100**. Hence, the example latch mechanism of FIGs. 11 and 12 may be the first latch mechanism **109** described above for FIGs. 5 and 6, the second latch mechanism **110** described above for FIGs. 5 and 6, or both the first latch mechanism **109** and the second latch mechanism **110**.

[0057] As illustrated in FIGs. 11 and 12, the example latch mechanism may include a catch **134** coupled to the bridge **119**. The catch **134** is configured to contact and engage the step **126** on the first linear rack **111** in the extended configuration and disengage from the step **126** on the first linear rack **111** in the retracted configuration. To facilitate the engagement and disengagement of the catch **134** from the step **126**,

the step **126** may be angled or rounded, or a portion of the catch **134** facing the step **126** may be angled or rounded, or both.

[0058] As illustrated, the catch **134** is coupled to the bridge **119** through a pivot **135**. The first latch mechanism **109** may also include a cantilevered spring **136** configured to apply a torque to the catch **134** about the pivot **135** to bias the catch **134** against the first linear rack **111**. As illustrated, the cantilevered spring **136** may be integral to and extend from the catch **134**. Accordingly, the cantilevered spring **136** may be configured to slide through one or more guide points **137** of the bridge **119**, which constrain an end of the cantilevered spring **136** opposite the catch **134**.

[0059] Operation of this example latch mechanism is substantially as described above for FIGs. 2–8.

[0060] FIG. 13 is a close-up of a portion of an alternative arrangement for the game controller **100** of FIGs. 5 and 6, illustrating an example latch mechanism in an unlatched configuration. FIG. 14 is a close-up of a portion of an alternative arrangement for the game controller **100** of FIGs. 5 and 6, illustrating the example latch mechanism of FIG. 13 in a latched configuration. While illustrated and described for the first-handle side of the game controller **100**, the discussion for FIGs. 13 and 14 applies equally to the second-handle side of the game controller **100**. Hence, the example latch mechanism of FIGs. 13 and 14 may be the first latch mechanism **109** described above for FIGs. 5 and 6, the second latch mechanism **110** described above for FIGs. 5 and 6, or both the first latch mechanism **109** and the second latch mechanism **110**.

[0061] As illustrated in FIGs. 13 and 14, the example latch mechanism may include an elastic body **138** coupled to the bridge **119**. The elastic body **138** is configured to contact and frictionally engage a raised portion **139** on the first linear rack **111** in the extended configuration and disengage from the raised portion **139** in the retracted configuration. To facilitate the engagement and disengagement of the elastic body **138** from the raised portion **139**, the raised portion **139** may be angled or rounded, or the raised portion **139** may be angled or rounded, or both. As illustrated, the elastic body **138** is configured to elastically distort when engaged with the raised portion **139** of the first linear rack **111**.

[0062] Accordingly, in transitioning from the retracted configuration (an example of which is illustrated in FIG. 13) to the extended configuration (an example of which is illustrated in FIG. 14), the first linear rack **111** slides relative to the elastic body **138** until the elastic body **138** contacts the raised portion **139** of the first linear rack **111**. The elastic body **138** then elastically distorts and frictionally engages the raised portion **139** on the first linear rack **111**. Likewise, in transitioning from the extended configuration to the retracted configuration, the elastic body **138** is disengaged from the raised portion **139** of the first linear rack **111**. Otherwise, operation of this example latch mechanism is substantially as described above for FIGs. 2–8.

[0063] FIG. 15 is a close-up of a portion of an alternative arrangement for the game controller **100** of FIGs. 5 and 6, illustrating an example latch mechanism in an unlatched configuration. FIG. 16 is a close-up of a portion of an alternative arrangement for the game controller **100** of FIGs. 5 and 6, illustrating the example latch mechanism of FIG. 15 in a latched configuration. While illustrated and described for the first-handle side of the game controller **100**, the discussion for FIGs. 15 and 16 applies equally to the second-handle side of the game controller **100**. Hence, the example latch mechanism of FIGs. 15 and 16 may be the first latch mechanism **109** described above for FIGs. 5 and 6, the second latch mechanism **110** described above for FIGs. 5 and 6, or both the first latch mechanism **109** and the second latch mechanism **110**.

[0064] As illustrated in FIGs. 15 and 16, the example latch mechanism may include one or more resilient clips **140** on the first handle **101**. As illustrated, the resilient clip **140** may be within the guide portion **113** of the first handle **101**. The resilient clip **140** is configured to contact and engage an outer edge of the bridge **119** in the extended configuration and to disengage from the outer edge of the bridge **119** in the retracted configuration. To facilitate the engagement and disengagement of the resilient clip **140** from the outer edge of the bridge **119**, the resilient clip **140** may be angled or rounded, the outer edge may be angled or rounded, or both. The resilient clip **140** is biased against the outer edge of the bridge **119**. As illustrated in FIG. 15, the resilient clips **140** may be disengaged from the outer edge of the bridge **119** while still being in contact with the outer edge.

[0065] As illustrated in FIG. 16, the resilient clip **140** engages a terminus of the bridge **119**. In other embodiments, the resilient clip **140** may engage an indentation

or step on the outer edge of the bridge **119**, the indentation or step not being at the terminus of the bridge **119**.

[0066] Alternatively, one or more resilient clips **140** may be on the bridge **119** and be configured to contact and engage the first handle **101** in the extended configuration and to disengage from the first handle **101** in the retracted configuration.

[0067] With specific reference to the embodiment illustrated in FIGs. 15 and 16, in transitioning from the retracted configuration (an example of which is illustrated in FIG. 15) to the extended configuration (an example of which is illustrated in FIG. 16), the bridge **119** slides relative to the first handle **101** until the resilient clip **140** engages the terminus of the bridge **119**. Likewise, in transitioning from the extended configuration to the retracted configuration, the resilient clip **140** is disengaged from the terminus of the bridge **119**. Otherwise, operation of this example latch mechanism is analogous to what is described above for FIGs. 2–8.

EXAMPLES

[0068] Illustrative examples of the disclosed technologies are provided below. An embodiment of the technologies may include one or more, and any combination of, the examples described below.

[0069] Example 1 includes a game controller for a mobile device, the game controller comprising: a first handle configured to contact and support a mobile device, the first handle comprising a user-accessible, first hardware interface on a main body portion of the first handle and configured to accept touch inputs; a bridge in sliding engagement with the first handle, the bridge having a span extending away from the main body portion of the first handle, the span having a transverse midline, the bridge and the first handle being configured for the main body portion of the first handle to translate in a retraction direction toward the midline of the bridge and into a retracted configuration and also to translate in an extension direction away from the midline of the bridge into an extended configuration; a first spring mechanism configured to bias the first handle toward the retracted configuration; and a first latch mechanism configured to temporarily lock the bridge in the extended configuration.

[0070] Example 2 includes the game controller of Example 1, the first latch mechanism being further configured to require a first disengagement force in the retraction direction to unlock the bridge from the extended configuration, the first

disengagement force being greater than a first retraction force exerted on the first latch mechanism in the retraction direction by the first spring mechanism.

