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(54) **FIREARM SAFETY LOCK WITH  
AUXILIARY SHOOTING FUNCTION**

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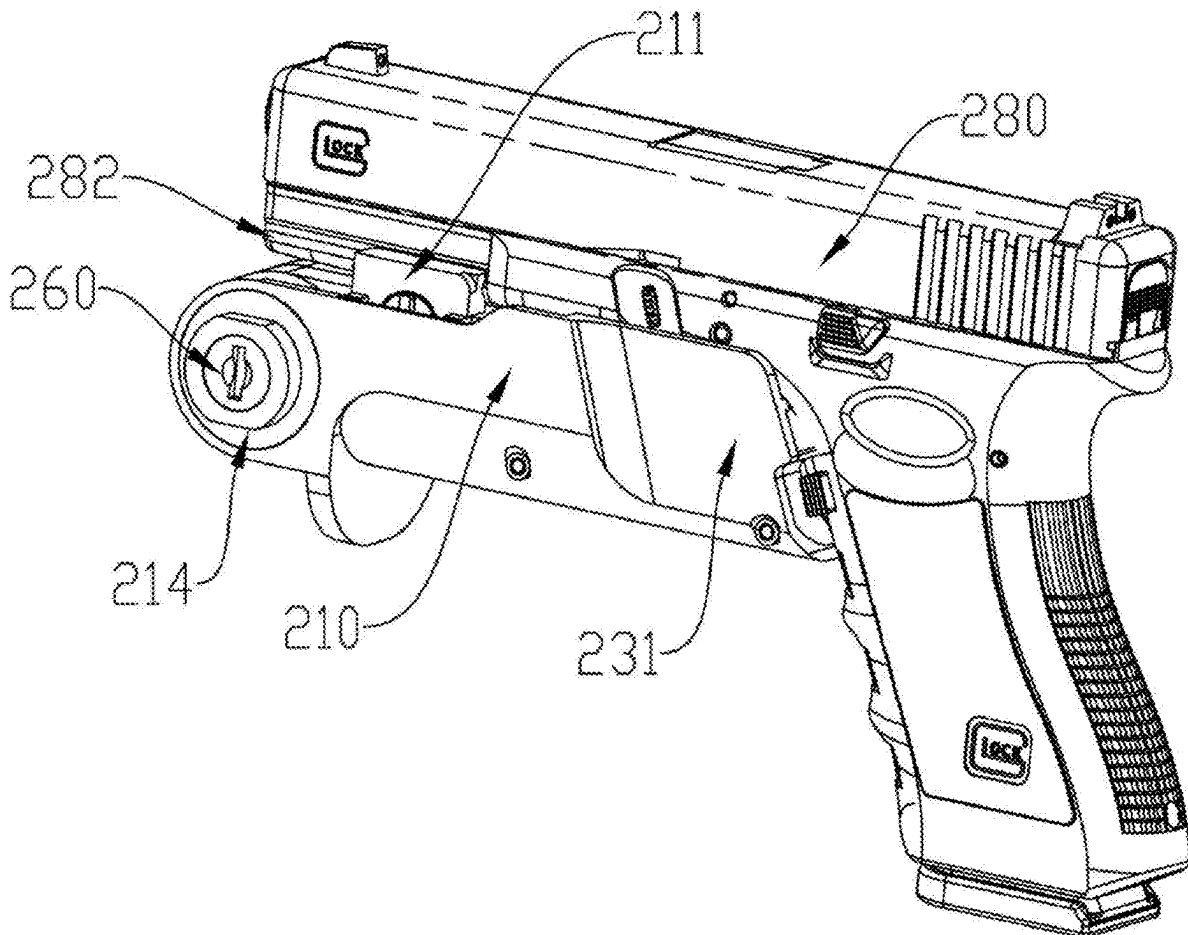
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(57) **ABSTRACT**

A firearm safety lock with an auxiliary shooting function is provided, and relates to the technical field of firearm safety locks. The firearm safety lock includes a lock body of the safety lock; the lock body is provided with a fixed support, a shackle assembly, and a reinforcing hook; the fixed support is detachably fixedly connected to the lock body and is configured to detachably fixedly connect the lock body to a standard guide rail of a firearm; one end of the shackle assembly is mounted at the lock body through movable connection, and the other end of the shackle assembly can block or cover a trigger of the firearm to lock the firearm.



