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(54) KEY PROVIDED WITH BUILT-IN TRANSMITTER ELEMENT AND KEY BODY

(57) A transmitting element 18 is embedded into a resin container 16 by insert-molding. After the resin container 16 has been attached to a base portion 12B of a key body 12, an outer soft resin skin 34 is integrally formed onto the resin container 16 and the base portion 12B, so that a key knob 14 is formed. The transmitting element 18 is reliably fixed into the base portion 12B via the resin container 16, so that the transmitting element 18 can be protected from external force applied to the key knob 14.

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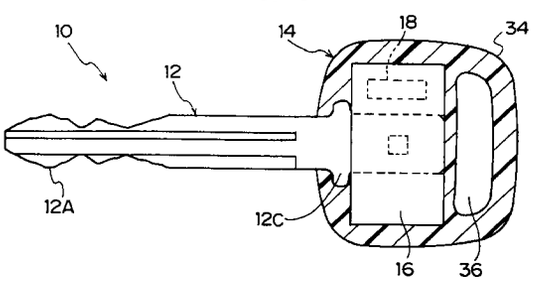

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Description

BACKGROUND OF THE INVENTION

FIELD OF THE INVENTION

The present invention relates to a key provided with a built-in transmitting element in which a transmitting element is embedded at the interior of the key, and to the key body thereof.

DESCRIPTION OF THE RELATED ART

Conventionally, in order to unlock a lock with a key, a plurality of pins provided at the internal cylinder of the lock are driven by mechanical projections and recesses or a magnetic force by an embedded magnet provided at the insertion portion of the key body so that pins bridging over the boundary surface of the internal cylinder and the fixed external cylinder are moved, and the internal cylinder is rotated within the external cylinder.

However, when such a combination of a mechanical key and a lock is used, the lock can be unlocked, if a reproduced key has the same shape as that of an original key. In addition, it is difficult to make defensive structures against destructive activities with such combination. In particular, in case of keys for vehicles, since an engine starter can be operated by directly connecting electric wires without using the key, it is difficult to achieve complete key functions by use of a conventional combination of a key and a lock.

To solve this problem, in addition to the insertion portion of a key having mechanical projections and recesses or magnetic force generating portion, a key with a built-in transmitting element for transmitting a specified ID code has been proposed. According to an embodiment of such key, only when a receiving element installed in a vehicle receives the specified ID code, the engine of the vehicle can be started or continuously operated so that the movement of the vehicle due to a direct connection of electric wires or a mechanical destruction can be prevented. For such conditions, since the transmitting element is required to be small and metal portions are not disposed on the outer periphery of the transmitting element, the transmitting element is not generally disposed at the insertion portion of the key body, but at a grip portion (i.e. key knob) formed by non-metal member such as resin which does not interfere in transmitting functions.

In such a key with a built-in transmitting element, the grip portion of the key is constituted by resin cases which are divided into two portions, so that the resin cases clamp the transmitting element and the base portion of the key body by screwing with bolts.

Further, when a battery is exhausted, since the transmitting element cannot transmit the ID code and the vehicle engine cannot be started, a key with a built-in transmitting element which needs no battery has been adopted in recent years.

However, since the grip portion is formed by non-metal member such as resin or the like, there has been a drawback that when the key body is rotated, external force is applied to the transmitting element, so that the transmitting element is damaged.

Moreover, in an assembling structure in which two resin cases are fastened by screws, as the key is used for a long period of time, the screws are loosened and the resin cases are opened, so that the embedded components such as a transmitting element and a battery or the like may be released from the resin cases and thereby dropped from the resin cases. In such a case, there has been a drawback in that since the ID code is not transmitted, the vehicle engine cannot start. Further, there is a possibility that when the screws are loosened, a gap is formed between the resin cases, dust and/or water penetrate thereinto and affect the transmitting element which has been embedded in the resin cases.

Also in the assembling structure in which the resin cases are fastened by screws, a work for screwing is trouble some and the key assembling is time-consuming. Because a certain degree of hardness is required for the resin cases to be securely screwed together, a slightly resilient material whose touch feel is comfortable cannot be used as a grip portion of a key.

SUMMARY OF THE INVENTION

In view of the above-described facts, it is an object of the present invention to provide a key with a built-in transmitting element which is resistant against external force such as torsion, and which has a structure in which the transmitting element is reliably embedded in the key. Further, it is another object of the present invention to provide a key with a built-in transmitting element and a key body in which any screwing work is not required for manufacturing or assembling the key, the transmitting element does not fall off from a grip portion of the key, and dust and/or water do not penetrate into the grip portion.

An aspect of the present invention is a key with a built-in transmitting element in which a transmitting element is assembled in a key body having an insertion portion comprising a holding member in which the transmitting element is integrally held by insert-molding, a mounting member for mounting the holding member to the key body, and an outer soft skin formed onto the holding member and the key body. According to the key with a built-in transmitting element of the present invention, the transmitting element is integrally held in the holding member by insert-molding, and the holding member is mounted to the key body by the mounting member. The outer soft skin is formed onto the holding member and the key body. In this way, the holding member and the key body are covered with the outer soft skin, so that the transmitting element is reliably fixed into the key body. Further, the transmitting element is sealed by the outer soft skin and is thereby protected from external force acting thereon.

Further, an aspect of the present invention is a key with a built-in transmitting element in which a transmitting element is embedded in a key body having an insertion portion comprising a holding member in which the transmitting element is integrally held by insert-molding, a mounting member which engages the holding member with a base portion of the key body to hold the transmitting element in the key body, and an outer soft skin formed onto the holding member and the key body. Accordingly, since the holding member in which the transmitting element is integrally held by insert-molding is engaged with the base portion of the key body by the mounting member, the outer soft skin is formed onto the holding member (which is reliably engaged with the key body) and the key body by resin molding, so that the transmitting element is reliably fixed into the key body.

Moreover, an aspect of the present invention is a key with a built-in transmitting element comprising a transmitting element, a supporting member for supporting the transmitting element into a key body, and an outer soft skin which is formed onto the transmitting element and the key body and fixes the transmitting element into the key body. Accordingly, the outer soft skin is formed onto the supporting member and the key body in a state in which the transmitting element is supported into the key body via the supporting member. A metal key body is a suitable material as the supporting member. The transmitting element can be held by bending a portion of the metal key body.

Further, an aspect of the present invention is a key with a built-in transmitting element comprising a transmitting element, a supporting member in which said transmitting element is adhered to a base portion of a key body, and an outer soft skin which is formed onto the transmitting element and the key body and fixes the transmitting element into the key body. Accordingly, the transmitting element is fixed to the base portion of the key body by adhesion. Thereafter, the outer soft skin is formed onto the transmitting element and the key body.

Moreover, an aspect of the present invention is a key with a built-in transmitting element comprising a transmitting element, a supporting member into which the transmitting element is accommodated and which is mounted in a base portion of a key body, and an outer soft skin which is formed onto the supporting member and the key body to fix the transmitting element into the key body. Accordingly, the transmitting element is accommodated into the supporting member, the supporting member is mounted to the base portion of the key body, and the outer soft skin is formed onto the supporting member and the key body.

Further, an aspect of the present invention is a key with a built-in transmitting element comprising a metal key body, a hard resin which is provided on a portion of the key body by insert-molding, an accommodation portion which is formed in a portion of the hard resin, a transmitting element which is accommodated into the accommodation portion, and a cap member which closes an opening portion of the accommodation portion. Accordingly, a portion of the metal key body is inserted into the hard resin, the transmitting element is accommodated into an accommodation portion which is formed at a portion of the hard resin, so that the opening portion of the accommodation portion is closed by the cap member. Therefore, the transmitting element which has been accommodated in the accommodation portion is reliably held in the hard resin and is protected from external force. In this case, the hard resin and the cap member ought to have strength enough to protect the transmitting element from external force. On the other hand, the exposed outer periphery of the hard resin is covered with an outer soft skin, so that touch feel during the key operation is improved.

Moreover, an aspect of the present invention is a key with a built-in transmitting element comprising a metal key body, a hard resin which is provided on a portion of the key body by insert-molding, an accommodation portion which is formed in a portion of the hard resin, and a cap member into which a transmitting element is accommodated and which closes the accommodation portion. Accordingly, a portion of the metal key body is integrated with the hard resin by insert-molding. The transmitting element which is accommodated within the cap member is held in the accommodation portion formed at a portion of the hard resin by attaching the cap member to the hard resin. Therefore, the transmitting element is protected from external force by the hard resin and the cap member.

Further, an aspect of the present invention is a key with a built-in transmitting element comprising a metal key body, a hard resin which is connected with a portion of the key body, an outer soft skin formed onto the hard resin, an accommodation recessed portion which is formed in the hard resin via the outer soft skin, a transmitting element which is inserted into the accommodation recessed portion, and an ornament member which closes an opening portion of the accommodation recessed portion. Accordingly, a portion of the metal key body is connected with the hard resin, the outer soft skin is formed onto the hard resin, an accommodation recessed portion is formed into the hard resin via the outer soft skin. Since the opening portion of the accommodation recessed portion is closed by the ornament member, the transmitting element which is accommodated into the hard resin is protected from external force.

Moreover, an aspect of the present invention is a key with a built-in transmitting element, comprising a metal key body, a hard resin which is connected with a portion of the key body, an outer soft skin which is formed onto the hard resin, an accommodation recessed portion which is formed in the hard resin via the outer soft skin, a transmitting element which is inserted into the accommodation recessed portion, and a cap member which closes an opening portion of the accommodation recessed portion. Accordingly, a portion of the metal key body is connected with the hard resin, the outer soft skin is formed onto the hard resin,

the accommodation recessed portion is formed into the hard resin via the outer soft skin. After the transmitting element has been inserted into the accommodation recessed portion, the opening portion of the accommodation recessed portion is closed by the cap member, the transmitting element is reliably accommodated into the hard resin and is thereby protected from external force.

Further, an aspect of the present invention is a key with a built-in transmitting element comprising a plate-shaped metal key body, and an ornament member mounted to one side surface of the key and into which a transmitting element is held. Accordingly, the ornament member is mounted on one side surface of the plate-shaped metal key body. Since the transmitting element is held by the ornament member, the transmitting element is reliably connected with the metal key body by merely mounting the ornament member on the metal key body, so that the transmitting element is protected from external force by the ornament member and the key body.

Moreover, an aspect of the present invention is a key with a built-in transmitting element, wherein a base portion of a key body and a transmitting element is inserted into a container-shaped holder and is covered with resin by insert-molding so as to form a grip portion. Accordingly, the base portion of the key body and the transmitting element are embedded and incorporated into the molded resin of the grip portion together with the holder into the holder into which the base portion of the key body and the transmitting element have been inserted. In this case, the base portion of the key body and the transmitting element are preferably inserted into the holder from a direction opposing the direction in which the resin is injected into the resin mold. Therefore, the base portion and the transmitting element are prevented from being offset due to injection pressure during resin molding. Further, since the holder includes a cap which closes an insertion opening portion of the holder into which the base portion of the key body and the transmitting element are inserted, the transmitting element is prevented from falling off from the holder until the grip portion is formed by molding, and the transmitting element is also protected from the pressure and heat during molding. Moreover, since the key body includes a pressing portion which presses the cap which closes the insertion opening portion of the holder, the transmitting element is prevented from falling off from the holder until the grip portion is formed by molding and from being affected by pressure and heat during molding. At the same time, the bond strength between the grip portion and the base portion of the key body is improved.

Further, an aspect of the present invention is a key with a built-in transmitting element wherein, a recessed portion which accommodates a transmitting element therein is formed at a base portion of a key body which is formed by resin molding in a configuration of a grip portion. Since the transmitting element is disposed in the recessed portion so as to be interposed between both side portions of the base portion which has been formed by resin molding, the transmitting element is covered so as to be interposed between the side portions of the base portion, even if a torsional stress due to a rotating operation during the use of the key is applied to the grip portion, the base portion extending along the side portions of the transmitting element is subjected to the stress so that the application of loading to the transmitting element can be prevented. Moreover, even if not only the base portion but also the transmitting element are covered with resin by molding so as to form the grip portion, since the transmitting element in the grip portion is disposed in the recessed portion of the base portion, the grip portion can be made compact.

Moreover, an aspect of the present invention is a key with a built-in transmitting element in which a grip portion is formed by resin molding in a state in which an accommodation portion is formed at a position corresponding to a recessed portion of a base portion of a key body, and an opening is provided at the accommodation portion to communicate with an outside thereof, the opening being closed by a closing member being fitted into the opening in a state in which the transmitting element has been inserted from the opening and has been accommodated in the accommodation portion. In this case, the base portion of the key body is covered with resin by molding, an accommodation portion which communicates with an outside thereof through an opening of the accommodation portion is formed at a position corresponding to the recessed portion of the base portion of the resin. The transmitting element is inserted from the opening and is accommodated into the accommodation portion, the opening of which is closed by a closing member fitted thereinto. Since the closing member is fitted into the opening, even when a small amount of impact and vibration is applied thereto, the closing member is not disengaged from the opening. Further, even if a torsional stress due to a rotating operation during the use of the key is applied to the grip portion, since the base portion extending along both sides of the transmitting element is subjected to the stress, the transmitting element is protected from the torsional stress. Moreover, even if the transmitting element is embedded in the grip portion, the grip portion can be made compact.

Further, an aspect of the present invention is a key with a built-in transmitting element in which a base portion is integrated with the transmitting element by resin molding in a state in which the transmitting element has been disposed in a recessed portion of the base portion. In this case, the grip portion is formed by molding resin onto the base portion accommodating the transmitting element so as to form the grip portion. Accordingly, there is no possibility that the transmitting element which is covered with resin falls off from the grip portion. Further, even if a torsional stress due to a rotating operation during the use of the key is applied to the grip portion, since the base portion extending along both sides

of the transmitting element is subjected to the stress, loading is not applied to the transmitting element. The grip portion can be made compact even if the entire transmitting element is embedded therein .

Moreover, an aspect of the present invention is a key with a built-in transmitting element in which the accommodation portion is formed such that the transmitting element which is accommodated into the accommodation portion can be disposed to be spaced apart from the key body at a predetermined distance. Accordingly, the electric wave transmitted by the transmitting element is not interfered by the metal key body is reliably transmitted.

Further, an aspect of the present invention is a key with a built-in transmitting element in which the transmitting element is disposed to be spaced apart from the key body at a predetermined distance via a spacing member. In this case, the transmitting element and the base portion are covered with resin in a state in which the transmitting element is disposed to be spaced apart from the key body at a predetermined distance via the spacing member. Accordingly, since the electric wave transmitted by the transmitting element is transmitted from a position which is spaced apart from the metal key body at the predetermined distance, it is not interfered by the metal key body.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a front view of a key of a first embodiment according to the present invention;

Fig. 2 is a cross-sectional view taken along the line 2-2 in Fig. 1;

Fig. 3 is a cross-sectional view taken along the line 3-3 in Fig. 2;

Fig. 4(a) is a front view of a key body according to the first embodiment and Fig. 4(b) is a plan view thereof;

Fig. 5(a) is a front view of a resin container according to the first embodiment, Fig. 5(b) is a side view thereof, and Fig. 5(c) is a cross-sectional view taken along the line 5-5 in Fig. 5(a);

Fig. 6 is a circuit diagram of a transmitting element and a control module;

Fig. 7 is a side view of a vehicle showing a state in which the control module is disposed at the interior of the vehicle;

Fig. 8 is a plan view of a relationship between a key body and a resin container according to a second embodiment of the present invention;

Fig. 9 is an exploded view of Fig. 8;

Fig. 10 is a front view of a key according to a third embodiment of the present invention;

Fig. 11(a) is a perspective view of a resin container according to the third embodiment, Fig. 11(b) is a front view thereof, and Fig. 11(c) is a side view thereof;

Fig. 12 is a perspective view of a key body according to the third embodiment;

Fig. 13 is a cross-sectional front view of a key according to a fourth embodiment;

Fig. 14 is a cross-sectional view taken along the line 14-14 in Fig. 13;

Fig. 15(a) is a front view of a key body according to the fourth embodiment and Fig. 15(b) is a cross-sectional view taken along the line 15-15 in Fig. 15(a);

Fig. 16(a) is a front view of a resin container according to the fourth embodiment, Fig. 16(b) is a side view thereof, and Fig. 16(c) is a bottom view thereof in Fig. 16(a);

Fig. 17 is a front view of a relationship between a key body and a resin container according to a fifth embodiment of the present invention;

Fig. 18 is an exploded view of Fig. 17;

Fig. 19 is a perspective view of a resin container according to the fifth embodiment;

Fig. 20 is a front view of a key body and a resin container according to a sixth embodiment;

Fig. 21 is a broken-out perspective view of the resin container according to the sixth embodiment;

Fig. 22(a) is a side view of the resin container according to the sixth embodiment, Fig. 22(b) is a front view thereof, and Fig. 22(c) is a plan view thereof;

Fig. 23 is a front view of a key body and a resin container according to a seventh embodiment;

Fig. 24 is a front view of a key according to the seventh embodiment;

Fig. 25 is a perspective view of the key body and the resin container according to the seventh embodiment;

Fig. 26 is an exploded perspective view of Fig. 25;

Fig. 27 is a front view of a key body and a transmitting element according to an eighth embodiment of the present invention;

Fig. 28 is a plan view of Fig. 27;

Fig. 29 is a front view of a key body and a transmitting element according to a ninth embodiment;

Fig. 30 is a plan view showing a portion of Fig. 29;

Fig. 31 is a front view of a key body and a transmitting element according to a tenth embodiment;

Fig. 32 is a front view showing a portion of Fig. 31;

Fig. 33 is a front view of a relationship between a key body and a resin container according to an eleventh embodiment;

Fig. 34 is a cross-sectional view taken along the line 34-34 in Fig. 33;

Fig. 35 is an exploded perspective view of the eleventh embodiment;

Fig. 36 is a front view of a key according to a twelfth embodiment;

Fig. 37 is a cross-sectional view taken along the line 37-37 in Fig. 36;

Fig. 38 is a perspective view of a resin container according to the twelfth embodiment;

Fig. 39 is a cross-sectional view taken along the line 39-39 in Fig. 36;

Fig. 40 is a front view of a key of a thirteenth embodiment according to the present invention;

Fig. 41 is a cross-sectional view taken along the line 41-41 in Fig. 40;

Fig. 42 is a front view showing a state in which an ornament of the key in Fig. 40 is taken off;

Fig. 43 is a cross-sectional view taken along the line 43-43 in Fig 42;

Fig. 44 is a perspective view of the ornament;

Fig. 45 is a cross-sectional view which corresponds to Fig. 41 in which the thirteenth embodiment of the present invention is shown;

Fig. 46 is a front view of a key according to a fourteenth embodiment which corresponds to Fig. 41;

Fig. 47 is an exploded view of Fig. 44;

Fig. 48 is a perspective view of an ornament according to the fourteenth embodiment;

Fig. 49 is a exploded front view of a key according to a fifteenth embodiment of the present invention;

Fig. 50 is a cross-sectional view taken along the line 50-50 in Fig. 49;

Fig. 51 is a front view of a key according to a sixteenth embodiment of the present invention;

Fig. 52 is a cross-sectional view taken along the line 52-52 in Fig. 51;

Fig. 53 is a cross-sectional view taken along the line 53-53 in Fig. 51;

Fig. 54 is a front view of a key according to a seventeenth embodiment of the present invention;

Fig. 55 is an exploded perspective view showing a portion except a key knob according to the seventeenth embodiment;

Fig. 56 is a front view showing a portion except a key knob according to the seventeenth embodiment;

Fig. 57 is a front view of a key according to an eighteenth embodiment of the present invention;

Fig. 58 is an exploded perspective view showing a portion except a key knob according to the eighteenth embodiment;

Fig. 59 is a first assembly diagram of a portion except a key knob;

Fig. 60 is a second assembly diagram of a portion except a key knob;

Fig. 61 is a third assembly diagram of a portion except a key knob;

Fig. 62 is a fourth assembly diagram of a portion except a key knob;

Fig. 63 is a front view of a portion except the key knob according to the seventeenth embodiment;

Fig. 64 is a cross-sectional plan view of a key according to a nineteenth embodiment of the present invention;

Fig. 65 is a cross-sectional view of the key according to the nineteenth embodiment at the main portion side thereof;

Fig. 66 is an exploded perspective view of the key according to the nineteenth embodiment;

Fig. 67 is a cross-sectional plan view of a key according to a twentieth embodiment of the present invention;

Fig. 68 is a cross-sectional view of the key according to the twentieth embodiment at the main portion side thereof;

Fig. 69 is an exploded perspective view of a key before molding;

Fig. 70 is a perspective view of the key according to the nineteenth embodiment;

Fig. 71 is an exploded perspective view of another example of a key before molding;

Fig. 72 is a cross-sectional plan view of the another example of the key; and

Fig. 73 is a perspective view of the another example of the key.

EMBODIMENT

(A first embodiment)

As shown in Fig. 1, a key 10 comprises a key body 12 and a key knob 14. The key body 12 is constituted by a flat metal plate and has an insertion portion 12A which is inserted into a lock with engaging projections and recesses portion formed therein. The insertion portion 12A is used for insertion into a key cylinder 24 provided in a steering column 22 of a vehicle 20 shown in Fig. 7.

A base portion 12B of the key body 12 is fixed to a key knob 14 in an embedded state. As shown in Figs. 2 and 3, the key knob 14 is constituted by attaching a resin container 16 which serves as a holding member to the outer periphery of the base portion 12B and by forming an outer soft resin skin 34 onto an outer surface portion of the resin container 16.

As shown in Fig. 5, the resin container 16 is thick plate-shaped and has a through hole 16A at the central portion of the resin container 16 in the thickness direction thereof. The base portion 12B of the key body 12 is inserted into the through hole 16A. In order to restrict the amount by which the base portion 12B of the key body is inserted into the through hole 16A, an enlarged diameter portion 12C is provided at a portion of the base portion 12B.

A projection 16B is provided on the rein container so as to project at a substantially central portion of the through hole 16A. When the base portion 12B is inserted into the through hole 16A, the projection 16B enters into a rectangular hole 12D which is formed in the base portion 12B. Therefore, the projection 16B has a slanted surface at one side surface thereof, so that the insertion of the base portion 12B of the key body into the through hole 16A can be facilitated. On the other hand, the projection 16B has a sharply slanted surface at the other side thereof. When the projection 16B enters into the rectangular hole 12D, the key body 12 is engaged with the resin container 16, so that the key body 12 is prevented from falling off from the resin container 16.

A transmitting element 18 is included into the resin

container 16 in a sealed state in parallel to the through hole 16A. The transmitting element 18 is disposed in a forming mold for forming the resin container 16. When the resin container 16 is formed, the outer periphery of the transmitting element 18 is covered with molten resin, so that the transmitting element 18 is embedded integrally in the resin container 16. More specifically, supporting pin holes (not shown) for supporting the transmitting element 18 in a forming mold used for insert-molding are left in a portion of the resin container 16. However, as shown in Figs. 1 through 3, the supporting pin holes are filled with an outer resin skin 34 which is formed onto the outer periphery of the resin container 16, so that the supporting pin holes never expose to the outer periphery of the outer resin skin 34.

Further, the resin container 16 is preferably made of such resin as polyacetal resins and polyester resins such as polybutylenetelephthalate resin or the like, has a predetermined hardness, and ought to have a strength enough to endure a force applied to the key knob 14 by a user because the key knob 14 serves as a user operating force input portion. Meanwhile, the outer resin skin 34 is made of a relatively soft synthetic resin, such as soft polyvinylychloride resin or the like.

A through hole 36 is provided in the key knob 14 and is used for attaching a key holder or the like .

As shown in Fig. 7, a control module 40 is mounted in the vicinity of the steering column 22. The control module 40 is preferably disposed inside the cover of the steering column 22 so that the control module 40 cannot be visually found from outside.

As shown in Fig. 6, in the control module 140, a transmitting and receiving coil 142, a transmitting and receiving circuit 143, a control circuit 144 and a memory 146 are connected each other. The control circuit 144 is connected to a vehicle control circuit 150 via an interface circuit 148. Accordingly, when a vehicle engine is started or a receiving signal is generated in the transmitting and receiving coil 142, the control circuit 144 of the control module 140 transmits an actuation signal from the transmitting and receiving coil 142 to the transmitting element of the key 10 via the transmitting and receiving circuit 143. An ID code from the transmitting element 18 of the key 10 is received by the transmitting and receiving coil 142 and judged by the control circuit 144. A registration code writing device 152 is connected to the control circuit 144 so that an ID code can be written therein.

