PORTABLE DEVICE WITH ELECTRONIC KEY SYSTEM AND MECHANICAL KEY SYSTEM HAVING DOWNSIZED STRUCTURE

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Abstract

A portable device is constructed with an emergency key and a device body having a receiving part. The emergency key has a lock mechanism constructed with a holding member and a button urged by the holding member to be protruded from the emergency key. The device body has a first holding hole engaging with the button when the emergency key is received in the receiving part. When the button is pushed, the emergency key can be pulled out of the receiving part. The emergency key is inserted into the receiving part, so that the button engages with the hole. The emergency key has the lock mechanism, so that the electronic key system is downsized.
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BACKGROUND OF THE INVENTION

In an electronic key system having a security function, ID codes are identified between a mobile portable device carried by a user and an electronic device provided in a vehicle or the like by wireless communication in order to lock and unlock a door, for example. Especially in a vehicle, an electronic key system is in practical use for permitting an engine starting operation in accordance with an identification result of ID codes between a portable device and an electronic device of a key mechanism of a vehicle, so as to enhance anti-theft performance of a vehicle.

For example, as shown in FIG. 10, a vehicle has an entrance system having an electronic key system and a mechanical key system. The electronic key system locks and unlocks the mechanical key system in accordance with the identification result of ID codes between the portable device and the electronic device of the vehicle. The mechanical key system of the entrance system is locked and unlocked by a mechanical key plate of a portable device carried by a user.

According to JP-A-2002-322841, an emergency key (mechanical key plate) is received in a receiving part formed in a device body of the portable device, in consideration of a situation where battery power of the portable device is run out.

Furthermore, in the portable device used for the electronic key system, a lock mechanism is provided in the device body so that the emergency key is not easily pulled out of the receiving part of the device body.

Here, FIG. 9A is a front view showing an example of a portable device and FIG. 9B is a side view showing the portable device according to a related art. A device body 103 of the portable device 101 has a communication unit 400 for performing wireless communication with the electronic device of the vehicle. The device body 103 of the portable device 101 also has a lock mechanism. The lock mechanism includes a spring 107 and a sliding member 105 that is manually operated by a user. The spring 107 urges (biasses) the sliding member 105 in a predetermined direction. A protrusion 105a is formed in the sliding member 105 on the opposite side to the spring 107. The protrusion 105a engages with an engaging slot 111a of an emergency key 111 in a receiving part 109 of the device body 103, so as to restrict the emergency key 111 from being dropped out of the receiving part 109. In this structure, when the sliding member 105 is slid against urging force of the spring 107, i.e., when the sliding member 105 is slid in a left direction in FIG. 9A, engagement between the protrusion 105a of the sliding member 105 and the engaging slot 111a of the emergency key 111 is released. In this situation, the emergency key 111 can be pulled out of the receiving part 109 of the device body 103.

However, in the above structure of the portable device, the lock mechanism is provided in the device body for detachably holding the emergency key in the receiving part of the device body. Accordingly, downsizing of the portable device is difficult, because the device body includes the lock mechanism. Additionally, the interior space of the plate-shaped emergency key having a predetermined thickness and a predetermined length is not used, and the emergency key becomes a dead space in the above structure.

SUMMARY OF THE INVENTION

In view of the foregoing problems, it is an object of the present invention to produce a downsized portable device for a mechanical key system and an electronic key system.

According to the present invention, a portable device is used for an entrance system that is locked and unlocked by an electronic system or by a mechanical system. The portable device has a key, a device body and a lock mechanism. The key mechanically engages with the entrance system in order to lock and unlock the entrance system. The device body electrically instructs locking and unlocking the entrance system. The device body has a receiving part for receiving the key. The lock mechanism detachably holds the key in the receiving part. The key has at least a part of the lock mechanism.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and advantages of the present invention will become more apparent from the following detailed description made with reference to the accompanying drawings. In the drawings:

FIG. 1A is a perspective view showing a portable device in a normal condition where the portable device is carried by a user, and FIGS. 1B-1D are perspective views showing the portable device in a using condition where an emergency key received in the portable device is used, according to the first embodiment in the present invention;

FIG. 2A is a front view showing the emergency key, FIG. 2B is a right side view showing the emergency key, FIG. 2C is a rear view showing the emergency key, and FIG. 2D is a partial cross-sectional view showing the emergency key taken along the line IID-IID in FIG. 2A;

FIG. 3A is a front view showing an emergency key, FIG. 3B is a right side view showing the emergency key, FIG. 3C is a rear view showing the emergency key, and FIG. 3D is a partial cross-sectional view showing the emergency key taken along the line IID-IID in FIG. 3A, according to the second embodiment in the present invention;