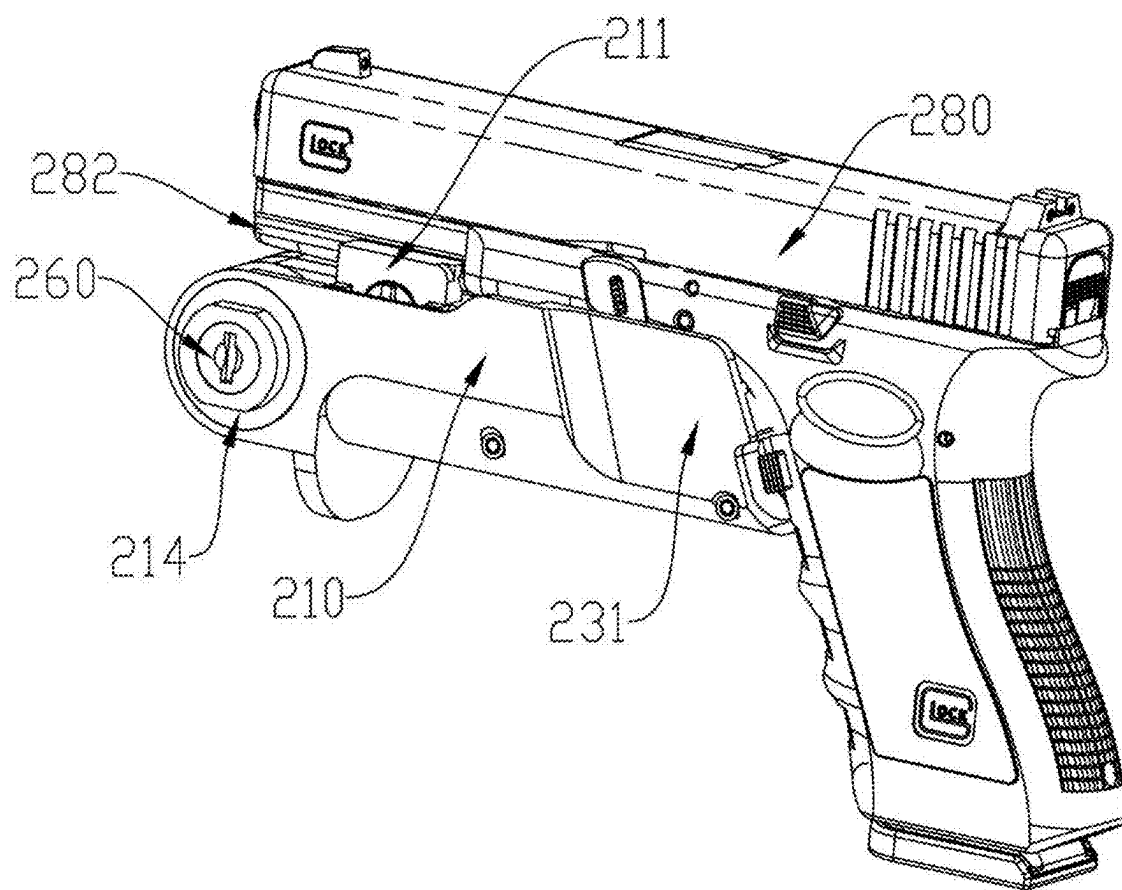


FIG. 1

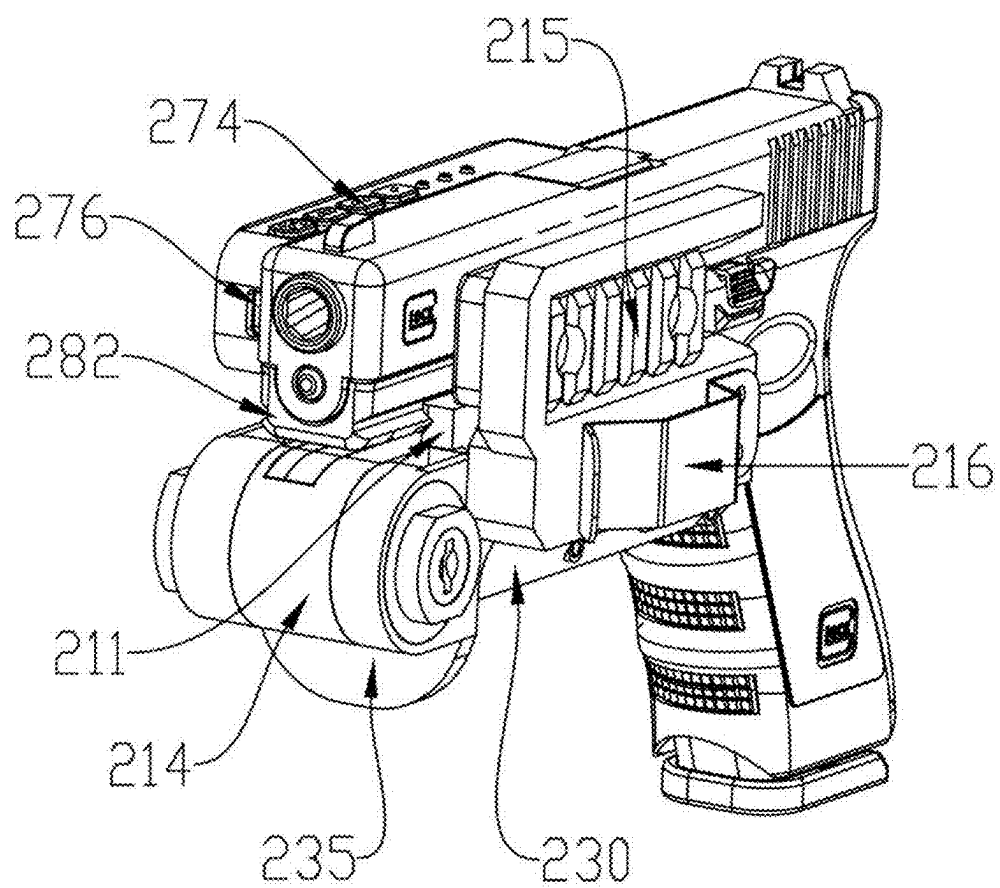


FIG. 2

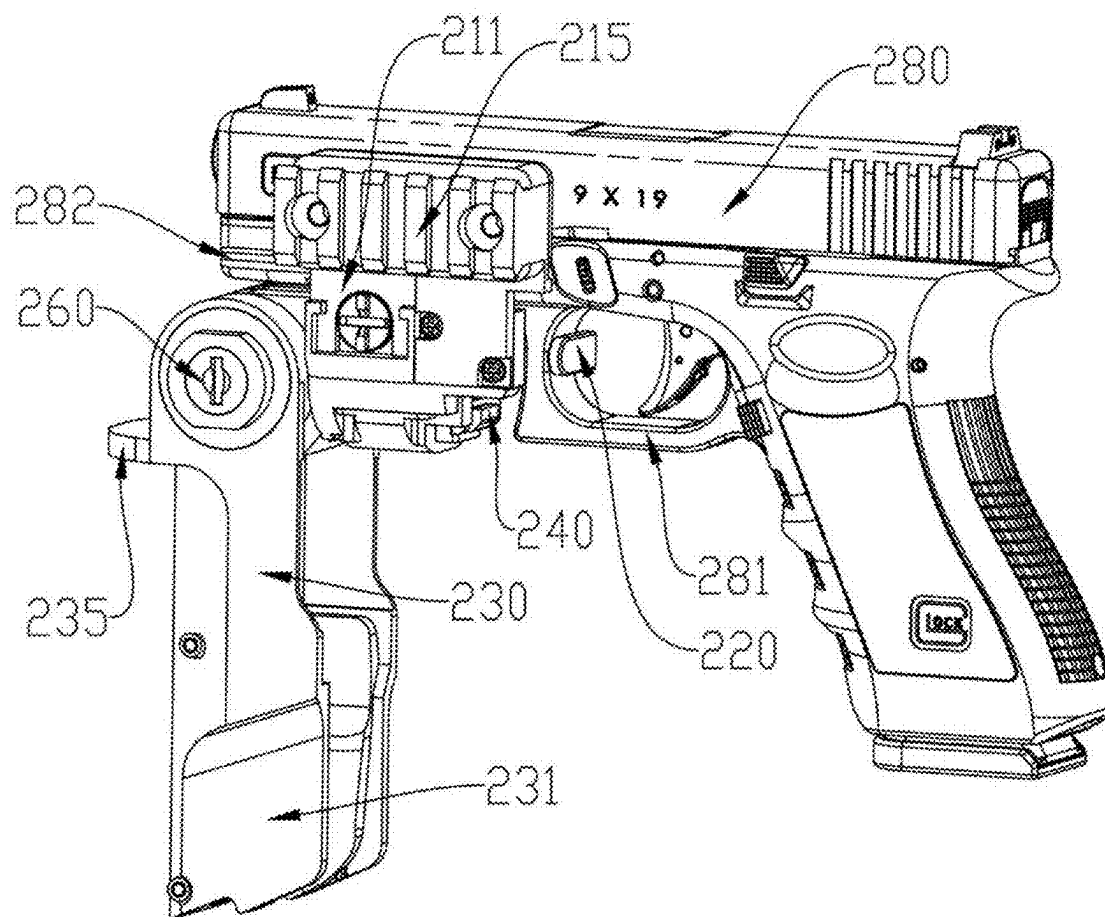


FIG. 3

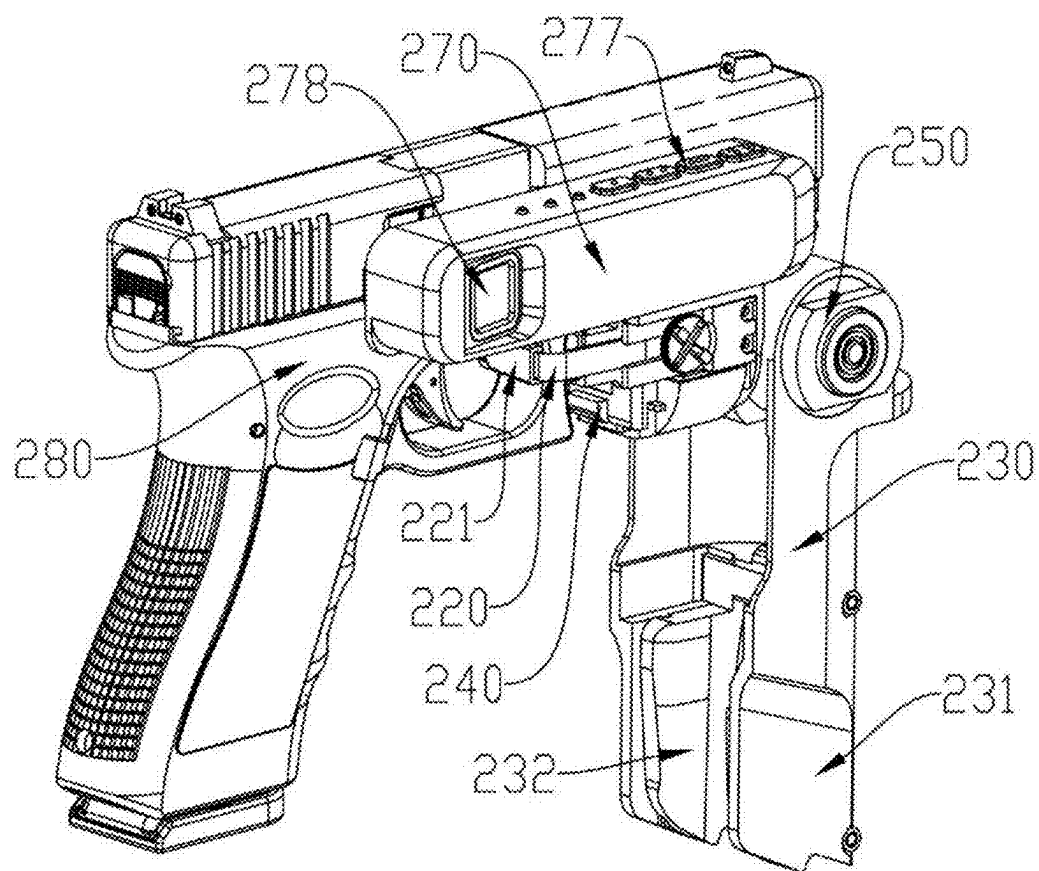


FIG. 4

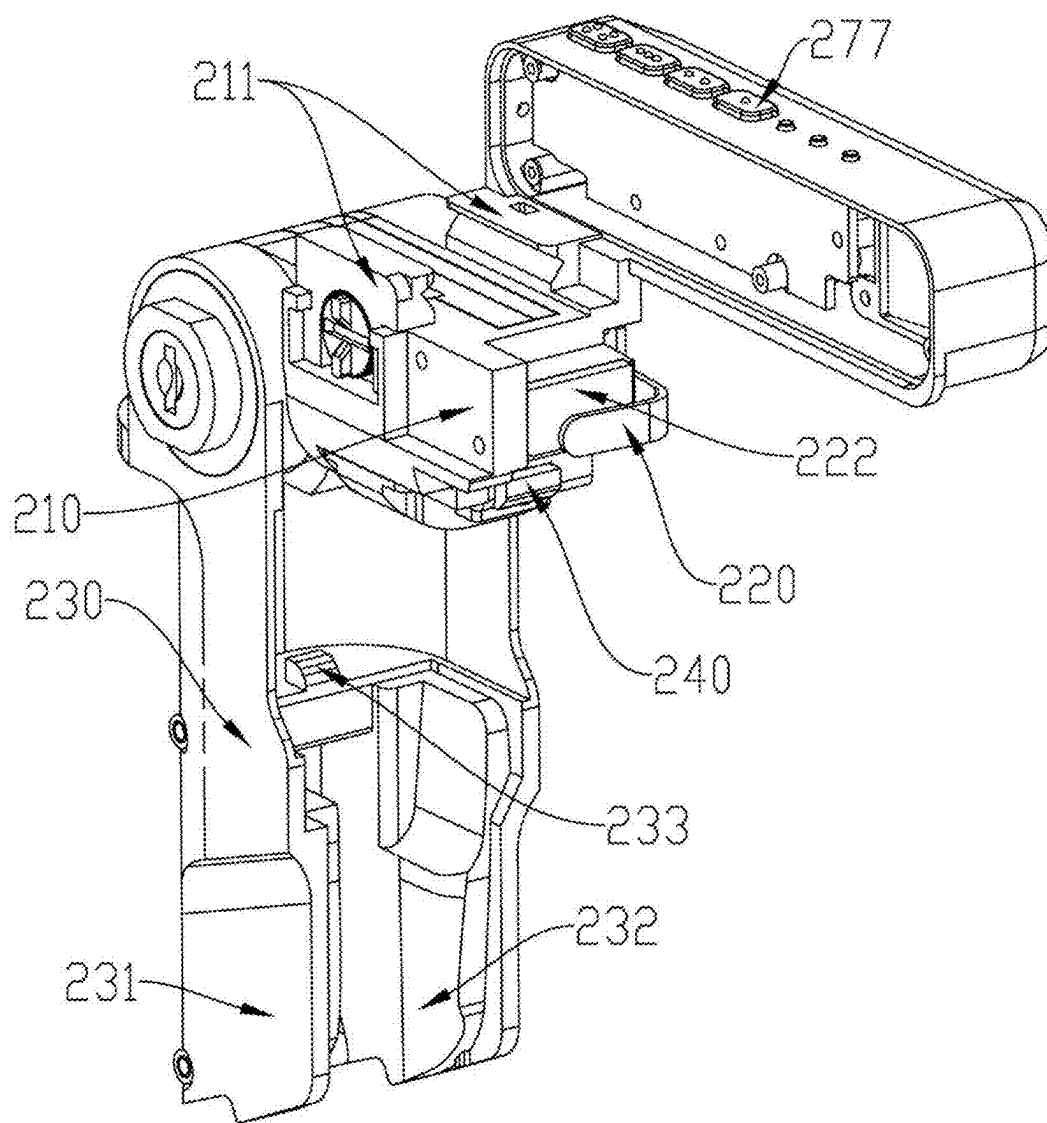
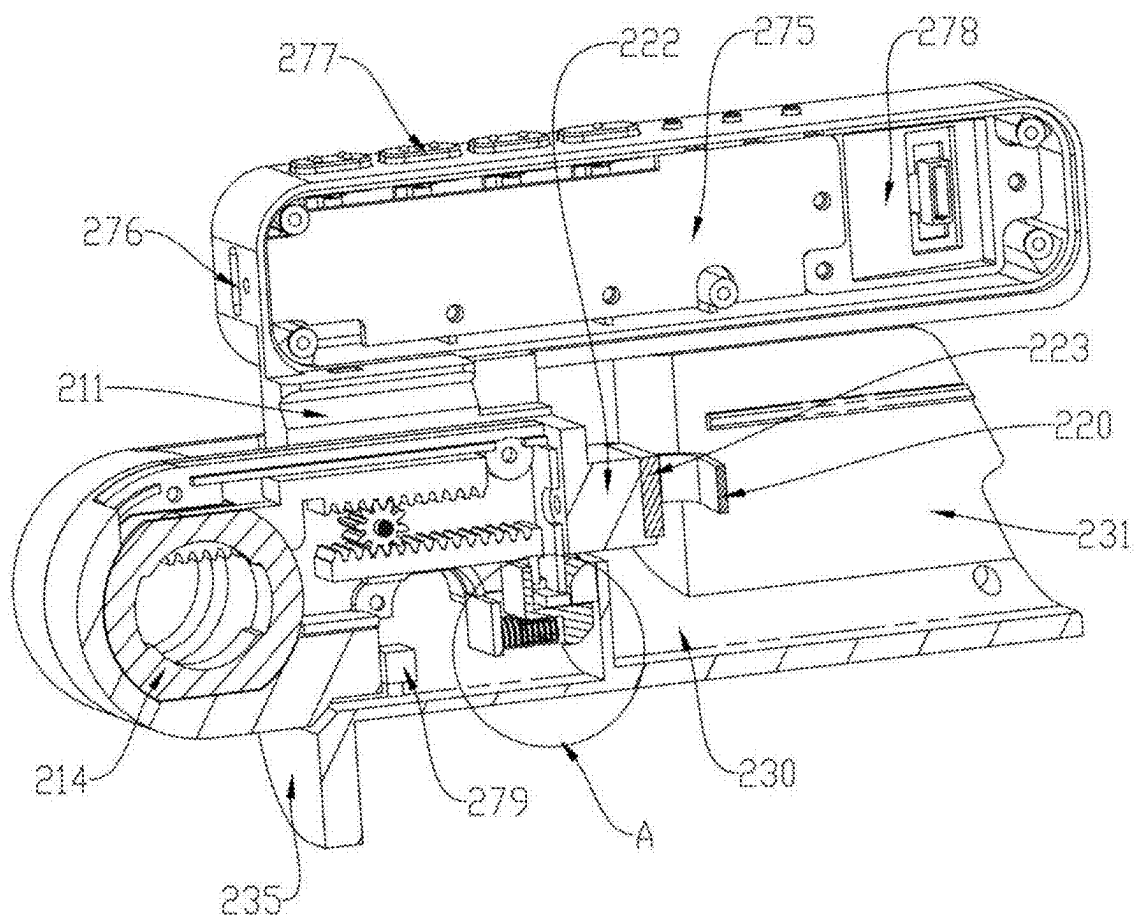
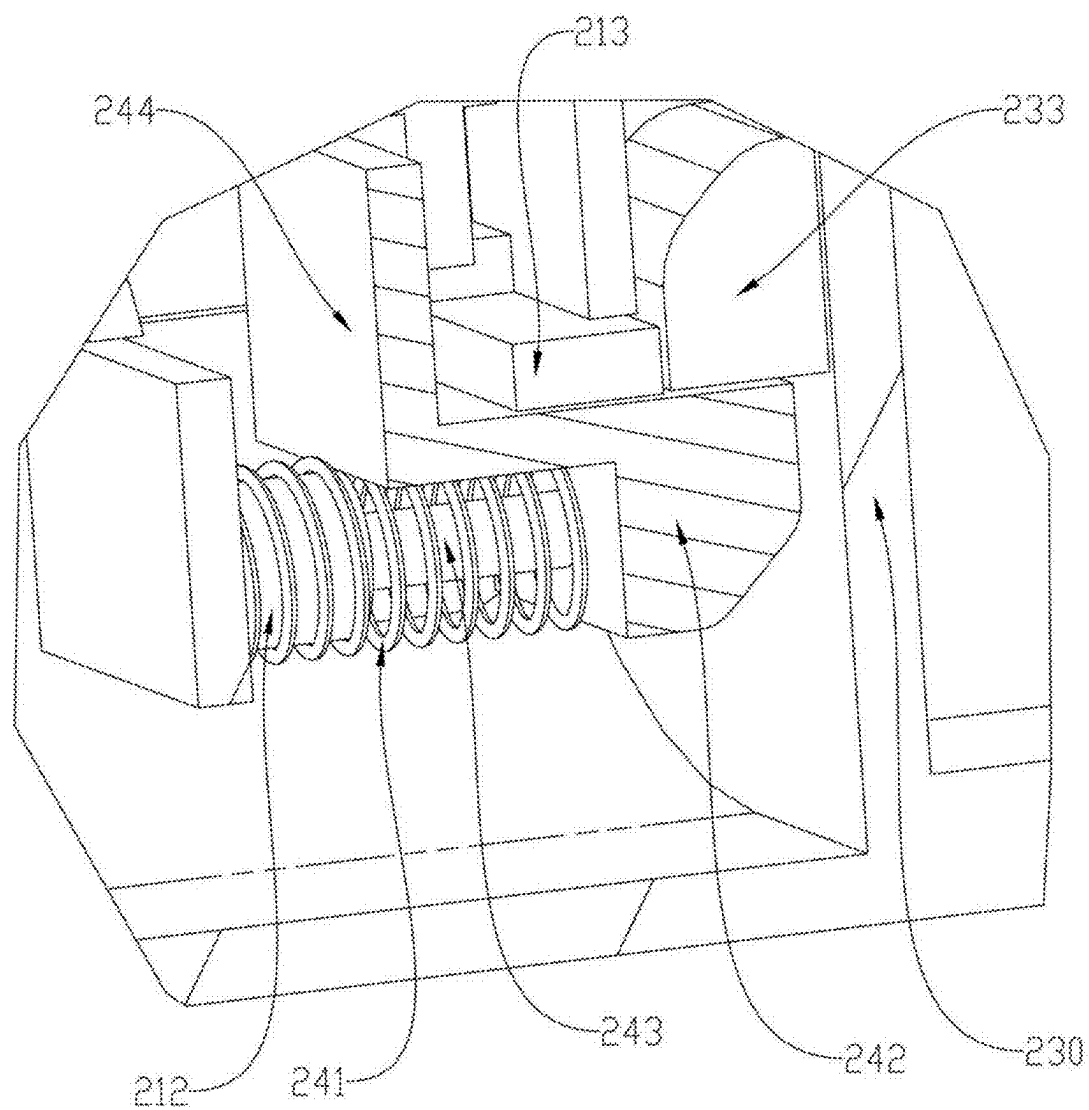