On the other hand, a transmitting and receiving coil 154, a transmitting and receiving circuit 155, a control circuit 156 and a memory 158 are provided to be connected each other in the transmitting element 18. Accordingly, an electromotive force is generated in the transmitting and receiving coil 154 in the transmitting element 18 by current generated in the transmitting and receiving coil 142. The electromotive force actuates the control circuit 156 through the transmitting and receiving circuit 155 and the ID code stored in the memory 158 is transmitted from the transmitting and receiving coil 154 to the transmitting and receiving coil 142. When the transmitting and receiving coil 142 receives the ID code it transmits the same to the control circuit 144 through the transmitting and receiving circuit 143. Therefore, the control circuit 144 collates the ID code thus received with the ID code stored in the memory 146. When it is determined through this collation that the ID codes are identical to each other, a signal is transmitted from the control circuit 144 to the vehicle control circuit 150 through the interface circuit 148 so that the vehicle engine can start or continuously run. When the received ID code is different from the ID code stored in the memory 146, another signal is transmitted to the vehicle control circuit 150 to disable the vehicle engine from starting, or to stop the running of the vehicle engine.

The transmitting and receiving circuit 155, the control circuit 156 and the memory 158 in the transmitting element 18 are constituted as a single IC. The external dimensions of the transmitting element 18 are, for example, 1 mm in diameter and 10 mm in length.

Next, a description of manufacturing procedures of the key 10 according to the first embodiment will be given hereinafter.

The key body 12 is made from a metal plate material by a press or cutting processing. Further, the resin container 16 is formed by insert-molding in a state in which the transmitting element 18 is disposed in a manufacturing mold in advance, so that the transmitting element 18 is integrally held in the resin container 16. The base portion 12B of the key body 12 is inserted into the through hole 16A of the resin container 16, and when the projection 16B of the resin container 16 enters into the rectangular hole 12D, the key body 12 is engaged with the resin container 16. In this state, the base portion 12B of the key body 12 and the resin container 16 are inserted into a forming mold for molding and the outer resin skin 34 is formed onto the outer periphery of the base portion 12B of the key body 12 and the resin container 16 by insert-molding. In this way, the key 10 which is shown in Figs. 1 through 3 is manufactured. The key knob 14 is constituted such that the outer resin skin 34, which is softer than the resin container 16, forms the outer surface of the key knob 14, while the resin container 16, which is provided inside of the key knob 14 and is harder than the outer resin skin 34, is not exposed to an interior side of the vehicle when the key 10 is used.

Next, operations of the key according to the first embodiment will be given hereinafter.

When the key 10 is rotated by holding the key knob 14, the inner cylinder of the key cylinder 24 into which the key 10 is inserted is rotated together with the key 10, and the starter is actuated by the vehicle control circuit 50 so that the vehicle engine starts.

At the same time, the transmitting and receiving circuit 143 of the control module 140 receives a signal announcing that the vehicle engine has started from the vehicle control circuit 150, and the control circuit 144

actuates the transmitting and receiving circuit 143 to pass a current to the transmitting and receiving coil 142. Accordingly, the transmitting element 18 of the key 10 disposed in the vicinity of the transmitting and receiving coil 142 causes an electromotive force in the transmitting and receiving coil 154. The control circuit 156 is actuated by the electromotive force and the ID code stored in the memory 158 is transmitted from the transmitting and receiving coil 154. The transmitted signal is received by the transmitting and receiving coil 142 and transmitted to the control circuit 144 through the transmitting and receiving circuit 143. The control circuit 144 transmits a signal to the vehicle control circuit 150 when the ID code received by the control circuit 144 is identical to the ID code stored in the memory 146 and the vehicle control circuit 150 is allowed to continue to run the vehicle engine. However, when the received ID code is different from the stored ID code in the memory 146, or an ID code is not received, the control circuit 144 transmits a different signal to the vehicle control circuit 150, so that the vehicle control circuit 150 makes the engine to stop.

Further, in the first embodiment, the key 10 transmits the ID code to the control module 140 after the vehicle engine has started. However, the ID code may be transmitted when the key 10 is inserted into the key cylinder 24, and thereafter, the vehicle control circuit 150 causes the engine to start.

(A second embodiment)

The second embodiment of the present invention is shown in Figs. 8 and 9. In the descriptions of a second through a twentieth embodiments which will be given hereinafter, portions of the description identical to those which have already been given in the first embodiment will be omitted.

Similarly to the first embodiment, in the second embodiment, a resin container 41 is provided with a through hole 41A formed therein and it contains the transmitting element 18 which is provided by insert-molding. In the present embodiment, being different from the first embodiment, the key body 12 is inserted into the through hole 41A from the insert portion 12A direction. The key body 12 is positioned by abutting the base portion 12B which is wider than the insertion portion 12A. Further, in the present embodiment, the outer soft resin skin 34, which is formed onto the outer periphery of the resin container 41 and the base portion 12B, is formed by molding in a state in which a portion of the resin container 41 is exposed. The outer resin skin 34 is not formed onto a portion of the transmitting element 18 in the resin container 41.

(A third embodiment)

The third embodiment of the present invention is shown in Figs. 10 through 12. In this embodiment, the transmitting element 18 is integrally formed into a resin container 44 which is used as an ornament. Namely, the transmitting element 18 and the resin container 44 are united by insert-molding. A projection 44A is formed at a portion on the other side of the resin container 44 and is inserted into the rectangular hole 12D of the key body 12, so that the resin container 44 is engaged with the key body 12. A mark portion 44B which forms the ornament is provided on the surface of the resin container 44. When the outer resin skin 34 has been formed onto the outer periphery of the resin container 44 and the base portion 12B of the key body 12, the mark portion 44B is positioned so as to be exposed onto the outer resin skin 34. Namely, the outer resin skin 34 is formed onto the outer periphery of the resin container 44 and the base portion 12B of the key knob 14, the outer periphery corresponding to a portion other than the mark portion 44B.

(A fourth embodiment)

The fourth embodiment is shown in Figs. 13 through 16.

A resin container 46 according to the present embodiment is shown in Fig. 16(a). A groove 46A is formed at the central portion of the resin container 46 in the thickness direction thereof. The base portion 12B of the key body is inserted into the groove 46A so that the resin container 46 is engaged with the key body. A projection 46B which is projected from a wall portion of the groove 46A enters into the rectangular hole 12D which is formed in the base portion of the key body so that the resin contain 46 is mechanically engaged and held with the key body. In the same manner as the aforementioned embodiments, the transmitting element 18 is also provided into the resin container 46 by insert-molding. Accordingly, in the fourth embodiment, the resin container 46 is mounted to the base portion 12B of the key body 12. Thereafter, as shown in Figs. 13 and 14, the outer soft resin skin 34 is integrally formed onto the resin container 46 and the base portion 12B by molding.

(A fifth embodiment)

The fifth embodiment is shown in Figs. 17 through 19.

As described in the above embodiments, according to the present embodiment, a resin container 48 has the transmitting element 18 which is provided thereinto by insert-molding. However, a groove 48A is formed at one side portion of the resin container 48 and projections 48B are provided at end portions of the groove 48A extending therefrom in a direction in which the end portions approach to each other. The projections 48B are inserted into an elongated groove 12E formed in the key body 12 so that the resin container 48 is fixed to the key body 12. Since the elongated groove 12E has the same configuration as that of an elongated groove 12F which has been formed in the insertion portion 12A in advance so as to correspond to the projections formed in the key

cylinder 24, manufacturing of the elongated groove 12E can be facilitated.

(A sixth embodiment)

The sixth embodiment of the present invention is shown in Figs. 20 through 22.

A resin container 50 according to the sixth embodiment has a groove 50A in the same manner as the resin container 48 of the fifth embodiment. However, a predetermined width of a projection 50B projects from the bottom surface of the groove 50A so that the depth of the groove 50A substantially decreases by the height of a portion of the projection 50B. When the resin container 50 is inserted into the key body 12 in a direction orthogonal to the insertion direction of the key body 12 in the fifth embodiment (i.e., the direction of the arrow in Fig. 20), the resin container 50 is fitted into a recessed portion 12G which is formed in the base portion 12B of the key body 12. A portion of the base portion 12B of the key body 12 is clamped by the sidewalls of the groove 50A so that the resin container 50 is engaged with the key body 12. Further, an outer soft resin skin 34 is integrally formed onto the resin container 50 and the base portion 12B of the key body 12 in the similar manner to the above embodiments.

(A seventh embodiment)

The seventh embodiment of the present invention is shown in Figs. 23 through 26.

In the present embodiment, the elongated grooves 12E and 12F of the fifth embodiment in Figs. 17 through 19 are provided so as to form a continuous line in the key body 12. After the resin container 48 which is similar to that of the fifth embodiment has been inserted into the continuous elongated grooves 12E and 12F, the outer resin skin 34 is integrally formed onto the resin container 48 and the key body 12 by molding. Further, in the seventh embodiment, the enlarged diameter portion 12C of the base portion 12B of the key body 12 projects from the end portion of the base portion 12B opposing the insertion portion 12A, so that the resin container 48 can obtain a proper positioning and a reliable strength against external force.

(An eighth embodiment)

The eighth embodiment of the prevent invention is shown in Figs. 27 and 28.

Bending portions 54 are formed into a substantially U-shaped cross sectional configuration at portions of the base portion 12B of the key body 12. The transmitting element 18 is adhered to the inner side of one of the bending portions 54 by an adhesive 55. The outer resin skin 34 is formed onto the transmitting element 18 and the bending portions 54 together with the base portion 12B of the key body 12, namely, the transmitting element 18 is embedded into the outer resin skin 34 by insert-molding.

The transmitting element 18 may directly be adhered to the bending portion 54 with the adhesive 55. Otherwise, as the other embodiments, the transmitting element 18 may be mounted to the bending portion 54 after the transmitting element 18 has been embedded into the resin container by insert-molding in the same manner.

(A ninth embodiment)

The ninth embodiment of the present invention is shown in Figs. 29 and 30.

In the present embodiment, a plurality of projections 57 project from the side portions of the base portion 12B of the key body 12. As shown in Fig. 30, viewing from the longitudinal direction of the insertion portion 12A of the key 10, the projections 57 having a substantially U-shaped configuration are provided to face each other. Accordingly, the transmitting element 18 can be inserted into the U-shaped configurations formed by the projections 57 facing each other and held. In order to hold the transmitting element 18 mechanically, the transmitting element 18 may be press-fitted between the projections 57 by making the distance of the facing projections 57 smaller than the outer diameter of the transmitting element 18. However, in order to hold the transmitting element 18 reliably, the transmitting element 18 may be held by the projections 57 by using an adhesive.

Further, the outer soft resin skin 34 is integrally formed onto the base portion 12B of the key body 12 and the transmitting element 18 in a similar manner to the above embodiments.

(A tenth embodiment)

The tenth embodiment of the present invention is shown in Figs. 31 and 32.

In the present embodiment, a pair of recessed portions 61 are formed in the base portion 12B of the key body 12 in parallel to the longitudinal direction of the insertion portion 12A. The transmitting element 18 is adhered to one of the recessed portions with an adhesive 62. In this way, after the adhesion of the transmitting element 18 using the adhesive has been completed, the outer resin skin 34 is formed onto the base portion 12B of the key body 12 and the transmitting element 18.

(An eleventh embodiment)

The eleventh embodiment of the present invention is shown in Figs. 33 through 35.

A resin container 64 into which the transmitting element 18 is accommodated is described in the present embodiment. The resin container 64 is provided with a through hole 64A into which the insertion portion 12A of the key body is inserted and an accommodation hole

64B into which the transmitting element 18 is accommodated. After the transmitting element 18 has been accommodated into the accommodation hole 64B, and the insertion portion 12A of the key body has been inserted into the through hole 64A, as shown in Fig. 33, the insertion portion 12A of the key body is placed at an opening portion of the accommodation hole 64B so as to prevent the transmitting element 18 from falling off from the accommodation hole 64B. Accordingly, as shown in Fig. 33, the key insertion direction of the through hole 64A intersects the longitudinal direction of the accommodation hole 64B.

The resin container 64 is provided with a through hole 64C which forms an opening 36 and through holes 64D which position the transmitting element 18 in the accommodation hole 64B when the outer resin skin 34 is formed onto the resin container 64 and a portion of the outer resin skin 34 is thereby entered into the transmitting element 18 in the accommodation hole 64B.

(A twelfth embodiment)

The twelfth embodiment of the present invention is shown in Figs. 36 through 39.

In the present embodiment, a resin container 68 has an insertion hole 68A into which the base portion 12B of the key body 12 is inserted at a central portion of the resin container 68. In parallel to the insertion portion 68A, accommodation holes 68B are formed at both sides of the insertion hole 68A, respectively. After the transmitting element 18 has been accommodated into one or both of accommodation holes 68B, the base portion 12B of the key body 12 is inserted into the insertion hole 68A. Since the enlarged diameter portions 12C of the key body 12 are provided so as to correspond to portions of the opening portions of the accommodation holes 68B, respectively, the transmitting element 18 which is accommodated into the accommodation hole 68B is prevented from falling off therefrom. Therefore, when the outer resin skin 34 is formed onto the resin container 68, a portion of a molding resin enters into the accommodation hole 68B, so that the transmitting element 18 is secured therein.

An insertion state of the transmitting element 18 and the accommodation hole 68B as members described in the above embodiment is effected such that the transmitting element 18 is accommodated into the accommodation hole 68B easily so as to be spaced apart from each other. Meanwhile, in a press-fitted state of the members, after the transmitting element 18 has been accommodated into the accommodation hole 68B, sizing of the members can be effected so as to prevent the transmitting element 18 from falling off from the accommodation hole 68B.

(A thirteenth embodiment)

The thirteenth embodiment is shown in Figs. 40 through 44. As shown in Fig. 40, the key 10 has the key body 12 and the key knob 14. As shown in Figs. 2 and 4, a hard resin 17 is formed onto the base portion 12B of the key body 12 by molding. A recessed portion 17A is provided on one side surface of the hard resin 17 and has an accommodating portion.

The outer soft resin skin 34 is integrally formed onto the outer periphery of the hard resin 17. The outer soft resin skin 34 is formed onto the outer periphery of the hard resin 17 other than a portion adjacent to the recessed portion 17A and a surface portion of the hard resin 17 which opposes the portion adjacent to the recessed portion 17A. Ornament members 27, 29 are attached to both side surfaces of the hard resin 17. Each of the ornament members 27, 29 has substantially the same thickness as that of the outer soft skin 34 and is made from a synthetic resin which has substantially the same hardness as that of the hard resin 17. Typically, an ornament member is a decoration portion in which a name of a manufacturing company of the vehicle, a vehicle family or the like is represented by letters, geometrical patterns or the like. The ornament member 27 is provided to close the recessed portion 17A and presses the transmitting element 18 into the bottom surface of the recessed portion 17A, so that the transmitting element 18 is fixed thereinto. Further, a method of fixing the transmitting element 18 into the recessed portion 17A can be applied in which the transmitting element 18 may be adhered to the recessed portion 17A with an adhesive, while the other method is provided in which the transmitting element 18 may be pressed into the recessed portion 17A by mounting a soft member such as a soft rubber or the like on the surface opposing the ornament member 27.

These hard resin 17 and the ornament member 27 comprise a hard resin including polyacethal resins and polyestel resins or the like such as polybutylenetelephthalate (PBT) or the like. The outer resin skin 34 is a synthetic resin which is softer than the resin container 16. Since the outer resin skin 34 is soft, the key knob 14 exposing to an interior side of the vehicle is made soft, accordingly. Further, an opening 36 is provided in the key knob 14 and is used for attaching a key holder or the like .

The hard resin 17 is formed onto the key body 12 by insert-molding in a state in which the base portion 12B thereof is inserted into the hard resin 17. During the molding or after the molding, the recessed portion 17A is formed in the hard resin 17 by cutting. The outer soft resin skin 34 is formed onto the outer periphery of the hard resin 17 other than a portion adjacent to the recessed portion 17A and a surface portion of the hard resin 17 which opposes the portion adjacent to the recessed portion 17A.

Thereafter, the transmitting element 17 is inserted into the recessed portion 17A via an adhesive, a cushioning material or the like, when it is needed. The ornament member 27, 29 are mounted on both surfaces of the hard resin 17 via press-fitting, snap-fitting, adhesion or the like. The mounting order of the ornament member

27 and the outer soft skin 34 can be reversed. Namely, after the transmitting element 18 has been inserted into the recessed portion 17A in Fig. 4, the ornament member 27 may be attached to the hard resin 17 with the adhesive or the like. Thereafter, the outer soft skin 34 may be formed onto the outer periphery of the hard resin 17.

As a result, the transmitting element 18 which has been accommodated into the hard resin 17 is allowed to reliably maintain its accommodation state by the hard resin 17 and the ornament member 27 and is thereby protected from an external operating force and an external torsion stress.

(A fourteenth embodiment)

The fourteenth embodiment of the present invention is shown in Figs. 45 through 48.

In the present embodiment, a recessed portion 17B is provided in the hard resin 17. An opening portion of the recessed portion 17B is wider than the other portion thereof. An ornament member 61 which is inserted into the recessed portion 17B is formed into a plate-shaped configuration, and corresponds to the aforementioned wide opening portion. A projection 61A projects from the ornament member 61 which corresponds to the recessed portion 17B. The transmitting element 18 is integrally accommodated into the projection 61A by insert-molding.

Accordingly, in the fourteenth embodiment, after the base portion 12B of the key body 12 has been provided into the hard resin 17 by insert-molding, ornament members 61 and 29 are attached to both side surfaces of the hard resin 17. However, in the ornament member 61, since the transmitting element 18 has been embedded into the projection 61A by insert-molding in advance, the ornament member 61 is attached to the hard resin 17 by adhesion, press-fitting and snap-fitting or the like so that the transmitting element 18 can be accommodated into the key knob 14 and be protected from external force.

Further, the outer soft skin 34 can be formed onto the outer periphery of the hard resin 17 in the same manner as the above embodiments.

(A fifteenth embodiment)

The fifteenth embodiment of the present invention is shown in Figs. 49 and 50. In the present embodiment, after the base portion 12B of the key body 12 has been integrally embedded into the hard resin 17 by molding, the outer soft skin 34 is integrally formed onto the outer periphery of the hard resin 17. Thereafter, in parallel to the insertion portion 12A, an accommodation hole 66 is formed through the outer soft skin 34 and the hard resin 17. The transmitting element 18 is inserted into the accommodation hole 66 and the opening portion of the accommodation hole 66 is closed by a cap member 65. An adhesive is applied to the accommodation hole 66 and the cover member 65, so that the transmitting element 18 can reliably be held in the key knob 14 without rattling. Further, by using the adhesive, the penetration of the water into the accommodation hole 66 can be prevented. Similarly to the present embodiment, the penetration of the water can also be prevented in the other embodiments by using adhesive.

(A sixteenth embodiment)

The sixteenth embodiment is shown in Figs. 51 through 53. In the present embodiment, a rectangular hole 71 having a relatively large internal diameter is provided in the plate-shaped base portion 12B of the key body 12. Ornament members 73 and 74 which serve as a cap are kept in close contact with respective surfaces of the base portion 12B in the vicinity of the rectangular hole 71. A projection 73A is provided at a portion of the ornament member 73 which corresponds to the inner periphery of the rectangular hole 71 in an assembled state. The transmitting element 18 has been embedded into the projection 73A by insert-molding previously. In the vicinity of the projection 73A, an arm portion 73B is projected from the ornament member 73 and has a pawl portion 73C at the tip end thereof. At the time of the insertion, the pawl portion 73C is engaged with a portion at the other side of the rectangular hole 71. Meanwhile, arm portions 74A and 74B are provided projecting from the ornament member 74. The arm portion 74A is press-fitted between the projection 73A and the arm portion 73B. The arm portion 74B is provided to correspond to the internal periphery of the rectangular hole 71 at the other side of the arm 73B. the arm portion 74B has a pawl portion 74C which is formed at the tip end thereof. The pawl portion 74C is engaged with a surface portion of the base portion 12B which corresponds to the ornament member 73.

Accordingly, in the sixteenth embodiment, the ornament members 73 and 74 are disposed on the surfaces of the base portion 12B and are engaged with the pawl portions 73C and 74C. Further, the arm portion 74A is press-fitted into the ornament member 73 to fix the ornament members 73 and 74 to the key body 12. The ornament members 73 and 74 are otherwise fixed to the key body 12 by means of adhesion.

The outer resin skin 34 is integrally formed onto the outer periphery of the base portion 12B to which the outer peripheries of the ornament members 73 and 74 are corresponded. Similarly to the above embodiments, a name of a manufacturing company of the vehicle or the like is represented on the ornament members 73 and 74.

Therefore, in the present embodiment, by simply mounting the ornament member 73 on the base portion 12B of the metallic key body, the ornament member 73 in which the transmitting element 18 has been embedded in advance is fixed to the key body 12. Further, the ornament member 73 is made from a hard resin, so that the transmitting element 18 can be protected against

external force.

(A seventeenth embodiment)

The seventeenth embodiment of the present invention is shown in Figs. 54 through 56.

Fig. 54 shows the key body 12, the transmitting element 18, a holder 76, and the key knob 14 as a grip portion. Among these members, as shown in Fig. 55, the base portion 12B of the key body 12 is rectangular-shaped and is wider than the insertion portion 12A, and has a hole 12H formed therein.

The holder 76 is made of plastic and has a rectangular container shaped configuration. The holder 76 is provided with a first accommodation portion 77 for accommodating the base portion 12B of the above key body 12 and a second accommodation portion 78 for accommodating the transmitting element 18, the accommodation portions 77 and 78 being partitioned by a partition wall 79. Further, the above accommodation portions 77 and 78 of the holder 76 have insertion openings 62 and 63, respectively, which are formed on a coplanar surface of the holder 76. A projection 67 projects from one of the inner surfaces of the accommodation portion 77 at the innermost portion of the inner surface. A projection 72 projects from an opening edge portion on one of the inner surfaces of the accommodation portion 78.

Since the holder 76 is structured as described above, the base portion 12B of the key body 12 is inserted from the insertion opening 62 into the first accommodation portion 77, the projection 66 is engaged with the hole 12H, so that the base portion 12B of the key body is engaged with the holder 76. On the other hand, the transmitting element 18 is inserted into the second accommodation portion 78, the projection 72 is engaged with the back edge portion of the transmitting element 18, so that the transmitting element 18 is engaged with the holder 76.

Further, the base portion 12B of the key body 12 and the transmitting element 18 are set in a forming mold (not shown). A molten resin is injected into the forming mold from the insertion portion 12A side which is a direction indicated by an arrow A in Fig. 56, so that injection traces of the molten resin cannot be exposed. Accordingly, the base portion 12B of the key body 12 and the transmitting element 18 are covered with the resin, so that the above key knob 14 is formed by insert-molding.

As a result, the base portion 12B of the key body 12 and the transmitting element 18 are accommodated into the holder 76 and are embedded in the molten resin for molding the key knob 14 together with the holder 76. In the key knob 14 of the present embodiment, being different from a conventional key knob comprising a case which is divided into two pieces which are screwed each other, it is not necessary to effect a screwing. Accordingly, a cost for a screwing can be reduced from a total manufacturing cost. Further, the key knob 14 can be used at any number of times without forming any gag within the key knob 14. Therefore, the key knob 14 can be used for a long time without fearing that dust or water may enter into the key.

(A eighteenth embodiment)

The eighteenth embodiment is shown in Figs. 57 through 62. In the present embodiment, a holder 80 has an outline different from that of the holder 76 of the seventeenth embodiment. However, similarly to the seventeenth embodiment, the holder 80 is made of plastic and is container-shaped, and includes a first accommodation portion 81 for accommodating the base portion 12B of the key body 12 and a second accommodation portion 82 for accommodating the transmitting element 18, both of which being partitioned by a partition wall 83.

However, in the present embodiment, the accommodation portions 81 and 82 in the holder 80 have insertion openings 69 and 70, respectively, which are open on a coplanar surface of the holder 80 as a whole opposing the coplanar surface of the holder 76 of the seventeenth embodiment. Further, projections 84 are projected from inner surfaces facing each other in the accommodation portion 81 at the opening edge portions thereof. On the other hand, a cap 75 which can close the insertion opening 70 is formed at an outside of the second accommodation portion 82 so as to be connected to a self-hinge portion 85. In addition, a hole 86 into which the insertion portion 12A of the key body 12 can be inserted is formed at the bottom of the first accommodation portion 81.

Further, a hole 12J and a recessed portion 12K are formed in the base portion 12B of the key body 12 and a pressing portion 12Q is formed by a projecting portion which projects in an opposite direction of the base portion 12B.