FIG. 4A is a front view showing an emergency key, FIG. 4B is a right side view showing the emergency key, FIG. 4C is a rear view showing the emergency key, and FIG. 4D is a partial cross-sectional view showing the
emergency key taken along the line IVD-IVD in FIG. 4A, according to the third embodiment in the present invention;

[0016] FIG. 5A is a perspective view showing a portable device in a normal condition where the portable device is carried by a user, FIGS. 5B and 5C showing the portable device in a condition where an emergency key received in the portable device is used, and FIG. 5D is a perspective view showing the emergency key, according to the fourth embodiment in the present invention;

[0017] FIG. 6A is a perspective view showing a portable device in a normal condition where the portable device is carried by a user, FIGS. 6B and 6C showing the portable device in a condition where an emergency key received in the portable device is used, and FIG. 6D is a perspective view showing the emergency key, according to the fifth embodiment in the present invention;

[0018] FIG. 7 is a partially cross-sectional view showing a portable device and the emergency key, according to the sixth embodiment in the present invention;

[0019] FIG. 8A is a front view showing an emergency key, FIG. 8B is a right side view showing the emergency key, FIG. 8C is a rear view showing the emergency key, and FIG. 8D is a partial cross-sectional view showing the emergency key taken along the line VIII-ID-VIIIID in FIG. 8A, according to the seventh embodiment in the present invention;

[0020] FIG. 9A is a front view showing a portable device using an electronic key system, and FIG. 9B is a side view showing the portable device according to a related art; and

[0021] FIG. 10 is a schematic diagram showing a structure of an entrance system of a vehicle, which has a mechanical key system and an electronic key system, and a relationship between the entrance system and a mechanical key and a device body according to the related art.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0022] In the present invention, a portable device is used as a small sized mobile electronic key unit used for an immobilizer system. Besides, the portable system is used in an entrance system (FIG. 10) of the vehicle which has a mechanical key system and an electronic key system. The mechanical key system of the entrance system is locked and unlocked when a mechanical emergency key engages with the mechanical key system for opening a door of the vehicle, for example. The electronic key system electrically instructs locking and unlocking the mechanical key system of the entrance system in accordance with an identification result of ID codes between a device body of the portable device and an electronic device, such as a wireless communication circuit of a vehicle using the wireless communication method. That is, the portable device identifies between an ID code of the small sized electronic key unit (portable device) carried by a user and an ID code of the vehicle electronic device using the wireless communication, in order to lock and unlock a vehicle door, to permit an engine start or the like in accordance with the identification result of the ID codes.

[0023] [First Embodiment]

[0024] A portable device 1 has a device body 3 formed in a substantially parallelepiped shape with a resinous material. The device body 3 receives a communication unit 300 constructed with an antenna, an ID communication processing section, a battery, a transponder, and the like. The antenna is used for performing wireless communication in order to identify ID codes between the portable device 1 and a communicating circuit provided in a vehicle electronic device. The ID communication processing part is constructed with a transmitting/receiving circuit, a microcomputer and the like. The battery energizes the ID communication processing section. The transponder identifies the ID codes between the transponder and a transponder-transmitting/receiving circuit provided in the vehicle electronic device using an electromagnetic wireless communication, when the battery power is run out.

[0025] The device body 3 has a receiving part 7 for receiving an emergency key 5 which mechanically engages with the entrance system in order to lock and unlock the entrance system, and is mainly used when the battery power is run out. In a normal condition, the emergency key 5 is inserted into the receiving part 7 to be received in the receiving part 7. The receiving part 7 is formed inside a side face 3a of the device body 3, and is located along with the side face 3a. Specifically, the emergency key 5 is inserted into a key cylinder provided in a vehicle door in order to lock and unlock the vehicle door, mainly when the battery of the portable device 1 is run out. In an electronic key system of the entrance system, the emergency key 5 is inserted into another key cylinder provided in a passenger compartment of the vehicle for example, in order to switch an operating mode of the vehicle electronic device to an electromagnetic communication mode. In the electromagnetic communication mode, the ID codes are identified between the transponder of the portable device 1 and the transponder-transmitting/receiving circuit of the vehicle electronic device.