[0071] Example 3 includes the game controller of any of Examples 1–2, further comprising: a first linear rack coupled to the first handle and in sliding engagement with the bridge, the first linear rack extending substantially along the span of the bridge; and a pinion affixed to the bridge and in contact with the first linear rack, the pinion configured to rotate relative to the bridge as the first linear rack is translated relative to the pinion.

[0072] Example 4 includes the game controller of any of Examples 1–3, in which the first spring mechanism comprises a first constant-load spring connecting the first handle to the bridge, the first constant-load spring configured to exert a substantially constant force in the retraction direction.

[0073] Example 5 includes the game controller of any of Examples 1–4, in which the first latch mechanism comprises a catch coupled to the bridge and configured to contact and engage a step on the first linear rack in the extended configuration and disengage the step on the first linear rack in the retracted configuration.

[0074] Example 6 includes the game controller of Example 5, in which the catch is pivotally coupled to the bridge, the first latch mechanism further comprising a cantilevered spring configured to apply a torque to the catch to bias the catch against the first linear rack.

[0075] Example includes the game controller of Example 6, in which the cantilevered spring is integral to and extends from the catch.

[0076] Example 8 includes the game controller of Example 5, in which the catch comprises a tension spring having an engagement portion, the tension spring configured to bias the engagement portion against the first linear rack, the engagement portion configured to engage the step in the extended configuration.

[0077] Example 9 includes the game controller of any of Examples 1–4, in which the first latch mechanism comprises an elastic body coupled to the bridge and configured to contact and frictionally engage a raised portion on the first linear rack in the extended configuration and disengage the raised portion on the first linear rack in the retracted configuration, the elastic body configured to elastically distort when engaged with the raised portion of the first linear rack.

[0078] Example 10 includes the game controller of any of Examples 1–4, in which the first latch mechanism comprises a resilient clip on the first handle, the resilient clip configured to contact and engage an outer edge of the bridge in the extended configuration and disengage from the outer edge of the bridge in the retracted configuration.

[0079] Example 11 includes the game controller of Example 10, in which a guide portion of the first handle extends from the main body portion of the first handle and along a first end of the span of the bridge, the guide portion of the first handle configured to align the bridge with the main body portion of the first handle, and in which the resilient clip is within the guide portion of the first handle.

[0080] Example 12 includes the game controller of any of Examples 1–11, in which a guide portion of the first handle extends from the main body portion of the first handle and along a first end of the span of the bridge, the guide portion of the first handle configured to align the bridge with the main body portion of the first handle.

[0081] Example 13 includes the game controller of any of Examples 1–12, further comprising: a second handle configured to contact and support the mobile device, the second handle comprising a user-accessible, second hardware interface on a main body portion of the second handle and configured to accept touch inputs, the bridge being in sliding engagement with the second handle, the midline of the bridge being between the first handle and the second handle, the bridge and the second handle being configured for the main body portion of the second handle to translate along the bridge in the retraction direction toward the midline of the bridge and into the retracted configuration and also to translate in the extension direction away from the midline of the bridge and into the extended configuration; a second spring mechanism configured to bias the second handle toward the retracted configuration; and a second latch mechanism configured to temporarily lock the bridge in the extended configuration.

[0082] Example 14 includes the game controller of Example 13, the second latch mechanism being further configured to require a second disengagement force in the retraction direction to unlock the bridge from the extended configuration, the second disengagement force being greater than a second retraction force exerted on the second latch mechanism in the retraction direction by the second spring mechanism.

[0083] Example 15 includes the game controller of any of Examples 13–14, further comprising a second linear rack coupled to the second handle and in sliding engagement with the bridge, the second linear rack extending substantially along the span of the bridge, the pinion being in contact with the second linear rack, the pinion further configured to rotate relative to the bridge as the second linear rack is translated relative to the pinion.

[0084] Example 16 includes the game controller of any of Examples 13–15, in which the second spring mechanism comprises a second constant-load spring connecting the second handle to the bridge, the second constant-load spring configured to exert a substantially constant force in the retraction direction.

[0085] Example 17 includes the game controller of any of Examples 13–16, in which a guide portion of the second handle extends from the main body portion of the second handle and along a second end of the span of the bridge, the guide portion of the second handle configured to align the bridge with the main body portion of the second handle.

[0086] Example 18 includes a method for engaging a mobile device with a game controller, the method including: moving a first handle in an extension direction along a bridge in sliding engagement with the first handle from a retracted configuration to an extended configuration, the first handle configured to contact and support the mobile device, the first handle comprising a user-accessible, first hardware interface on a main body portion of the first handle and configured to accept touch inputs, the extension direction being away from a transverse midline of the bridge; temporarily locking, with a first mechanism coupled to the bridge, the first handle in the extended configuration; positioning the mobile device to contact and be supported by the game controller; unlocking, by disengaging the first mechanism, the first handle from the extended configuration; and moving, via a first force mechanism coupled to the first handle, the first handle toward the retracted configuration.

[0087] Example 19 includes the method of Example 18, further comprising: before positioning the mobile device to contact and be supported by the game controller: moving a second handle of the game controller in the extension direction, the second handle configured to contact and support the mobile device, the second handle comprising a user-accessible, second hardware interface on a main body portion of the second handle and configured to accept touch inputs, and temporarily locking, with a

second mechanism coupled to the bridge, the second handle in the extended configuration; and after positioning the mobile device to contact and be supported by the game controller, unlocking, by disengaging the second mechanism, the second handle from the extended configuration, and moving, via a second force mechanism coupled to the second handle, the second handle toward the retracted configuration.

[0088] *****

[0089] The previously described versions of the disclosed subject matter have many advantages that were either described or would be apparent to a person of ordinary skill. Even so, all of these advantages or features are not required in all versions of the disclosed apparatus, systems, or methods. For example, not all contemplated embodiments will include the second handle. As another example, not all contemplated embodiments having the second handle will include the second latch mechanism or the second spring mechanism. As another example, not all contemplated embodiments will include the connector of the game controller if, for example, the mobile device and the game controller communicate wirelessly.

[0090] Additionally, this written description makes reference to particular features. It is to be understood that the disclosure in this specification includes all possible combinations of those particular features. For example, where a particular feature is disclosed in the context of a particular aspect or embodiment, that feature can also be used, to the extent possible, in the context of other aspects and embodiments.

[0091] Also, when reference is made in this application to a method having two or more defined steps or operations, the defined steps or operations can be carried out in any order or simultaneously, unless the context excludes those possibilities.

[0092] Furthermore, the term "comprises" and its grammatical equivalents are used in this application to mean that other components, features, steps, processes, operations, etc. are optionally present. For example, an article "comprising" or "which comprises" components A, B, and C can contain only components A, B, and C, or it can contain components A, B, and C along with one or more other components.

[0093] Although specific embodiments have been illustrated and described for purposes of illustration, it will be understood that various modifications may be made without departing from the spirit and scope of the disclosure. Accordingly, the invention should not be limited except as by the appended claims.