FIG. 5



**FIG. 6**



**FIG. 7**



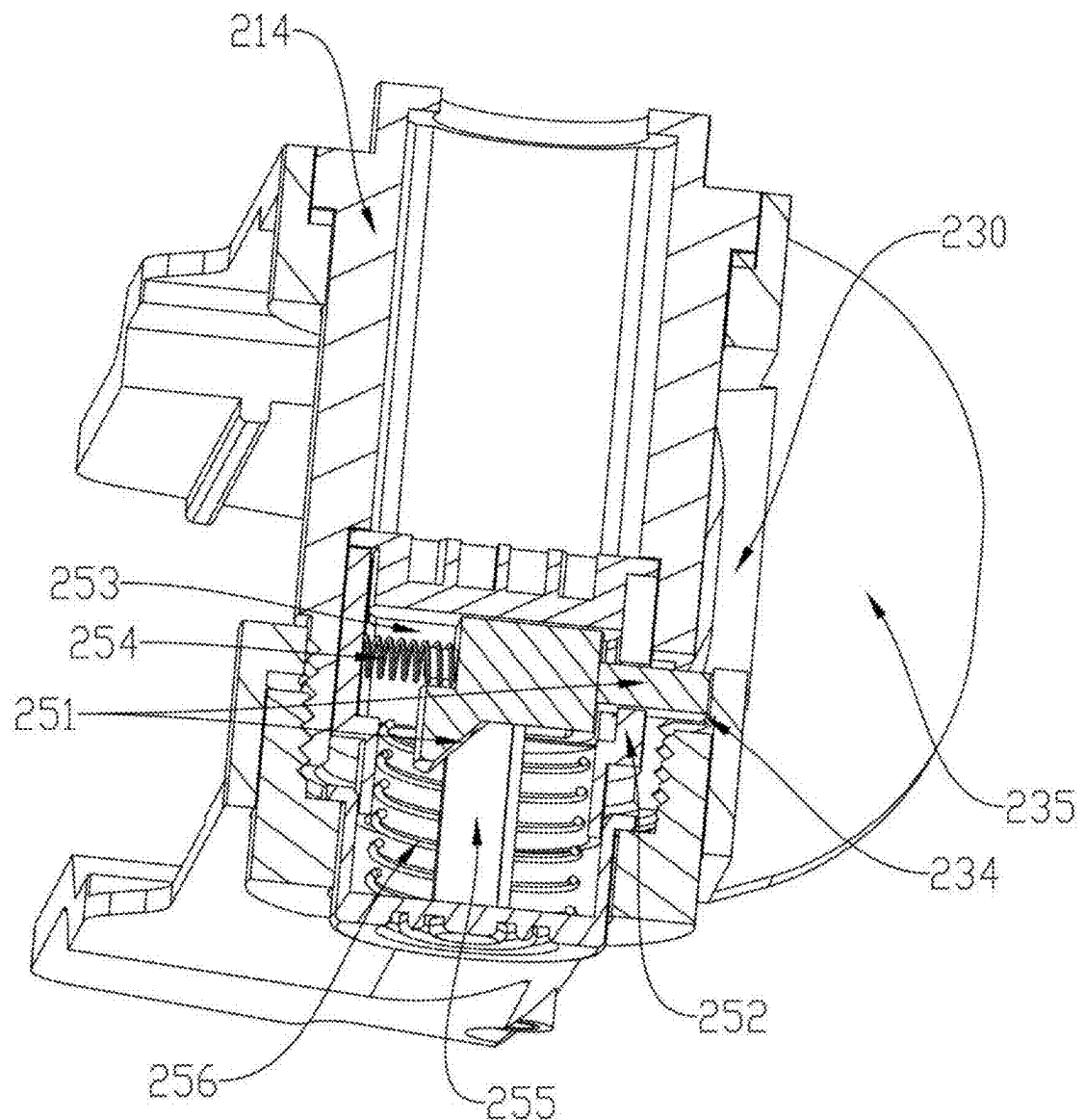


FIG. 8

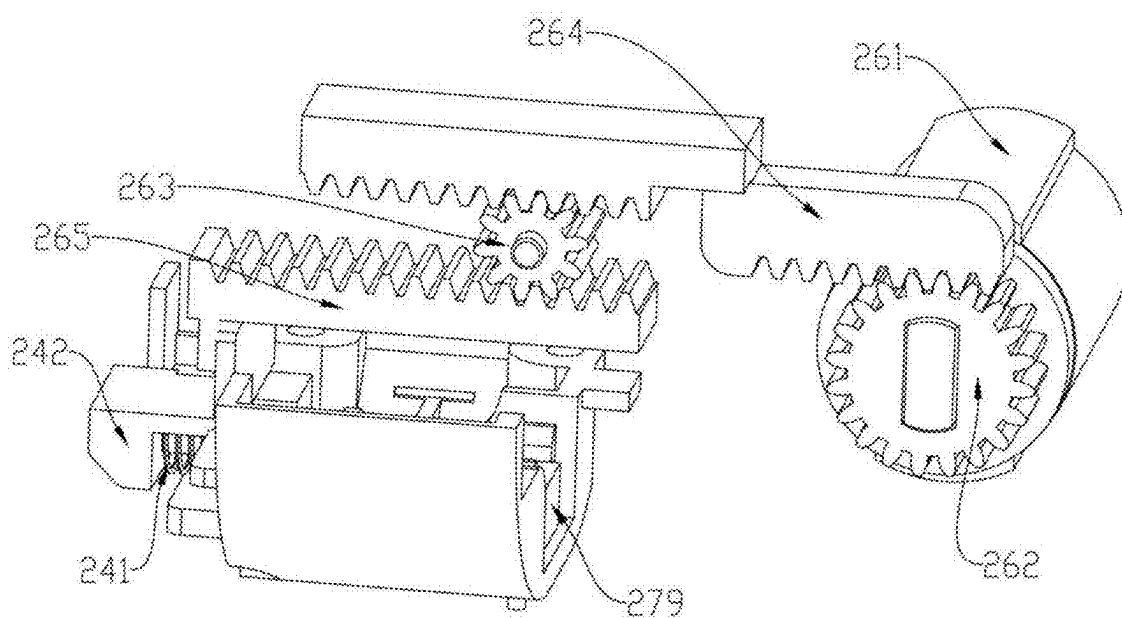


FIG. 9

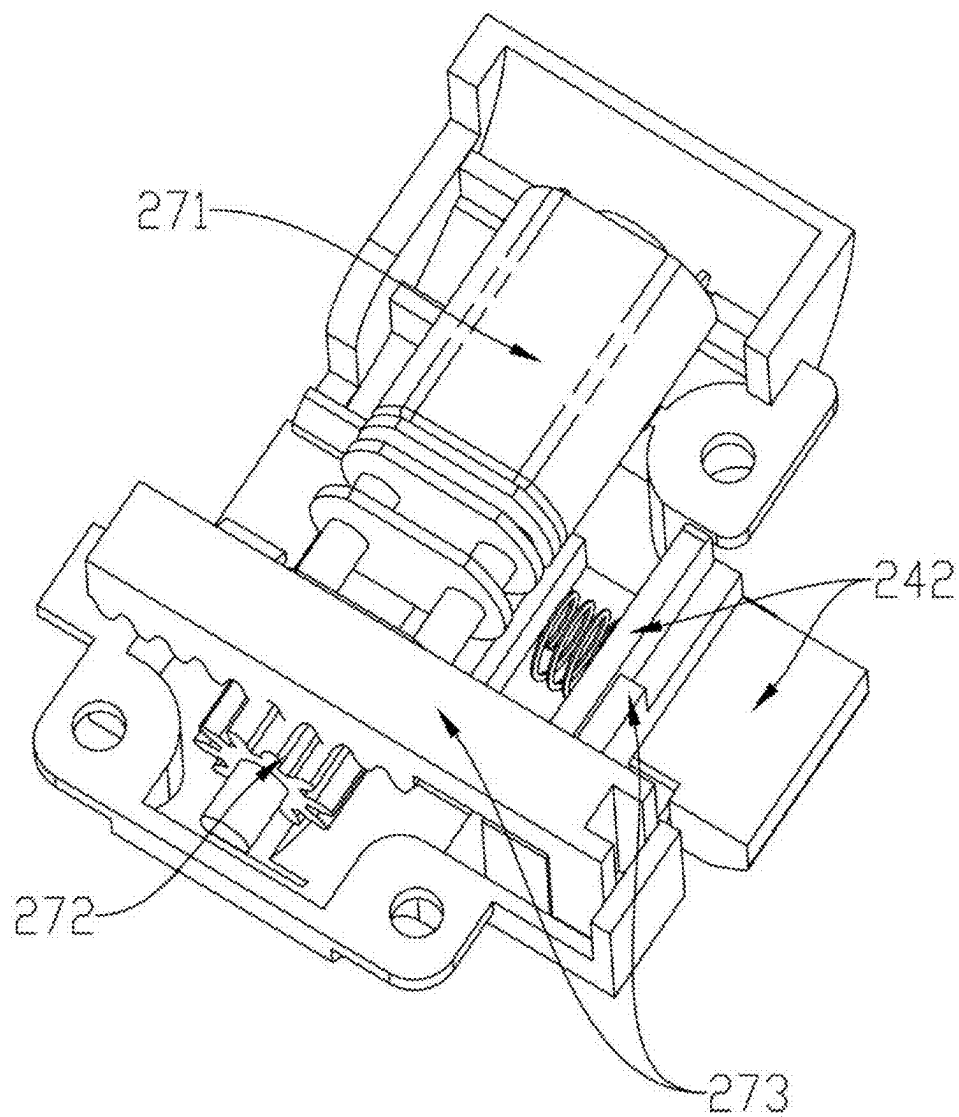


FIG. 10

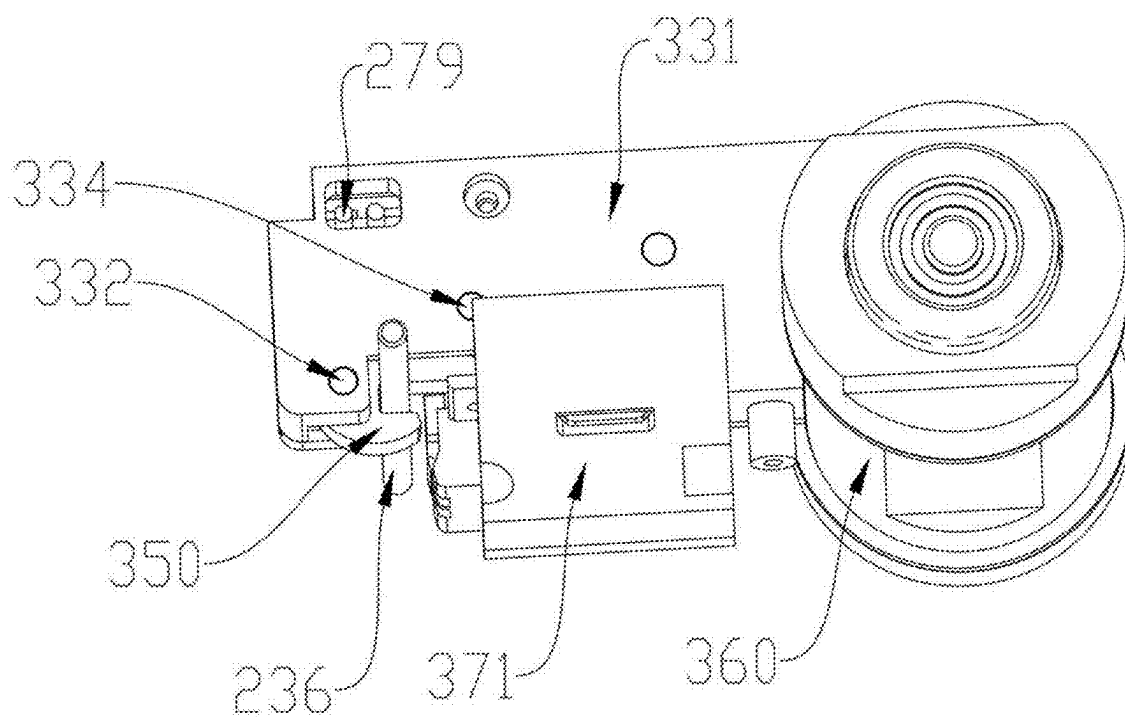


FIG. 11

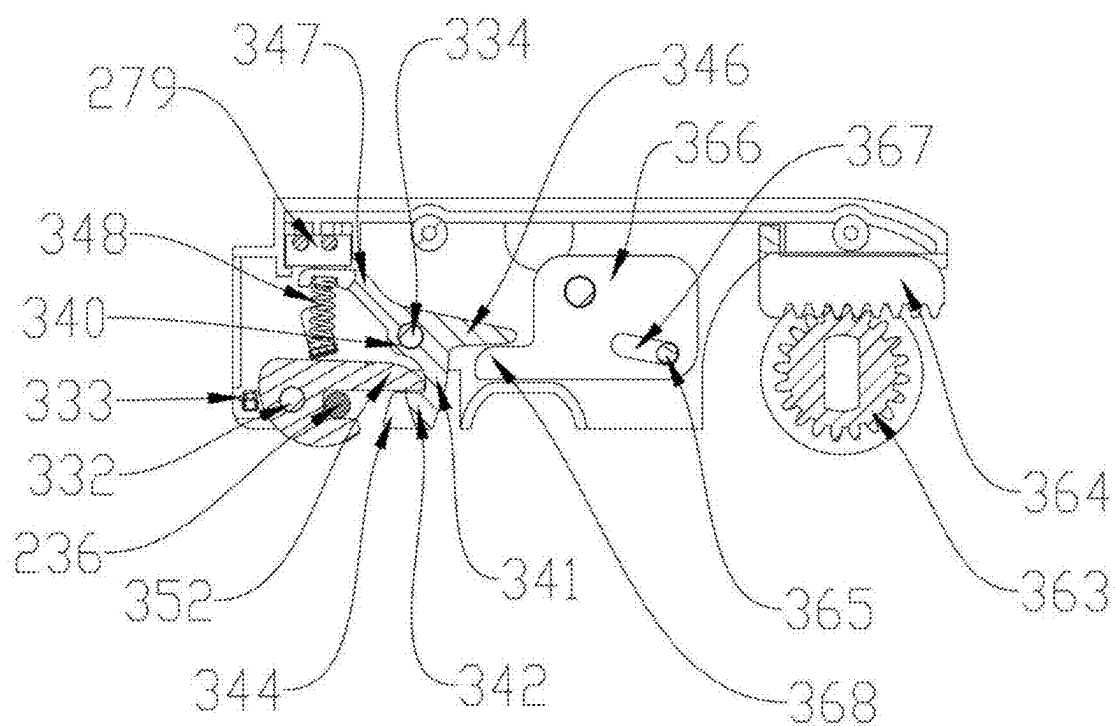


FIG. 12

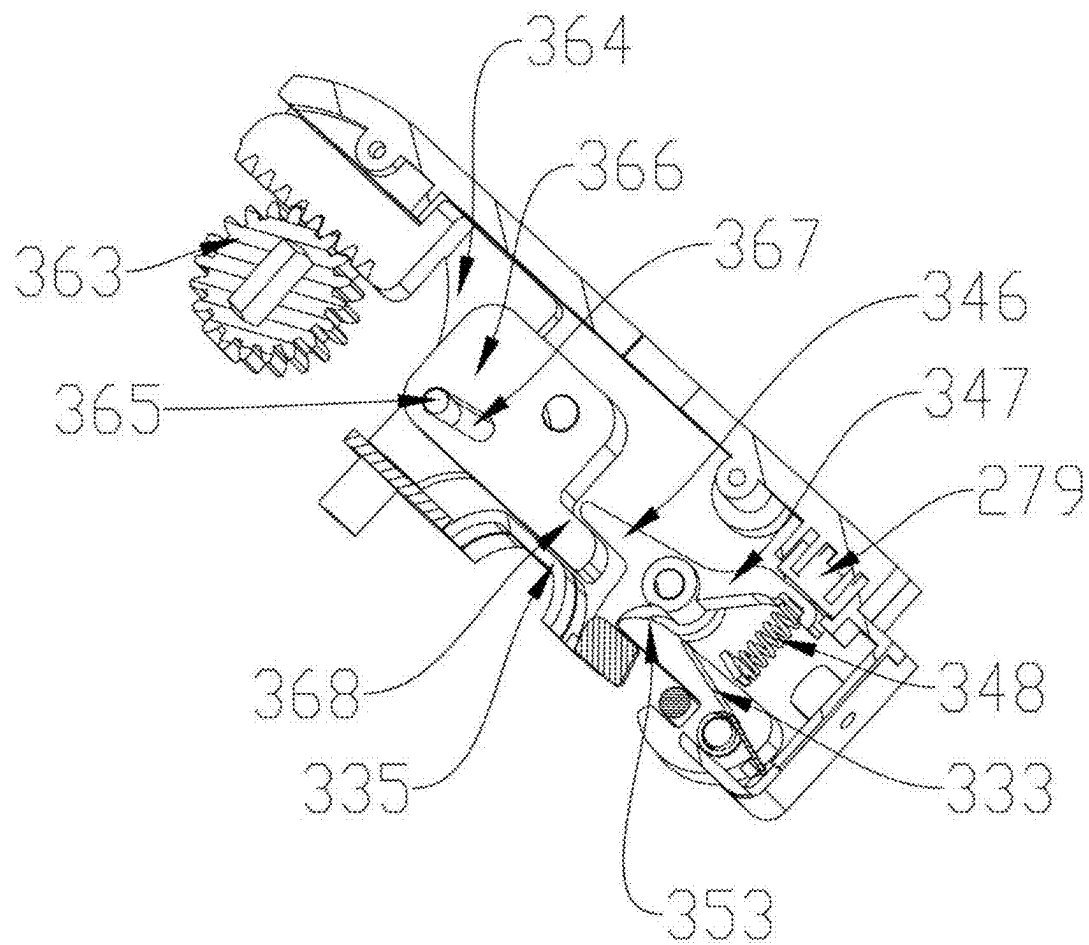


FIG. 13

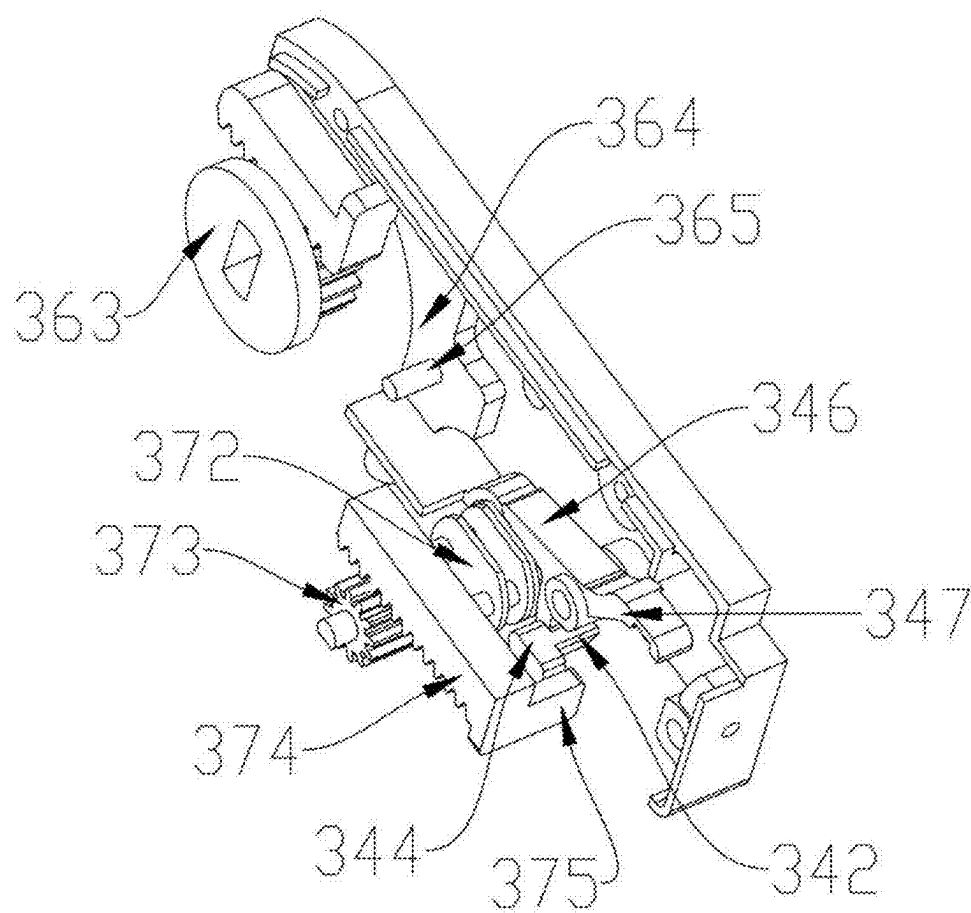


FIG. 14

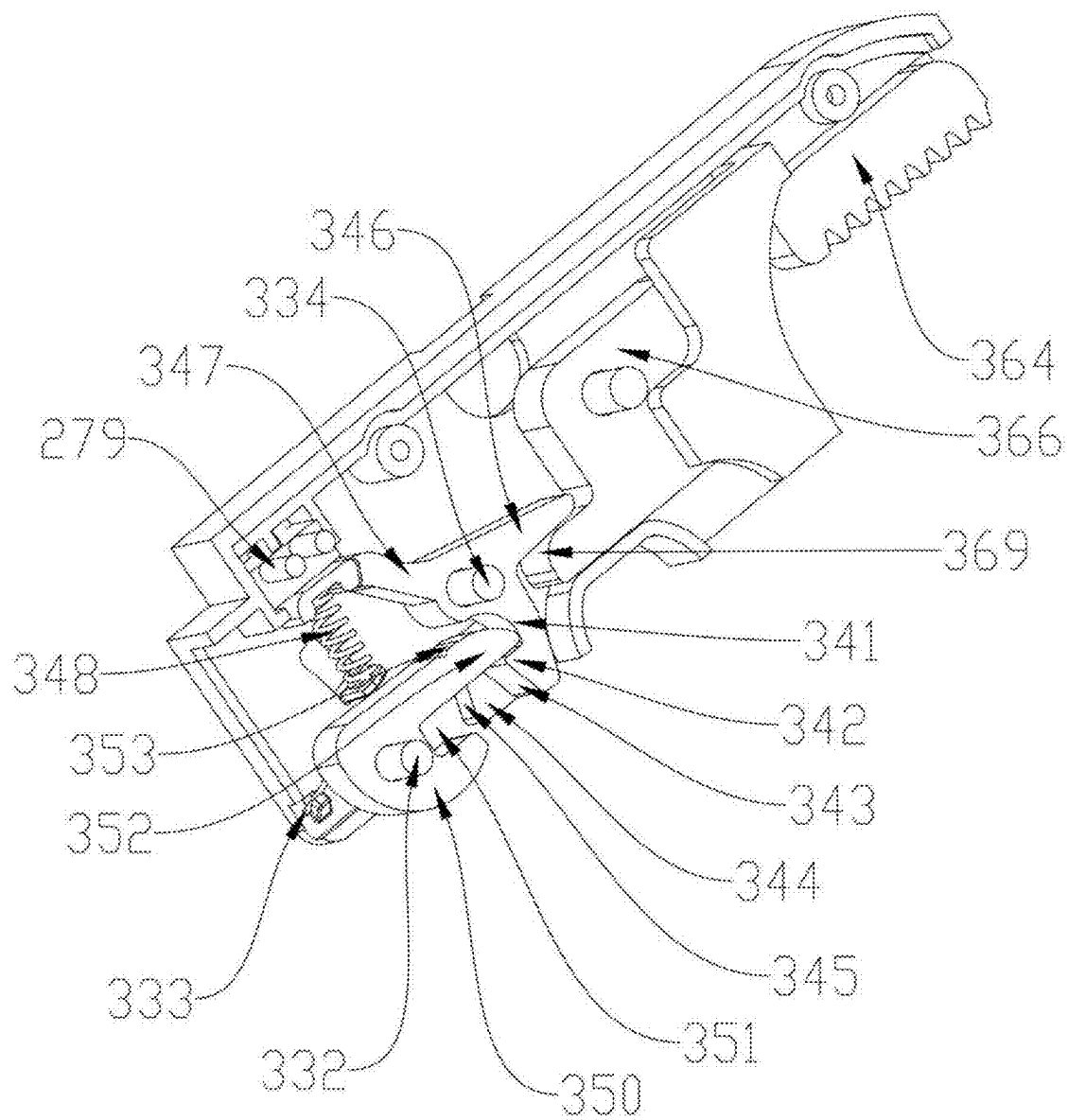


FIG. 15



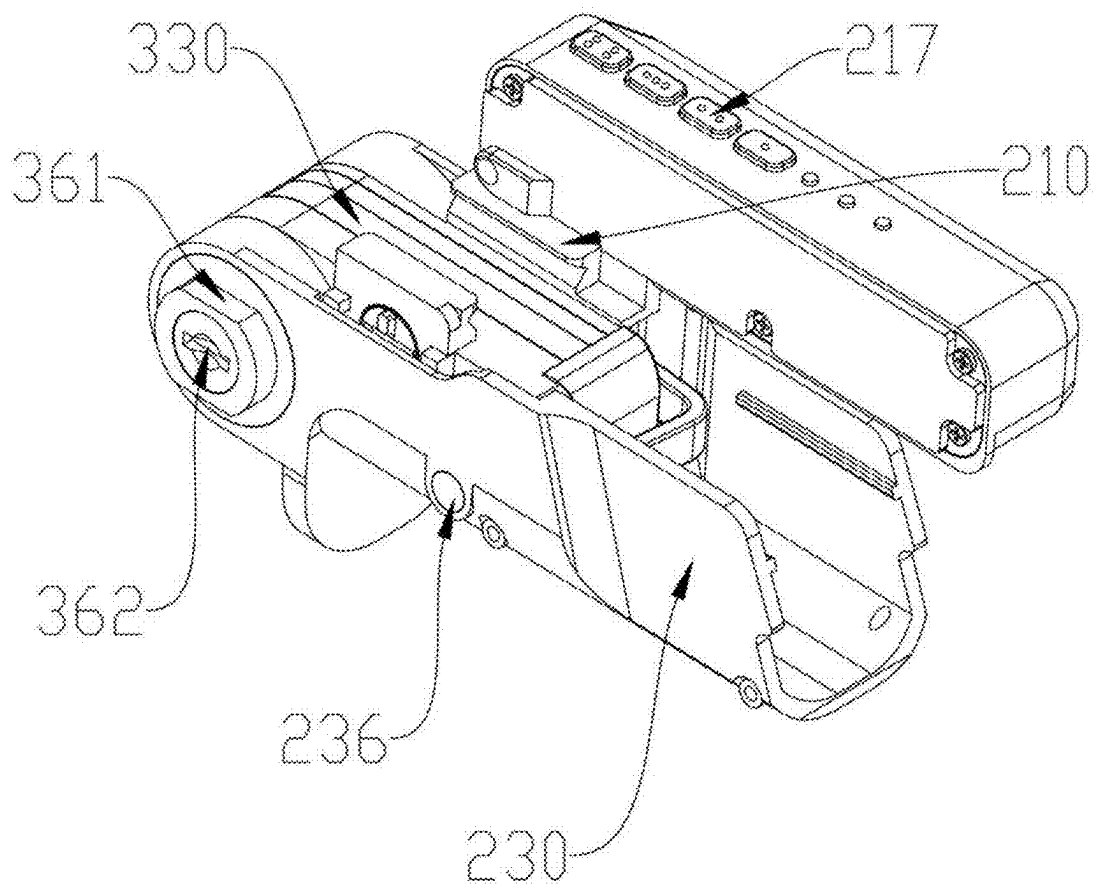


FIG. 16

## FIREARM SAFETY LOCK WITH AUXILIARY SHOOTING FUNCTION

### TECHNICAL FIELD

**[0001]** The present disclosure relates to the technical field of firearm safety locks, and in particular, to a firearm safety lock with an auxiliary shooting function.

### BACKGROUND

**[0002]** People always hope that firearms such as shotguns, rifles, and pistols can be safe and cannot be misused by unauthorized persons. Usually, locking a firearm firmly onto a relatively stationary object can achieve this purpose, but it is not convenient to use the firearm. Especially when a user needs to carry a firearm to various places, the foregoing way is very inconvenient.