[0026] The emergency key 5 has a button 9 in the vicinity of the back end (upper end in FIG. 2A) of the emergency key 5 in which a recession 200 such as an elongated key groove, cuts and the like is not formed. That is, the button 5 is located in the substantially longitudinally opposite side with respect to a direction in which the emergency key is inserted into the key cylinder of the vehicle or the like. The button 9 is pushed in a direction from the outside of the emergency key 5 toward the inside of the emergency key 5 in the thickness direction of the emergency key 5. In this situation, the button 5 is displaced from a reference position in which the button 5 is protruded from a front face (side face in the left side in FIG. 2D) of the emergency key 5 toward a position in which the button 5 is not protruded from the front face of the emergency key 5. When the pushing is stopped, i.e., when pushing force working on the button 9 is released, the position of the button 5 is returned to the reference position.

[0027] The emergency key 5 has a ring 11 on its back end. The ring 11 can be used when the emergency key 5 is hooked on a key holder or the like, while the emergency key 5 is reserved or carried when the emergency key 5 is pulled out of the receiving part 7 of the portable device 1.

[0028] The side face 3a of the device body 3 forms a sidewall of the receiving part 7. The side face 3a has a hole
(first holding hole) 13, with which the button 9 of the emergency key 5 engages, when the emergency key 5 is received in the receiving part 7.

[0029] As shown in FIG. 2D, the emergency key 5 is constructed with a key body 15, the ring 11 and a bracket 17. The key body 15 is a main body part of the emergency key 5, and is formed in an elongated plate shape, for example. The bracket 17 supports the button 9 located in the vicinity of the back end of the key body 15, and holds the ring 11 located in the back end of the key body 15.

[0030] The key body 15 has a key part K (FIG. 2A) in which the recession 200 is formed to mechanically engage with a key mechanism of the entrance system which is provided in the key cylinder behind the key hole of the vehicle, for example. The key part K is a part of the key body 15 from the fore-end (lower end in FIG. 2) of the key body 15 to a part between the fore-end and the back end of the key body 15.

[0031] The key body 15 has a slot 15a (FIG. 2D) in the front face of the key body 15, in which the button 9 is provided, in the vicinity of the back end of the key body 15. The key body 15 has a fitting hole 15b on the opposite side (rear face) with respect to the front face of the key body 15 for holding the bracket 17. The key body 15 is preferably made of resin (e.g., PA66).

[0032] The bracket 17 is made of a blade spring, and is formed in a substantially U-shape in its cross-section so as to pinch the front face and the rear face of the key body 15 in the vicinity of the back end of the key body 15. The bracket 17 is attached to the back end of the key body 15 so as to pinch the front face and the rear face of the key body 15 while hooking the ring 11 on its U-shaped top section, so that the bracket 17 is connected with the back end of the key body 15.

[0033] The bracket 17 has a protrusion 17b formed in a part at which the bracket 17 contacts the rear face of the key body 15. When the bracket 17 is attached to the back end of the key body 15, the protrusion 17b engages with the fitting hole 15b of the key body 15. The blade spring part 17a fits to the slot 15a of the key body 15. An L-shaped part 17c, which is a bottom part of the blade spring part 17a, hooks on an arm 15c of the slot 15a, so that the bracket 17 is fixed to the key body 15.

[0034] The button 9 is provided on the outer peripheral surface of the blade spring part 17a engaging with the slot 15a of the key body 15. The button 9 can be integrally formed with the bracket 17. Alternatively, the button 9 can be formed separately from the bracket 17, and can be put on the bracket 17.

[0035] When the pushing force is not applied to the button 9, the button 9 is urged (biased) by the bracket 17 (specifically, the blade spring 17a), so as to be located at the reference position (FIGS. 2B and 2D). In the reference position, at least the outer face (surface on the left side in FIGS. 2B and 2D) of the button 9 is outwardly protruded from the front face of the key body 15.

[0036] When the button 9 is pushed from the outside of the key body 15 (left side in FIG. 2D) into the inside of the key body 15 (right side in FIG. 2D), the blade spring part 17a of the bracket 17 is resiliently bent. In this situation, the outer face of the button 9 is displaced to the same level as the level of the front face of the key body 15, or is more deeply displaced into the key body 15 exceeding the level of the front face of the key body 15. In this situation, the blade spring part 17a of the bracket 17 is used as a holding member which resiliently holds the button 9 in a direction in which the button 9 returns to the reference position.

[0037] Referring back to FIG. 1A, when the emergency key 5 is received in the receiving part 7 of the device body 3, the button 9 of the emergency key 5 engages with a first holding hole 13 of the device body 3. Therefore, the emergency key 5 can be restricted from dropping out of the receiving part 7 of the device body 3.