In this way, as shown in Figs. 59 through 62, the transmitting element 18 is inserted into the second accommodation portion 82. Thereafter, the cap 75 is bent from the self-hinge portion 85 so as to cover and close the insertion opening portion. The base portion 12B of the key body 12 through which the insertion portion 12A has been passed is inserted from the insertion opening 69 into the first accommodation portion 81, the recessed portion 12K is engaged with the projection 84, and the base portion 12B is thereby fixed to the holder 80. At the same time, the pressing portion 12Q abuts the cap 75 so that the cap 75 is pressed.

Thereafter, the base portion 12B of the key body 12 and the transmitting element 18 are set in a forming mold (not shown). As indicated by an arrow B in Fig. 62, a molten resin is injected from the insertion portion 12A side of the key body 12, so that the key knob 14 is covered with the injected resin and formed by insert-molding.

Accordingly, even in the eighteenth embodiment, the base portion 12B of the key body 12 and the transmitting element 18 are also inserted into the holder 80

and are embedded in a molten resin for molding the key knob 14 together with the holder 80. Therefore, similarly to the seventeenth embodiment, the key knob 14 of the present embodiment requires no screwing, so that a cost for screwing can be reduced from a total manufacturing cost. The key knob 14 can be used at any number of times without forming any gap in the key knob 14. Accordingly, the key knob 14 can be used for a long time without fearing that dust or water may enter into the key knob.

In the seventeenth embodiment, there has been a drawback in that when the resin for molding the key knob 14 has been injected, an injection pressure is generated, and the projection 66 is disengaged from the hole 12H, so that the holder 76 is tilted from the key body 12, as shown in Fig. 63. Meanwhile, in the eighteenth embodiment, since the base portion 12B of the key body and the transmitting element 18 are inserted into the holder 80 from a direction which opposes an injection direction of the resin for forming the key knob 14, the holder 80 is prevented from being offset from the key body 12 due to the injection pressure. Accordingly, the transmitting element 18 is also prevented from falling off from the holder 80 and effects a proper operation.

Moreover, accordingly to the eighteenth embodiment, the holder 80 has a cap 75 which closes the insertion opening portion 70 of the holder 80 into which the base portion 12B of the key body 12 and the transmitting element 18 are inserted. Therefore, the transmitting element 18 is prevented from falling off from the holder 80 before the molding of the key knob 14, and is thereby protected from pressure and heat during the molding.

In addition, the key body 12 comprises a pressing portion 12Q. The cap 75 which has closed the insertion opening portion 70 of the holder 80 is pressed by the pressing portion 12Q. Therefore, the transmitting element 18 is reliably prevented from falling off from the holder 80 before the molding of the key knob 14 and from being affected by pressure and heat during the molding. In addition, a connection strength between the key knob 14 and the base portion 12B of the key body 12 can be increased by the pressing portion 12Q.

If the cap 75 is a separate component, the number of the components in the holder 80 is increased. Also, since the cap 75 is a small component, it becomes difficult to assemble the cap 75 in the holder 80 and missing of the cap 75 may be caused. On the other hand, in the eighteenth embodiment, since the cap 75 is continuously integrated with the holder 80 by the self-hinge portion 85, the number of the components is not increased, the assembling of the cap 75 can be facilitated by merely bending the cap 75 extended from the self-hinge portion 85 so as to cover the insertion opening portion 70, and missing of the cap 75 can thereby be prevented.

(A nineteenth embodiment)

The nineteenth embodiment is shown in Figs. 64 through 66. As shown in Fig. 66, the key 10 is comprised of the key body 12, a transmitting element 21 which is accommodated into an accommodation portion 19 formed in the key knob 14, and a stopper 20 which closes an opening 19A of the accommodation portion 19 into which the transmitting element 21 has been accommodated. The transmitting element 21 has a configuration different from that of the transmitting element 18 in the above embodiments (the transmitting element 21 in the twentieth embodiment has the same configuration as that of the nineteenth embodiment).

As shown in Fig. 64, a protector 15 made from polyvinyl chloride (PVC) is formed onto the base portion 12B of the key body 12 by forming the key knob 14. The base portion 12B of the key body 12 is formed into a substantially U-shaped configuration including a recessed portion 12L provided at the base end portion side thereof. The accommodation portion 19 is provided at a position corresponding to the recessed portion 12L of the key body 12 and the side portions of the accommodation portion 19 are interposed by portions of the substantially U-shaped base portion 12B extending along the inner periphery of the key knob 14.

As shown in Figs. 64 and 65, projections 19B are provided in the vicinity of the opening 19A of the accommodation portion 19. The projections 19B project from the inner surfaces of the accommodation portion 19, respectively. The inner surfaces oppose each other in the thickness direction of the key knob 14 (i.e., the vertical direction in Fig. 65). Grooves 20A are formed in the stopper 20 at positions corresponding to the projections 19B, respectively. The stopper 20 is fitted into the accommodation portion 19 from the opening 19A. When the projections 19B are engaged with the grooves 20A, the stopper 20 is anchored to the protector 15, so that the stopper 20 is prevented from being disengaged from the protector 15.

The transmitting and receiving coil 154 or the like is accommodated into the transmitting element 21 (see Fig. 6) and is disposed along the longitudinal direction thereof. Preferably, the longitudinal direction of the transmitting element 21 is disposed in parallel with the longitudinal direction of the key body 12, so that the transmitting and receiving coil 154 can effectively receive the magnetism. Further, for the purpose of transmitting an electric wave from the transmitting element 21 to the receiving element without disturbance by the metal-made base portion 12B, the transmitting element 21 is required to be apart from the base portion at a predetermined distance (a few millimeters). To this end, the accommodation portion 19 is formed in such a manner that the longitudinal direction of the transmitting element 21 becomes in parallel with the longitudinal direction of the key body when the transmitting element 21 is accommodated into the accommodation portion 19 and a predetermined distance (a few millimeters) can be maintained between the accommodation portion 19 and the base portion 12B. Further, two insertion holes 15A through which a key ring is passed are

formed in the protector 15. As shown in Fig. 65, recessed portions 15B are formed on the surfaces of the protector 15 so that the key knob 14 becomes more slip-resistant when it is gripped by fingers of the user.

Next, a description of the operation of the key 10 which has been constituted as described above will be given hereinafter.

The protector 15 made from PVC is formed onto the base portion 12B of the key body 12, so that the key body 12 is formed in advance. At this time, the accommodation portion 19 into which the transmitting element 21 is accommodated is provided at a position corresponding to a recessed portion of the base portion 12B having a substantially U-shaped configuration. Therefore, even if the accommodation portion 19 for accommodating the transmitting element 21 is formed in the key knob 14, the key knob 14 can be made compact. In this way, the transmitting element 21 is assembled in the key body 12.

The assembling of the transmitting element 21 is effected such that the transmitting element 21 is inserted into the accommodation portion 19 from the opening 19A which is formed in the key knob 14 and the stopper 20 is fitted into the opening 19A and the opening 19A is thereby closed. Once the stopper 20 is fitted into the opening 19A, the stopper 20 is securely anchored to the protector 16 by engaging the projections 19B with the anchoring grooves 20A, so that the stopper 20 is not disengaged from the protector 15. Moreover, since the transmitting element 21 which has been incorporated in the key 10 is not required to be provided with a battery and to be replaced thereof. Accordingly, there is no problem even if the accommodation portion 19 is closed by the stopper 20 and cannot be opened.

In this way, the transmitting element 21 which has been accommodated into the accommodation portion 19 is disposed at a substantially central portion of the recessed portion 12L of the base portion 12B which is substantially U-shaped. Namely, the longitudinal direction of the transmitting element 21 is in parallel to the longitudinal direction of the key body 12, and the transmitting element 21 is disposed to be spaced apart from the key body 12 at a predetermined distance (i.e., a few millimeters).

When an engine is actuated by the use of the key 10, the key 10 is inserted into the key cylinder and is rotated. During the rotating operation, a stress in a torsional direction is applied to the key knob 14. However, since portions of the base portion 12B having the substantially U-shaped configuration extend along inner side edge portions of the key knob 14, even if the key knob 14 is subjected to such a torsion stress as described above, the key knob 14 is not distorted. Further, since the transmitting element 21 is disposed with the side portions thereof being interposed by portions of the substantially U-shaped base portion 12B extending along the inner periphery of the key knob 14, the transmitting element 21 is not loaded. For this reason, even if the key 10 is used for a long period of time and the rotating operation of the key 10 is repeated at any number of times, the transmitting element 21 is not damaged due to a stress generated during the rotating operation of the key 10.

When the key 10 is inserted into the key cylinder, a magnetism generation device at the key cylinder side generates magnetism. When the magnetism is received by the transmitting element 21, an ID code previously stored is transmitted. At this time, the transmitting and receiving coil 154 is disposed to be extended along the insertion direction of the key 10 so as to be susceptible to the magnetism so that the electric power for transmitting the ID code can effectively be obtained. Further, since the transmitting element 21 is separated from the metal base portion 12B at a predetermined distance (a few millimeters), the electric wave to be transmitted is not disturbed by the metal key body 12 so that the ID code can reliably be received by the receiving element at the key cylinder side.

As described above, according to the key 10 of the nineteenth embodiment, the transmitting element 21 is accommodated into the accommodation portion 19 in the resin constituting the key knob 14 which is formed onto the base portion 12B of the key body 12 by molding. When the stopper 20 is fitted into the opening 19A, the projections 19B are engaged with the anchoring grooves 20A, the opening 19A of the accommodation portion 19 is closed, so that the stopper 20 is anchored to the opening 19A. For this reason, even if the stopper 20 is subjected to a small amount of impact and/or vibration after the stopper 20 has been fitted into the opening 19A and has been anchored to the opening 19A, the stopper 20 is not disengaged from the opening 19A. Therefore, even if the key 10 can be used for a long period of time, the transmitting element 21 can be assembled in the key knob 14 without falling off from the key knob 14.

Further, since the base portion 12B of the key body 12 is formed into a substantially U-shaped configuration and has the recessed portion at the base end portion thereof, the accommodation portion 19 for accommodating the transmitting element 21 is formed at a position corresponding to the recessed portion 12L, and the transmitting element 21 is disposed in the recessed portion 12L, even if the transmitting element 21 is embedded in the recessed portion 12L, the key knob 14 can be made compact.

Further, since the base portion 12B is provided at the inner periphery of the resin key knob 14 and portions of the substantially U-shaped configuration of the base portion extend along the internal side edge portions of the key knob 14, even if the key 10 is rotated by holding the key knob 14, the key knob 14 is not distorted due to a torsional stress during the rotating operation. Since the transmitting element 21 is interposed by portions of the substantially U-shaped base portion 12B inwardly from the side portions thereof, the transmitting element 21 is protected from the torsion stress during

the rotating operation of the key 10 because of the configuration of the base portion 12B extending along the inner periphery of the key knob 14. As a result, even if the key 10 is used for a long period of time and the rotating operation is repeated at any number of times, the transmitting element 21 is prevented from being damaged.

Moreover, the assembling work of the transmitting element 21 of the nineteenth embodiment can be more facilitated than that described in the prior art which is constituted in that screws are used to fasten a resin case, because the assembling work of the transmitting element 21 of the nineteenth embodiment is merely effected such that the transmitting element 21 is inserted into the accommodation portion 19 in the key knob 14 of the key body 12 and the stopper 20 is fitted into the opening 19A of the accommodation portion 19. Further, the transmitting elements 21 may be assembled into the key bodies 12 by the necessary number when the keys 10 are to be shipped. Also, it is convenient to adjust the stock.

(A twentieth embodiment)

The twentieth embodiment is shown in Figs. 67 through 69. The present embodiment is the same as the nineteenth embodiment other than that the transmitting element is integrally embedded in the key knob of an ignition key by molding.

As shown in Fig. 67, the key 10 is formed such that polyvinyl chloride (PVC) is molded in the configuration of the key body 14 onto the base portion 12B of the key body 12 together with the holder 12 and the transmitting element 21. The protector 15 made from the molded resin is provided with two insertion holes 15A and two recessed portions 15B (see Fig. 68) in the same manner as the nineteenth embodiment.

As shown in Fig. 69, the base portion 12B of the key body 12 has a slightly different configuration from that of the base portion 12B of the key body 12 of the nineteenth embodiment. However, similarly to the nineteenth embodiment, the base portion 12B of the key body 12 according to the twentieth embodiment is formed into a substantially U-shaped configuration and has a recessed portion 12M at the base end portion thereof. A couple of anchoring grooves 12N are formed in portions which oppose each other in the recessed portion 12M of the base portion 12B. A holder 91 serving as a spacing member is made from polybutylenetelephthalate (PBT) and is substantially rectangular cylindrical shaped configuration having a bottom. Materials of the holder 91 may include polyacetal resins such as polyoxymethylene (POM) or the like. The transmitting element 21 is inserted into an accommodation portion 92 through an opening 92A. A guide groove 91A is formed at a side portion of the holder 91 along the outer periphery thereof except the opening 92A, so that the holder 91 can be fitted into the recessed portion 12M of the base portion 12B through the guide groove 91A. The holder 91 is constituted such that projections 93 are formed at positions corresponding to anchoring grooves 12N, respectively. Accordingly, each of the projections 93 can be engaged with the each of the anchoring grooves 12N, so that the holder 91 is anchored to the key body 12. Further, the accommodation portion 92 is constituted such that when the holder 91 is fitted into the recessed portion 12M of the base portion 12B, the transmitting element 21 which is accommodated into the accommodation portion 92 is disposed to be spaced apart from the base portion 12B at a predetermined distance (a few millimeters).

As shown in Fig. 67, the length of each of the extending portions of the substantially U-shaped base portion 12B extending in parallel with each other by interposing the recessed portion 12M therebetween is set so as to provide a space for forming insertion holes 15A in the protector 15. The holder 91 has notched portions at portions corresponding to the insertion holes 15A.

Previously before the key knob 14 is formed by resin molding with heat, the holder 91 and the transmitting element 21 are assembled in the recessed portion 12M of the base portion 12B of the key body 12. A heat-resin molding is effected such that a mold is used by forming the key knob 14, the base portion 12B of the key body 12 in which the transmitting element 21 and the holder 91 are assembled is inserted into the mold, and the molten PVC is poured into the mold with pressure. The transmitting element 21 is heat-resistant and can thereby endure the heat at the temperature of 200°C, so that the transmitting element 21 has a heat-resistance enough to endure the heat-resin molding.

A description of the operation of the key 10 which has been constituted as described above will be given hereinafter.

When the key 10 is manufactured, the holder 91 and the transmitting element 21 are assembled in the base portion 12B of the key body 12 in the first place. Namely, the holder 91 is fitted into the recessed portion 12M of the base portion 12B, and the transmitting element 21 is inserted into the accommodation portion 92 of the holder 91 from the opening 92A. When the holder 91 has been fitted into the recessed portion 12M of the base portion 12B, the holder 91 is anchored to the key body 12 by the engagement of the projections 93 and the anchoring grooves 12N.

The key body 12 before molding which has been assembled as described above is set in the mold by inserting the key body 12 before molding into the mold from the base portion 12B side of the key body 12. Thereafter, the molten PVC (polychrolide vinyl) is poured into the mold with pressure, so that the resin heat-molding is effected. Since the holder 91 is anchored to the key body 12 by the engagement of the projections 93 and the anchoring grooves 12N, the holder 91 is prevented from being displaced from the key body 12 due to the pressure with which the molten is poured into the mold. Further, since the water pres-

sure acts on a direction in which the transmitting element 21 is pressed into the accommodation portion 92, the transmitting element 21 is prevented from falling off from the accommodation portion 92. The resin heat-molding is effected by lifting the key body 12 flatly or by lifting the base portion 12B side of the key body 12 upwardly. When the key body 12 is taken out from the mold, as shown in Fig. 67, the entire portion of the transmitting element 21 is embedded in the resin which forms the key knob 14, so that the key 10 is formed.

In the key 10 manufactured as described above, the transmitting element 21 which is embedded in the key knob 14 of the key 10 is disposed so as to be apart from the base portion 12B at a predetermined distance (a few millimeters) via the holder 91. Since resin enters into a space between the transmitting element 21 and the accommodation portion 92, the transmitting element 21 is securely fixed into the accommodation portion 92 without rattle.

According to the key 10 of the twentieth embodiment, since the transmitting element 21 is covered with resin by molding and embedded in the key knob 14, the transmitting element 21 is prevented from falling off from the key knob 14. Further, the transmitting element 21 which is covered with resin by molding is highly water proof, for example, even if the key is dropped into water, water does not enter into the key so that a malfunction of the transmitting element 21 can be prevented. Further, the transmitting element 21 is assembled in the key body 12 via the holder 91, the transmitting element 21 can be disposed at a desired position so as to be spaced apart from the key body 12B at a predetermined distance (a few millimeters), so that the electric wave transmitted by the transmitting element 21 is prevented from being interfered by the metal key body 12.

Moreover, similarly to the nineteenth embodiment, since the base portion 12B of the key body 12 is formed into a substantially U-shaped configuration, the transmitting element 21 is accommodated into the recessed portion 12M at the base end portion thereof, the key nob 14 is not distorted during the rotating operation of the key 10, the application of the load to the transmitting element 21 can be prevented. The key knob 14 can be made compact to the same degree as a key knob in which a transmitting element is not embedded. The holder 91 is anchored to the key body 12 by the engagement of the projections 93 and the anchoring grooves 12N, so that the holder 91 is prevented from being displaced from the key body 12 by the water pressure during resin molding.

While preferred embodiments of the present invention has been described, it is to be understood that the present invention may be constituted as will be described hereinafter without departing from the scope and spirit of the invention.

The configuration of the base portion 12B, the key body 12, or the holder 91 can properly be changed in conformity with the configuration of the design of the key knob 14. For example, as shown in Fig. 73, when a single insertion hole 15A for the attachment of a key ring is formed in the key knob 14, the configuration of the base portion 12B of the key body 12 or the holder 91 can be changed into that shown in Figs. 71 and 72. Namely, as shown in Figs. 71 and 72, a recessed portion 12P as a space for forming the insertion holed 15A therein is provided in one of two extending portions of the substantially U-shaped base portion 12B, which is provided at a side facing the insertion hole 15A (i.e. at the upper side in Fig. 72). Further, a recessed portion 94 is formed in the holder 91 at a position corresponding to the insertion hole 15A.

The nineteenth embodiment may be constituted such that an opening which communicates with the accommodation portion 19 is formed in a flat portion side of the key knob 14 from which the transmitting element 21 may be inserted.

Both the nineteenth embodiment and the twentieth embodiment may be constituted such that each of the recessed portions 12L and 12M is formed at the base portion side of the base portion 12B and has an opening. However, the opening of the recessed portion 12L or 12M which is formed at the base portion and accommodates a transmitting element can be positioned properly. For example, the recessed portion having an opening is formed at the side edge portion of the base portion (i.e., the upper portion or the lower portion of the base portion in Figs. 64 and 67) from which the transmitting element may be inserted.

In the twentieth embodiment, the holder 91 may be inserted from the thickness direction with respect to the base portion of the key body. In this case, even if the recessed portion 12M has a configuration which becomes narrower at the opening portion thereof, the holder 91 can be inserted.

In the present embodiment, the holder and the transmitting element can be manufactured not separately but integrally. In this case, the assembling of the transmitting element in the key body can be more facilitated.

In the present embodiment, when the transmitting element is assembled in the key body, the transmitting element may simply be inserted into the holder which has been formed onto the base portion of the key body by molding in advance.

The materials of the holder portion and the protector portion are not limited to those in the above embodiments. Accordingly, the materials may optionally be replaced by other materials such as hydrocarbon resins including polyethylene (PE), polypropylene (PP), acrylnitrile-butadiene-stylene copolymer (ABS) and the like, acrylic resins, halogen containing resins including fluorine resin (TFE) and the like, polyether resins, amino resins including urea resin (UF), melamine resin (MF),and the like, polyester resins including polyethylenetelephthalate (PET), polycarbonate (PC), and the like, polyamide resins including nylon (PA) and the like, polyurethane resins including polyurethane (PUR) and the like, phenol resins, epoxy resins, cellulose resins

including acetyl-cellulose resin (CA), acetyl-butyril-cellulose resin (CAB) and the like, and protein resins including casein resin (CS) and the like.

Placticizers can optionally be added to the resin such as PVC which forms the protector portion 15 so that rubber-resilience is added to the key knob 14 and the touch feel of the key knob 14 is improved.

The present invention may be constituted such that a magnetic force generating apparatus and a receiving apparatus are disposed at the key cylinder side of a vehicle door to effect an unlocking of the door lock by an electronic locking mechanism due to the ID code transmitted from the key 10.

The present invention may be applied to a key with a built-in transmitting element other than an ignition key of a vehicle. For example, door key which transmits ID code for identifying residents of a apartment building or a locker key or the like which transmits a specified pass word number code.

A transmitting element which is embedded in a key knob of a key with a built-in transmitting element according to the present invention, is not limited to a transmitting element such as a transmitting element or the like, and various kinds of transmitting elements may be embedded in the key knob.

A description of a technical spirit of the present invention which is embodied in the twentieth embodiment but is not described in the appended claims will be given hereinafter together with the effect of the present invention.

According to claim 19, a pawl portion is formed at said spacing member and an anchoring groove is formed in said base portion at a position corresponding to the pawl portion, so that said spacing member can be anchored to said base portion at a predetermined position thereof by the engagement of said anchoring pawl and said anchoring groove. According to the above constitution, since the spacing member is anchored to the base portion at a predetermined position thereof in which the transmitting element can be disposed to be spaced apart from the base portion at a predetermined distance by the engagement of the anchoring pawl and the anchoring groove, the transmitting element is prevented from being displaced, even if the transmitting element is subjected to a pressure due to the poured molten during resin molding.

Claims

1. A key with a built-in transmitting element in which a transmitting element is embedded in a key body having an insertion portion, comprising:

   a holding member in which the transmitting element is integrally held by insert-molding;
   a mounting member for mounting said holding member to the key body; and
   an outer soft skin formed onto said holding member and the key body.

2. A key with a built-in transmitting element in which a transmitting element is embedded in a key body having an insertion portion, comprising:

   a holding member in which the transmitting element is integrally held by insert-molding;
   a mounting member which engages said holding member with a base portion of the key body to hold the transmitting element in the key body; and
   an outer soft skin formed onto said holding member and the key body.

3. A key with a built-in transmitting element, comprising:

   a transmitting element;
   a supporting member for supporting said transmitting element into a key body; and
   an outer soft skin which is formed onto said transmitting element and the key body to fix said transmitting element in the key body.

4. A key with a built-in transmitting element, comprising:

   a transmitting element;
   a supporting member in which said transmitting element is adhered to a base portion of a key body; and
   an outer soft skin which is formed onto said transmitting element and the key body to fix said transmitting element in the key body.

5. A key with a built-in transmitting element, comprising:

   a transmitting element;
   a supporting member into which said transmitting element is accommodated and which is mounted in a base portion of a key body; and
   an outer soft skin which is formed onto said supporting member and the key body to fix said transmitting element into the key body.

6. A key with a built-in transmitting element, comprising:

   a metal key body;
   a hard resin which is provided on a portion of said key body by insert-molding;
   an accommodation portion which is formed in a portion of said hard resin;
   a transmitting element which is accommodated into said accommodation portion; and
   a cap member which closes an opening portion of said accommodation portion.

7. A key with a built-in transmitting element, compris-

ing:

a metal key body;
a hard resin which is provided on a portion of said key body by insert-molding;
an accommodation portion which is formed in a portion of said hard resin; and
a cap member into which a transmitting element is accommodated and which closes said accommodation portion.

8. A key with a built-in transmitting element, comprising:

a metal key body;
a hard resin which is connected with a portion of said key body;
an outer soft skin which is formed onto said hard resin;
an accommodation recessed portion which is formed into said hard resin via said outer soft skin;
a transmitting element which is inserted into said accommodation recessed portion; and
an ornament member which closes an opening portion of said accommodation recessed portion.

9. A key with a built-in transmitting element, comprising:

a metal key body;
a hard resin which is connected with a portion of said key body;
an outer soft skin which is formed onto said hard resin;
an accommodation recessed portion which is formed into said hard resin via said outer soft skin;
a transmitting element which is inserted into said accommodation recessed portion; and
a cap member which closes an opening portion of said accommodation recessed portion.

10. A key with a built-in transmitting element, comprising:

a plate-shaped metal key body; and
an ornament member which is mounted to one side surface of the key body and into which a transmitting element is held.