CLAIMS:

I (or we) claim:

1. A game controller for a mobile device, the game controller comprising:

a first handle configured to contact and support a mobile device, the first handle comprising a user-accessible, first hardware interface on a main body portion of the first handle and configured to accept touch inputs;

a bridge in sliding engagement with the first handle, the bridge having a span extending away from the main body portion of the first handle, the span having a transverse midline, the bridge and the first handle being configured for the main body portion of the first handle to translate in a retraction direction toward the midline of the bridge and into a retracted configuration and also to translate in an extension direction away from the midline of the bridge into an extended configuration;

a first spring mechanism configured to bias the first handle toward the retracted configuration; and

a first latch mechanism configured to temporarily lock the bridge in the extended configuration.

2. The game controller of claim 1, the first latch mechanism being further configured to require a first disengagement force in the retraction direction to unlock the bridge from the extended configuration, the first disengagement force being greater than a first retraction force exerted on the first latch mechanism in the retraction direction by the first spring mechanism.

3. The game controller of claim 1, further comprising:

a first linear rack coupled to the first handle and in sliding engagement with the bridge, the first linear rack extending substantially along the span of the bridge; and

a pinion affixed to the bridge and in contact with the first linear rack, the pinion configured to rotate relative to the bridge as the first linear rack is translated relative to the pinion.

4. The game controller of claim 1, in which the first spring mechanism comprises a first constant-load spring connecting the first handle to the bridge, the first constant-load spring configured to exert a substantially constant force in the retraction direction.

5. The game controller of claim 1, in which the first latch mechanism comprises a catch coupled to the bridge and configured to contact and engage a step on the first linear rack in the extended configuration and disengage the step on the first linear rack in the retracted configuration.

6. The game controller of claim 5, in which the catch is pivotally coupled to the bridge, the first latch mechanism further comprising a cantilevered spring configured to apply a torque to the catch to bias the catch against the first linear rack.

7. The game controller of claim 6, in which the cantilevered spring is integral to and extends from the catch.

8. The game controller of claim 5, in which the catch comprises a tension spring having an engagement portion, the tension spring configured to bias the engagement portion against the first linear rack, the engagement portion configured to engage the step in the extended configuration.

9. The game controller of claim 1, in which the first latch mechanism comprises an elastic body coupled to the bridge and configured to contact and frictionally engage a raised portion on the first linear rack in the extended configuration and disengage the raised portion on the first linear rack in the retracted configuration, the elastic body configured to elastically distort when engaged with the raised portion of the first linear rack.

10. The game controller of claim 1, in which the first latch mechanism comprises a resilient clip on the first handle, the resilient clip configured to contact and engage an outer edge of the bridge in the extended configuration and disengage from the outer edge of the bridge in the retracted configuration.

11. The game controller of claim 10, in which a guide portion of the first handle extends from the main body portion of the first handle and along a first end of the span of the bridge, the guide portion of the first handle configured to align the bridge with the main body portion of the first handle, and in which the resilient clip is within the guide portion of the first handle.

12. The game controller of claim 1, in which a guide portion of the first handle extends from the main body portion of the first handle and along a first end of the span of the

bridge, the guide portion of the first handle configured to align the bridge with the main body portion of the first handle.

13. The game controller of claim 1, further comprising:

a second handle configured to contact and support the mobile device, the second handle comprising a user-accessible, second hardware interface on a main body portion of the second handle and configured to accept touch inputs, the bridge being in sliding engagement with the second handle, the midline of the bridge being between the first handle and the second handle, the bridge and the second handle being configured for the main body portion of the second handle to translate along the bridge in the retraction direction toward the midline of the bridge and into the retracted configuration and also to translate in the extension direction away from the midline of the bridge and into the extended configuration;

a second spring mechanism configured to bias the second handle toward the retracted configuration; and

a second latch mechanism configured to temporarily lock the bridge in the extended configuration.

14. The game controller of claim 13, the second latch mechanism being further configured to require a second disengagement force in the retraction direction to unlock the bridge from the extended configuration, the second disengagement force being greater than a second retraction force exerted on the second latch mechanism in the retraction direction by the second spring mechanism.

15. The game controller of claim 13, further comprising a second linear rack coupled to the second handle and in sliding engagement with the bridge, the second linear rack extending substantially along the span of the bridge, the pinion being in contact with the second linear rack, the pinion further configured to rotate relative to the bridge as the second linear rack is translated relative to the pinion.

16. The game controller of claim 13, in which the second spring mechanism comprises a second constant-load spring connecting the second handle to the bridge, the second constant-load spring configured to exert a substantially constant force in the retraction direction.

17. The game controller of claim 13, in which a guide portion of the second handle extends from the main body portion of the second handle and along a second end of the span of the bridge, the guide portion of the second handle configured to align the bridge with the main body portion of the second handle.

18. A method for engaging a mobile device with a game controller, the method including:

moving a first handle in an extension direction along a bridge in sliding engagement with the first handle from a retracted configuration to an extended configuration, the first handle configured to contact and support the mobile device, the first handle comprising a user-accessible, first hardware interface on a main body portion of the first handle and configured to accept touch inputs, the extension direction being away from a transverse midline of the bridge;

temporarily locking, with a first mechanism coupled to the bridge, the first handle in the extended configuration;

positioning the mobile device to contact and be supported by the game controller;

unlocking, by disengaging the first mechanism, the first handle from the extended configuration; and

moving, via a first force mechanism coupled to the first handle, the first handle toward the retracted configuration.

19. The method of claim 18, further comprising:

before positioning the mobile device to contact and be supported by the game controller:

moving a second handle of the game controller in the extension direction, the second handle configured to contact and support the mobile device, the second handle comprising a user-accessible, second hardware interface on a main body portion of the second handle and configured to accept touch inputs, and

temporarily locking, with a second mechanism coupled to the bridge, the second handle in the extended configuration; and

after positioning the mobile device to contact and be supported by the game controller:

unlocking, by disengaging the second mechanism, the second handle from the extended configuration, and

moving, via a second force mechanism coupled to the second handle, the second handle toward the retracted configuration.