[0038] When the button 9 engaging with the first holding hole 13 is pushed from the outside of the device body 3 in the direction shown by Y1, an engaging condition, i.e., locking condition between the button 9 and the first holding hole 13 can be released. Subsequently, the back end of the emergency key 5 (ring 11) is pulled in the direction shown by Y2 in FIG. 1B while the button 9 of the emergency key 5 is pushed from the outside of the device body 3, so that the emergency key 5 can be pulled out of the receiving part 7 of the device body 3.

[0039] When battery power is run out for example, the emergency key 5 is pulled out of the receiving part 7 of the device body 3, and is used for the mechanical key system. Alternatively, the emergency key 5 can be removed from the device body 3 when a user orders another person to move the vehicle in a hotel, for example. In this case, the emergency key 5 can be pulled out of the device body 3, so as not to be illegally duplicated.

[0040] When the emergency key 5 is used for the mechanical key system, the emergency key 5 is pulled out of the receiving part 7 of the device body 3 in the same manner as described above. Subsequently, the emergency key 5 is inserted into a first opening 7a of the receiving part 7 of the device body 3 from the back end (ring 11) side of the emergency key 5 in a direction shown by Y3 in FIG. 1C by a predetermined length. Thus, as shown in FIG. 1D, the portable device 1 becomes in a using condition in which the button 9 engages with the first holding hole 13, and the key part K of the key body 15 protrudes from the device body 3. In this situation, the device body 3 becomes a grip for twisting the emergency key 5.

[0041] When the using condition of the emergency key 5 shown in FIG. 1D is changed to the normal condition shown in FIG. 1A, the emergency key 5 and the device body 3 are operated in an opposite order to the above operation process. That is, in the using condition in FIG. 1D, the fore-end of the emergency key 5 is drawn from the first opening 7a while the button 9 of the emergency key 5 is pushed from the outside of the device body 3, so that the emergency key 5 can be pulled out of the device body 3. The emergency key 5, which is pulled out of the receiving part 7 of the device body 3, is inserted into the first opening 7a of the receiving part 7 from the rear-end side of the emergency key 5. Thus, as shown in FIG. 1A, the emergency key 5 is received in the receiving part 7 of the device body 3, and the button 9 engages with the first holding hole 13 of the device body 3.

[0042] In the first embodiment, the bracket 17 (holding member) and the button 9 (button part) are provided on the emergency key 5 for constructing a lock mechanism.
In the above structure of the portable device 1, the lock mechanism is provided in the emergency key 5, so that the emergency key 5 is detachably received in the receiving part 7 of the device body 3. Therefore, only the first holding hole 13 needs to be formed in the device body 3 for constructing the detachable structure between the emergency key 5 and the device body 3. Besides, a manually slidable member (FIG. 9A) or the like needs not to be provided in the device body 3. Therefore, the device body 3 (i.e., the portable device 1) can be downsized. Here, an engaging condition and a non-engaging condition between the button 9 of the emergency key 5 and the first holding hole 13 of the device body 3 can be manually switched using the lock mechanism in the above structure of the portable device 1.

Conventionally, the width of the emergency key needs to be enlarged, or a large grip part (FIG. 9A) is additionally needed at the back end of the emergency key to improve operability for twisting the emergency key when the mechanical key system is locked and unlocked.

By contrast, in the above structure of the portable device 1, the emergency key 5 is oppositely inserted from the back end side of the emergency key 5 into the receiving part 7 of the device body 3 when the emergency key 5 is used, so that the device body 3 can be used as a grip for twisting the emergency key 5. Therefore, even when the width of the emergency key 5 (key body 15) is small, the back end of the emergency key 5 is not enlarged, or a large grip is not additionally provided, operability for twisting the emergency key 5 can be preferably maintained. As a result, the portable device 1 can be further downsized.

Furthermore, when the emergency key 5 is used, the button 9 of the emergency key 5 engages with the first holding hole 13 of the device body 3 so as to be in the locking condition. Therefore, the emergency key 5 is steadily fixed to the device body 3 which is used as a grip body, so that operability for twisting the emergency key 5 is further improved.

The key body 15 of the emergency key 5 can be made of a metallic material. However, when the key body 15 is made of a resinous material, the weight of the key body 15 can be reduced, and the key body 15 does not affect a communicating operation of a wireless communication circuit provided in the device body 3.

In the second embodiment, only the emergency key 5 is different from the portable device 1 in the first embodiment. As shown in FIGS. 3A to 3D, the button 9 (button part), a spring part 19 (holding member) supporting the button 9, and the ring 11 are integrally formed with the resinous key body 15 of the emergency key 5. The button 9 and a spring part 19 construct the lock mechanism, so as to detachably hold the emergency key 5 received in the receiving part 7 of the device body 5.