11. A key with a built-in transmitting element, wherein a base portion of a key body and a transmitting element are inserted into a container-shaped holder and are covered with resin by insert-molding so as to form a grip portion.

12. A key with a built-in transmitting element according to claim 11, wherein the base portion of the key body and the transmitting element are inserted into the holder from a direction opposing the direction in which resin is injected into the resin mold.

13. A key with a built-in transmitting element according to claim 11, wherein the holder includes a cap which closes an insertion opening portion of said holder into which the base portion of the key body and the transmitting element have been inserted.

14. A key with a built-in transmitting element according to claim 13, wherein the key body includes a pressing portion which presses the cap which has closed the insertion opening portion of the holder.

15. A key with a built-in transmitting element in which resin is molded so as to form a grip portion in a state in which a recessed portion for accommodating a transmitting element is formed at a base portion of a key body onto which the resin is molded in the configuration of the grip portion, an accommodation portion is formed at a position corresponding to the recessed portion of the base portion of the key body, and an opening is provided at the accommodation portion which is allowed to communicate with an outside thereof, the opening being closed by a closing member being fitted into the opening in a state in which the transmitting element inserted from the opening has been accommodated into the accommodation portion.

16. A key with a built-in transmitting element according to claim 15, wherein said accommodation portion is provided such, that said transmitting element which is accommodated into said accommodation portion can be disposed to be spaced apart from said key body at a predetermined distance.

17. A key with a built-in transmitting element, wherein a recessed portion for accommodating a transmitting element is formed at a base portion of a key body onto which resin is molded in the configuration of a grip portion in a state in which the transmitting element has been disposed in the recessed portion of the base portion of the key body and the grip portion is formed by molding resin onto the base portion accommodating the transmitting element.

18. A key with a built-in transmitting element according to claim 17, wherein said transmitting element is disposed in the recessed portion of the base portion of the key body via a spacing member such that said transmitting element is disposed to be spaced apart from said key body at a predetermined distance.

19. A key body in which a recessed portion for accommodating a transmitting element is formed in a base

portion of a key body onto which resin is molded in a configuration of a grip portion.

FIG. 1

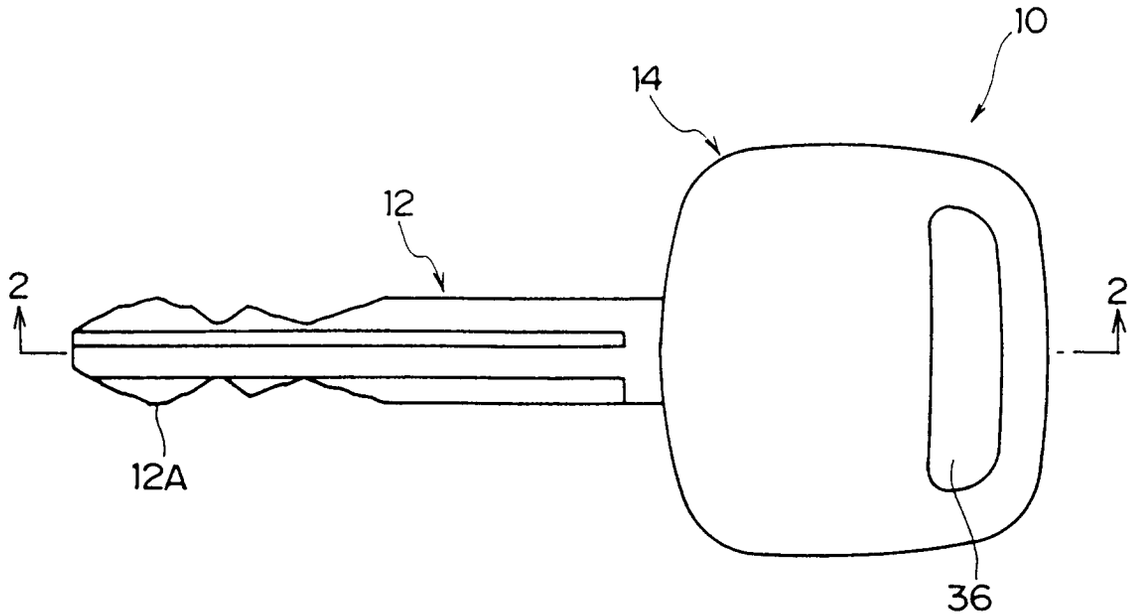

FIG. 2

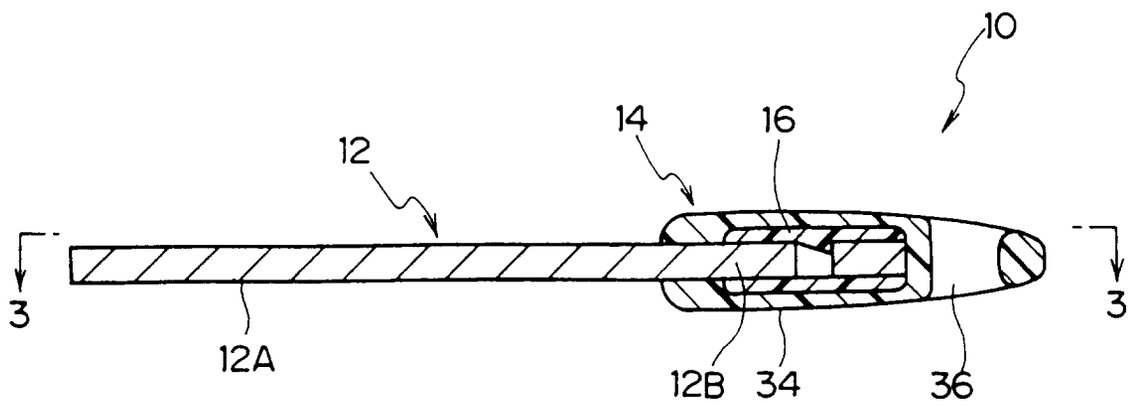

FIG. 3

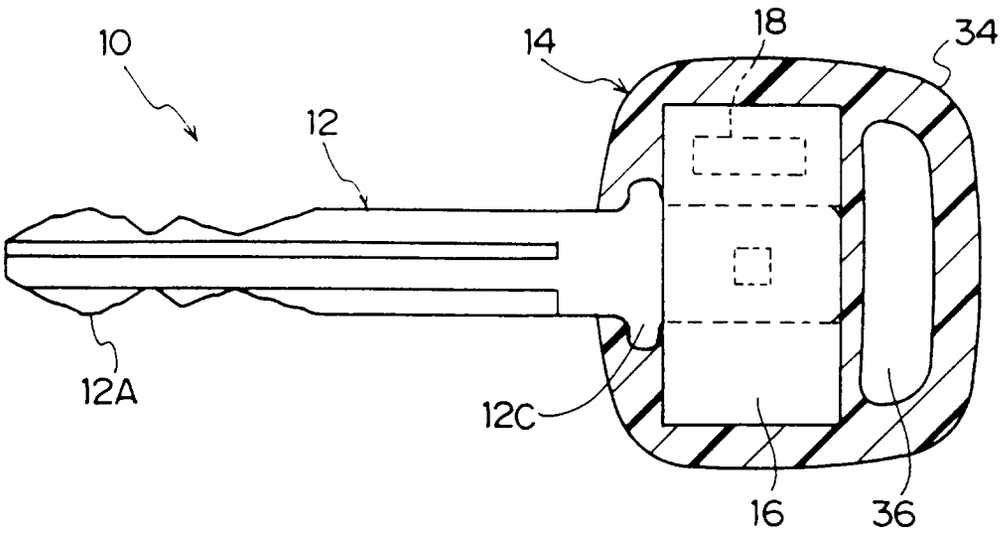
10
14
18
34
12
12A
12C
16
36

FIG. 4

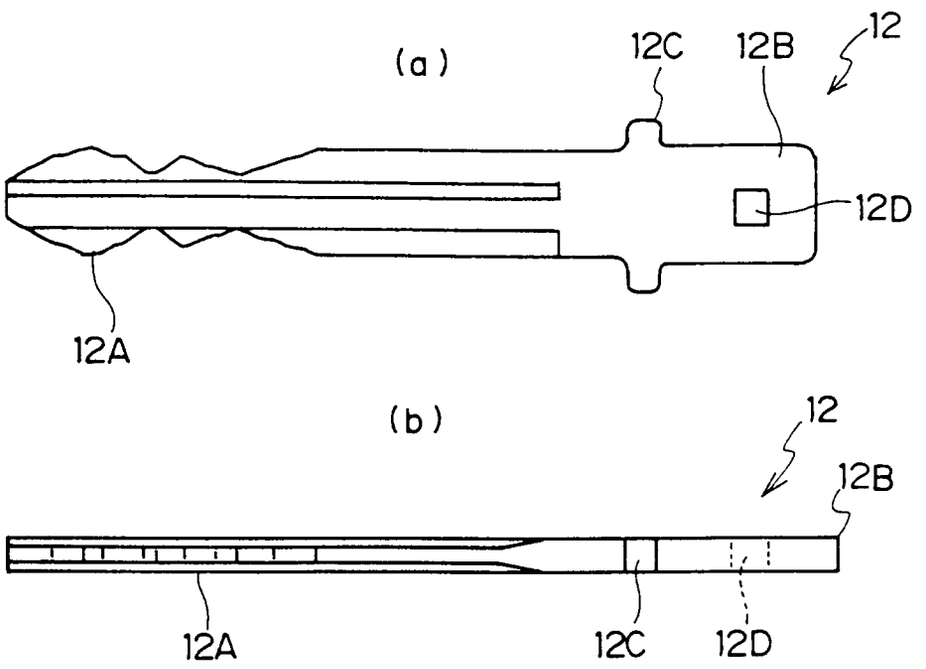
(a)
12C
12B
12
12D
12A
(b)
12
12B
12A
12C
12D