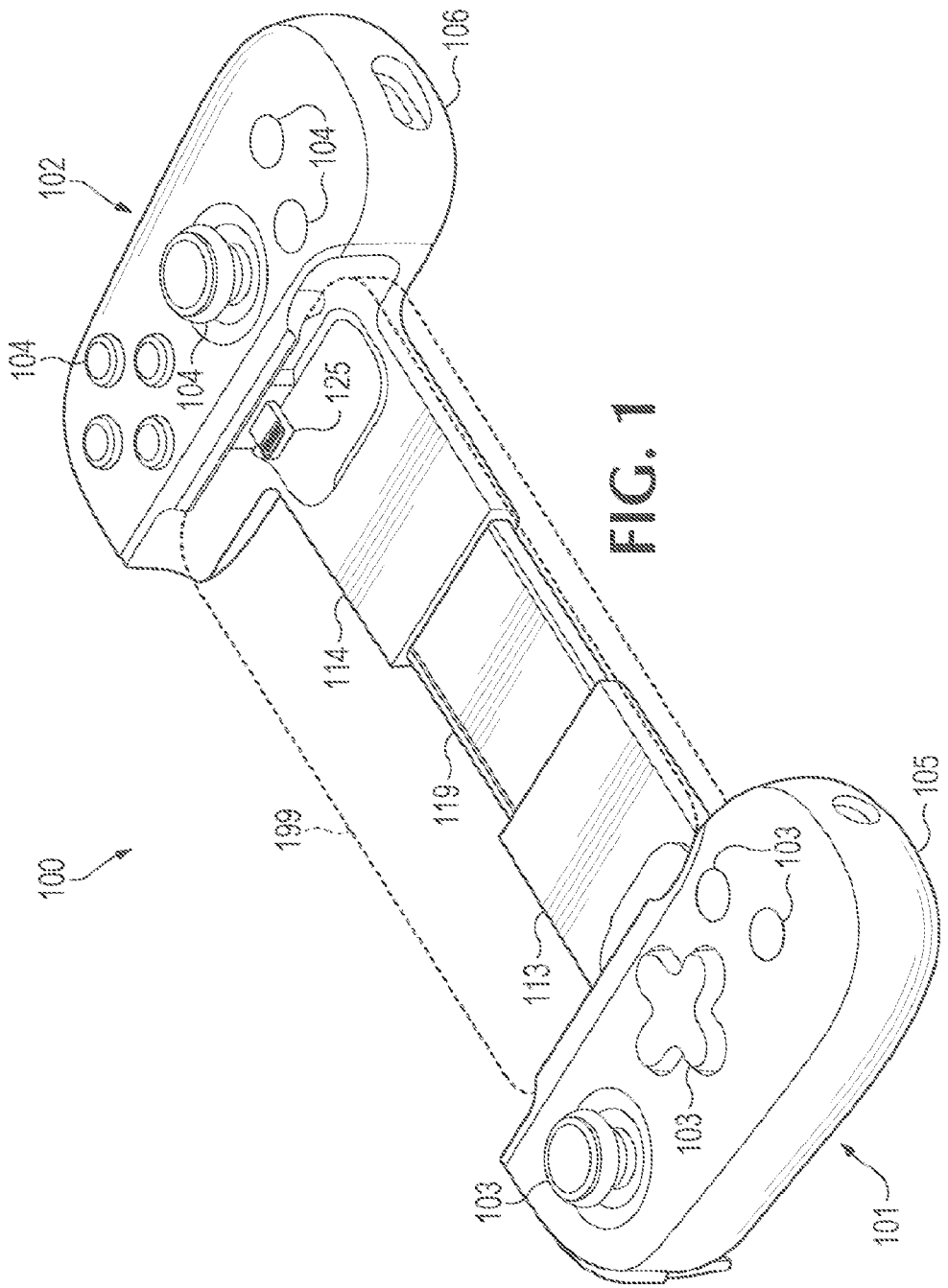

FIG. 1

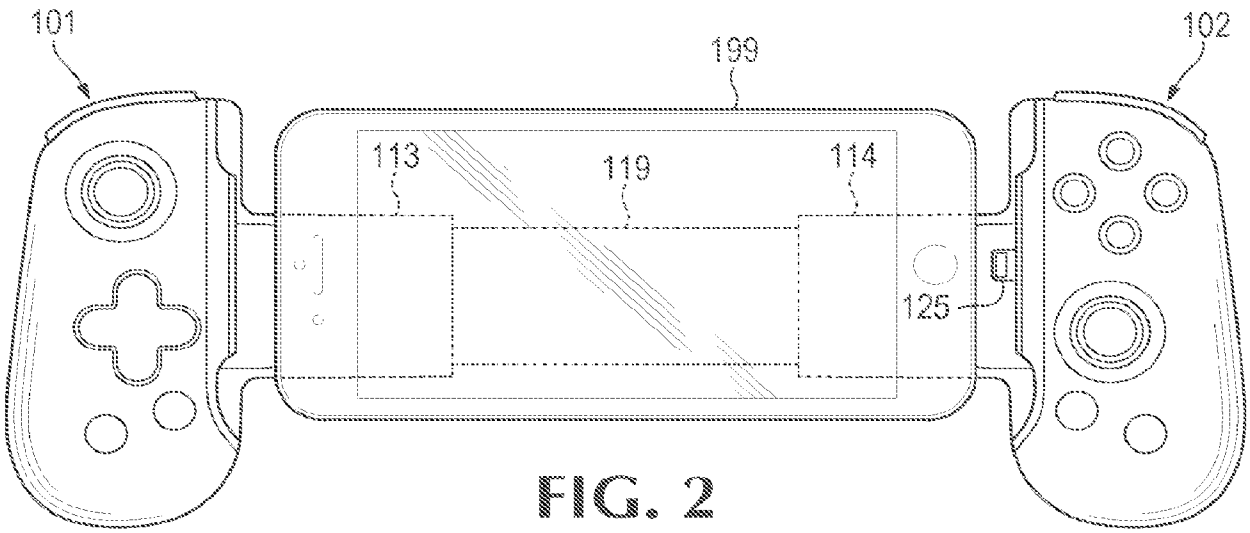

FIG. 2

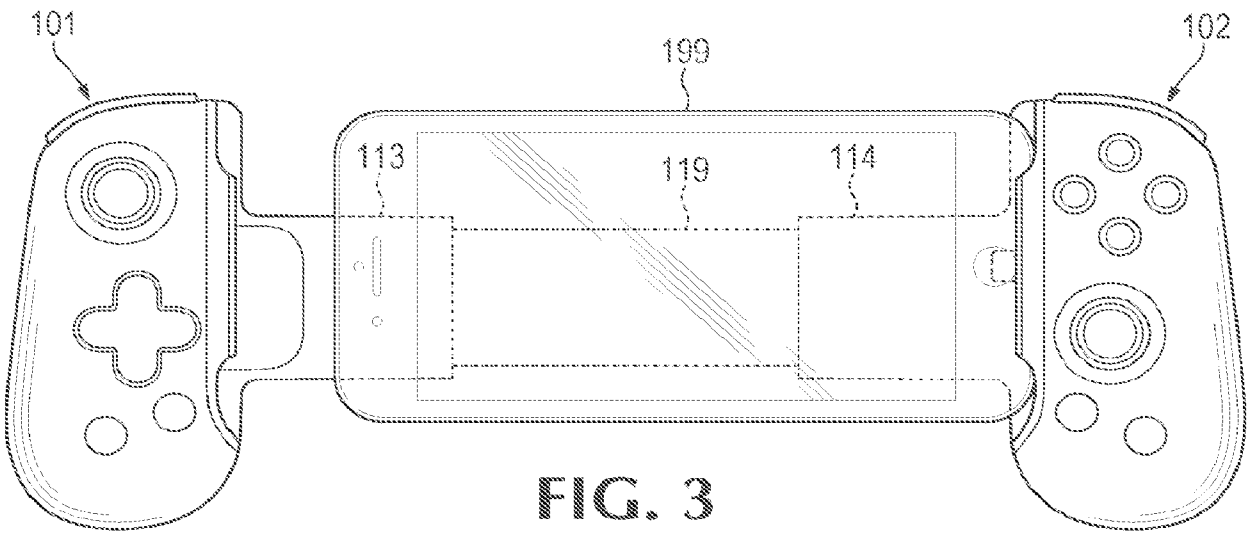

FIG. 3

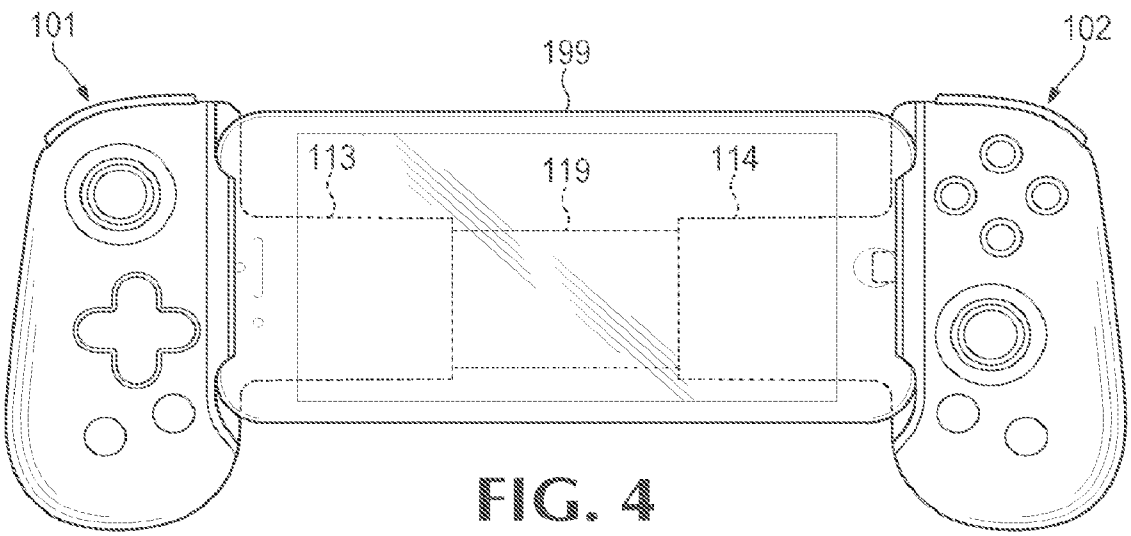

FIG. 4