In the emergency key 5 of the second embodiment, a space 21 is formed in a part located in the vicinity of the back end of the key body 15. The space 21 penetrates the key body 15 from its front face to its rear face. The space 21 is equivalent to the slot 15a in the first embodiment.

The spring part 19 is integrally formed with the key body 15 and the button 9, so as to support the button 9 in the space 21 of the key body 15. The ring 11 is integrally formed with the back end of the key body 15.

In the emergency key 5 of the second embodiment, when the pushing force is not applied to the button 9, the button 9 is urged by the spring part 19, so as to be located at the reference position (FIGS. 3B and 3D). At the reference position, at least the outer face (surface on the left side in FIGS. 3B and 3D) of the button 9 is outwardly protruded from the front face of the key body 15.

When the button 9 is pushed from the outside of the key body 15 (left side in FIG. 3D) into the inside of the key body 15 (right side in FIG. 3D), the spring part 19 is resiliently bent. In this situation, the outer face of the button 9 is displaced to the same level as the level of the front face of the key body 15, or is more deeply displaced into the key body 15 exceeding the level of the front face of the key body 15. In this case, the spring part 19 is used as a holding member which resiliently holds the button 9 in a direction in which the button 9 returns to the reference position.

The structure of the second embodiment can produce the same function as that of the first embodiment, even though the construction of the lock mechanism differs from that of the first embodiment.

In the third embodiment, only the emergency key 5 is different from the portable device 1 in the first embodiment. As shown in FIGS. 4A to 4D, the button 9 (button part) and a spring part 23 (holding member) supporting the button 9 are formed separately from the key body 15. The button 9 and the spring part 23 construct the lock mechanism, which is made of resin, so as to detachably hold the emergency key 5 in the receiving part 7 of the device body 3.

In the emergency key 5 of the third embodiment, a space 25 is formed in a part in the vicinity of the back end of the key body 15. The space 25 is equivalent to the slot 15a in the first embodiment. The space 25 penetrates the key body 15 from its front face to its rear face, so as to form a front opening 25a in the front face and a rear opening 25b in the rear face of the key body 15. The rear opening 25b is larger than the front opening 25a in the key body 15. The front opening 25a is formed in a substantially circular shape or the like, so that the button 9 located in the front opening 25a can partially protrude from the front opening 25a.

The key body 15 has a fixing hole 27 on the fore-end side (lower side in FIG. 4) of the key body 15 with respect to the front opening 25a. The fixing hole 27 penetrates the key body 15 from the front face to the rear opening 25b of the key body 15.

The spring part 23 has the button 9 in its one longitudinal end portion, and has a fitting protrusion 23a in the other longitudinal end portion longitudinally opposite to the button 9. The fitting protrusion 23a is snap-fitted to the fixing hole 27 of the key body 15, so as to be engaged with the fixing hole 27.

The spring part 23 is put into the space 25 of the key body 15 from the side of the rear opening 25b, so as to be fixed to the key body 15. In this situation, the button 9 is supported by the spring part 23 so as to be protruded from the front opening 25a.
In the emergency key 5 of the third embodiment, when the pushing force is not applied to the button 9, the button 9 is urged by the spring part 23, so as to be located at the reference position (FIGS. 4B and 4D). At the reference position, at least the outer face (left side in FIGS. 4B and 4D) of the button 9 is outwardly protruded from the front face of the key body 15.

When the button 9 is pushed from the outside of the key body 15 (right side in FIG. 4D) into the inside of the key body 15, the spring part 23 is resiliently bent. In this situation, the outer face of the button 9 is displaced to the same level as the level of the front face of the key body 15, or is more deeply displaced into the key body 15 exceeding the level of the front face of the key body 15. In this case, the spring part 23 is used as a holding member which resiliently supports the button 9 in a direction in which the button 9 returns to the reference position.

The structure of the third embodiment can produce the same function as that of the first embodiment, even though the construction of the lock mechanism differs from that of the first embodiment.

In the third embodiment, the key body 15 of the emergency key 5 can be made of a metallic material. However, it is more advantageous when the key body 15 is made of a resinous material. In this case, the spring part 23 is preferably made of a highly resilient (highly elastic) resinous material compared with a resinous material constructing the key body 15. The key body 15 needs strength so as to be durable in repeated use for dozens of times, however the spring part 23 needs high resilience (high elasticity) so as to be durable for repeated bending.