**[0003]** Taking weapons from gun locks unintentionally, accidentally, and even without authorization is a common problem that law-enforcement personnel, military personnel, and other tactical users of weapons with gun locks face. For safety and effectiveness, there are mainly two problems needing to be solved for a gun lock: maintaining the safety of a weapon all the time and allowing an authorized user to quickly deploy a weapon when needed.

**[0004]** The existing technology discloses various different mechanisms to prevent weapons from being accidentally removed from gun locks. Most structures in the existing technology include complex and cumbersome mechanisms. These mechanisms are clumsy, inconvenient, and difficultly manipulated. Especially, it is difficult to quickly deploy the weapons from the gun locks. Such a safety lock is required in all types of firearms to lower a risk of unauthorized, unintentional, or accidental opening of a gun lock to deploy a weapon. However, a gun lock that ensures higher safety of a weapon often causes the weapon to be pulled out or deployed slowly, and a gun lock that provides quick deployment on a weapon often causes low safety. Therefore, a user often needs to make an unexpected trade-off between two necessary features (namely safety and quick deployment). Thus, it is very necessary to use a gun lock that can provide high safety and quick calling deployment without reducing any necessary features.

**[0005]** Chinese patent document No. CN202403610U discloses a firearm trigger lock composed of an upper lock sleeve, an upper rubber cushion, a lower rubber cushion, a lower lock sleeve, and a key. The upper rubber cushion sleeves an inner side of the upper lock sleeve. The lower rubber cushion sleeves an inner side of the lower lock sleeve. A plug is arranged in a cylinder of the upper lock sleeve. A plug pillar is connected to the plug and is inserted into a plug pillar slot of the lower lock sleeve together with a plug sleeve.

**[0006]** At present, although the trigger lock on the market prevents unauthorized misuse, when an authorized user needs to use a firearm, the user needs to first unlock a gun lock product. After removing an entire lock body, the user can take out a firearm for shooting, which seriously affects a speed of firearm deployment of the user.

**[0007]** Therefore, there is a need for a firearm safety lock with an auxiliary shooting function. This firearm safety lock can effectively combine a high safety feature into the gun lock without hindering the speed of firearm deployment of the user.

### SUMMARY

**[0008]** In order to overcome the drawbacks described above, the present disclosure aims to provide a technical solution that can solve the above problems.

**[0009]** The present disclosure provides a firearm safety lock with an auxiliary shooting function, including a lock body of the safety lock, wherein the lock body is provided with a fixed support and a shackle assembly; the fixed support is detachably fixedly connected to the lock body and is configured to detachably fixedly connect the lock body to a standard guide rail of a firearm; and one end of the shackle assembly is mounted at the lock body through movable connection, and the other end of the shackle assembly blocks or covers a trigger of the firearm to lock the firearm.

**[0010]** Further, the lock body is further provided with a reinforcing hook; one end of the reinforcing hook is detachably fixedly connected to the lock body, and the other end of the reinforcing hook extends into a trigger ring of the firearm and abuts against an inner wall of the trigger ring to prevent the lock body from being separated from the firearm.

**[0011]** Further, a sliding rail assembly is arranged at one end of the lock body that is connected to the shackle assembly; and one end of the sliding rail assembly is fixedly connected to the fixed support, and the other end of the sliding rail assembly is fixedly connected to the shackle assembly, so that the shackle assembly is able to move a distance along the sliding rail assembly to lock or unlock the trigger of the firearm.

**[0012]** Further, a rotating shaft assembly is arranged at one end of the lock body that is connected to the shackle assembly; the rotating shaft assembly is fixedly connected to the lock body; and one end of the shackle assembly is rotatably connected to the rotating shaft assembly, and the other end of the shackle assembly is formed into a free end and can be rotated an angle around the rotating shaft assembly, to form a locked state or an unlocked state for the trigger of the firearm.

**[0013]** Further, the lock body is further provided with a first bolt; the shackle assembly is provided with a shackle part at a position corresponding to the first bolt; and when the shackle assembly locks the trigger, the shackle part cooperates with the first bolt to form a locked state for the shackle assembly.

**[0014]** Further, a clamping notch is provided in one end of the shackle assembly that is connected to the rotating shaft assembly, and the rotating shaft assembly is provided with a clamping pin at a position corresponding to the clamping notch; and the shackle assembly is rotated an angle around the rotating shaft assembly, so that the clamping pin is clamped into the clamping notch and locks the shackle assembly, causing the shackle assembly to form an auxiliary grip for firearm shooting.

**[0015]** Further, the lock body is further provided with a clamping assembly; the clamping assembly is mounted on the rotating shaft assembly; the clamping assembly is provided with a clamping cavity, a clamping spring, a release button, and a release spring; a clamping sliding chute is provided inside the clamping cavity; a clamping pin is slidably connected to the clamping sliding chute; one end of the clamping spring abuts against the clamping cavity, and the other end of the clamping spring abuts against the clamping pin, so that the clamping pin maintains an outwards protruding elastic state; one end of the release button protrudes out of the clamping cavity, and the other end of the

release button is provided with an active inclined surface; a passive inclined surface is arranged at a portion of the clamping pin that corresponds to the active inclined surface; one end of the release spring abuts against the clamping cavity, and the other end of the release spring abuts against the release button, so that the release button maintains an outwards protruding elastic state.

**[0016]** Further, the lock body is further provided with a first unlocking device; the first unlocking device is provided with a first plug, a first gear a, a first gear b, a first rack a, and a first rack b; the first gear a is fixedly connected to a square rotating shaft of the first plug; the first gear b is rotatably connected to the lock body; one end of the first rack a is in meshing connection with the first gear a, and the other end of the first rack a is in meshing connection with the first gear b; and one end of the first rack b is in meshing connection with the first gear b, and the other end of the first rack b unlocks the shackle assembly.

**[0017]** Further, the lock body is further provided with a second unlocking device; the second unlocking device is provided with a first motor, a second gear, a second rack, and an electronic lock; the electronic lock is electrically connected to the first motor and is able to control the first motor to operate; the second gear is fixedly connected to an output shaft of the first motor; and one end of the second rack is in meshing connection with the second gear, and the other end of the second rack unlocks the shackle assembly.

**[0018]** Further, the lock body is further provided with a triggering switch and a control module; the triggering switch is electrically connected to the control module; the triggering switch is mounted on the lock body; and when the shackle assembly locks the trigger of the firearm, the triggering switch can be triggered to cause the control module to disable a setting function of the electronic lock.

**[0019]** Further, the firearm safety lock with the auxiliary shooting function further includes a locking mechanism that is configured to lock the shackle assembly and includes a lock case, a locking hook assembly, a second bolt, and an unlocking assembly; the locking hook assembly is rotatably connected to the lock case; one end of the second bolt is rotatably connected to the lock case, and a locking groove is provided in the other end of the second bolt; the locking groove is configured to clamp a shackle pillar of the shackle assembly to lock the shackle assembly; an extension arm is arranged on one side edge of the locking groove; the extension arm cooperates with the locking hook assembly to form separable clamping, so that the locking hook assembly is able to limit the second bolt; and the unlocking assembly is mounted on the lock case and is able to drive the locking hook assembly to rotate an angle, to relieve the limitation on the second bolt, so that the second bolt synchronously releases the locking on the shackle assembly.

**[0020]** Further, the lock case is provided with a first rotating pillar and a torsion spring; the second bolt is rotatably connected to the first rotating pillar; the torsion spring sleeves the first rotating pillar; and one end of the torsion spring abuts against the lock case, and the other end of the torsion spring abuts against the extension arm.

**[0021]** Further, the lock case is further provided with a second rotating pillar; the locking hook assembly is rotatably connected to the second rotating pillar; the locking hook assembly is provided with a locking hook arm at a position corresponding to the extension arm; and the locking hook arm is able to be clamped with the extension arm.

**[0022]** Further, a hook-like convex block is arranged at a portion of the locking hook arm that is correspondingly clamped with the extension arm; and the hook-like convex block is able to clamp the extension arm to limit the extension arm at a preset position.

**[0023]** Further, the locking hook assembly is further provided with a driven arm for unlocking; and the driven arm for unlocking can be driven by the unlocking assembly to cause the locking hook assembly to rotate an angle and release the second bolt.

**[0024]** Further, the unlocking assembly is provided with a third unlocking device; the third unlocking device is provided with a second plug, a third gear, a third rack, and a first transmission block; the second plug is mounted on the lock case; the third gear sleeves a linkage shaft of the second plug and is driven by the linkage shaft to rotate synchronously; one end of the third gear is in meshing connection with the third rack; and a sliding shaft is arranged at the other end of the third rack; the first transmission block is rotatably connected to the lock case, and a strip-shaped sliding chute is provided in a portion of the first transmission block that corresponds to the sliding shaft; the strip-shaped sliding chute sleeves the sliding shaft; the sliding shaft is able to slide along an inner wall of the strip-shaped sliding chute to drive the first transmission block to rotate an angle; a driving arm for unlocking is arranged at a position of the first transmission block that corresponds to the driven arm for unlocking, to pry the driven arm for unlocking.

**[0025]** Further, the unlocking assembly is further provided with a fourth unlocking device; the fourth unlocking device is provided with a second motor, a fourth gear, and a fourth rack; the second motor is fixedly connected to the lock case; the fourth gear is fixedly connected to an output shaft of the second motor; one end of the fourth rack is in meshing connection with the fourth gear, and a push block is arranged at the other end of the fourth rack; an unlocking convex block is arranged at a portion of the locking hook arm that corresponds to the push block; and the unlocking convex block abuts against the push block.

**[0026]** Further, the locking hook assembly is further provided with a clamping locking arm and a pressure spring; one end of the pressure spring abuts against the lock case, and the other end of the pressure spring abuts against the clamping locking arm; and an elastic force of the pressure spring drives the locking hook assembly to maintain the limitation on the second bolt.

**[0027]** Compared with the prior art, the present disclosure has the beneficial effects below:

**[0028]** 1. By the arrangement of the fixed support, the firearm safety lock is directly fixed to the standard guide rail of the firearm, so that the safety lock is fixed on the firearm for a long time and is carried or moved with the firearm, which provides effective safety management for firearm users in various scenes.

**[0029]** 2. By the further arrangement of the reinforcing hook, the safety lock is fixed on the standard guide rail of the firearm more firmly to be prevented from falling off or from being forcibly removed. This further improves the safety of the firearm.

**[0030]** 3. The trigger part of the firearm is locked through the shackle assembly that is slidably or rotatably connected to the fixed support, to prevent the

trigger from being pulled unintentionally, accidentally, or without authorization. Therefore, the firearm is protected.

[0031] 4. Particularly after the safety lock is unlocked, without removing the entire safety lock, quick shooting can be implemented by only sliding out or rotating the shackle assembly. This increases the speed of firearm deployment of a user. Furthermore, the quickly opened shackle assembly further serves as the auxiliary grip for stable shooting. This improves the stability of shooting and improves the shooting accuracy of the firearm.

[0032] Therefore, according to the above improvements, the present disclosure provides a firearm safety lock with an auxiliary shooting function. This firearm safety lock can effectively combine a high safety feature into the gun lock without hindering the speed of firearm deployment of the user. The auxiliary grip is further added, which improves the shooting accuracy.

[0033] The additional aspects and advantages of the present disclosure will be set forth in part in the description below, parts of which will become apparent from the description below, or will be understood by the practice of the present disclosure.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0034] To describe the technical solutions in the embodiments of the present disclosure or in the related art more clearly, the following briefly introduces the accompanying drawings for describing the embodiments or the related art. Apparently, the accompanying drawings in the following description show merely some embodiments of the present disclosure, and a person of ordinary skill in the art may still derive other drawings from the accompanying drawings without creative efforts.

[0035] FIG. 1 is a schematic structural diagram of a locked state of a firearm by using a lock body according to the present disclosure;

[0036] FIG. 2 is a schematic structural diagram of a fixed support being fixed to a standard guide rail of a firearm according to the present disclosure;

[0037] FIG. 3 is a schematic structural diagram of shackle assembly being in an unlocked state according to the present disclosure;

[0038] FIG. 4 is a schematic structural diagram of a reinforcing hook according to the present disclosure;

[0039] FIG. 5 is a schematic structural diagram of a first bolt according to the present disclosure;

[0040] FIG. 6 is a cross-sectional view of a first bolt and a shackle assembly according to the present disclosure;

[0041] FIG. 7 is a partially enlarged view of part A in FIG. 6;

[0042] FIG. 8 is a cross-sectional diagram of a clamping assembly according to the present disclosure;

[0043] FIG. 9 is a schematic structural diagram of a first unlocking device according to the present disclosure;

[0044] FIG. 10 is a schematic structural diagram of a second unlocking device according to the present disclosure;

[0045] FIG. 11 is a schematic structural diagram of a lock case and an unlocking assembly according to the present disclosure;

[0046] FIG. 12 is a cross-sectional diagram of locking hook assembly and a second bolt according to the present disclosure;

[0047] FIG. 13 is a cross-sectional diagram of a locking hook assembly and an unlocking assembly according to the present disclosure;

[0048] FIG. 14 is a schematic structural diagram of a fourth unlocking device and a locking hook assembly according to the present disclosure;

[0049] FIG. 15 is a schematic structural diagram of a third unlocking device and a locking hook assembly according to the present disclosure; and

[0050] FIG. 16 is a schematic structural diagram of a lock body according to the present disclosure.