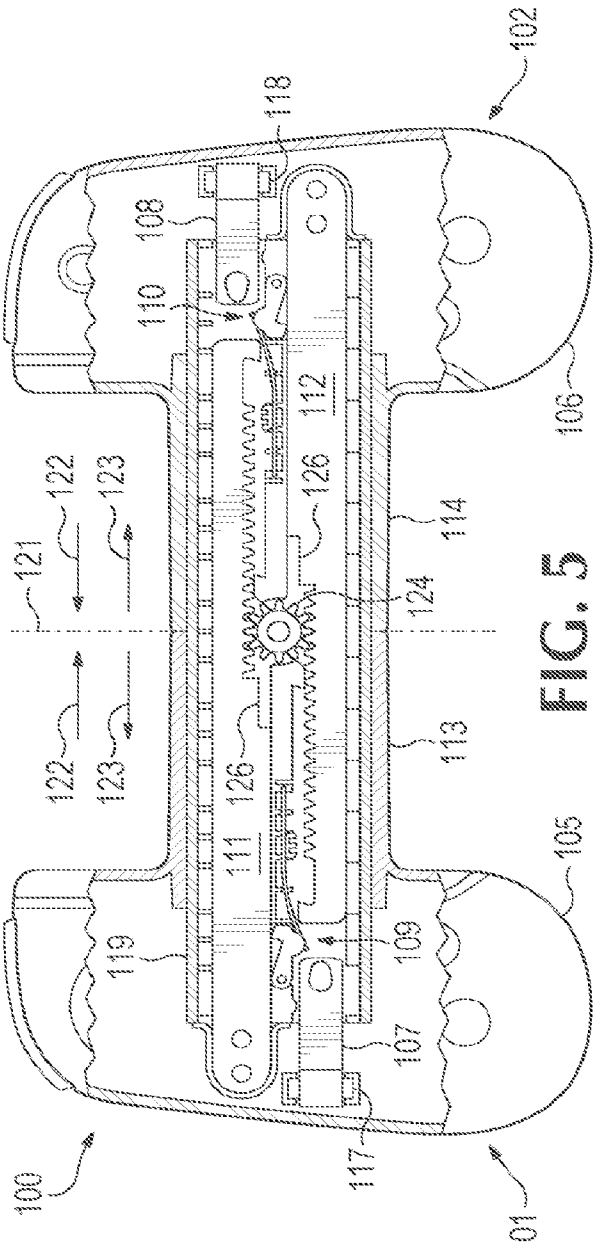
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FIG. 5

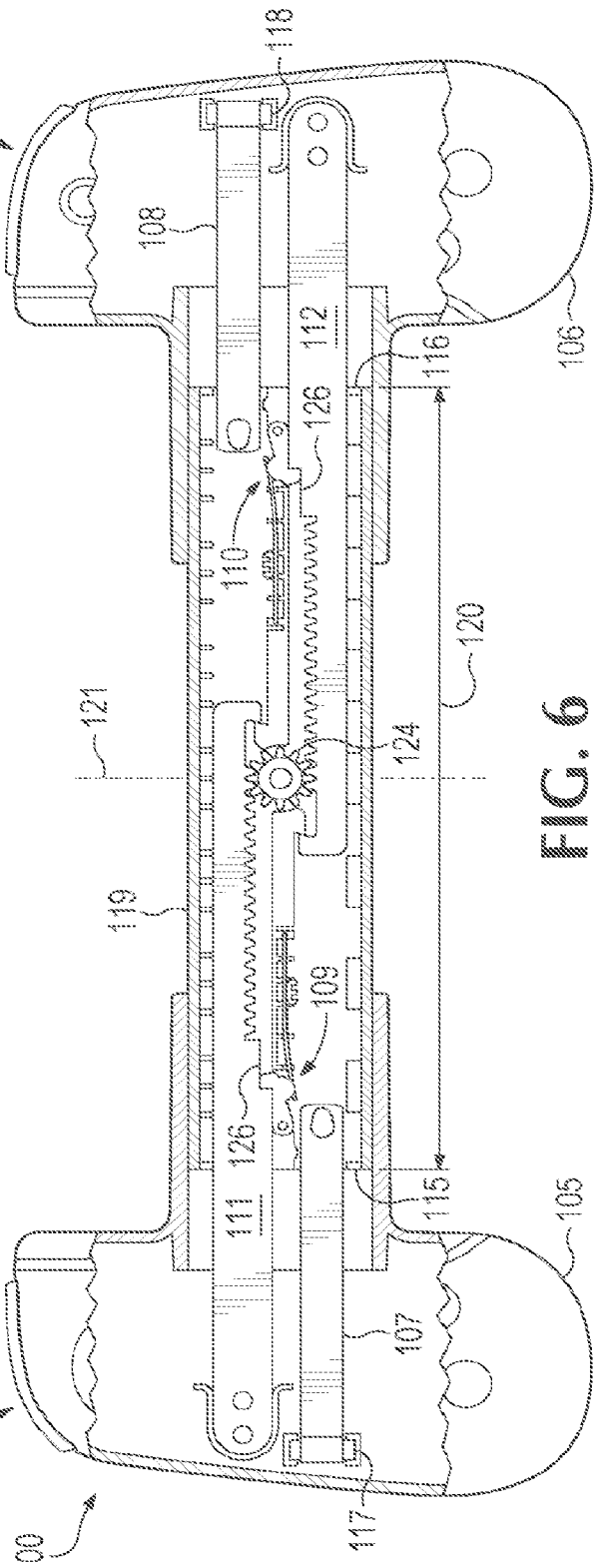
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FIG. 6