[Fourth Embodiment]

A portable device 31 in the fourth embodiment has two following structures different from those of the portable device 1 in the first embodiment.

First, as shown in FIGS. 5A to 5C, the emergency key 5 is received in the receiving part 7 of the device body 3. The device body 3 has a side face 7c in the opposite side to the side face 3b having the first opening 7a of the receiving part 7. The side face 7c has a second opening 7b connected with the first opening 7a through the receiving part 7. That is, the second opening 7b is opposite as the first opening 7a with respect to the receiving part 7, and the emergency key 5 can pass through the receiving part 7 of the device body 3 in the longitudinal direction of the device body 3.

Second, the side face 3u of the device body 3 has a second holding hole 33 in addition to the first holding hole 13. That is, the first holding hole 13 and the second holding hole 33 are located in the same plane. The second holding hole 33 and the first holding hole 13 are substantially symmetrically located with respect to the substantially longitudinal center of the side face 3u. The second holding hole 33 has a substantially same shape and a substantially same dimension as those of the first holding hole 13.

In the portable device 31 of the fourth embodiment, the emergency key 5 can be used in the following operating process in addition to the same operating process as that of the portable device 1 in the first embodiment.

As shown in FIG. 5A, the emergency key 5 is received in the receiving part 7 of the device body 3, and the button 9 of the emergency key 5 engages with the first holding hole 13 of the device body 3. In this situation, the lock mechanism between the emergency key 5 and the device body 3 is locked. When the button 9 of the emergency key 5 is pushed from the outside of the device body 3, the lock mechanism between the emergency key 5 and the device body 3 is unlocked. As shown by Y4 in FIG. 5A, the back end of the emergency key 5 (i.e., ring 11) is pushed toward the device body 3 in the direction where the front-end of the emergency key 5 protrudes from the second opening 7b of the receiving part 7, while the button 9 of the emergency key 5 is pushed. Thus, as shown in FIG. 5B, the emergency key 5 is slid to the second opening 7b in the receiving part 7, so that the front-end of the emergency key 5 protrudes from the second opening 7b of the receiving part 7. Subsequently, the front-end of the emergency key 5 protruding from the second opening 7b of the receiving part 7 is drawn in the direction shown by Y5 in FIG. 5B. Subsequently, as shown in FIG. 5C, the button 9 of the emergency key 5 engages with the second holding hole 33 of the device body 3, while the key part K of the emergency key 5 is protruded from the second opening 7b of the receiving part 7. In this situation, the key part K of the emergency key 5 is protruded from the opposite side compared with the portable device 1 in the first embodiment shown in FIG. 1D.

In the portable device 31 of the fourth embodiment, the emergency key 5 can be used depending on a user preference. Therefore, a commercial value and luxuriousness of the portable device 31 can be enhanced.

Next, the emergency key 5 is returned from the using condition shown in FIG. 5C to the normal condition shown in FIG. 5A in the following manner. The front-end of the emergency key 5 in FIG. 5C is pushed toward the device body 3 in an opposite direction with respect to Y5 in FIG. 5B, while the button 9 engaged with the second holding hole 33 is pushed from the outside of the device body 3 so as to unlock the lock mechanism. The emergency key 5 is slid toward the first opening 7a in the receiving part 7 until the button 9 engages with the first holding hole 13 of the device body 3. Alternatively, in the condition shown in FIG. 5C, the front-end of the emergency key 5 is pulled out of the device body 3 in the direction Y5 in FIG. 5B, while the button 9 of the emergency key 5 is pushed from the outside of the device body 3. The emergency key 5 pulled out of the device body 3 is inserted into the first opening 7a of the receiving part 7 from the side of the front-end of the emergency key 5, so that the button 9 engages with the first holding hole 13 of the device body 3 as shown in FIG. 5A. Alternatively, the emergency key 5 pulled out of the device body 3 can be inserted into the second opening 7b of the receiving part 7 from the side of the front-end of the emergency key 5, so that the emergency key 5 is received in the receiving part 7 and the button 9 engages with the second holding hole 33.

The emergency key 5 described in the second embodiment and the third embodiment shown in FIGS. 3 and 4 can be used in the structure of the portable device 31 in the fourth embodiment.
A portable device 31 of the fifth embodiment has two following structures different from those of the portable device 31 in the fourth embodiment.

First, as shown in FIGS. 6A to 6C, the side face 3a of the device body 3 has a linear slit 37 connecting between the first holding hole 13 and the second holding hole 33.