[0051] Reference numerals and names in the drawings are as follows:

[0052] 210: lock body; 211: fixed support; 212: positioning barrel; 213: anti-separation stopper; 214: rotating shaft assembly; 215: extension guide rail; 216: extension belt clip; 217: control module; 220: reinforcing hook; 221: rubber sleeve; 222: reinforcing portion; 223: buffer pad; 230: shackle assembly; 231: lock guard portion; 232: soft rubber pad; 233: shackle part; 234: clamping notch; 235: hand protection plate; 236: shackle pillar; 240: first bolt; 241: bolt spring; 242: bolt slider; 243: positioning pillar; 244: anti-separation baffle plate; 250: clamping assembly; 251: clamping pin; 252: clamping cavity; 253: clamping sliding chute; 254: clamping spring; 255: release button; 256: release spring; 260: first unlocking device; 261: first plug; 262: first gear a; 263: first gear b; 264: first rack a; 265: first rack b; 270: second unlocking device; 271: first motor; 272: second gear; 273: second rack; 274: electronic lock; 275: circuit board; 276: charging port; 277: password input assembly; 278: fingerprint recognition assembly; 279: triggering switch; 280: firearm; 281: trigger ring; 282: standard guide rail; 330: locking mechanism; 331: lock case; 332: first rotating pillar; 333: torsion spring; 334: second rotating pillar; 335: limiting protrusion; 340: locking hook assembly; 341: locking hook arm; 342: hook-like convex block; 343: second slope; 344: unlocking convex block; 345: fourth slope; 346: driven arm for unlocking; 347: clamping locking arm; 348: pressure spring; 350: second bolt; 351: locking groove; 352: extension arm; 353: first slope; 360: unlocking assembly; 361: third unlocking device; 362: second plug; 363: third gear; 364: third rack; 365: sliding shaft; 366: first transmission block; 367: strip-shaped sliding chute; 368: driving arm for unlocking; 369: third slope; 371: fourth unlocking device; 372: second motor; 373: fourth gear; 374: fourth rack; and 375: push block.

#### DETAILED DESCRIPTION OF THE EMBODIMENTS

[0053] The technical solutions in the embodiments of the present disclosure are clearly and completely described below. Apparently, the described embodiments are merely some embodiments of the present disclosure, rather than all of the embodiments. All other embodiments obtained by a person of ordinary skill in the art based on the embodiments of present disclosure without making creative efforts shall fall within the protection scope of present disclosure.

[0054] Firstly, a brief introduction will be made to a standard guide rail commonly used for firearms. A Picatinny rail, also referred to as an MIL-STD-1913 rail or an STANAG 2324 rail, which is a standardized accessory mounting platform mounted on a light weapon.

[0055] A guide rail system has been integrated with light weapons of the US military. It is a standard accessory system

of the US military and promotes technological development of various specialized researches on guide rails and guide rail accessories. The Picatinny rail has actually become an international standard, which not only is widely used by NATO countries in light weapons, but also emerges in AK rifles.

**[0056]** However, there are few firearm locks developed specifically for standard guide rails currently, and a firearm safety lock of the present disclosure is directly mounted on the standard guide rail, so that the firearm safety lock is easy to mount, firmly connected, and convenient to use. The firearm safety lock can be used and protected for a long time together with a firearm, thus improving the safety of the firearm. The safety lock can also be quickly unlocked, without being removed, to implement quickly shooting of the firearm. This increases the speed of firearm deployment of a user and improves the safety of the user.

**[0057]** In addition, the standard guide rail referred to in the present disclosure can be the Picatinny guide rail or other guide rails that are convenient for mounting of accessories. A fixed support can be mounted on various standard guide rails only by adjusting a corresponding structure of the fixed support.

**[0058]** Referring to FIG. 1 to FIG. 16, in this embodiment of the present disclosure, a firearm safety lock with an auxiliary shooting function includes a lock body of the safety lock. The lock body is provided with a fixed support and a shackle assembly. The fixed support is detachably fixedly connected to the lock body and is configured to detachably fixedly connect the lock body to a standard guide rail of a firearm. One end of the shackle assembly is mounted at the lock body through movable connection, and the other end of the shackle assembly can block or cover a trigger of the firearm to lock the firearm, so that the firearm is protected, and the safety of the firearm is improved.

**[0059]** Specifically, the firearm safety lock of the present disclosure is mounted through the fixed support that is matched with the standard guide rail, so that the firearm safety lock is conveniently and quickly fixed and assembled on the firearm. As shown in FIG. 5, a mounting structure on one side of the fixed support is preferably fixed on the lock body or integrally formed on the lock body, and a mounting structure on the other end of the fixed support is preferably detachably connected to the lock body, so that the fixed support mounts or removes the lock body through the detachable mounting structure. A specific structural form of the detachable mounting structure can use a corresponding structure in the existing technology, such as a bolt-connected mounting structure, to firmly mount the fixed support on the standard guide rail. As shown in FIG. 1, after the shackle assembly of the safety lock locks a trigger part of the firearm, the shackle assembly also covers or blocks the mounting structures of the fixed support, to prevent the fixed support from being removed and prevent the safety lock from being removed when the safety lock is in a locked state.

**[0060]** Secondly, the shackle assembly can be mounted on the lock body through various movable connection modes, and the movable connection modes need to ensure that the shackle assembly can moved a distance or rotated an angle on the lock body, to form a locked state or an unlocked state on the trigger part of the firearm. In addition, it is necessary to ensure that a limitation is imposed when the shackle assembly is moved or rotated on the lock body by a movable connection, so that the shackle assembly cannot be separated

from the lock body. For example, when the shackle assembly is movably mounted on the lock body in a rotatable connection way, the shackle assembly can only be rotated around a corresponding rotating shaft and cannot be separated from the lock body. Similarly, when the shackle assembly is mounted on the lock body in a translational connection way, a translation region for the shackle assembly can only be within a region of the lock body and cannot be separated from the lock body. Namely, regardless of whether the safety lock locks or unlocks the firearm, the shackle assembly of the safety lock continues to be mounted on the lock body, and the lock body also continues to be mounted on the firearm. Moreover, when the firearm is unlocked for use, the lock body does not need to be removed.

**[0061]** Furthermore, since the safety lock is mounted on the standard guide rail of the firearm through the fixed support, the standard guide rail is occupied. An extension guide rail can be arranged on the lock body. The extension guide rail is fixedly connected to the lock body, to provide a standard guide rail for a user to mount other accessories that need to be mounted on a guide rail. For example, tactical flashlight or another accessory is mounted through the extension guide rail. As shown in FIG. 2, the firearm safety lock provided by the present disclosure can be mounted on the firearm for a long time. When the firearm needs to be used, the safety lock is unlocked, and the shackle assembly is moved or rotated to expose the trigger part of the firearm for quick shooting, without removing the entire lock body. Therefore, an extension belt clip can also be arranged on the lock body. A user uses the extension belt clip to carry the lock body and firearm together. For example, a user uses the extension belt clip to clamp the firearm at a belt of the user. The extension belt clip can be directly mounted on the lock body or can be mounted on the extension guide rail.

**[0062]** As shown in FIG. 3 to FIG. 6, preferably, the lock body is further provided with a reinforcing hook. One end of the reinforcing hook is detachably fixedly connected to the lock body, and the other end of the reinforcing hook extends into a trigger ring of the firearm and abuts against an inner wall of the trigger ring to prevent the lock body from being separated from the firearm.

**[0063]** Specifically, the reinforcing hook can prevent the lock body from slipping off from the standard guide rail, which can prevent the lock body from moving towards a muzzle of the firearm, or being pulled out by a person. When the lock body is mounted on the standard guide rail of the firearm through the fixed support, preferably, the lock body is mounted on an end of the standard guide rail close to the firearm, so that the fixed support can be blocked by a firearm shell at an end of the standard guide rail, to prevent the lock body from continuing to move towards the trigger of the firearm. This can prevent the reinforcing hook from hitting the trigger. Alternatively, a reinforcing portion is arranged on one side of the lock body that corresponds to the trigger ring, so that the reinforcing portion of the lock body can abut against an outer wall of the trigger ring and cooperate with one end of the reinforcing hook that extends into the trigger ring, to clamp the trigger ring. In this setting, after the safety lock is mounted on the standard guide rail, the safety lock is also limited and fixed in a long side direction of the standard guide rail, to prevent the safety lock from being separated.

**[0064]** Secondly, as shown in FIG. 4, the reinforcing hook is also fixedly connected to the lock body through a detach-

able mounting structure, making it easy to mount the reinforcing hook. When the safety lock locks the firearm, the shackle assembly of the safety lock also covers or blocks the mounting structure of the reinforcing hook, so that after the safety lock locks the firearm, the reinforcing hook cannot be removed, which prevents such a phenomenon of impact on the safety of the firearm because the reinforcing hook is removed in the locked state and then the safety lock may be forcibly pulled out. A buffer pad is arranged on the reinforcing portion, and a rubber sleeve is arranged at one end of the reinforcing hook that extends into the trigger ring, to avoid scratches on the trigger ring of the firearm.

**[0065]** In another embodiment, preferably, a sliding rail assembly is arranged at one end of the lock body that is connected to the shackle assembly. One end of the sliding rail assembly is fixedly connected to the fixed support, and the other end of the sliding rail assembly is fixedly connected to the shackle assembly, so that the shackle assembly can move a distance along the sliding rail assembly to lock or unlock the trigger of the firearm, thus forming a locked state or an unlocked state for the trigger of the firearm.

**[0066]** Specifically, when the shackle assembly is movably mounted on the fixed support through the sliding rail assembly, the sliding rail assembly can be provided with a corresponding limiting portion, to prevent the shackle assembly from sliding out of the lock body and losing its locking effect on the firearm. When the sliding rail assembly assists the shackle assembly in sliding, it needs to ensure that the shackle assembly can form the locked state or the unlocked state for the trigger part of the firearm after sliding.

**[0067]** As shown in FIG. 1, FIG. 2, and FIG. 6, preferably, in another embodiment, a rotating shaft assembly is arranged at one end of the lock body that is connected to the shackle assembly. The rotating shaft assembly is fixedly connected to the lock body. One end of the shackle assembly is rotatably connected to the rotating shaft assembly, and the other end of the shackle assembly is formed into a free end and can rotate an angle around the rotating shaft assembly, to form a locked state or an unlocked state for the trigger of the firearm.

**[0068]** Specifically, when the free end of the shackle assembly is rotated to the trigger, the free end blocks or covers the trigger part, to lock the trigger, which is equivalent to locking the firearm and protecting the firearm from unauthorized shooting. A lock guard portion is arranged at the free end of the shackle assembly. The lock guard portion is designed as a U-shaped shell. When the shackle assembly is rotated an angle, the lock guard portion sleeves the trigger of the firearm to block or cover the trigger, thus locking the trigger. A soft rubber pad is further arranged on an inner wall of the U-shaped shell. The soft rubber pad abuts against the trigger ring to prevent the trigger ring from being scratched.

**[0069]** As shown in FIG. 3 to FIG. 7, preferably, the lock body is further provided with a first bolt. The shackle assembly is provided with a shackle part at a position corresponding to the first bolt. When the shackle assembly locks the trigger, the shackle part cooperates with the first bolt to form a locked state for the shackle assembly. The first bolt is provided with a bolt spring and a bolt slider. The bolt slider is movably connected to the lock body. One end of the bolt spring abuts against the lock body, and the other end of the bolt spring abuts against the bolt slider, so that the bolt slider maintains an outwards protruding elastic state.

**[0070]** Specifically, in order to make the movement of the bolt slider smoother and more accurate, a positioning barrel is further arranged on the lock body. The bolt slider is provided with a positioning column at a position corresponding to the positioning barrel. The positioning column can be plugged into the positioning barrel and slide in a directional manner along the positioning barrel. In order to prevent the bolt slider from being ejected by the bolt spring, an anti-separation baffle plate is arranged on the bolt slider. The lock body is provided with an anti-separation stopper at a position corresponding to the anti-separation baffle plate. The anti-separation stopper and the anti-separation baffle plate cooperate with each other to limit the directional sliding of the bolt slider within a distance.

**[0071]** Secondly, under an elastic force of the bolt spring, the bolt slider maintains a state of being pushed out towards the shackle part. When the trigger is locked by the shackle assembly, the shackle part is precisely stuck on the bolt slider, thus locking the shackle assembly. For unlocking, the first unlocking device or the second unlocking device is used to unlock the bolt slider, so that the bolt slider is pressed to move a distance, thus releasing the locking on the shackle part and making the shackle assembly release the locking on the trigger part. Therefore, the trigger of the firearm is released for quick shooting.

**[0072]** As shown in FIG. 8, preferably, a clamping notch is provided in one end of the shackle assembly that is connected to the rotating shaft assembly, and the rotating shaft assembly is provided with a clamping pin at a position corresponding to the clamping notch. The shackle assembly is rotated an angle around the rotating shaft assembly, so that the clamping pin is clamped into the clamping notch and locks the shackle assembly, causing the shackle assembly to form an auxiliary grip for firearm shooting.

**[0073]** Specifically, after the clamping pin is plugged into clamping notch, the clamping pin and the clamping notch cooperate with each other to form a locking structure that locks the rotation of the shackle assembly, so that the shackle assembly is formed into the auxiliary grip for a user to grip during shooting, which achieves the auxiliary shooting function and improving the shooting accuracy.

**[0074]** As shown in FIG. 8, preferably, the lock body is further provided with a clamping assembly. The clamping assembly is mounted on the rotating shaft assembly. The clamping assembly is provided with a clamping cavity, a clamping spring, a release button, and a release spring. A clamping sliding chute is provided inside the clamping cavity. A clamping pin is slidably connected to the clamping sliding chute. One end of the clamping spring abuts against the clamping cavity, and the other end of the clamping spring abuts against the clamping pin, so that the clamping pin maintains an outwards protruding elastic state. One end of the release button protrudes out of the clamping cavity, and the other end of the release button is provided with an active inclined surface. A passive inclined surface is arranged at a portion of the clamping pin that corresponds to the active inclined surface. The active inclined surface and the passive inclined surface cooperate with each other to press the release button, which can drive the clamping pin to move back into the clamping cavity to unlock the locked shackle assembly. One end of the release spring abuts against the clamping cavity, and the other end of the release spring abuts against the release button, so that the release button maintains an outwards protruding elastic state.

[0075] Specifically, the clamping pin continuously abuts against the shackle assembly under an elastic force of the clamping spring. When the shackle assembly is rotated an angle, preferably 90 degrees relative to the firearm, that is, when the shackle assembly is in a state of being perpendicular to the firearm, the clamping notch is exactly at the clamping pin, so that the clamping pin is clamped into the clamping notch under the elastic force of the clamping spring, to achieve a state of stopping the rotation of the shackle assembly and keep the shackle assembly in the stop state to form the auxiliary grip.