FIG. 5

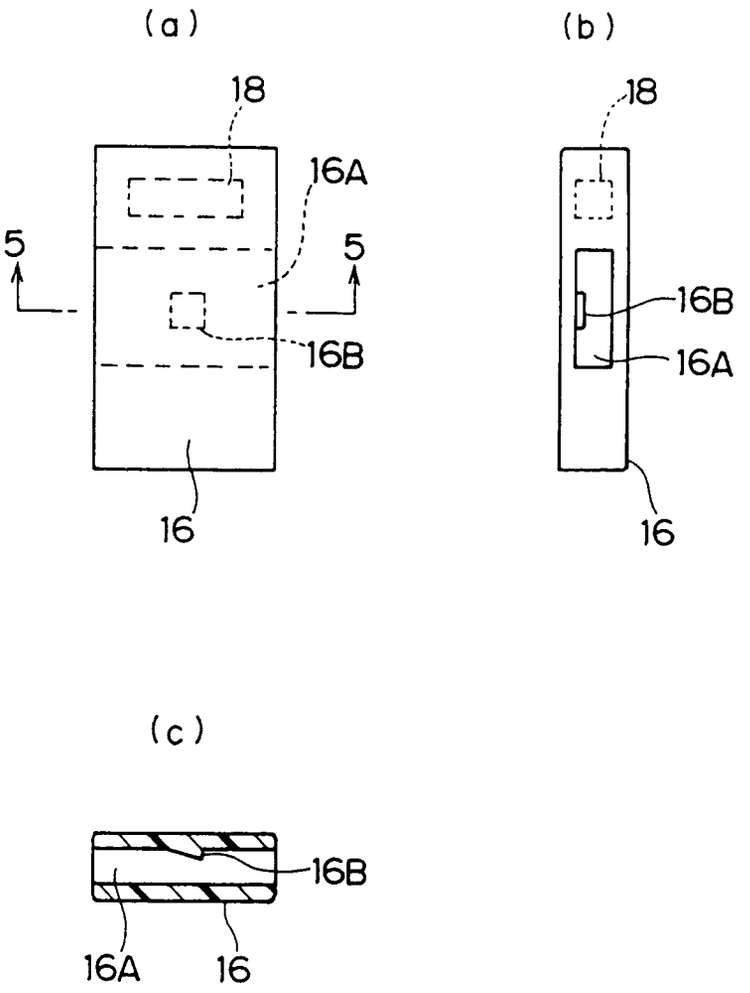

FIG. 6

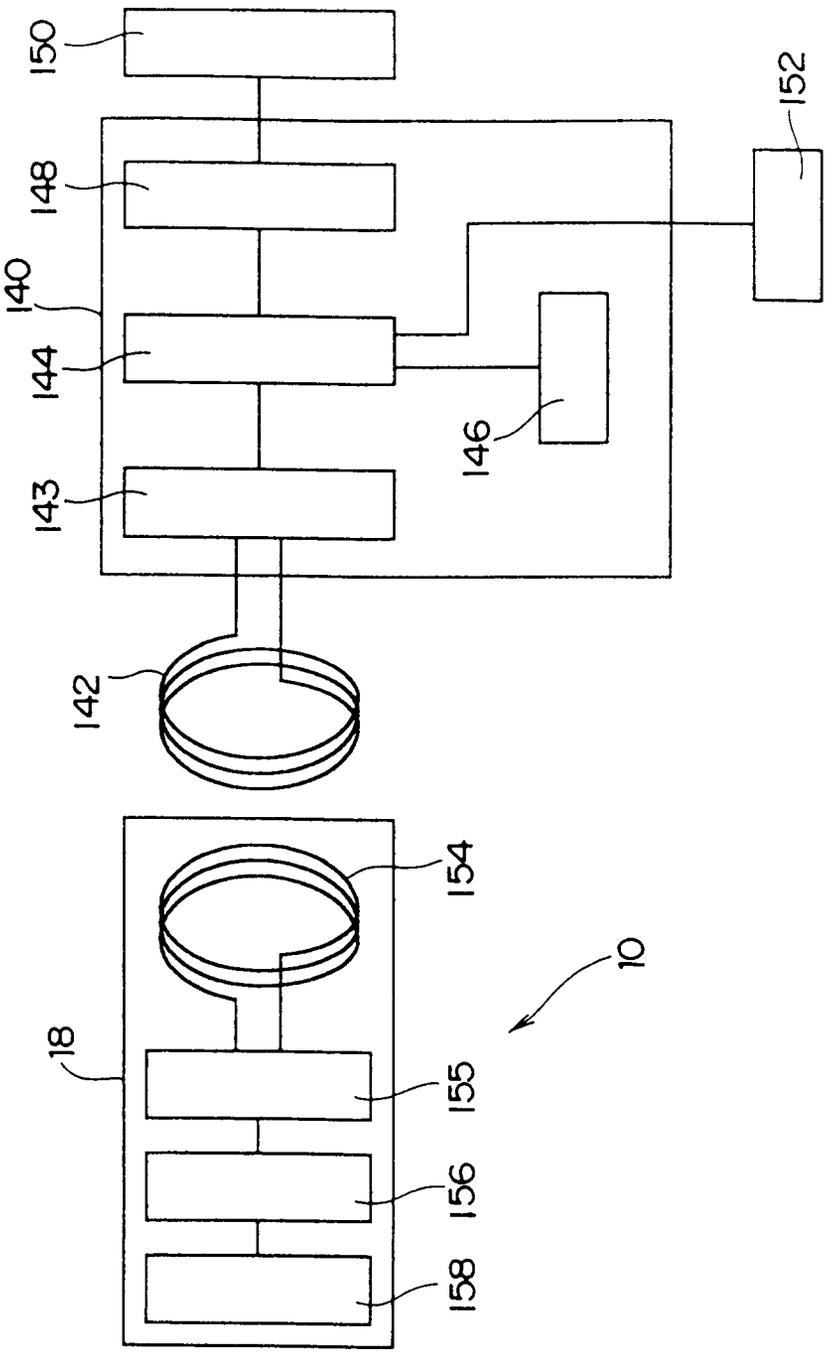

FIG. 7

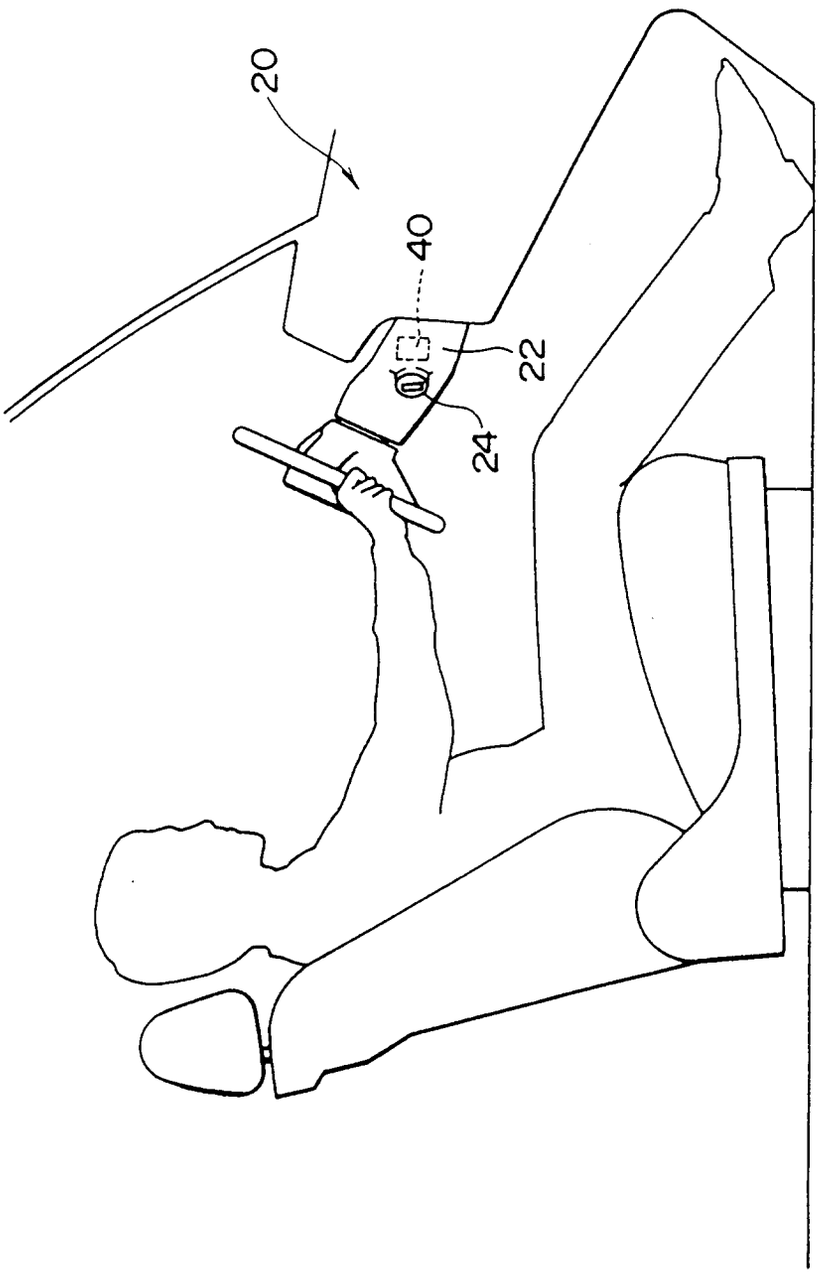

FIG. 8

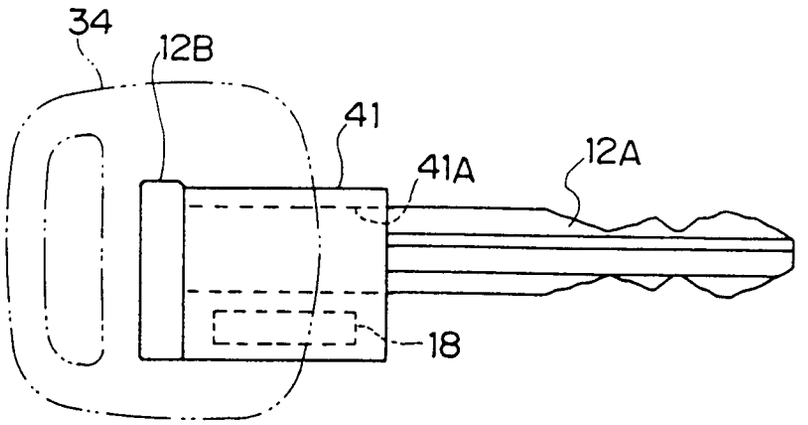

FIG. 9

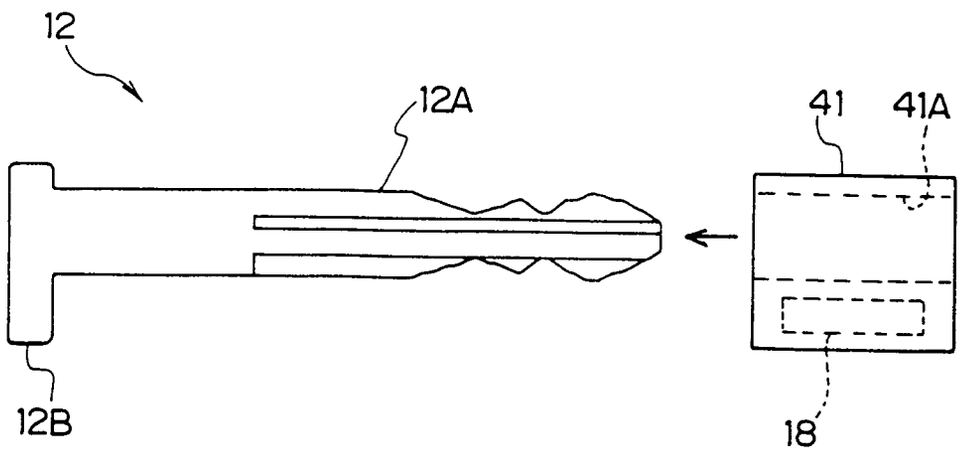

FIG. 10

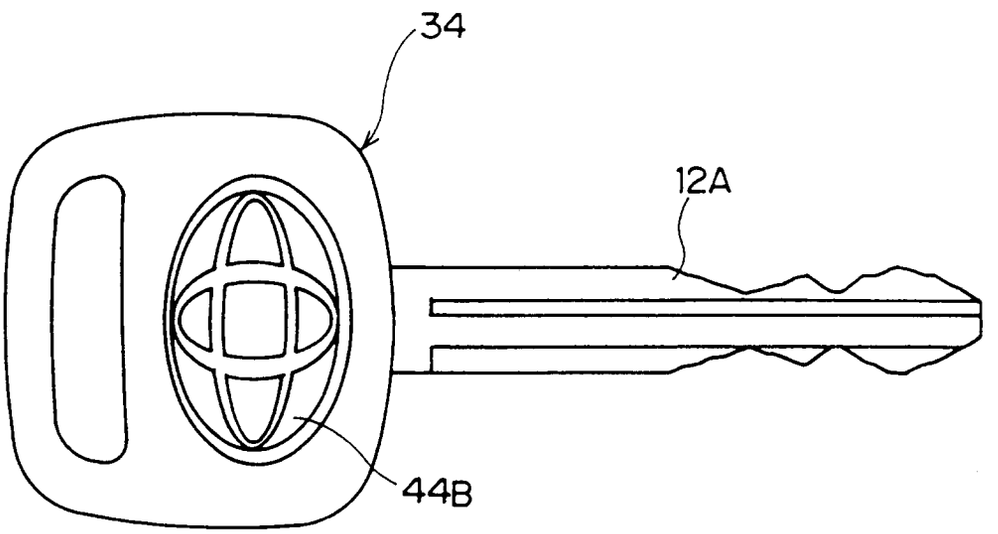

FIG. 11

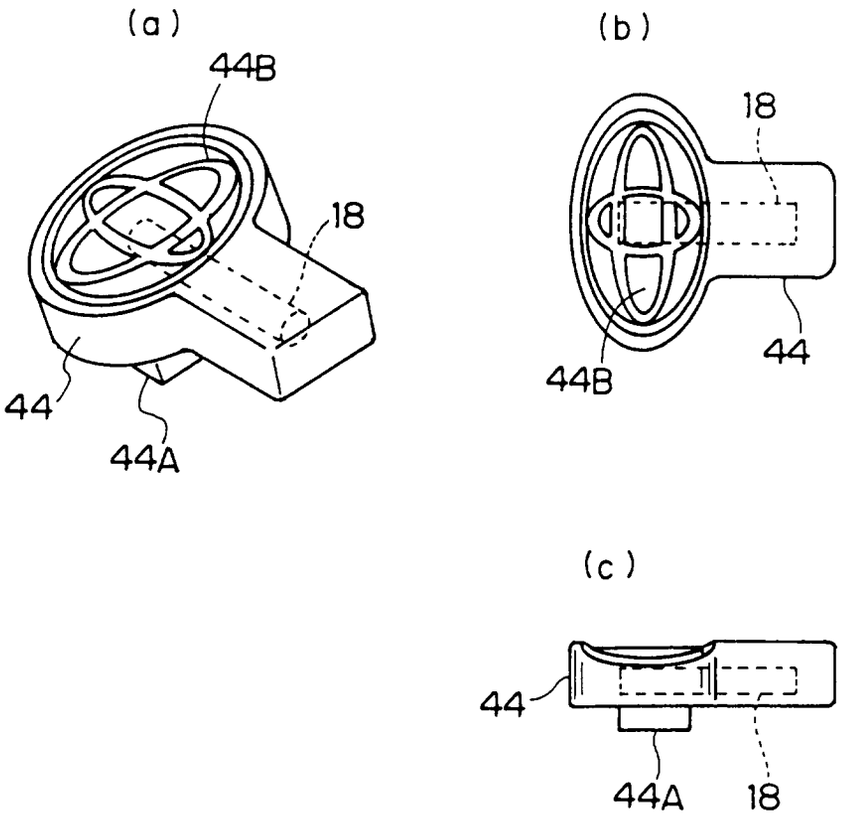

FIG. 12

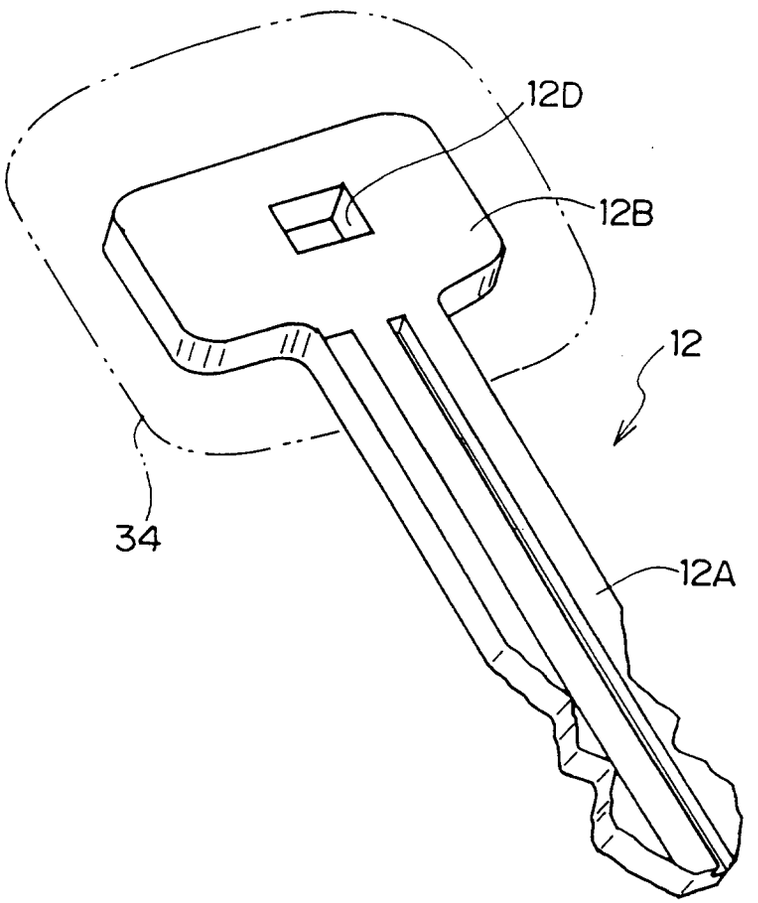

FIG. 13

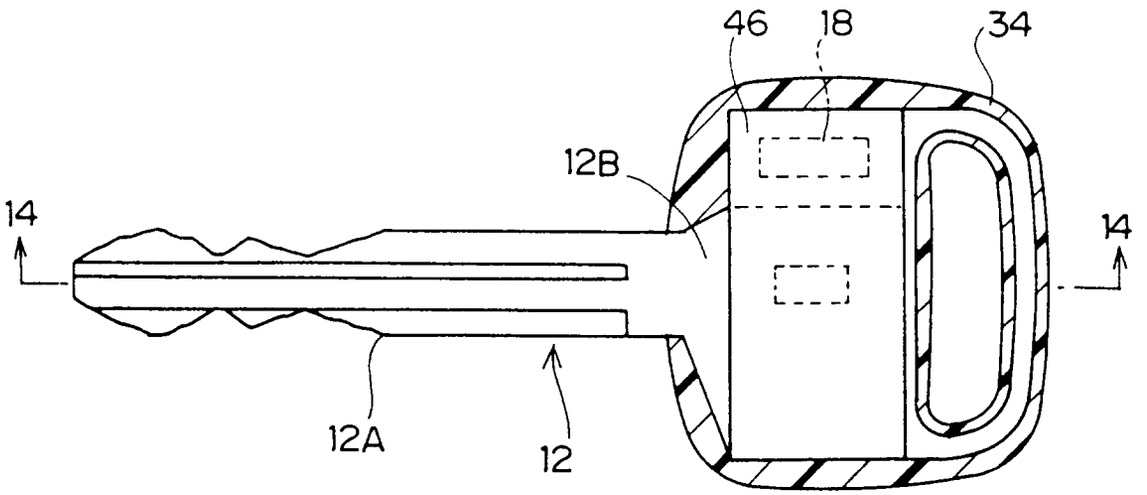

FIG. 14

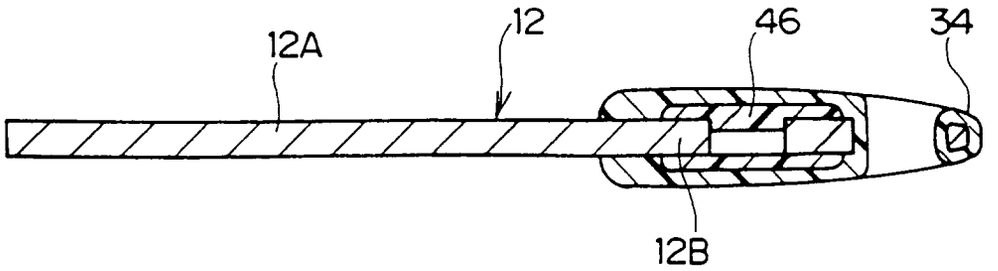

FIG. 15

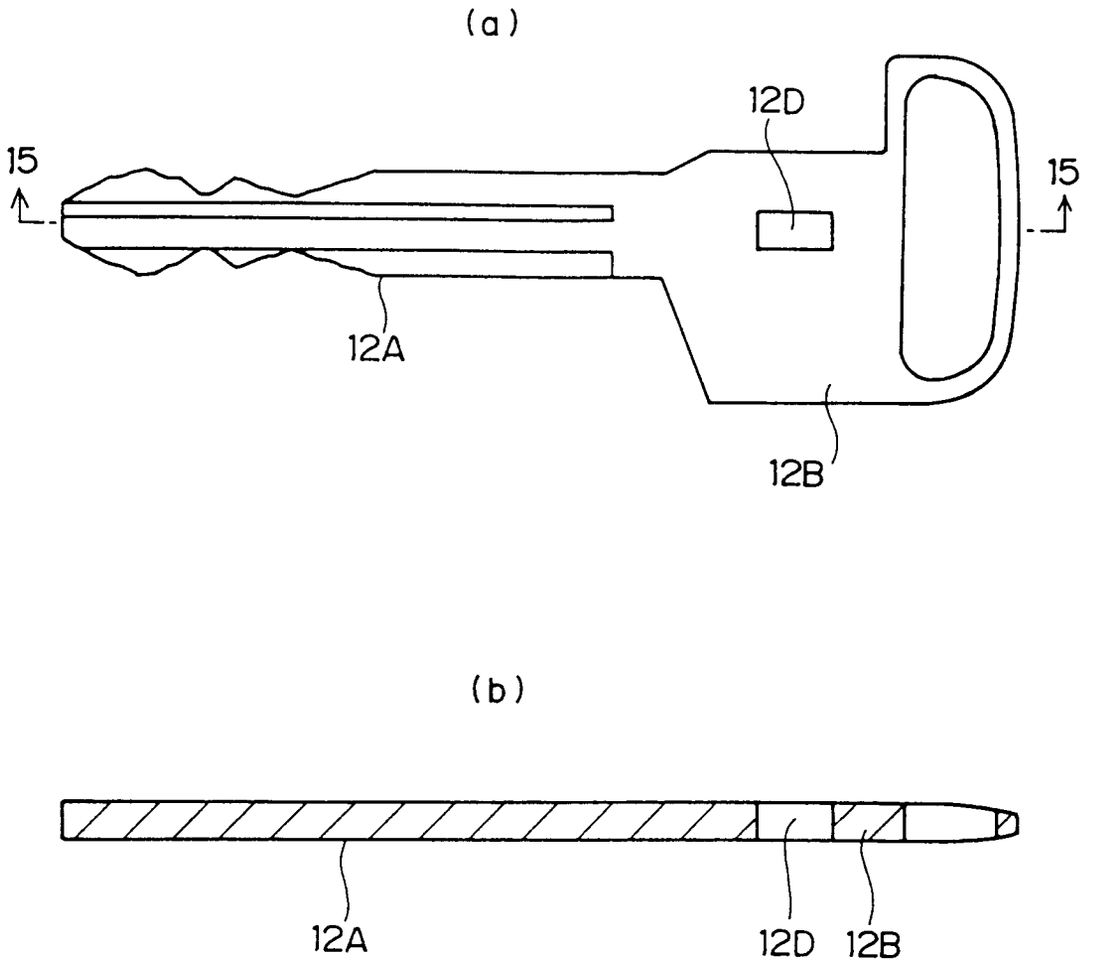

FIG. 16

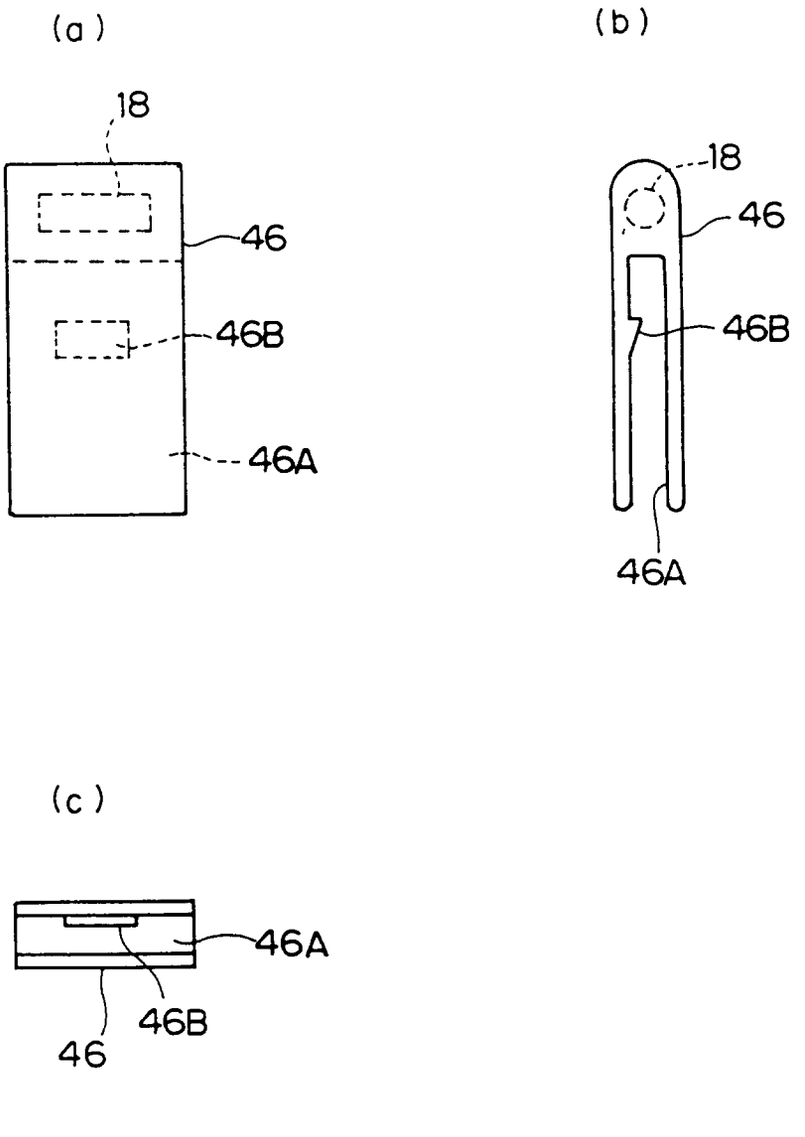

FIG. 17

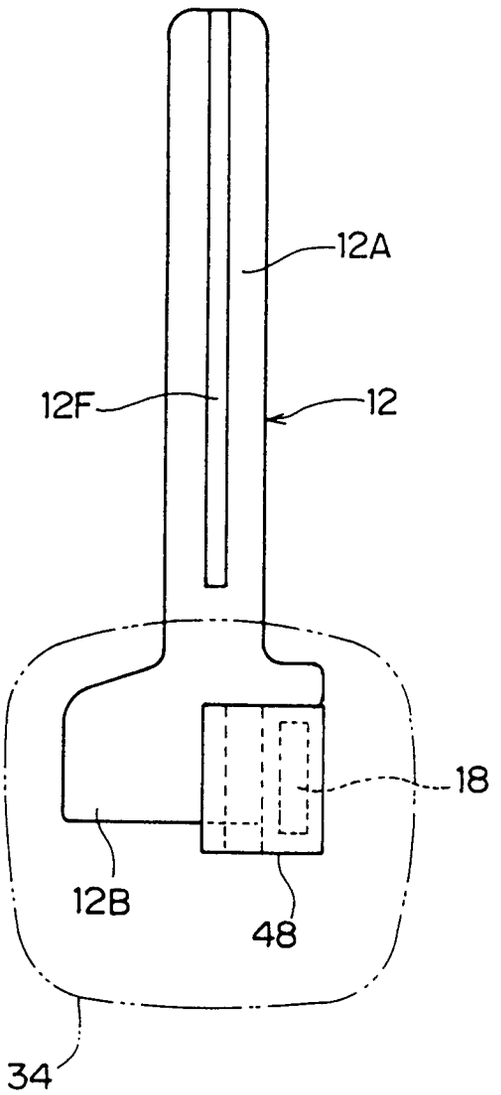

FIG. 18

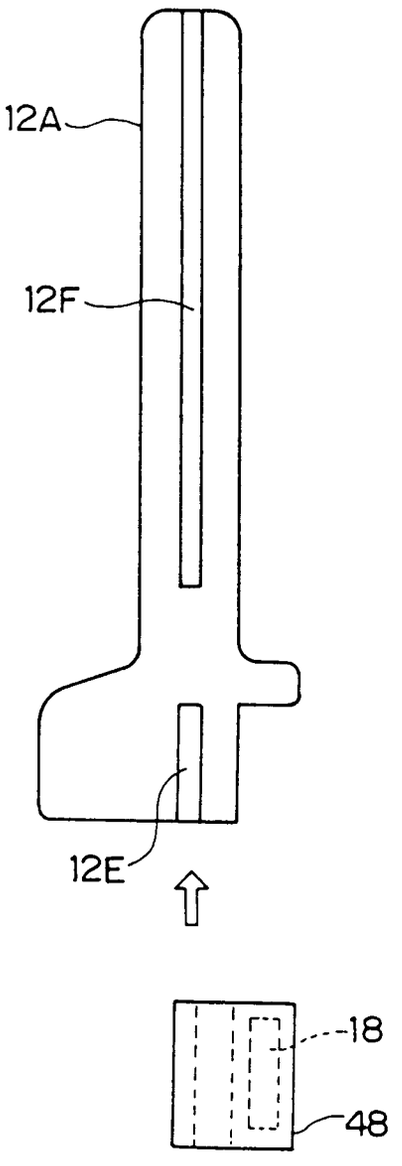

FIG. 19

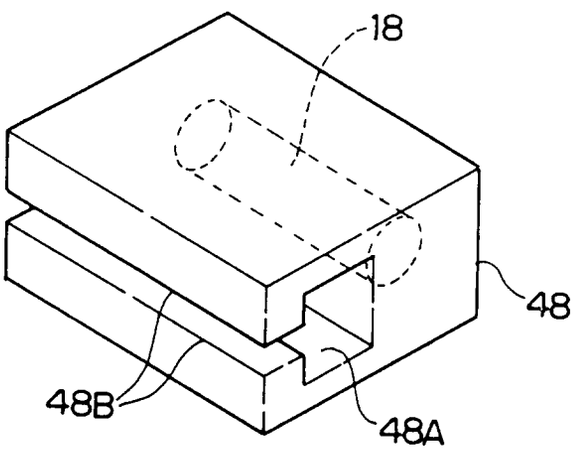

FIG. 20

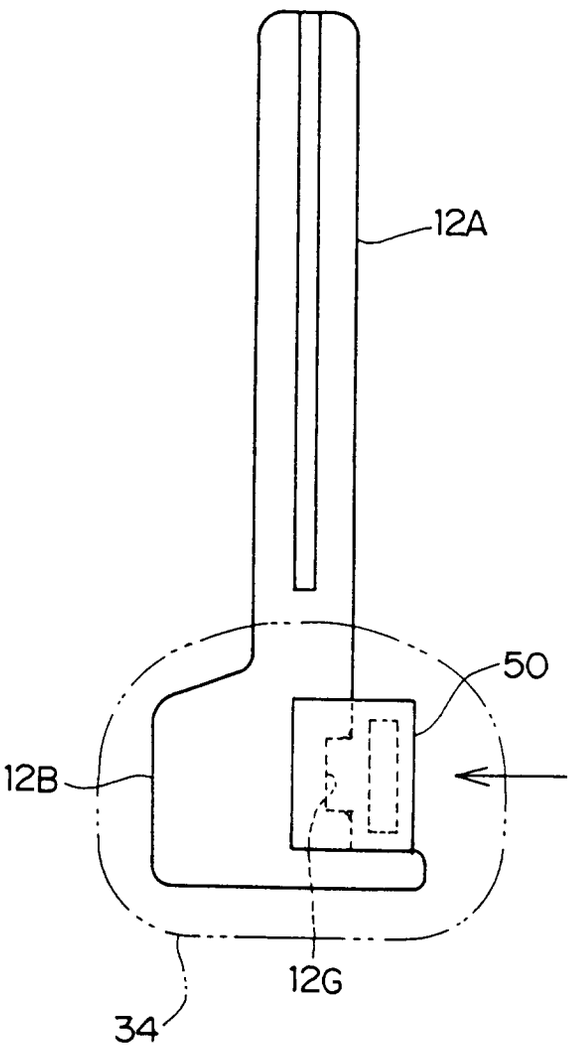

FIG. 21

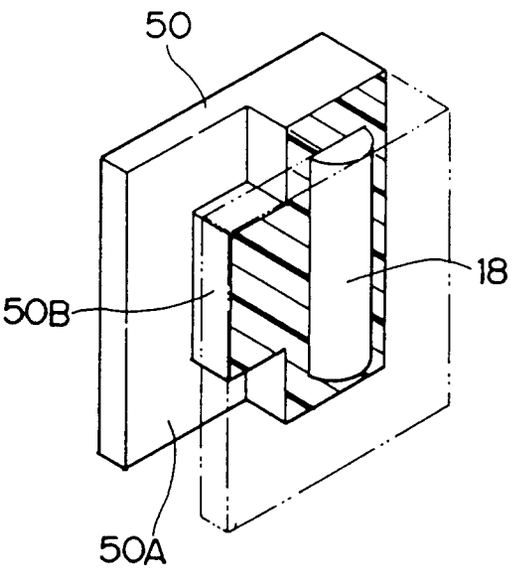

FIG. 22

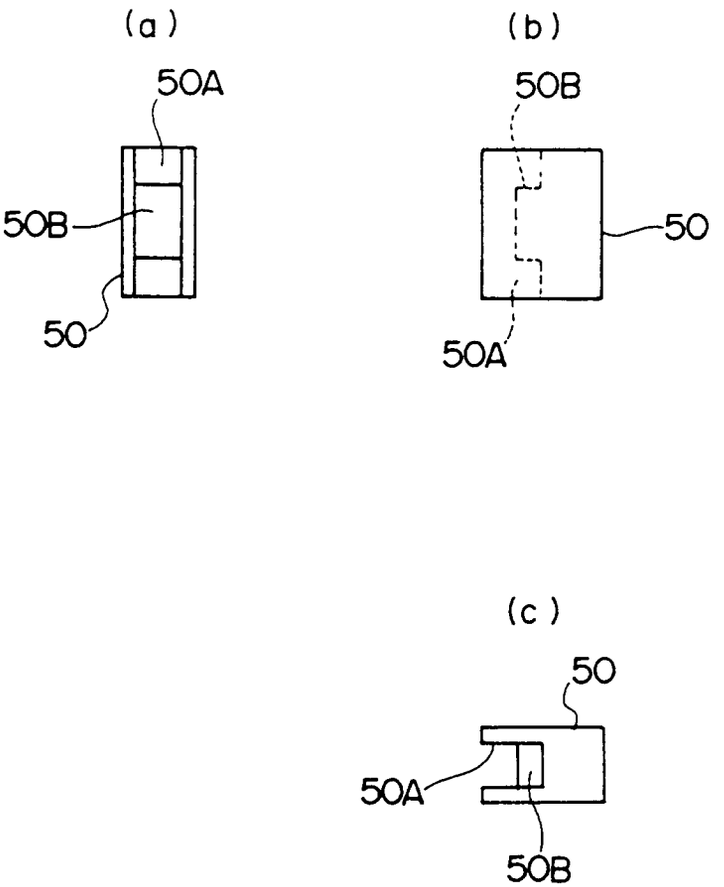