Second, an emergency key 5 received in the device body 35 has a protrusion 9a on the outer face of the button 9 in addition to the emergency key 5 in the first embodiment. Specifically, the width of the protrusion 9a is slightly smaller than the gap of the slit 37. When the emergency key 5 is slid in the receiving part 7 of the device body 3, and when the protrusion 9a is in a position between the first holding hole 13 and the second holding hole 33, the protrusion 9a outwardly slidably protrudes from the slit 37. The height of the protrusion 9a is slightly larger than the depth of the slit 37, i.e., the height of the protrusion 9a is slightly larger than the thickness of a sidewall on the side of the side face 3a of the device body 3.

In the structure of the device body 35 in the fifth embodiment, the user can easily operate the emergency key 5 to slide in the receiving part 7 so as to protrude the key part K of the emergency key 5 from the second opening 7b of the device body 3. When the emergency key 5 is received in the receiving part 7 of the device body 3 as shown in FIG. 6A, the protrusion 9a of the button 9 engaging with the first holding hole 13 is pushed from the outside of the device body 3 so as to unlock the lock mechanism. The user hooks a finger on the protrusion 9a so as to slide the protrusion 9a toward the second holding hole 33 in the direction shown by Y6 in FIG. 6B along with the slit 37, so that the emergency key 5 can be slid in the receiving part 7. Thus, as shown in FIG. 6C, the key part K of the emergency key 5 can be protruded from the device body 3.

When the emergency key 5 is returned from the using condition shown in FIG. 6C to the normal condition shown in FIG. 6A, the protrusion 9a of the button 9 engaging with the second holding hole 33 is pushed from the outside of the device body 3 so as to unlock the lock mechanism. Subsequently, the user hooks the finger on the protrusion 9a so as to slide the protrusion 9a toward the first holding hole 13 along with the slit 37, so that the emergency key 5 can be slid in the receiving part 7 to the first opening 7a. Therefore, the key part K of the emergency key 5 can be easily operated so as to be received in the device body 3.

The protrusion 9a can be provided on the button 9 of the emergency key 5 described in the second embodiment and the third embodiment shown in FIGS. 3 and 4 so as to be used as the emergency key 5 in the structure of the portable device 35 in the fifth embodiment.

As shown in FIG. 7, a portable device 41 of the sixth embodiment has two following structures different from those of the portable device 31 in the first embodiment.

First, the device body 3 has a biasing member (urging member) 43 constructed with a spring member or a rubber member in the end of the receiving part 7 located on the opposite side with respect to the first opening 7a in the device body 3. When the emergency key 5 is inserted into the receiving part 7 and the button 9 engages with the first holding hole 13, the biasing member 43 contacts the fore-end of the emergency key 5, so as to urge the emergency key 5 in the direction where the emergency key 5 is displaced from the receiving part 7.

In the portable device 41 of the sixth embodiment, when the emergency key 5 is received in the receiving part 7 and the button 9 of the emergency key 5 engaging with the first holding hole 13 is pushed from the outside of the device body 3, the lock mechanism is unlocked. In this situation, the back end of the emergency key 5 automatically pops out of the first opening 7a of the receiving part 7 by urging pressure of the biasing member 43. Therefore, when the emergency key 5 is used to lock and unlock the mechanical key system, for example, the emergency key 5 can be easily pulled out of the receiving part 7 of the device body 3.

The emergency key 5 described in the second embodiment and the third embodiment shown in FIGS. 3 and 4 can be used in the structure of the portable device 41 in the sixth embodiment.

As shown in FIGS. 8A to 8D, an emergency key 51 has pits 200 recessed from the surface of the in the key part k of the emergency key 5". The pits (recession) 200 are formed to mechanically engage with the mechanical key system of the entrance system which is provided in the key cylinder behind the key hole of the vehicle or the like. The structure of the holding member 9, 19, 23 of the emergency key 5 described in the second embodiment and the third embodiment shown in FIGS. 3 and 4 can be used in the emergency key 5" of the seventh embodiment.

The structure of the portable device in the present invention can be applied to various structures of portable devices or the like. For example, the button 9 of the emergency key 5, 5', 5" can be supported by another member or in another structure different from those of the above embodiments as long as force returning the button 9 to the initial position (reference position) works when the button 9 is pushed. For example, the emergency key includes a substantially cylindrical holding space for movably supporting the button 9, so that the button 9 can protrude from the side face of the emergency key 5, 5', 5" and can be received in the emergency key 5, 5', 5". A spring is further provided in the holding space to urge the button 9 in the direction where the button protrudes from the side face of the emergency key 5, 5', 5". In this case, the holding space and the spring are used as the holding member.