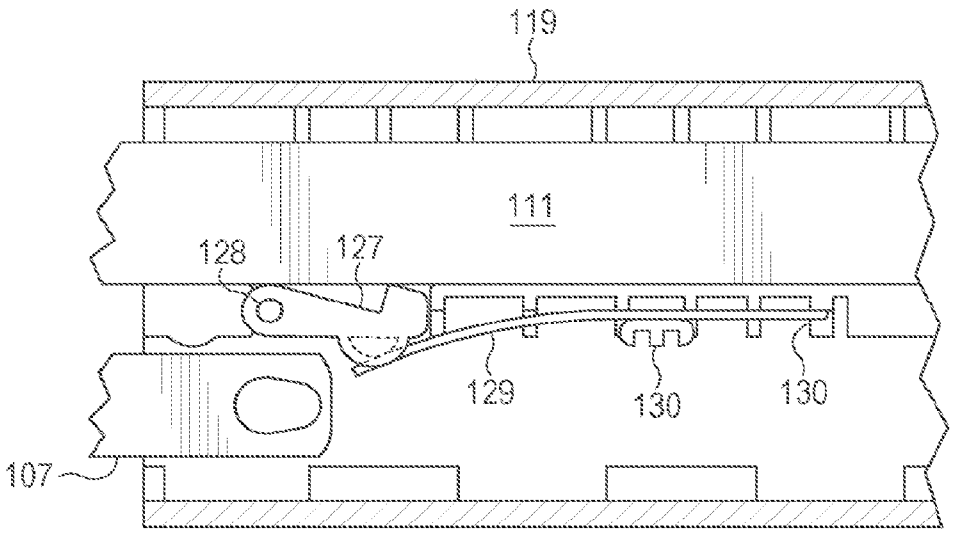
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FIG. 7

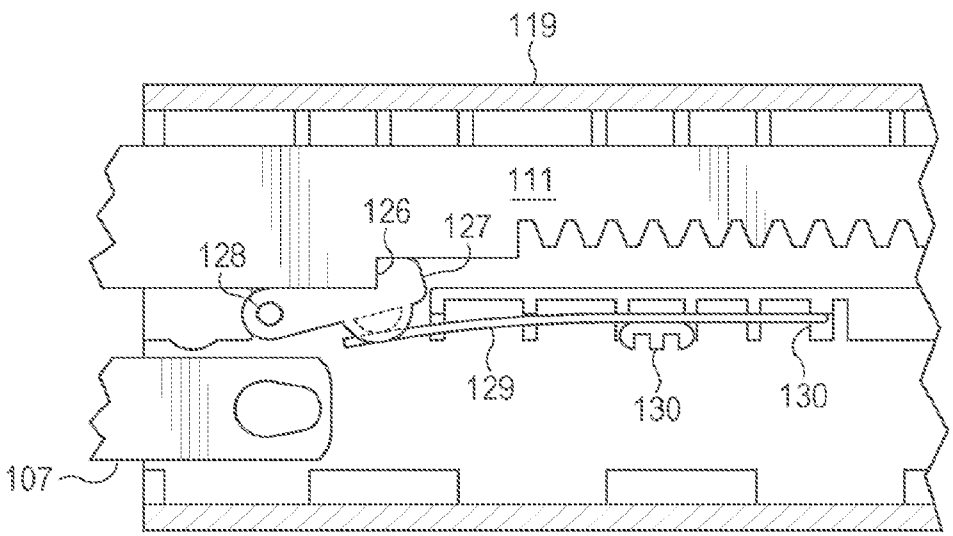
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FIG. 8