FIG. 23

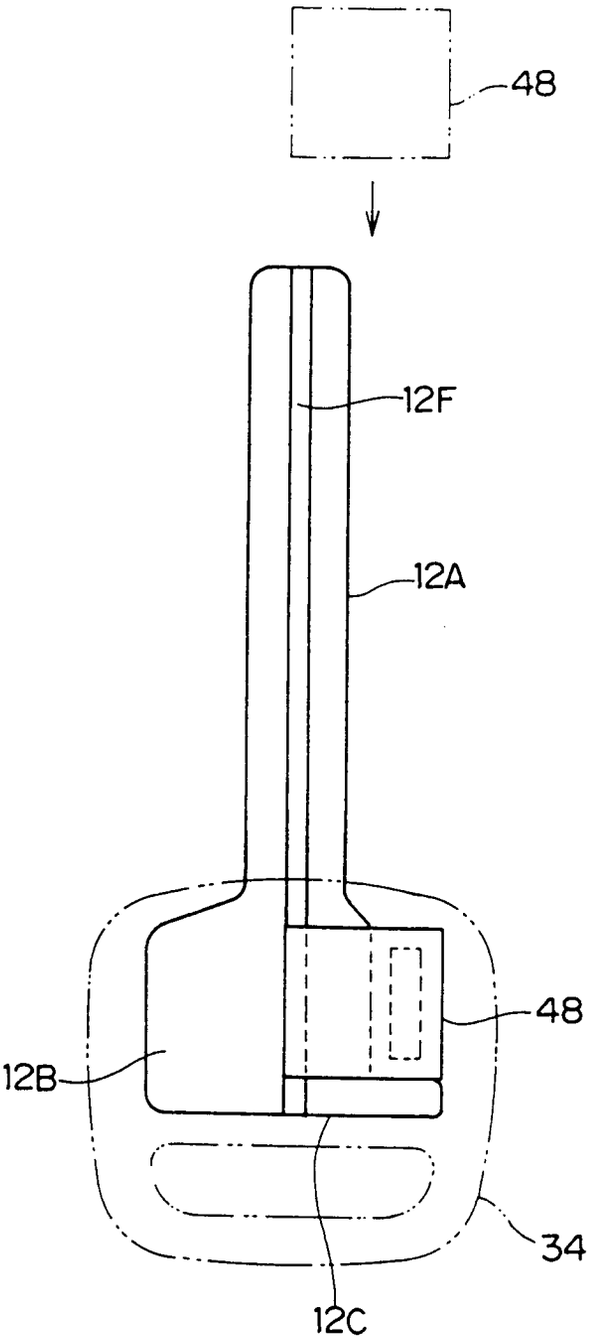

FIG. 24

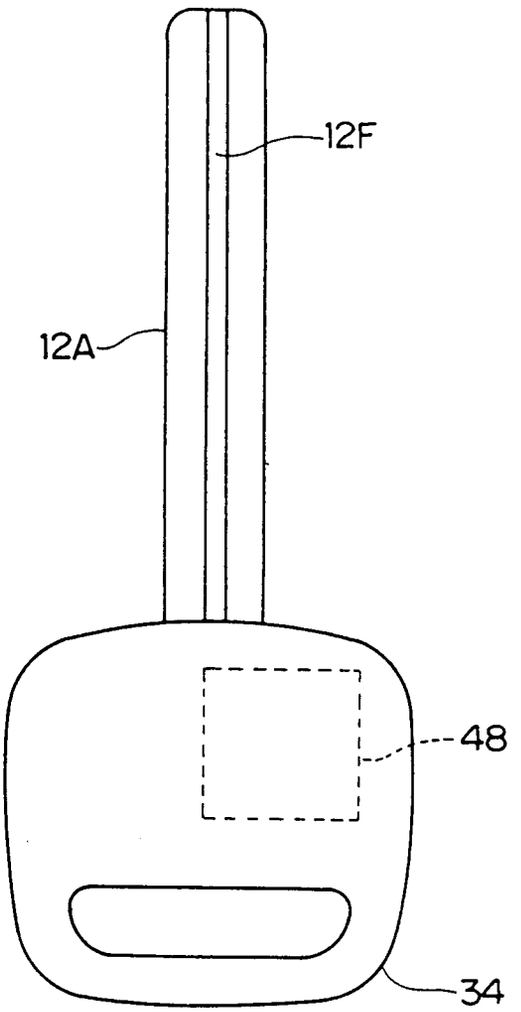

FIG. 25

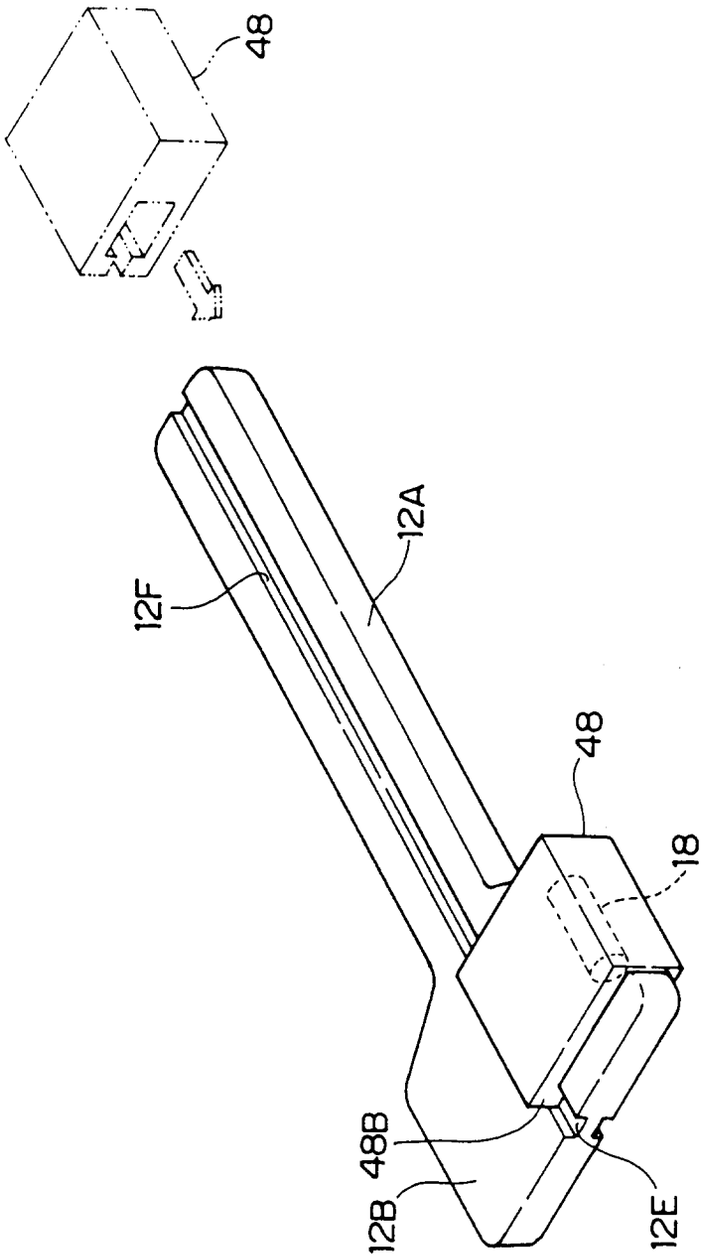

FIG. 26

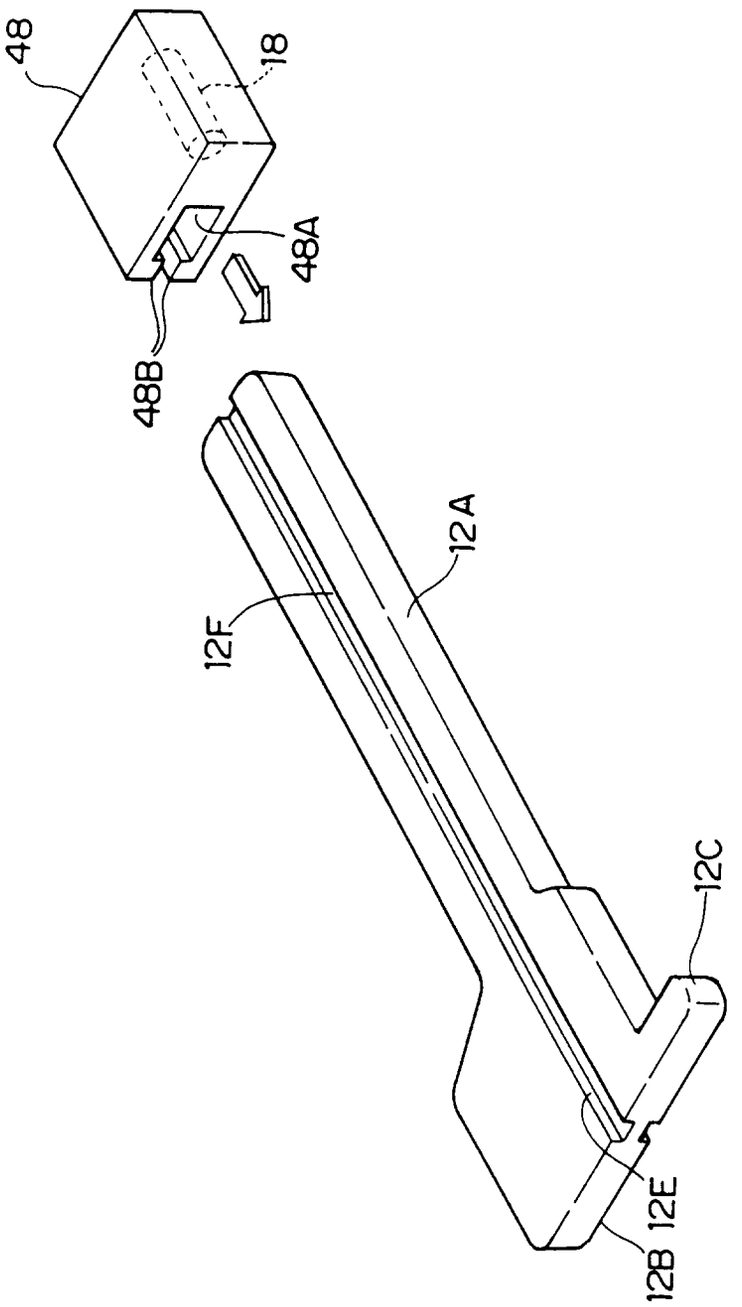

FIG. 27

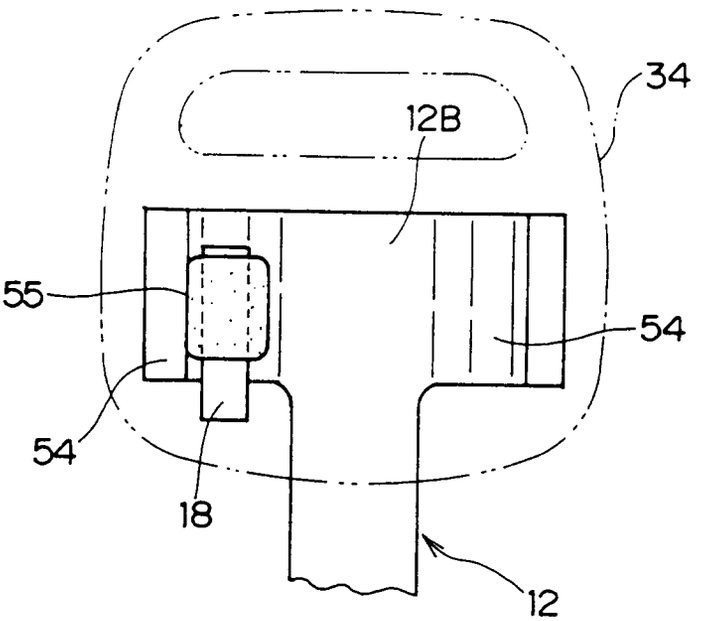

FIG. 28

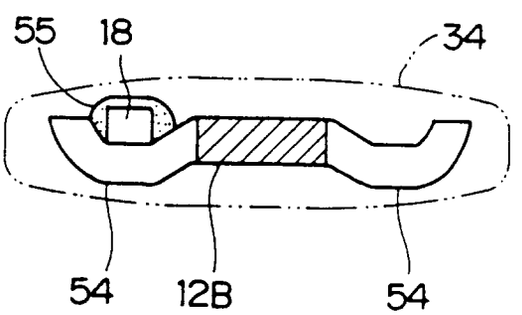

FIG. 29

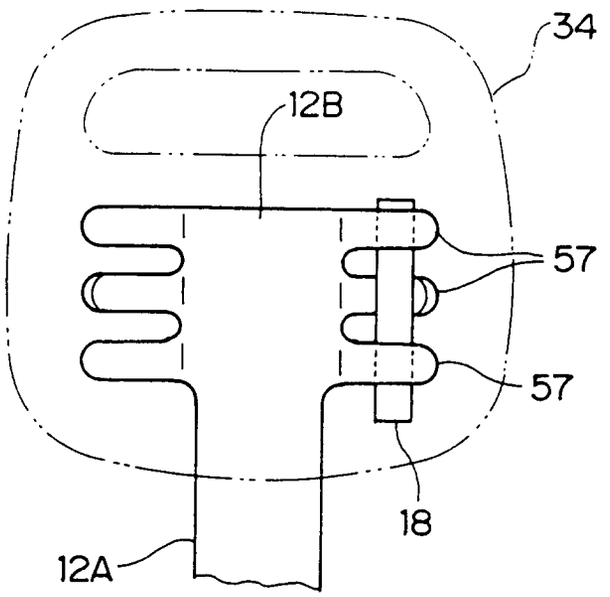

FIG. 30

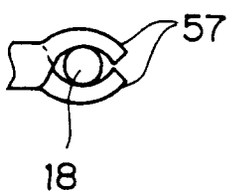

FIG. 31

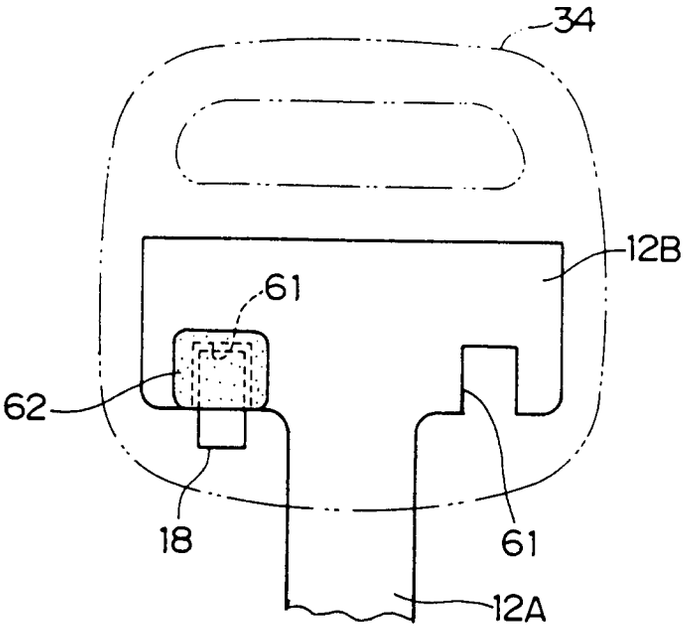

FIG. 32

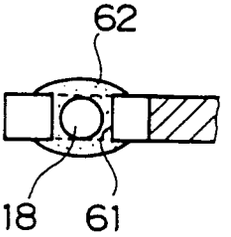

FIG. 33

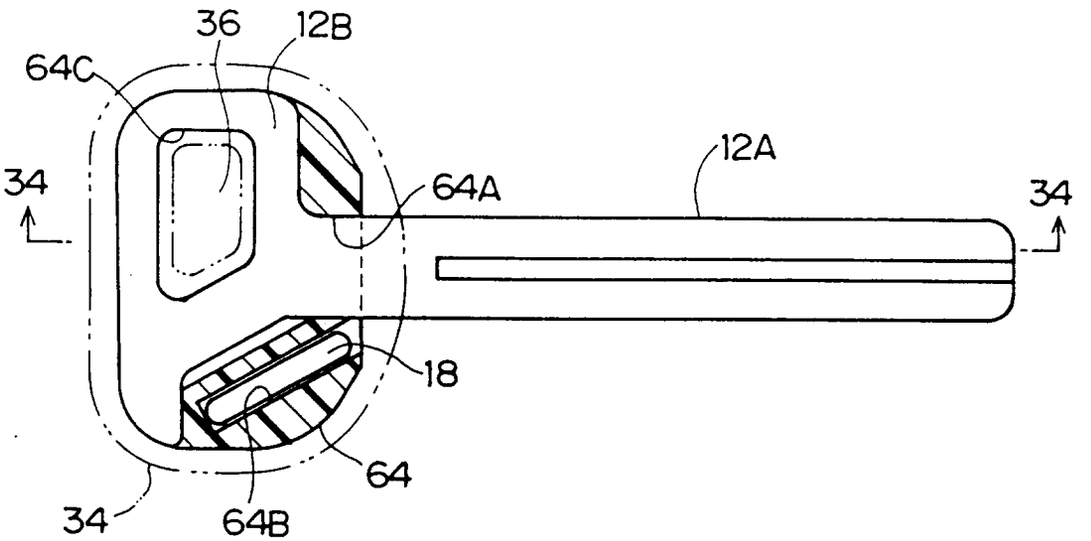

FIG. 34

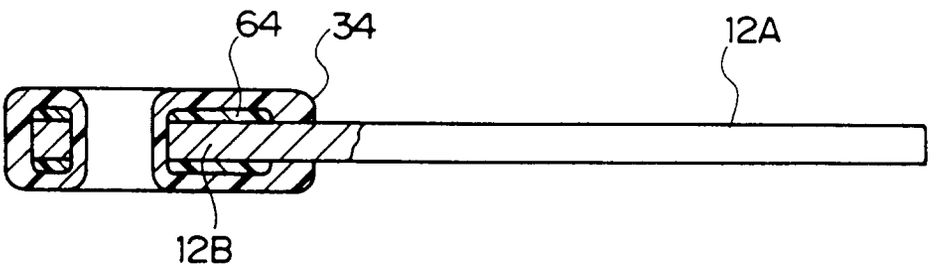

FIG. 35

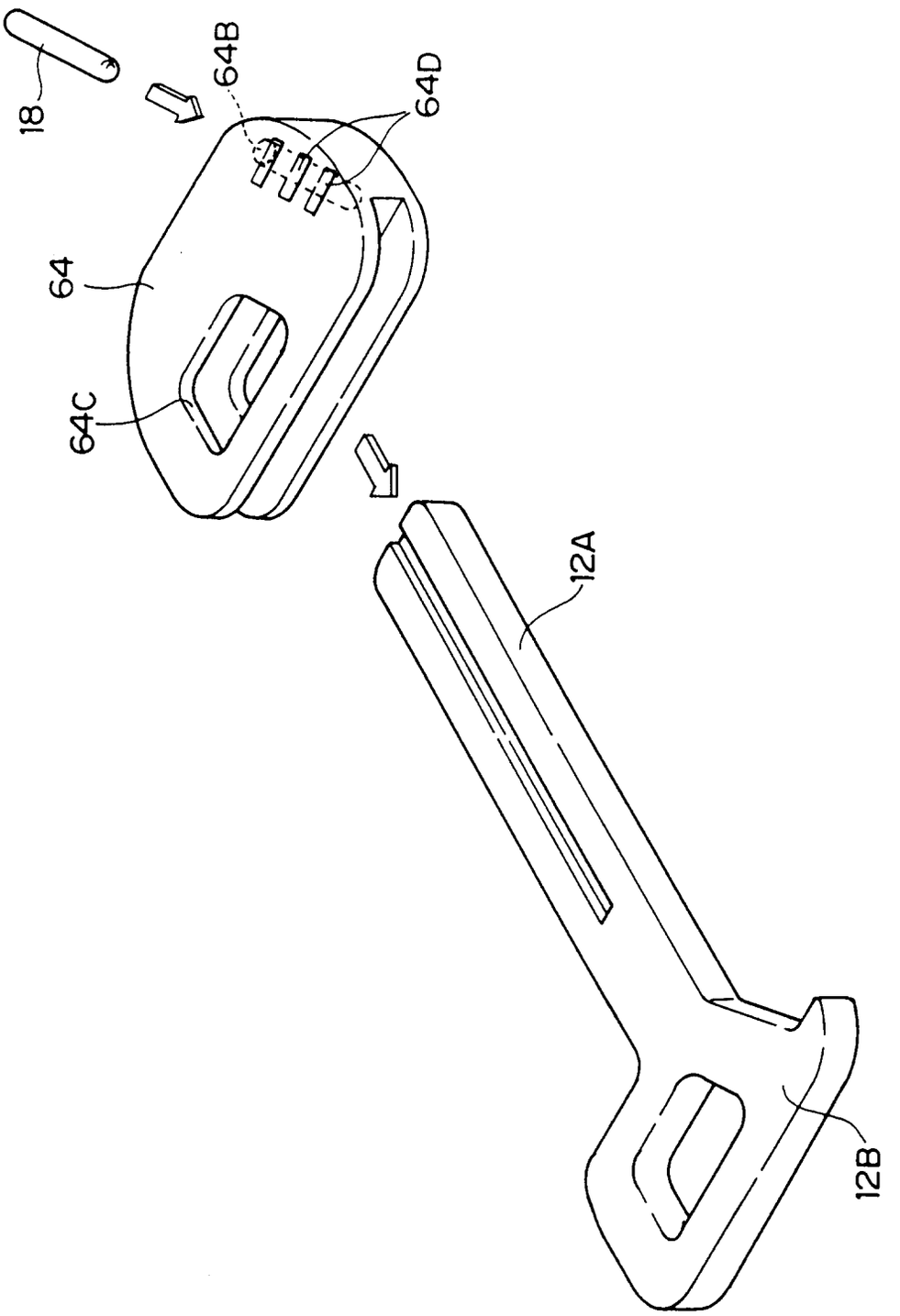

FIG. 36

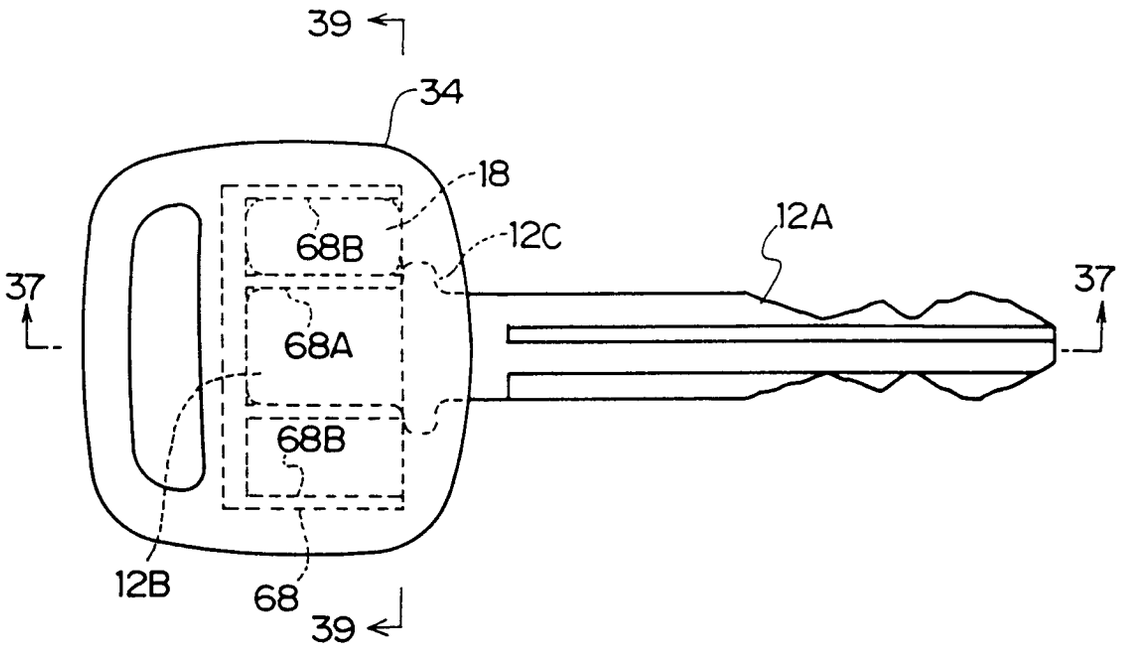

FIG. 37

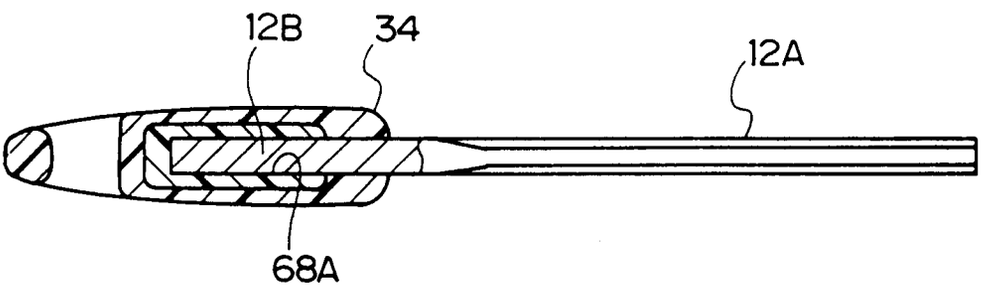

FIG. 38

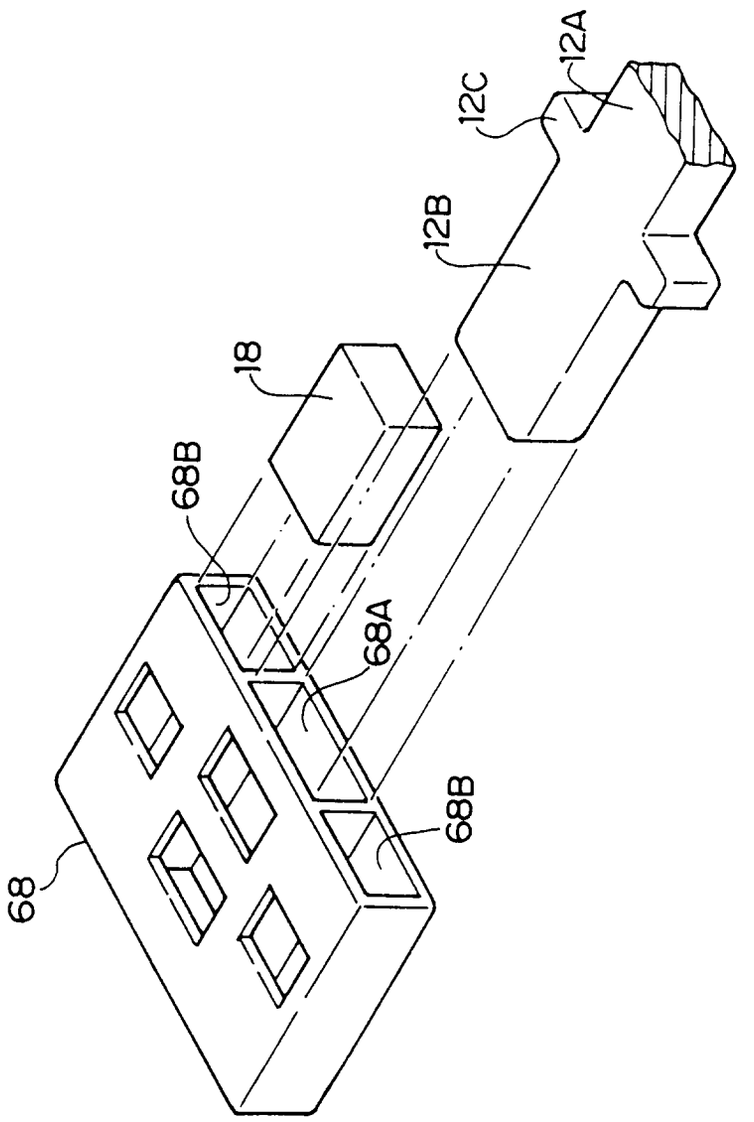

FIG. 39

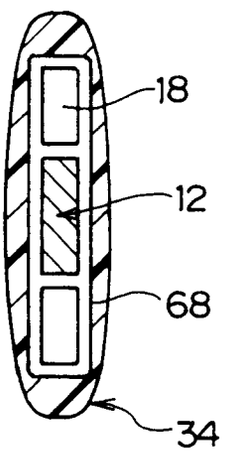

FIG. 40