The shape of the portable device is not limited to the substantially parallelepiped, and can be in various other shapes.

The emergency key 5, 5', 5" can be laterally received in the device body 3. The physical relationship between the emergency key 5, 5', 5" and the device body 3 is not limited to those of the above embodiments, and any structures of the emergency key 5, 5', 5" and the device body 3 can be used as long as the emergency key 5, 5', 5" has at least a part of the lock mechanism.

The shape of the emergency key is not limited to a plate shape, and can be various other shapes, such as a
cylindrical shape. Various key systems, such as a magnetic lock key can be applied to the emergency key 5, 5, 5*.

[0092] The recession 200, 200* is not necessary formed in the emergency key 5, 5*, 5* when the emergency key is used in the magnetic lock key or the like.

[0093] The location of the communication unit 300 is not limited to the location shown in the above embodiments. The communication unit 300 can be located at any part of the device body 3.

[0094] The entrance system is not limited for locking and unlocking the vehicle door. The entrance system can be also used for permitting engine start or the like.

[0095] The present invention is not limited to the vehicle electronic key system, and can be similarly used in any kinds of electronic key systems of a house or the like.

[0096] Various modifications and alternations may be made to the above embodiments without departing from the spirit of the present invention.

What is claimed is:
1. A portable device for an entrance system which is locked and unlocked electronically or mechanically, the portable device comprising:
   a key for mechanically engaging with the entrance system in order to lock and unlock the entrance system;
   a device body for electrically instructing locking and unlocking the entrance system and having a receiving part for receiving the key therein; and
   a lock mechanism that detachably holds the key in the receiving part,
   wherein the key has at least a part of the lock mechanism.
2. A portable device according to claim 1, wherein:
   the key has an elongated key part on one longitudinal end side of the key for mechanically engaging with the entrance system;
   the receiving part of the device body detachably receives at least one of the longitudinally end side of the key, on which the key part is located, and the other longitudinally end side of the key which is longitudinally opposite to the key part; and
   when the key is received in the receiving part from the longitudinally end side opposite to the key part by a predetermined length, the key part protrudes from the device body.
3. A portable device according to claim 1, wherein:
   the key has an elongated key part on one longitudinal end side of the key for mechanically engaging with the entrance system;
   the lock mechanism includes:
   a button part that is provided longitudinally separate from the key part to outwardly protrude from a side face of the key, wherein the button part is displaced from a reference position in which the button part is at least partially outwardly protruded from the side face of the key to a position in which the button part is not outwardly protruded from the side face of the key, when the button part is pushed from an outside of the key to an inside of the key; and
   a holding member that supports the button part, wherein the holding member resiliently biases the button part to be in the reference position when the button part is pushed from the outside of the key to the inside of the key; and
   the device body defines a first holding hole that engages with the button part of the key when the key is at least partially received in the receiving part of the device body.
4. A portable device according to claim 3, wherein:
   the receiving part of the device body detachably receives at least one of the longitudinally end side of the key, on which the key part is located, and the other longitudinally end side of the key which is longitudinally opposite to the key part; and
   when the key is received in the receiving part from the longitudinally end side opposite to the key part by a predetermined length, the button part of the key engages with the first holding hole of the device body, and the key part protrudes from the device body.
5. A portable device according to claim 4, wherein:
   the device body defines:
   a first opening that is connected to the receiving part;
   a second opening, which is connected to the receiving part, on an opposite side as the first opening with respect to the receiving part; and
   a second holding hole that is located in the same plane as a plane defining the first holding hole,
   wherein the second holding hole engages with the button part of the key when the key, which is inserted from the first opening into the receiving part of the device body, is in a position in which the key part of the key at least partially protrudes from the second opening of the device body.
6. A portable device according to claim 5, wherein:
   the device body defines a slit that connects the first holding hole and the second holding hole; and
   the button part of the key has a protrusion which slidably protrudes from the slit of the device body when the protrusion is in a position between the first holding hole and the second holding hole.
7. A portable device according to claim 3, wherein the device body has a biasing member in the receiving part for biasing the key in a direction in which the key is displaced from the receiving part when the key is received in the receiving part and the button part engages with the first holding hole.
8. A portable device according to claim 1, wherein at least a key body of the key is made of a resinous material.
9. A portable device according to claim 2, wherein the key part defines a recession shaped in an elongated groove to be engaged with the entrance system.
10. A portable device according to claim 2, wherein the key part defines a recession shaped in a pit to be engaged with the entrance system.