[0076] Secondly, when the trigger of the firearm needs to be locked by rotating the shackle assembly again, the release button is pressed, and the active inclined surface of the release button is used to cooperate with the passive inclined surface of the clamping pin to drive the clamping pin to move a distance away from the shackle assembly, thus releasing the clamping notch and rotating the shackle assembly again. In order to prevent the release button from being bounced off by an elastic force of the release spring, a limiting flange can be arranged on one side of the release button that is left in an unlocking cavity, and a corresponding limiting ring can be arranged at a portion of the rotating shaft assembly corresponding to the limiting flange, so that the limiting flange and the limiting ring cooperate with each other to form a limiting connection to the release button. In order to prevent the clamping pin from being bounced off by the elastic force of the clamping spring, a limiting pressing block is also arranged on the clamping pin. A corresponding limiting convex block is arranged at a portion of the clamping cavity that corresponds to the limiting pressing block, so that the limiting pressing block and the limiting convex block cooperate with each other to form a limiting connection to the clamping pin.

[0077] As shown in FIG. 1, FIG. 3, and FIG. 9, the lock body is further provided with a first unlocking device. The first unlocking device is provided with a first plug, a first gear a, a first gear b, a first rack a, and a first rack b. The first gear a is fixedly connected to a square rotating shaft of the first plug and synchronously rotates with the first plug. The first gear b is rotatably connected to the lock body. One end of the first rack a is in meshing connection with the first gear a, and the other end of the first rack a is in meshing connection with the first gear b. One end of the first rack b is in meshing connection with the first gear b, and the other end of the first rack b abuts against the first bolt. When the first plug is unlocked for rotation, the first rack b can drive the first bolt to move a distance through the driving connection of the first gear a, the first rack a, the first gear b, and the first rack b, so as to unlock the shackle assembly.

[0078] Specifically, the first gear b is rotatably connected through a pin shaft fixed to the lock body. Most of the time, the safety lock keeps locking the firearm, that is, the shackle assembly locks the trigger part of the firearm. When the firearm needs to be used for shooting, or the safety lock needs to be removed, the first plug is opened by a key of the first plug, and then the first plug is rotated. With the cooperation between the gears and the racks, the bolt slider moves a distance away from the shackle part to release the locking on the shackle part and release the locking on the shackle assembly. After the shackle assembly is rotated an angle, the covering or blocking on the trigger is released, so that a user pulls the trigger and uses the firearm for shooting. The covering or blocking on the fixed support or the

reinforcing hook can also be released, so that the fixed support or the reinforcing hook can be removed.

[0079] As shown in FIG. 2, FIG. 4, FIG. 6, and FIG. 10, preferably, the lock body is further provided with a second unlocking device. The second unlocking device is provided with a first motor, a second gear, a second rack, and an electronic lock. The second gear is fixedly connected to an output shaft of the first motor. One end of the second rack is in meshing connection with the second gear, and the other end of the second rack abuts against the first bolt. The electronic lock is electrically connected to the first motor and controls the first motor to operate, driving the second rack to move synchronously and driving the first bolt to unlock the shackle assembly.

[0080] Specifically, the electronic lock is provided with a circuit board, a control chip, a rechargeable battery, a charging port, a password input assembly, and a fingerprint recognition assembly which are electrically connected to each other. The rechargeable battery provides operating power for the electronic lock and the first motor. The password input assembly is provided with a plurality of buttons. The electronic lock is unlocked through a preset button password. The fingerprint recognition assembly can unlock the electronic lock through a preset fingerprint. The control chip uses a micro control unit such as a micro control unit (mcu) in an existing product, which has a program execution capability to manage and control corresponding electronic devices.

[0081] As shown in FIG. 6 and FIG. 9, preferably, the lock body is further provided with a triggering switch and a control module. The triggering switch is electrically connected to the control module. The triggering switch is mounted on the lock body. When the shackle assembly locks the trigger of the firearm, the triggering switch can be triggered to cause the control module to disable a setting function of the electronic lock.

[0082] Specifically, the push type triggering switch is used to detect a locking state between the shackle assembly and the trigger, to determine whether a current state of the firearm safety lock is unlocked or locked. When the firearm safety lock is in the open state, the control module can perform a corresponding setting operation on the electronic lock, such as setting a preset password or entering a preset fingerprint. When the firearm safety lock is in the locked state, that is, after the trigger of the firearm is locked, the control module cannot perform the setting operation on the electronic lock and can only perform an unlocking operation on the firearm safety lock. To prevent another person from performing a setting operation on the firearm safety lock unintentionally, accidentally, or without authorization when the firearm is safely locked, causing an error or no response in the control module of the safety lock,

[0083] main features and effects of the firearm safety lock of the present disclosure are summarized as follows:

[0084] 1. The firearm safety lock can be fixedly mounted on the firearm for a long time, thus achieving an effect of long-term safe locking on the firearm and providing long-term effective safety management on household firearm use.

[0085] 2. After unlocking, without removing the entire lock body, quick shooting can be performed by only moving the shackle assembly a distance or rotating the shackle assembly an angle to expose the trigger of the firearm. After being quickly opened, the shackle assembly

bly can achieve a stable grip function, to provide a user with a stable gripping action and improving the shooting accuracy. To improve the safety, a hand protection plate is also arranged at one end of the shackle assembly close to a muzzle of the firearm. When a user grips the auxiliary grip formed by the shackle assembly, a finger of the user is placed under the hand protection plate to prevent an accident caused by a recoil that vibrates the finger of the user to the muzzle of the firearm when the user uses the firearm.

[0086] 3. The firearm is unlocked in various forms, such as a biometric fingerprint, an electronic password, or a mechanical lock key. Especially a fingerprint unlocking mode increases the unlocking speed, so that a user can unlock the firearm more quickly for quick shooting.

[0087] 4. The entire body is made of a high-strength aluminum alloy material, which provides a lightweight effect for easy carrying. Meanwhile, the alloy body also provides ultra-high-strength safety protection for the safety lock, to prevent violent damage.

[0088] Locking and unlocking of the safety lock can be performed by electric control or manual control. In this embodiment of mounting the shackle assembly on the lock body through the movable connection of the sliding rail assembly, it is preferred to use electric control. That is, after the safety lock is unlocked, the motor is used to drive the shackle assembly to automatically slide to be open, to expose the trigger part for quick shooting. When locking is required, a corresponding locking button is pressed, so that the motor drives the shackle assembly to move a distance to cover or block the trigger part again, thus completing the operation of locking the firearm.

[0089] In this embodiment of mounting the shackle assembly on the lock body through the movable connection of the rotating shaft assembly, it is preferred to use manual control. That is, after the safety lock is unlocked, the shackle is gripped manually for being rotated, to expose the trigger part for quick shooting. When a locking operation needs to be performed, the shackle assembly is gripped manually for being rotated an angle, to cover or block the trigger part again, thus completing the operation of locking the firearm.

[0090] Moreover, this firearm safety lock is applicable to being used on a pistol. By use of a Picatinny rail of the pistol, the lock body can be stably mounted on the pistol for quick locking and storage of the pistol. The firearm safety lock can be locked on the pistol for a long time to implement long-time continuous safety protection on the pistol. Meanwhile, the firearm safety lock is compact in structure, small in shape, and light in weight. After locking the pistol, the firearm safety lock and the pistol form an entirety, which is convenient for carrying with a user. When the pistol needs to be used, the pistol can be quickly unlocked, and the trigger can be quickly released. Furthermore, the shackle assembly can be used to form the auxiliary grip to quickly complete a defensive shooting action, thus achieving quick counterattack shooting and improving the shooting accuracy.

[0091] In a second embodiment, referring to FIG. 11 to FIG. 16, the present disclosure further provides a locking mechanism with improved stability, which is configured to lock the shackle assembly. The locking mechanism includes a lock case, a locking hook assembly, a second bolt, and an unlocking assembly. The locking hook assembly and the second bolt are both rotatably connected to the lock case.

One end of the second bolt is rotatably connected to the lock case, and a locking groove is provided in the other end of the second bolt. The locking groove is configured to clamp a shackle pillar of the shackle assembly to lock the shackle assembly. An extension arm is arranged on one side edge of the locking groove. The extension arm cooperates with the locking hook assembly to form separable clamping, so that the locking hook assembly can limit the second bolt, and the locking hook assembly and the second bolt cooperate with each other to lock the shackle assembly. The unlocking assembly is mounted on the lock case and can drive the locking hook assembly to rotate an angle, to relieve the limitation on the second bolt, so that the second bolt synchronously releases the locking on the shackle assembly.

[0092] Specifically, in order to improve the stability of the locking mechanism, by the arrangement of the second bolt, the locking groove with a particular depth is provided in the second bolt, so that the locking groove is used to fully clamp the shackle pillar, to prevent the shackle pillar from being violently opened.

[0093] Secondly, the extension arm is further arranged on one side edge of the locking groove. The clamping between the extension arm and the locking hook assembly is used to detachably clamp the second bolt. Furthermore, an unlocking direction of the extension arm is roughly parallel to a radial direction of the locking hook assembly. Namely, an unlocking stress generated by the extension arm on a locking hook arm is distributed in the radial direction of the locking hook assembly, so that an unlocking stress generated by violent unlocking is mainly concentrated on a second rotating pillar, which further improves the stability of the locking mechanism and prevents the locking mechanism from being violently unlocked.

[0094] As shown in FIG. 11 and FIG. 12, preferably, the lock case is provided with a first rotating pillar and a torsion spring. The second bolt is rotatably connected to the first rotating pillar. The torsion spring sleeves the first rotating pillar. One end of the torsion spring abuts against the lock case, and the other end of the torsion spring abuts against the extension arm. A twisting force of the torsion spring drives the second bolt to maintain an outwards rotating unlocked state.

[0095] Specifically, the twisting force of the torsion spring drives the second bolt to rotate towards the outside of the lock case to release the shackle pillar from the locking groove, thus releasing the locking on the shackle assembly and implementing the unlocked state of the shackle assembly. When the second bolt maintains the outward rotating unlocked state, the locking groove is also open towards the outside of the lock case. When the shackle assembly needs to be locked, the shackle assembly is first rotated to clamp the shackle pillar into the locking groove, and the second bolt is pushed to rotate an angle, so that the extension arm and the locking hook assembly are clamped, thus imposing a limitation on the rotation of the second bolt. Then, the shackle pillar is locked again to form a locked state for the shackle assembly.

[0096] Secondly, in order to enable the extension arm to better push the locking hook assembly to rotate an angle when the extension arm is driven by the shackle pillar, preferably, a first slope is arranged at a portion of the extension arm that is in contact with the locking hook assembly. The first slope can be set as a slope with a consistent angle or a curved surface that bends in an angle,



so that the locking hook assembly can be better driven when the locking hook assembly follows the rotation of the extension arm.

**[0097]** As shown in FIG. 12 and FIG. 15, preferably, the lock case is further provided with a second rotating pillar. A middle position of the locking hook assembly is rotatably connected to the second rotating pillar. The locking hook assembly is provided with a locking hook arm at a position corresponding to the extension arm. The locking hook arm can be clamped with the extension arm. A hook-like convex block is arranged at a portion of the locking hook arm that is correspondingly clamped with the extension arm. The hook-like convex block is able to clamp the extension arm to limit the extension arm at a preset position.

**[0098]** Specifically, the locking hook arm can form a hook-like convex block to be clamped with the extension arm. It can also be understood as a sunken space is formed between the hook-like convex block and the locking hook arm, so that the extension arm is stored in the sunken space when locked, and the hook-like convex block can prevent the extension arm from leaving the sunken space.

**[0099]** In addition, a second slope is arranged at a portion of the hook-like convex block that corresponds to the first slope of the extension arm. The second slope cooperates with the first slope to better drive, when the extension arm rotates, the locking hook assembly to rotate an angle, so that a front end of the extension arm enters the sunken space. Meanwhile, an elastic force of a pressure spring of the locking hook assembly drives the locking hook assembly to reversely rotate an angle, thus limiting the extension arm inside the sunken space and completing the locking operation.

**[0100]** As shown in FIG. 12, FIG. 13, and FIG. 15, preferably, the locking hook assembly is further provided with a driven arm for unlocking. The driven arm for unlocking can be driven by the unlocking assembly to cause the locking hook assembly to rotate an angle and release the second bolt.

**[0101]** Specifically, the driven arm for unlocking is arranged on one side of the locking hook assembly that faces away from the second bolt, making it convenient to arrange a corresponding unlocking mechanism on the side where the driven arm for unlocking is located, to unlock the driven arm for unlocking.

**[0102]** As shown in FIG. 12, FIG. 13, and FIG. 15, preferably, the unlocking assembly is provided with a third unlocking device. The third unlocking device is provided with a second plug, a third gear, a third rack, and a first transmission block. The second plug is mounted on the lock case. The third gear sleeves a linkage shaft of the second plug and is driven by the linkage shaft to rotate synchronously. One end of the third rack is in meshing connection with the third gear, and a sliding shaft is arranged at the other end of the third rack. The first transmission block is rotatably connected to the lock case, and a strip-shaped sliding chute is provided in a portion of the first transmission block that corresponds to the sliding shaft. The strip-shaped sliding chute sleeves the sliding shaft. The sliding shaft can slide along an inner wall of the strip-shaped sliding chute to drive the first transmission block to rotate an angle. A driving arm for unlocking is arranged at a position of the first transmission block that corresponds to the driven arm for unlocking. The rotating first transmission block drives the driving arm for unlocking to pry the driven arm for unlocking, so that the

driven arm for unlocking drives the locking hook assembly to rotate an angle, and the locking hook arm releases the clamping on the extension arm to recover the unlocked state of the second bolt.

**[0103]** Specifically, in order to enable the driving arm for unlocking to better drive the driven arm for unlocking to rotate an angle, preferably, a third slope is arranged on the driving arm for unlocking, and the third slope is used to drive the driven arm for unlocking.