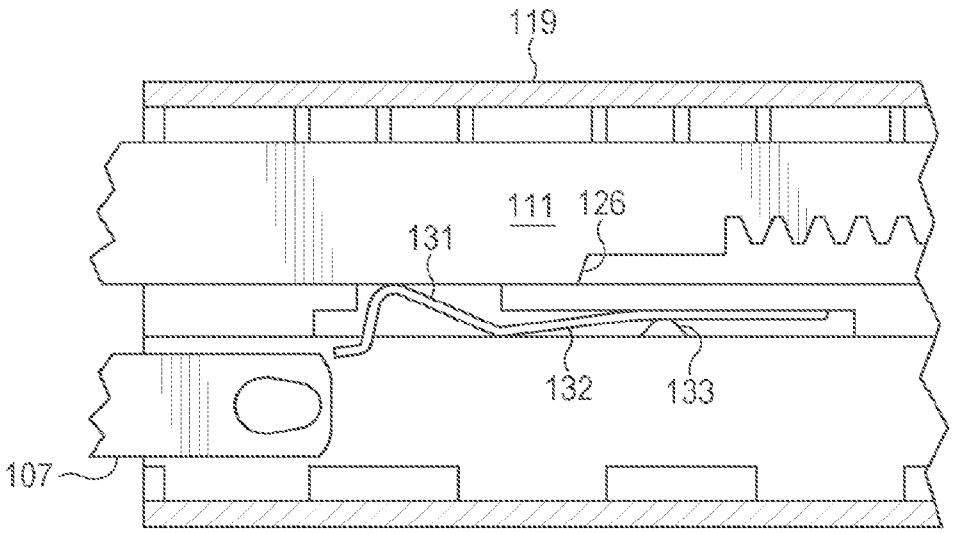

FIG. 9

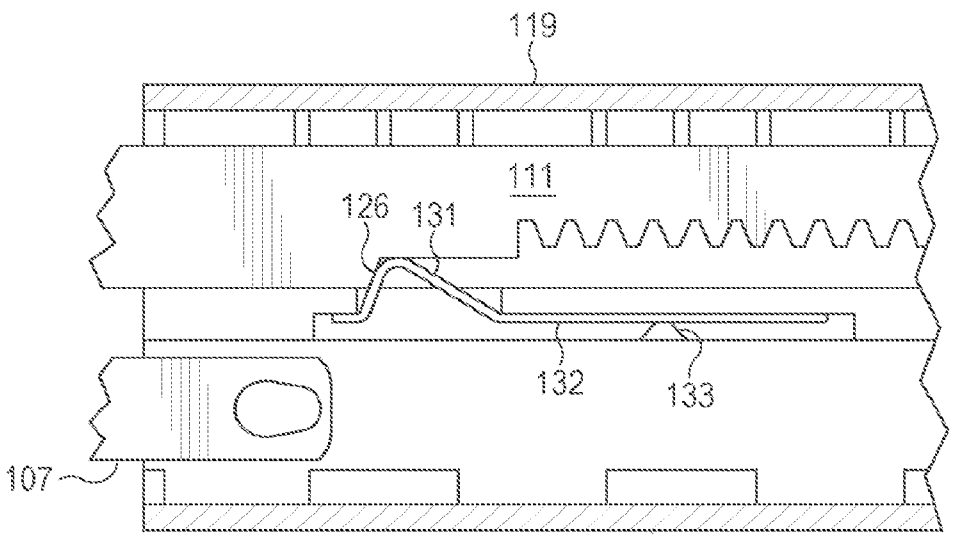

FIG. 10

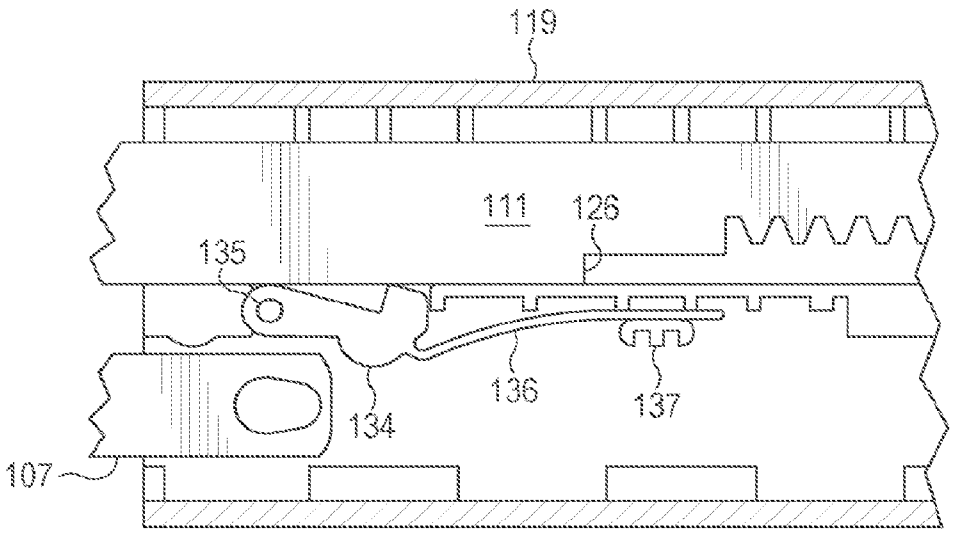

FIG. 11

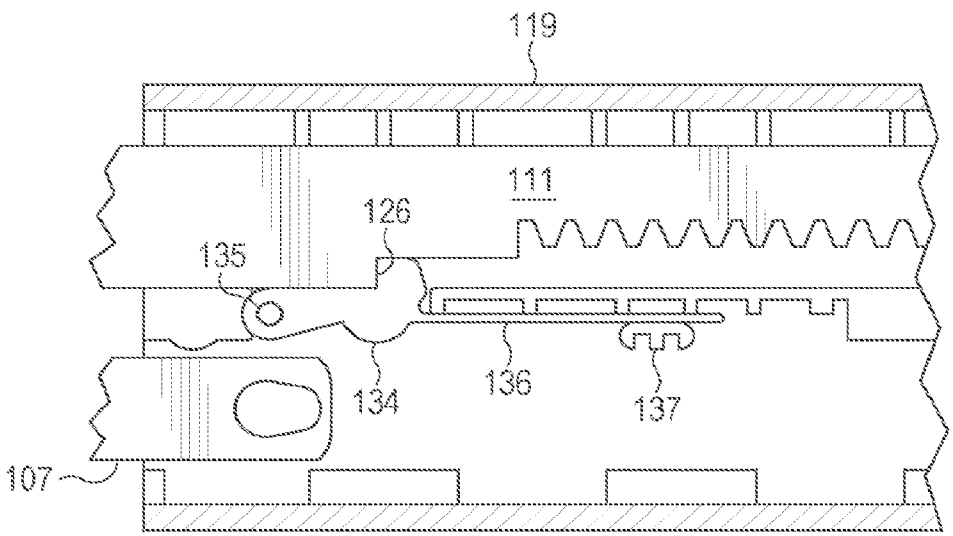

FIG. 12

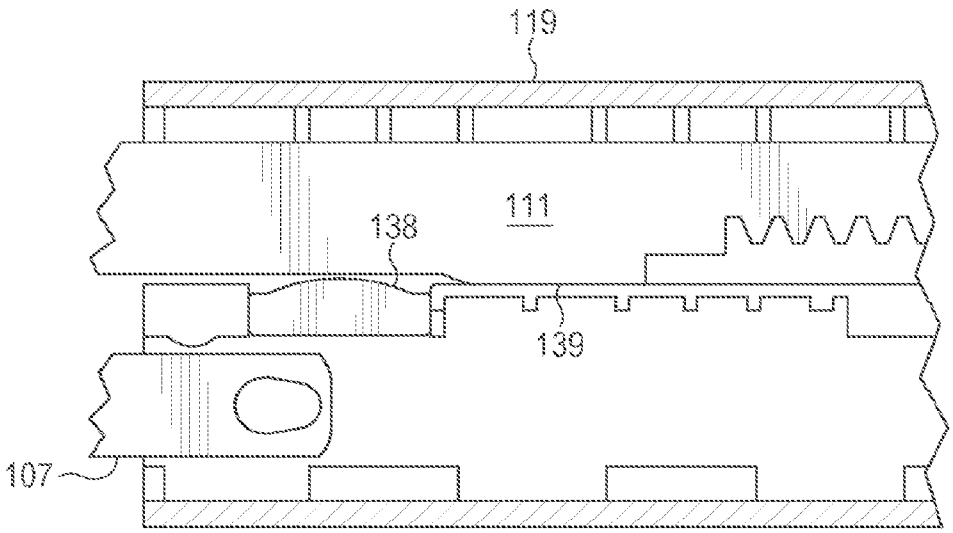