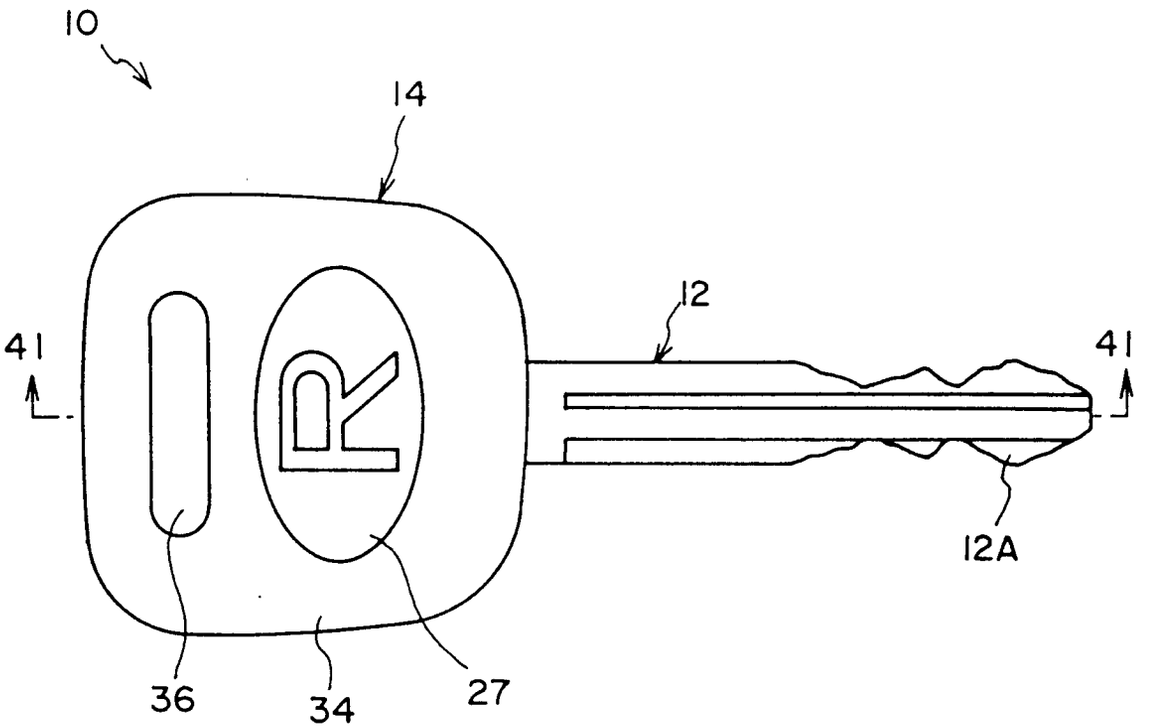

FIG. 41

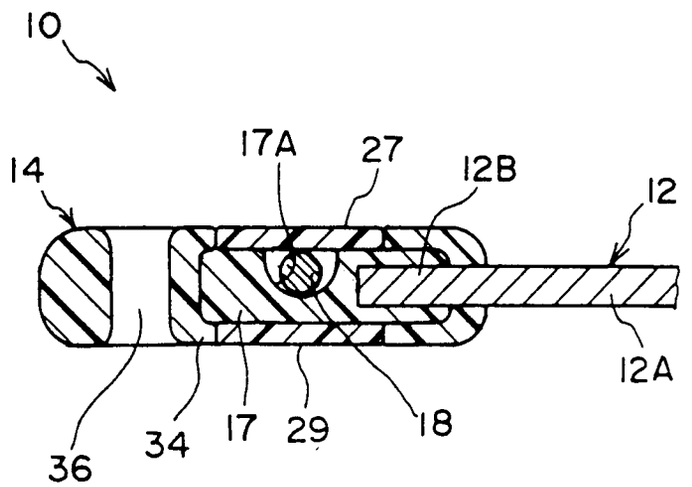

FIG. 42

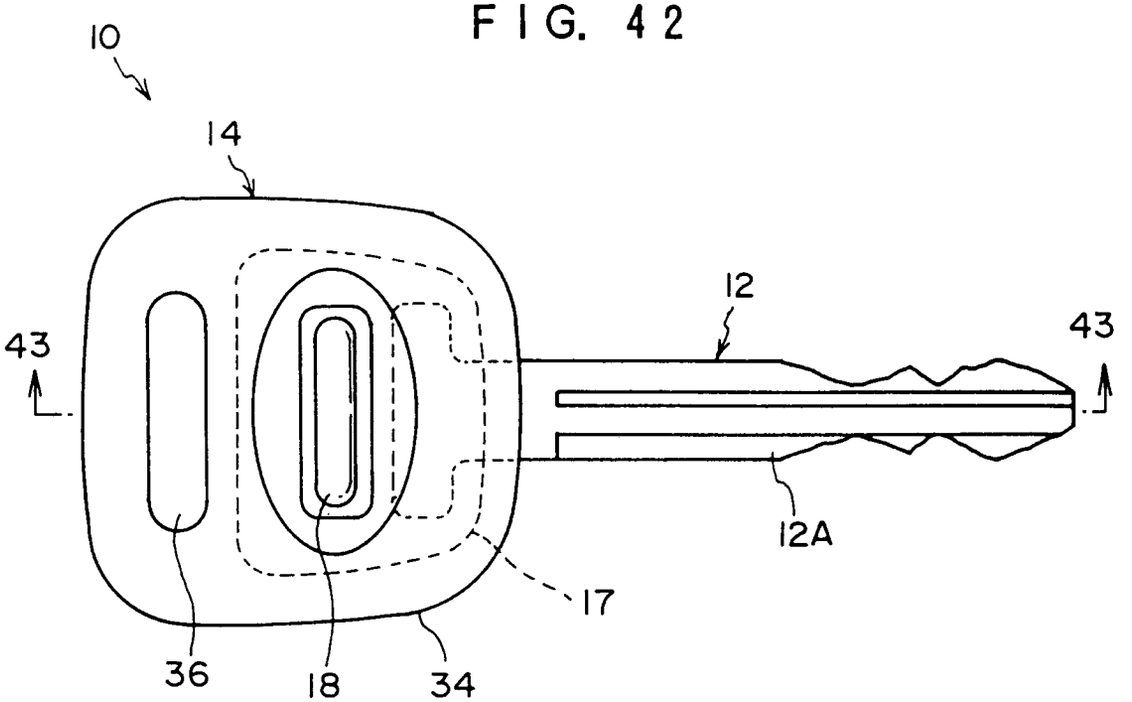

FIG. 43

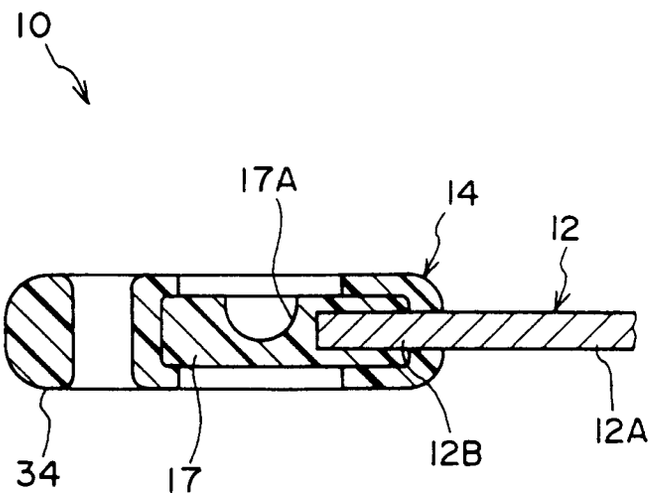

FIG. 44

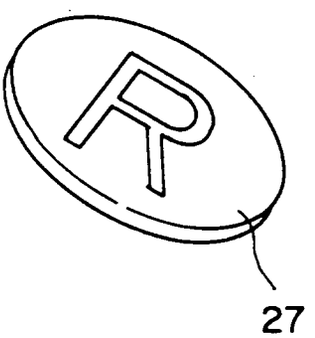

FIG. 45

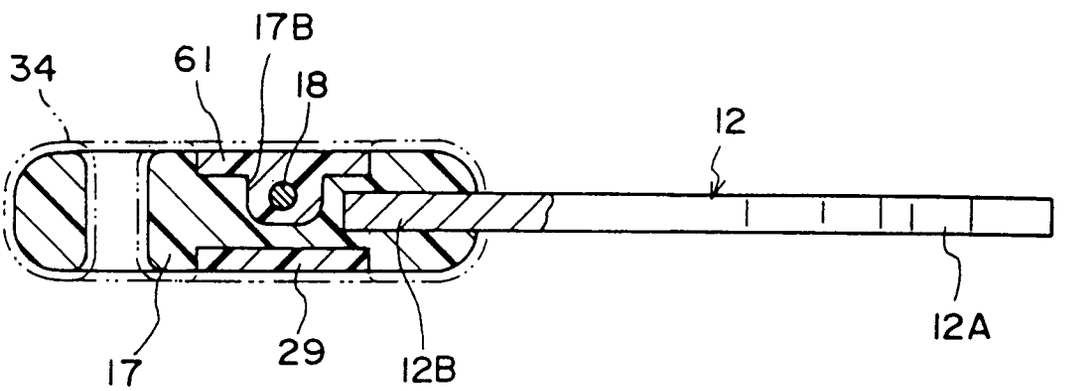

FIG. 46

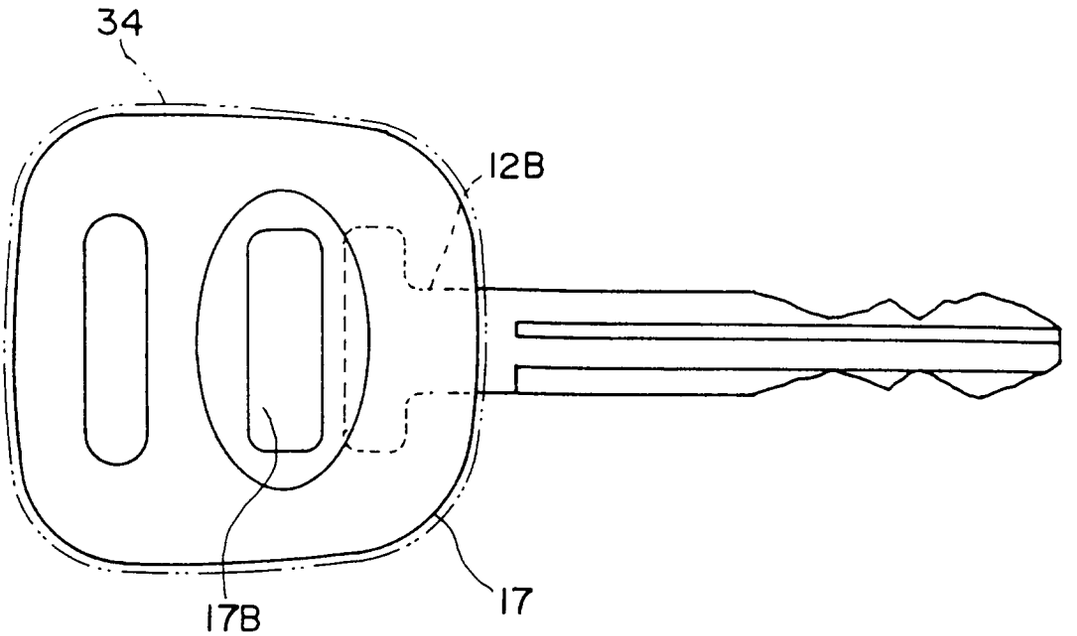

FIG. 47

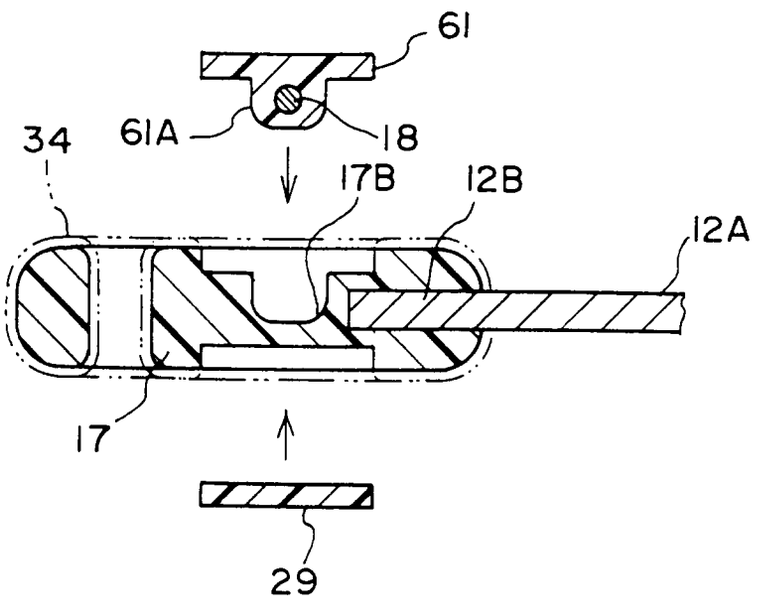

FIG. 48

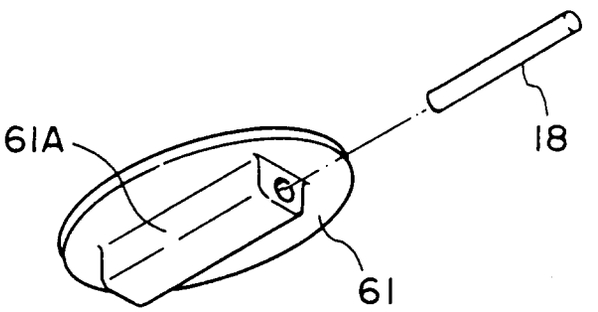

FIG. 49

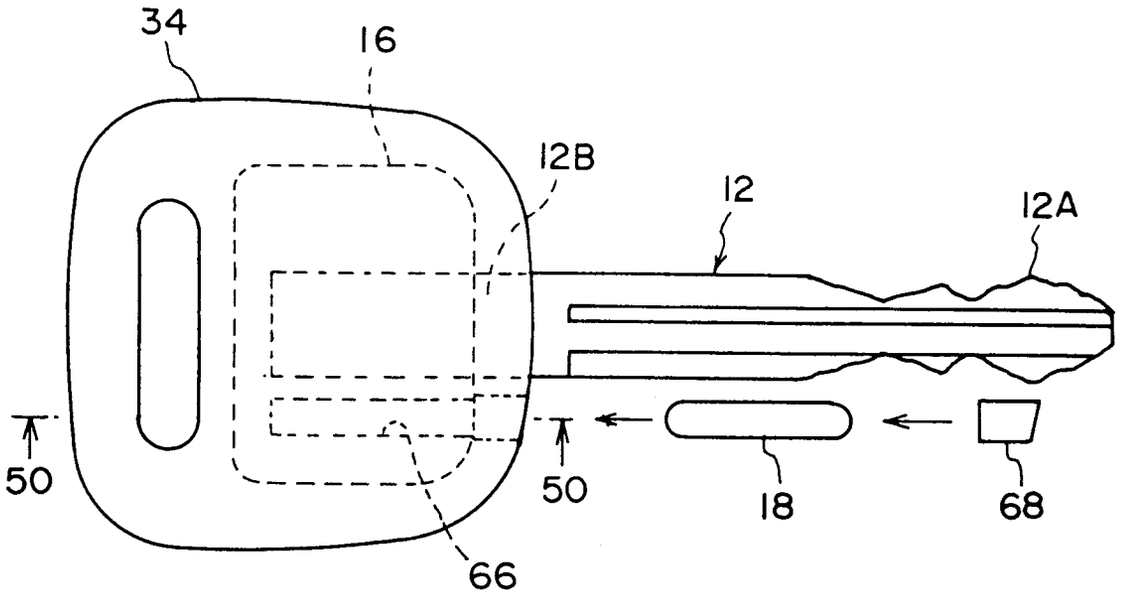

FIG. 50

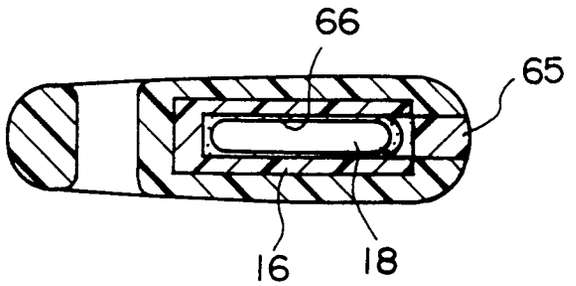

FIG. 51

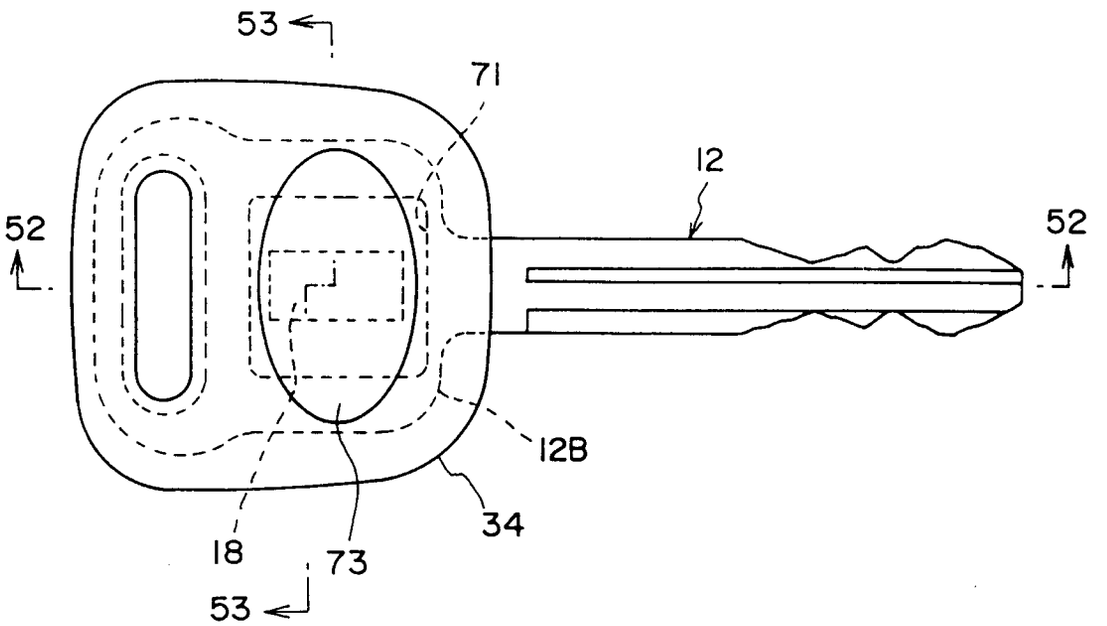

FIG. 52

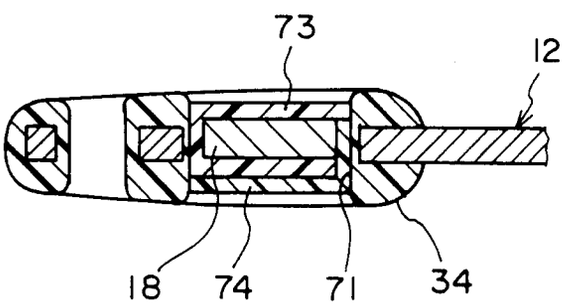

FIG. 53

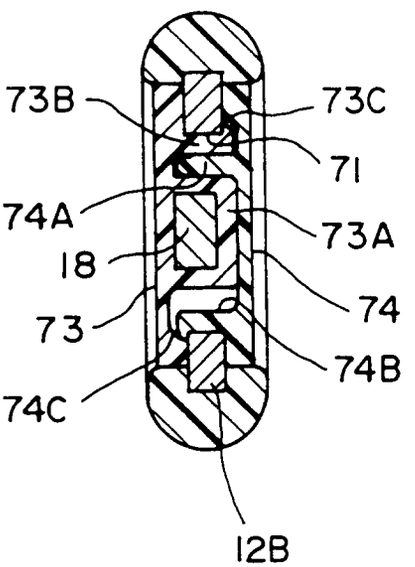

FIG. 54

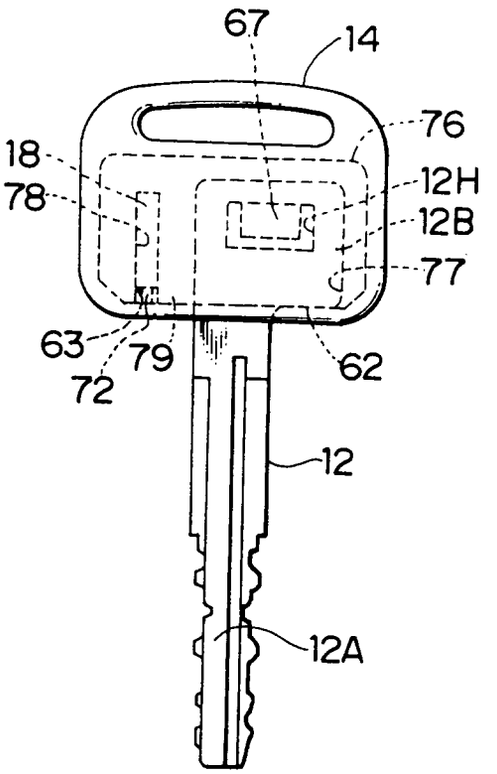
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FIG. 55

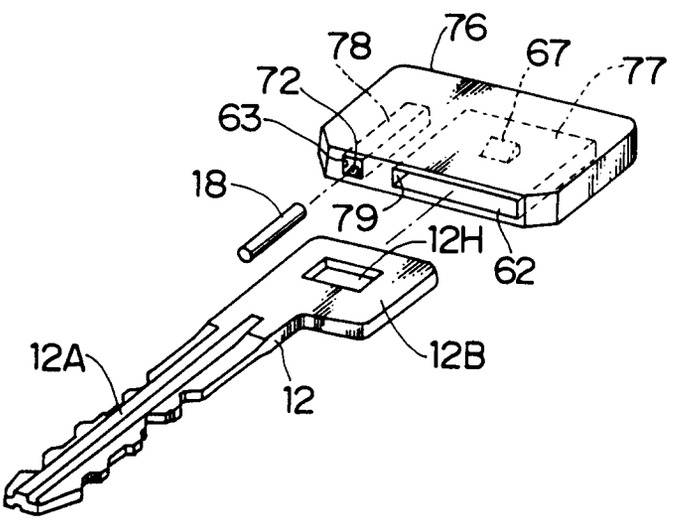
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FIG. 56