**[0104]** In addition, the lock case is further provided with a limiting protrusion. The limiting protrusion is arranged on the other side of the driving arm for unlocking that faces the driven arm for unlocking, thus forming a reverse limiting effect on the driving arm for unlocking. When the locking hook assembly is in the locked state, the driven arm for unlocking drives the driving arm for unlocking to rotate reversely to impose a limitation on the driving arm for unlocking and prevent the driven arm for unlocking from being separated.

**[0105]** As shown in FIG. 14 and FIG. 15, preferably, the unlocking assembly is further provided with a fourth unlocking device. The fourth unlocking device is provided with a second motor, a fourth gear, and a fourth rack. The second motor is fixedly connected to the lock case. The fourth gear is fixedly connected to an output shaft of the second motor. One end of the fourth rack is in meshing connection with the fourth gear. A push block is arranged at the other end of the fourth rack. An unlocking convex block is arranged at a portion of the locking hook arm that corresponds to the push block; and the unlocking convex block abuts against the push block and can rotate an angle under the driving of the push block, thus driving the locking hook assembly to synchronously rotate an angle, so that the locking hook assembly releases the clamping on the extension arm to recover the unlocked state of the second bolt.

**[0106]** Specifically, the operation of the second motor drives the fourth gear to rotate synchronously, thus driving the fourth rack to synchronously move a distance, so that the push block synchronously pushes the unlocking convex block to produce a displacement, and the locking hook assembly is driven to rotate an angle around the second rotating pillar. The locking hook arm is synchronously rotated an angle and releases the clamped state of the extension arm, so that the second bolt outwards rotates an angle under the twisting force of the torsion spring, to release the locking on the shackle pillar and complete the corresponding unlocking operation on the shackle assembly.

**[0107]** In addition, in order to make the push block drive the unlocking convex block more smoothly, the locking hook assembly is synchronously rotated an angle. Preferably, a fourth slope is arranged at a portion of the unlocking convex block that corresponds to the push block, so that the push block uses the fourth slope to drive the locking hook arm to rotate an angle, to complete the unlocking operation. The fourth slope roughly extends in the radial direction of the locking hook assembly, thus better driving the locking hook assembly to rotate.

**[0108]** As shown in FIG. 11 to FIG. 13, preferably, the locking hook assembly is further provided with a clamping locking arm and a pressure spring. One end of the pressure spring abuts against the lock case, and the other end of the pressure spring abuts against the clamping locking arm. An elastic force of the pressure spring drives the locking hook assembly to maintain the limitation on the second bolt.

[0109] Specifically, the clamping locking arm is arranged on one side of the locking hook assembly that face the second bolt, which facilitates the arrangement of the pressure spring and the triggering switch. The pressure spring causes the locking hook assembly to rotate around the second rotating pillar, so that the locking hook assembly tends to be rotated in a state of locking the second bolt until the clamping locking arm abuts against the triggering switch, thus limiting the locking hook arm to the locked state.

[0110] As shown in FIG. 15 and FIG. 16, preferably, a triggering switch and a control module are further included. The triggering switch is mounted at a portion of the lock case corresponding to the clamping locking arm, and the triggering switch is electrically connected to the control module. When the locking hook assembly forms the locked state for the second bolt, the clamping locking arm can trigger the triggering switch, so that the triggering switch sends a corresponding electronic signal to the control module.

[0111] Specifically, the push type triggering switch is used to detect a locking state between the locking hook assembly and the second bolt, to determine whether a current state of the shackle assembly is locked or unlocked. The fourth unlocking device is provided with a corresponding user authentication module. The user authentication module uses one or more authentication modes such as password authentication, fingerprint authentication, and facial authentication in the existing technology to confirm an authorized user before performing an electric unlocking operation. The control module is electrically connected to the fourth unlocking device and the user authentication module and performs corresponding program control on them. Only an authenticated user can obtain an unlocking permission to correctly complete the unlocking operation.

[0112] Secondly, in order to improve the safety, the control module performs a corresponding setting operation on the user authentication module only when the shackle assembly is in the unlocked state, such as setting a preset password or entering a preset fingerprint. When the shackle assembly is in the locked state, that is, after the shackle pillar of the shackle assembly is locked by the second bolt, the control module cannot perform a setting operation on the user authentication module, and can only perform a corresponding authentication operation, to unlock the shackle assembly, thus preventing such a phenomenon of an error or no response in the control module of the locking mechanism cause by a fact that unauthorized personnel performs a setting operation on the shackle assembly unintentionally, accidentally, or without authorization when the shackle assembly is in the locked state.

[0113] The second embodiment optimizes and improves the firearm safety lock:

[0114] 1. By the arrangement of the locking groove and the shackle pillar that are independent of each other, the locking groove of the second bolt is configured to independently lock the shackle pillar, which not only improves the locking strength of the locking mechanism, but also improves the stability of the locking mechanism. The second bolt sleeves the first rotating pillar, and two sides of the locking groove are side edges with thicknesses provide a strong locking effect on the shackle pillar. The extension arm and the locking

hook arm form a stable locking structure, which further increases the difficulty of violent unlocking.

[0115] 2. By the arrangement of the hook-like convex block, the locking strength of the extension arm is improved, and the stability of locking on the shackle pillar is improved. The pressure spring is further arranged to drive the locking hook assembly, to maintain the optimal limiting effect on the second bolt, thus improving the locking strength and stability.

[0116] For those skilled in the art, it is apparent that the present disclosure is not limited to the details of the exemplary embodiments mentioned above, and can be implemented in other specific forms without departing from the spirit or basic features of the present disclosure. Therefore, in any perspective, the embodiments should be regarded as exemplary and non-restrictive. The scope of the present disclosure is limited by the accompanying claims rather than the above description. Therefore, all changes within the meaning and scope of the equivalent conditions of the claims within the present disclosure.

What is claimed is:

1. A firearm safety lock with an auxiliary shooting function, comprising a lock body of the safety lock, wherein the lock body is provided with a fixed support and a shackle assembly; the fixed support is detachably fixedly connected to the lock body and is configured to detachably fixedly connect the lock body to a standard guide rail of a firearm; and one end of the shackle assembly is mounted at the lock body through movable connection, and the other end of the shackle assembly blocks or covers a trigger of the firearm to lock the firearm.

2. The firearm safety lock with the auxiliary shooting function according to claim 1, wherein the lock body is further provided with a reinforcing hook; one end of the reinforcing hook is detachably fixedly connected to the lock body, and the other end of the reinforcing hook extends into a trigger ring of the firearm and abuts against an inner wall of the trigger ring to prevent the lock body from being separated from the firearm.

3. The firearm safety lock with the auxiliary shooting function according to claim 1, wherein a sliding rail assembly is arranged at one end of the lock body that is connected to the shackle assembly; and one end of the sliding rail assembly is fixedly connected to the fixed support, and the other end of the sliding rail assembly is fixedly connected to the shackle assembly, so that the shackle assembly is able to move a distance along the sliding rail assembly to lock or unlock the trigger of the firearm.

4. The firearm safety lock with the auxiliary shooting function according to claim 1, wherein a rotating shaft assembly is arranged at one end of the lock body that is connected to the shackle assembly; the rotating shaft assembly is fixedly connected to the lock body; and one end of the shackle assembly is rotatably connected to the rotating shaft assembly, and the other end of the shackle assembly is formed into a free end and is rotated an angle around the rotating shaft assembly, to form a locked state or an unlocked state for the trigger of the firearm.

5. The firearm safety lock with the auxiliary shooting function according to claim 1, wherein the lock body is further provided with a first bolt; the shackle assembly is provided with a shackle part at a position corresponding to the first bolt; and when the shackle assembly locks the

trigger, the shackle part cooperates with the first bolt to form a locked state for the shackle assembly.

6. The firearm safety lock with the auxiliary shooting function according to claim 4, wherein a clamping notch is provided in one end of the shackle assembly that is connected to the rotating shaft assembly, and the rotating shaft assembly is provided with a clamping pin at a position corresponding to the clamping notch; and the shackle assembly is rotated an angle around the rotating shaft assembly, so that the clamping pin is clamped into the clamping notch and locks the shackle assembly, causing the shackle assembly to form an auxiliary grip for firearm shooting.

7. The firearm safety lock with the auxiliary shooting function according to claim 6, wherein the lock body is further provided with a clamping assembly; the clamping assembly is mounted on the rotating shaft assembly; the clamping assembly is provided with a clamping cavity, a clamping spring, a release button, and a release spring; a clamping sliding chute is provided inside the clamping cavity; a clamping pin is slidably connected to the clamping sliding chute; one end of the clamping spring abuts against the clamping cavity, and the other end of the clamping spring abuts against the clamping pin, so that the clamping pin maintains an outwards protruding elastic state; one end of the release button protrudes out of the clamping cavity, and the other end of the release button is provided with an active inclined surface; a passive inclined surface is arranged at a portion of the clamping pin that corresponds to the active inclined surface; one end of the release spring abuts against the clamping cavity, and the other end of the release spring abuts against the release button, so that the release button maintains an outwards protruding elastic state.

8. The firearm safety lock with the auxiliary shooting function according to claim 1, wherein the lock body is further provided with a first unlocking device; the first unlocking device is provided with a first plug, a first gear a, a first gear b, a first rack a, and a first rack b; the first gear a is fixedly connected to a square rotating shaft of the first plug; the first gear b is rotatably connected to the lock body; one end of the first rack a is in meshing connection with the first gear a, and the other end of the first rack a is in meshing connection with the first gear b; and one end of the first rack b is in meshing connection with the first gear b, and the other end of the first rack b unlocks the shackle assembly.

9. The firearm safety lock with the auxiliary shooting function according to claim 1, wherein the lock body is further provided with a second unlocking device; the second unlocking device is provided with a first motor, a second gear, a second rack, and an electronic lock; the electronic lock is electrically connected to the first motor and is able to control the first motor to operate; the second gear is fixedly connected to an output shaft of the first motor; and one end of the second rack is in meshing connection with the second gear, and the other end of the second rack unlocks the shackle assembly.

10. The firearm safety lock with the auxiliary shooting function according to claim 9, wherein the lock body is further provided with a triggering switch and a control module; the triggering switch is electrically connected to the control module; the triggering switch is mounted on the lock body; and when the shackle assembly locks the trigger of the

firearm, the triggering switch is triggered to cause the control module to disable a setting function of the electronic lock.

11. The firearm safety lock with the auxiliary shooting function according to claim 1, further comprising a locking mechanism that is configured to lock the shackle assembly and comprises a lock case, a locking hook assembly, a second bolt, and an unlocking assembly;

the locking hook assembly is rotatably connected to the lock case; one end of the second bolt is rotatably connected to the lock case, and a locking groove is provided in the other end of the second bolt; the locking groove is configured to clamp a shackle pillar of the shackle assembly to lock the shackle assembly; an extension arm is arranged on one side edge of the locking groove; the extension arm cooperates with the locking hook assembly to form separable clamping, so that the locking hook assembly is able to limit the second bolt; and the unlocking assembly is mounted on the lock case and is able to drive the locking hook assembly to rotate an angle, to relieve the limitation on the second bolt, so that the second bolt synchronously releases the locking on the shackle assembly.

12. The firearm safety lock with the auxiliary shooting function according to claim 11, wherein the lock case is provided with a first rotating pillar and a torsion spring; the second bolt is rotatably connected to the first rotating pillar; the torsion spring sleeves the first rotating pillar; and one end of the torsion spring abuts against the lock case, and the other end of the torsion spring abuts against the extension arm.

13. The firearm safety lock with the auxiliary shooting function according to claim 11, wherein the lock case is further provided with a second rotating pillar; the locking hook assembly is rotatably connected to the second rotating pillar; the locking hook assembly is provided with a locking hook arm at a position corresponding to the extension arm; and the locking hook arm is able to be clamped with the extension arm.

14. The firearm safety lock with the auxiliary shooting function according to claim 13, wherein a hook-like convex block is arranged at a portion of the locking hook arm that is correspondingly clamped with the extension arm; and the hook-like convex block is able to clamp the extension arm to limit the extension arm at a preset position.

15. The firearm safety lock with the auxiliary shooting function according to claim 11, wherein the locking hook assembly is further provided with a driven arm for unlocking; and the driven arm for unlocking is driven by the unlocking assembly to cause the locking hook assembly to rotate an angle and release the second bolt.

16. The firearm safety lock with the auxiliary shooting function according to claim 15, wherein the unlocking assembly is provided with a third unlocking device; the third unlocking device is provided with a second plug, a third gear, a third rack, and a first transmission block; the second plug is mounted on the lock case; the third gear sleeves a linkage shaft of the second plug and is driven by the linkage shaft to rotate synchronously;

one end of the third rack is in meshing connection with the third gear, and a sliding shaft is arranged at the other end of the third rack; the first transmission block is rotatably connected to the lock case, and a strip-shaped sliding chute is provided in a portion of the first

transmission block that corresponds to the sliding shaft; the strip-shaped sliding chute sleeves the sliding shaft; the sliding shaft is able to slide along an inner wall of the strip-shaped sliding chute to drive the first transmission block to rotate an angle; a driving arm for unlocking is arranged at a position of the first transmission block that corresponds to the driven arm for unlocking, to pry the driven arm for unlocking.

**17.** The firearm safety lock with the auxiliary shooting function according to claim **13**, wherein the unlocking assembly is further provided with a fourth unlocking device; the fourth unlocking device is provided with a second motor, a fourth gear, and a fourth rack; the second motor is fixedly connected to the lock case; the fourth gear is fixedly connected to an output shaft of the second motor; one end of the fourth rack is in meshing connection with the fourth gear, and a push block is arranged at the other end of the fourth rack; an unlocking convex block is arranged at a portion of the locking hook arm that corresponds to the push block; and the unlocking convex block abuts against the push block.

**18.** The firearm safety lock with the auxiliary shooting function according to claim **11**, wherein the locking hook assembly is further provided with a clamping locking arm and a pressure spring; one end of the pressure spring abuts against the lock case, and the other end of the pressure spring abuts against the clamping locking arm; and an elastic force of the pressure spring drives the locking hook assembly to maintain the limitation on the second bolt.

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