FIG. 13

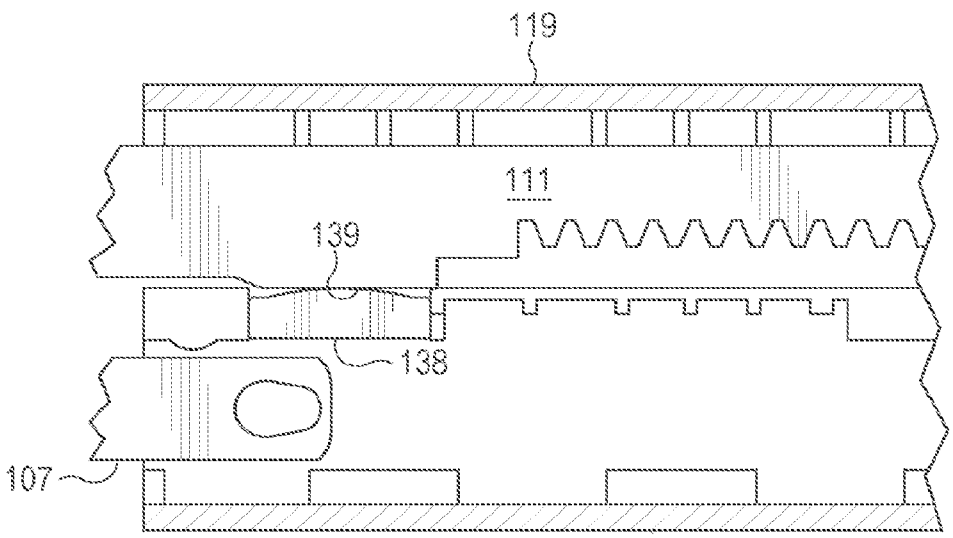

FIG. 14

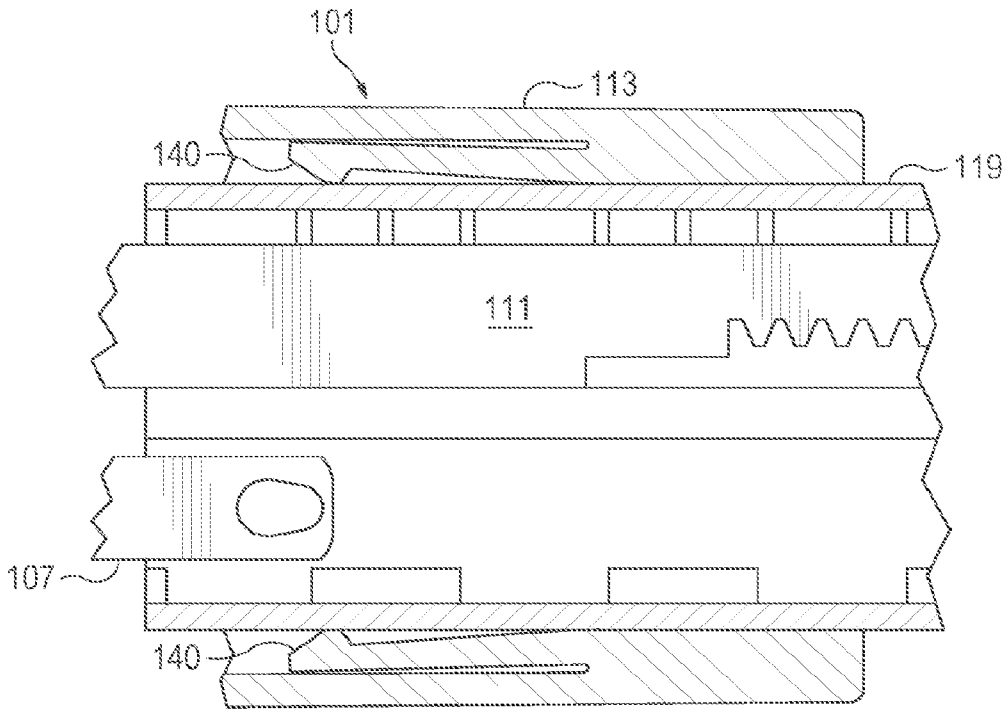

FIG. 15

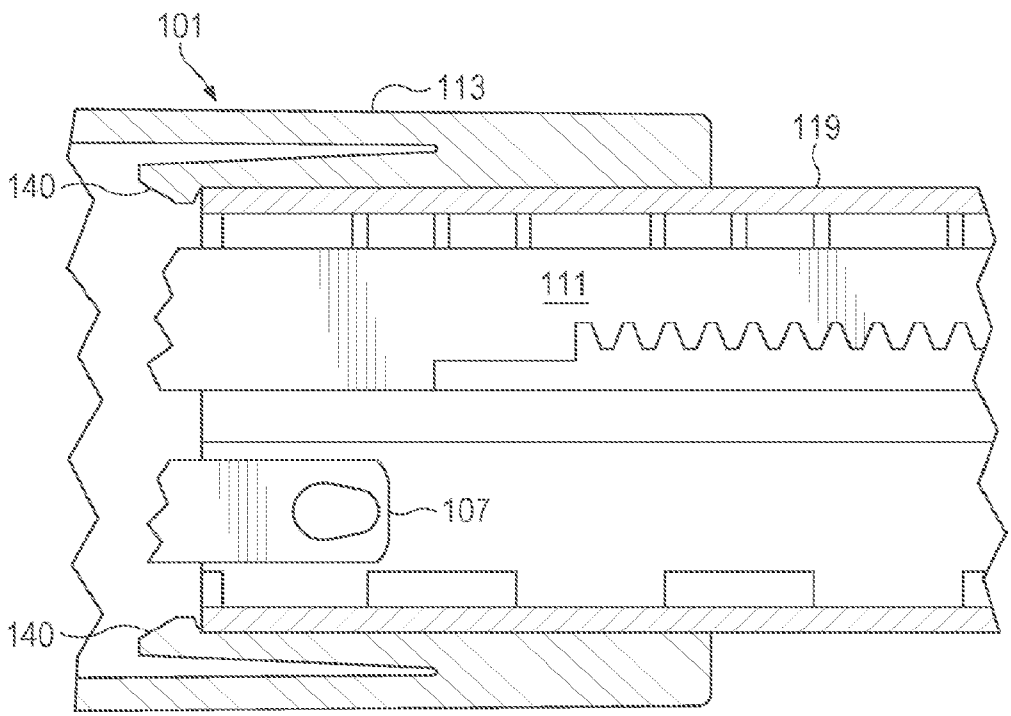

FIG. 16

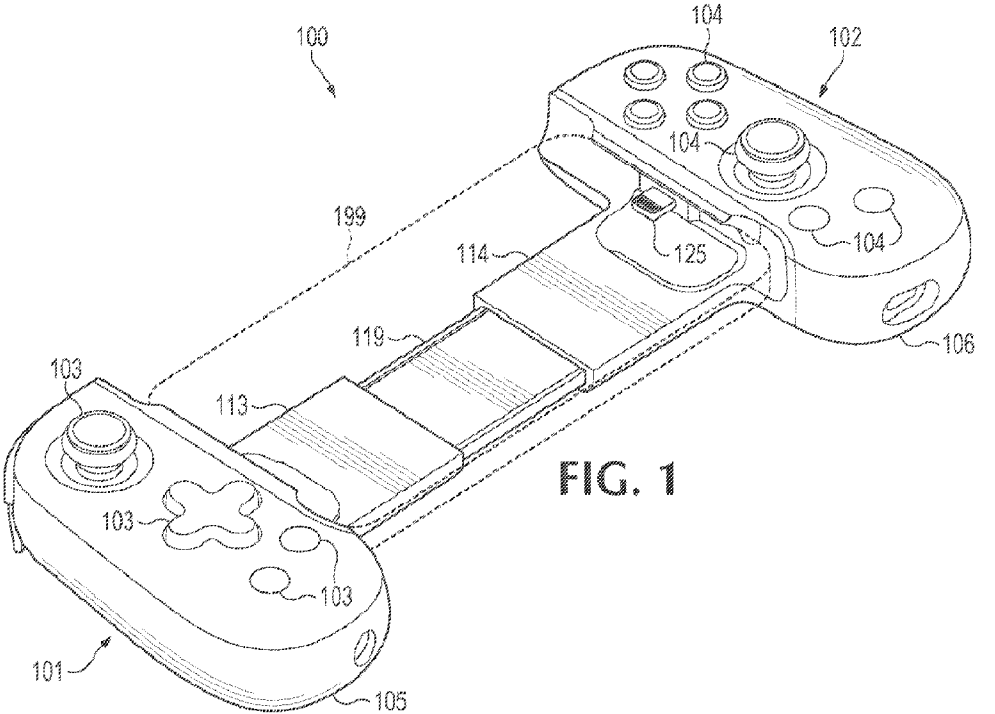

FIG. 1