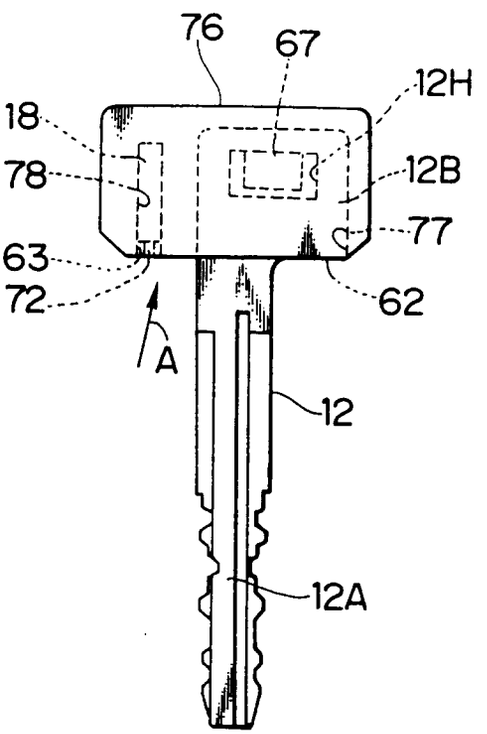

FIG. 57

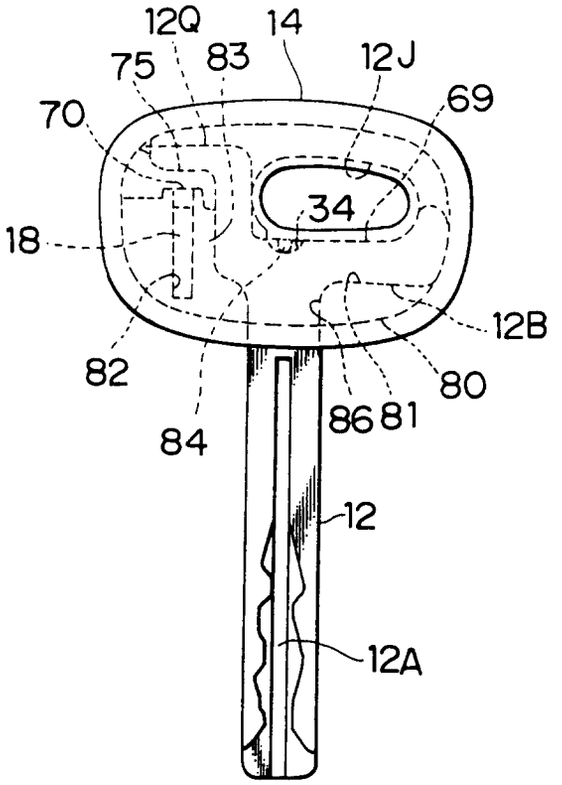
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FIG. 58

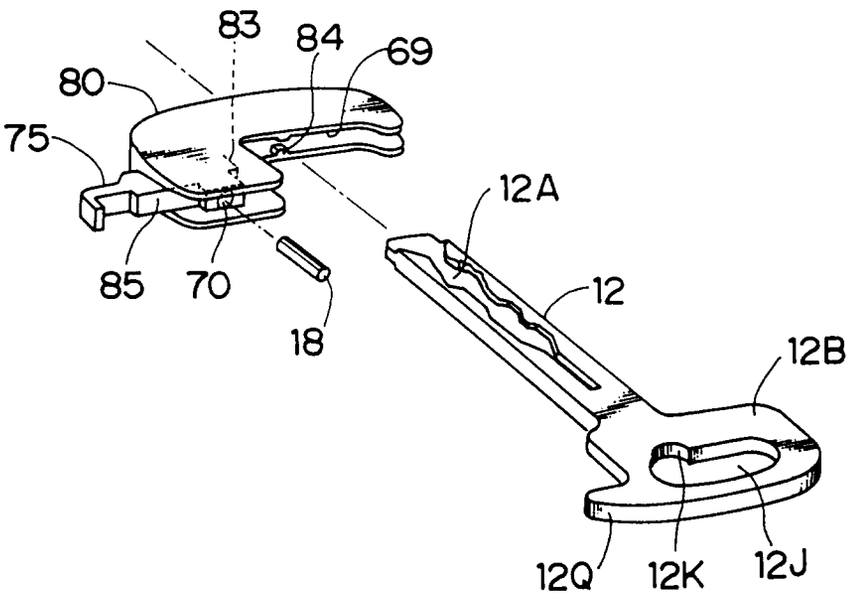
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FIG. 59

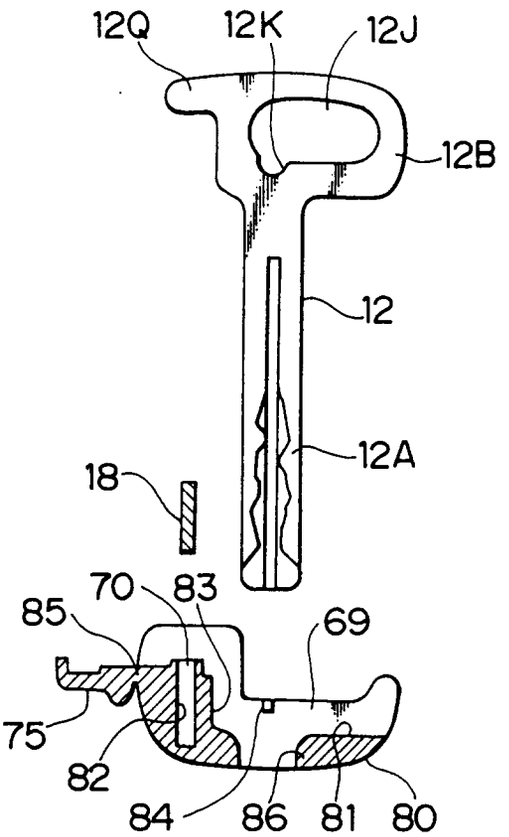

FIG. 60

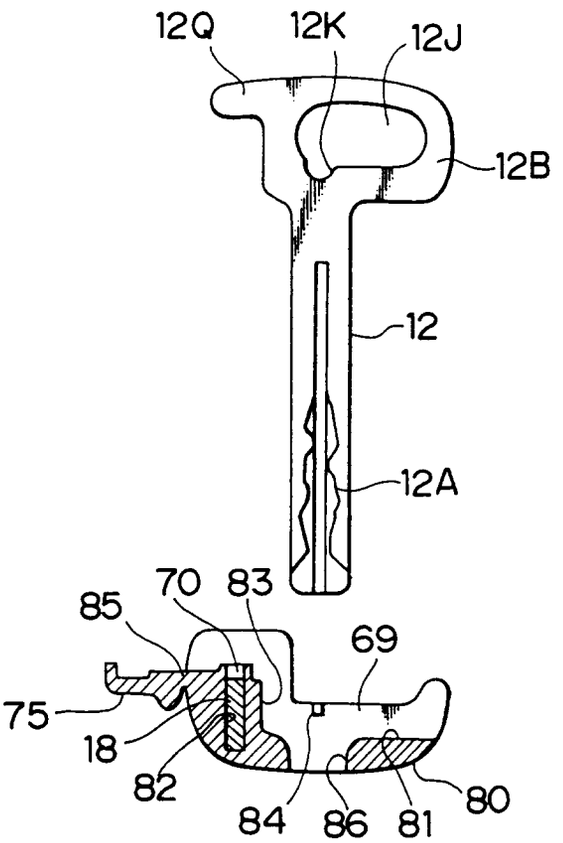

FIG. 61

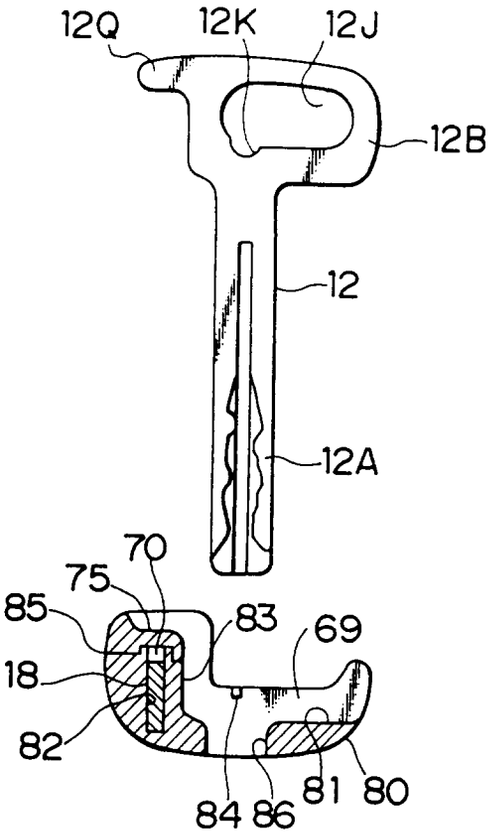
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FIG. 62

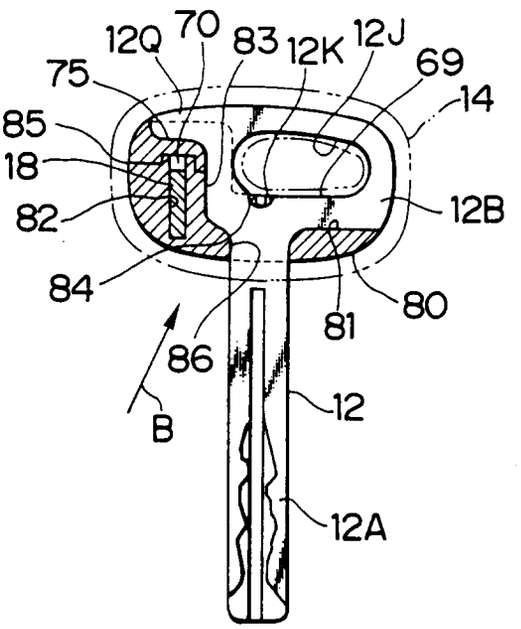
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FIG. 63

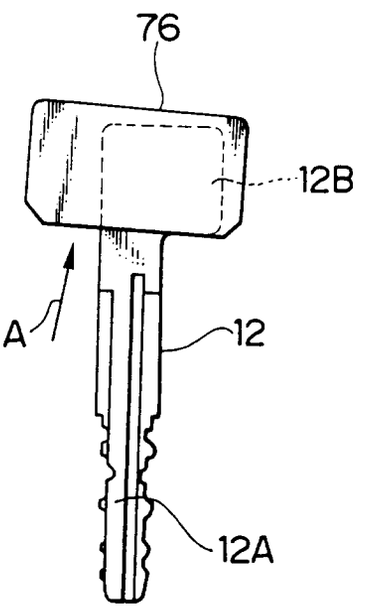

FIG. 64

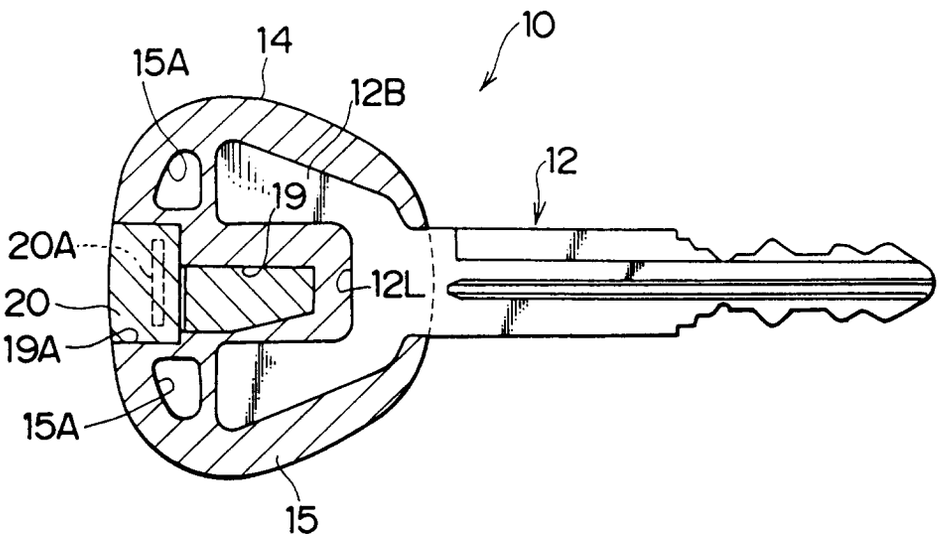
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FIG. 65

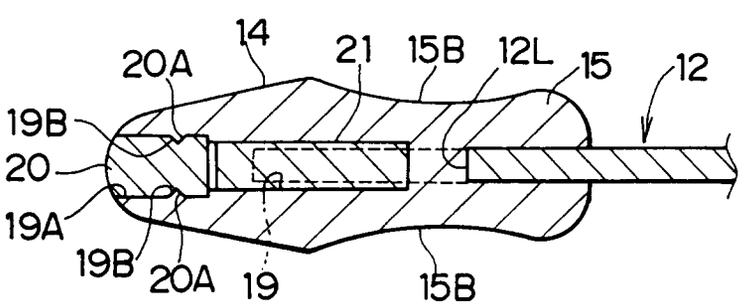
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FIG. 66

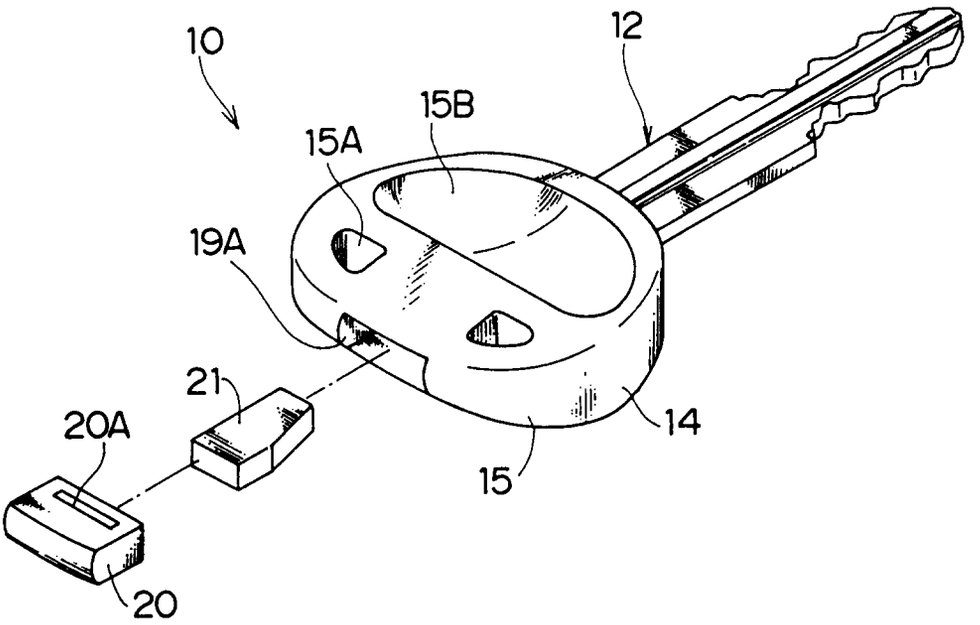
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FIG. 67

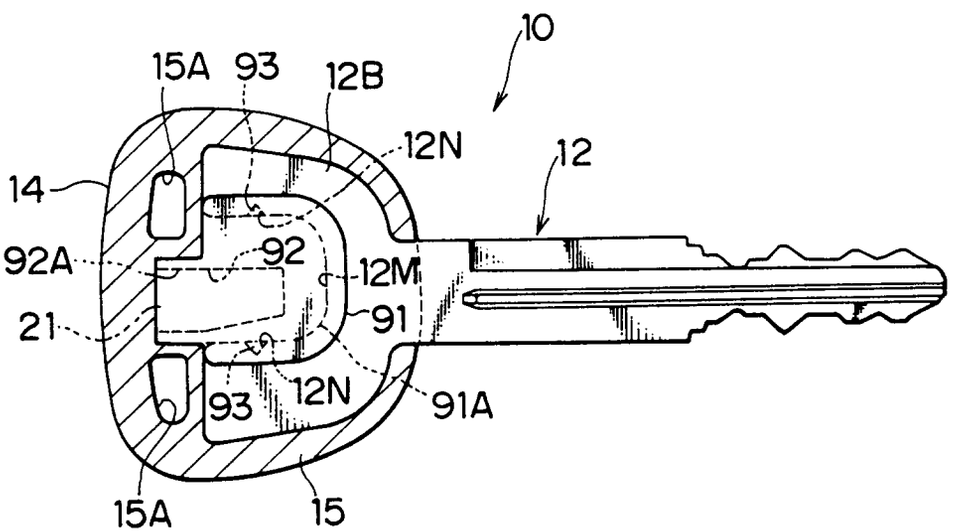
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FIG. 68

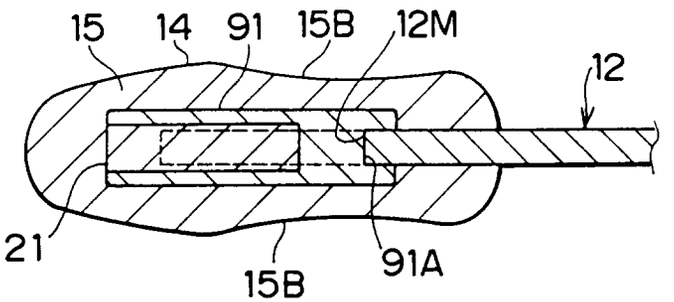

FIG. 69

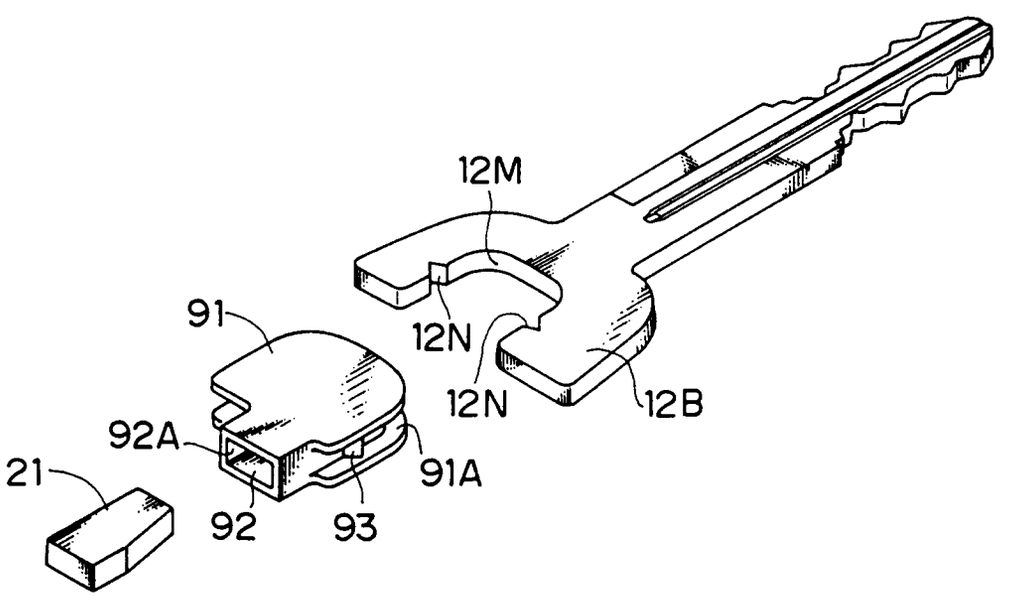

FIG. 70

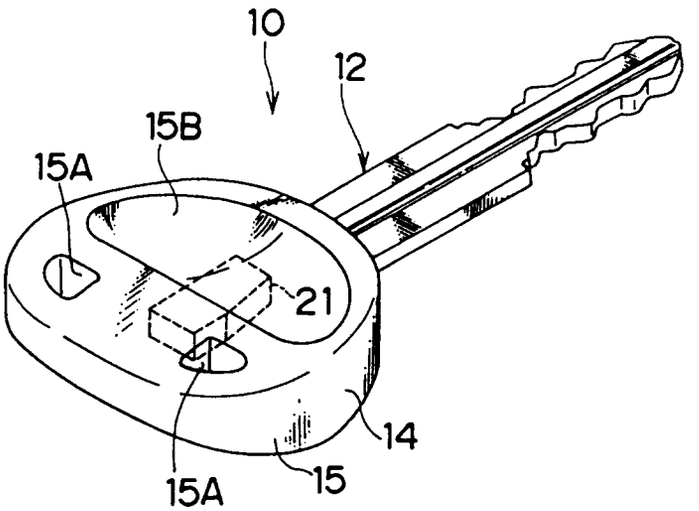
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FIG. 71

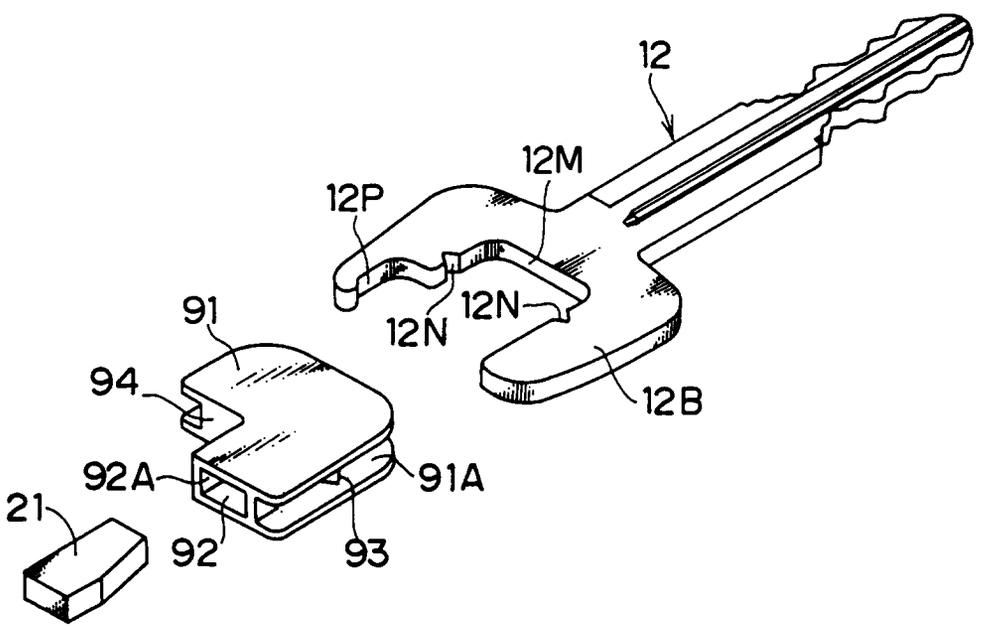
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FIG. 72

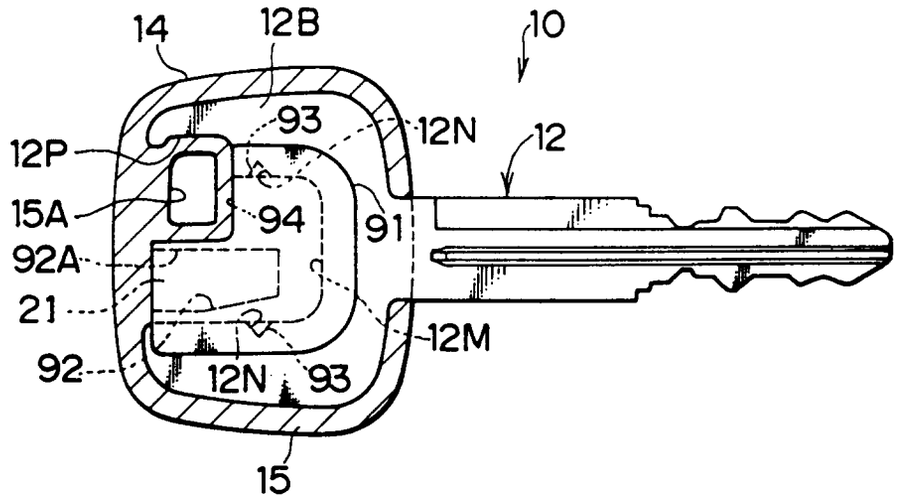
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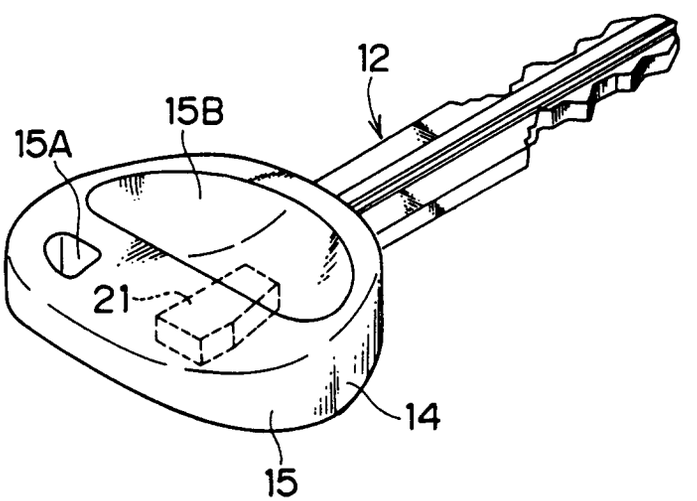
FIG. 73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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP95/00970

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl^6 E05B19/00, E05B49/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int. Cl^6 E05B19/00, E05B49/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1944-1994
Kokai Jitsuyo Shinan Koho 1971-1994

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A X A	JP, 4-6462, U (Tokai Rika Co., Ltd.), January 21, 1992 (21. 01. 92), Lines 9 to 18, page 11 (Family: none)	1-5 6-8 9-19

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
August 4, 1995 (04. 08. 95)	August 22, 1995 (22. 08. 95)
Name and mailing address of the ISA/ Japanese Patent Office Facsimile No.	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)