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2,844,683

KEYING AND CODING DEVICE

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Fig. 1.

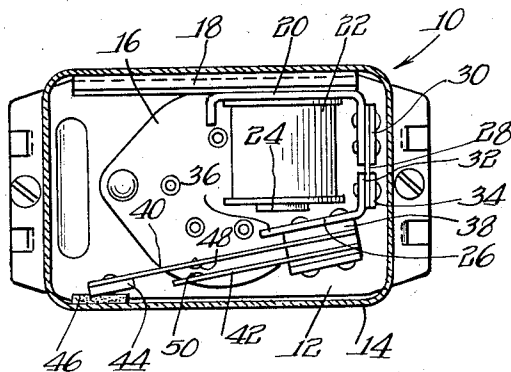


Fig. 2.

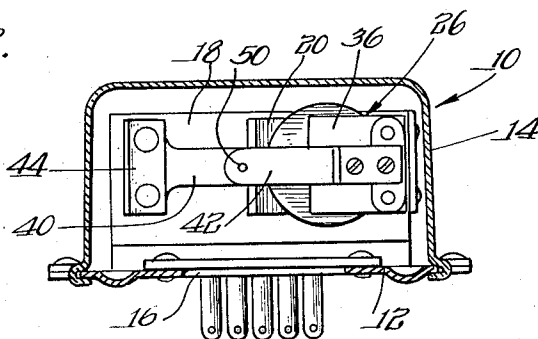
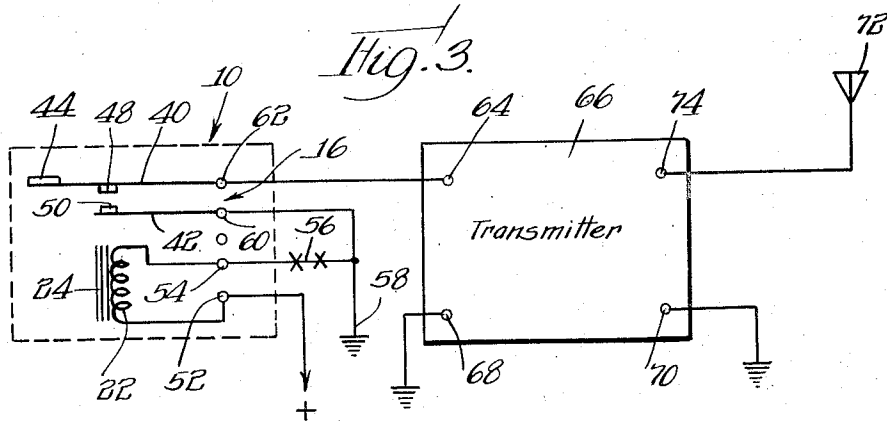


Fig. 3.



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KEYING AND CODING DEVICE

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5 Claims. (Cl. 200—90)

This invention is concerned with a keying and coding device, more specifically with an electromagnetically actuated, inertia type, resonant vibrating reed keying and coding device.

In many electronic applications it is common practice to transmit a code signal. For instance, in remote control garage door openers operating on electromagnetic principles, it is desirable to modulate a carrier wave with a code signal which will operate only one pre-selected garage door. Various types of coding mechanisms or apparatus are well known in the art. Most of these suffer from one or more defects including excessive cost of manufacture, radiated disturbances such as are caused by contact sparking, lack of sufficient ruggedness, the necessity of direct actuation as opposed to remote control, and other defects.

It is an object of this invention to provide a keying and coding device avoiding the above noted difficulties.

It is a further object of this invention to provide a keying and coding device as a separate unit which readily can be replaced and which is readily assembled with a device to which it is ancillary.

A further object of this invention is to provide a vibrating reed keying and coding device which is remotely actuated by means of a relay.

Other and further objects and advantages of the present invention will be apparent from the following description when taken in connection with the accompanying drawings wherein:

Fig. 1 is a top view of a keying and coding device made in accordance with the principles of our invention and with part of the case thereof broken away to show the working parts;

Fig. 2 is a side view of the keying and coding device with part of the case again being broken away to show the interior parts; and

Fig. 3 is a schematic wiring diagram illustrating the electrical characteristic of the device and its association with an apparatus such as a radio transmitter.

Referring first to Figs. 1 and 2, there will be seen a relay unit generally identified by the numeral 10, and including a base 12, and a cover 14. A connector plug 16 is suitably affixed to the base for plugging the relay unit into an apparatus with which it is to be used. The relay unit, comprising our keying and coding device, includes a bracket 18 upstanding from the base or floor 12. A coil mounting bracket 20 is secured to the bracket 18 by any suitable means, and a coil 22 wound around a pole piece 24 is assembled with the bracket 20 by any suitable means, such as by a peened over end on the pole piece 24 extending through an aperture in the coil mounting bracket 20. A substantially L-shaped armature 26 is flexibly connected to the coil mounting bracket 20 by means of a leaf spring 28 clamped against the end of the bracket 20 by a member 30, and clamped against the foot 32 of the L-shaped armature by a member 34. It will be understood that the members 30 and 34 are suit-

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ably affixed to the bracket and armature foot respectively by means such as rivets.

The bracket 20 and armature 26 are made of magnetic material, as will be understood, and the spring 28 preferably is made of steel to complete the magnetic path, the main portion or body 36 of the armature being mounted opposite the end of the pole 24. An insulating mounting block 38 is affixed to the body of the armature on the opposite side of the armature from the pole 24 and carries a pair of spring switch arms 40 and 42 insulated from one another. These switch arms are individually connected to two of the prongs 16 as will be understood.

The arm 40 is substantially longer than the arm 42, and is provided at its end with a weight 44. The compliance of the switch arm 40 and the mass of the weight 44 are selected so that the switch arm 40 forms a resonant reed having a pre-selected frequency. When the arm 40 and weight 44 are in the quiescent position shown in the drawings, the weight 44 abuts a piece of resilient material 46 to hold the arm 40 stationary with contacts 48 and 50 respectively on the arms 40 and 42 out of engagement.

When the coil 22 is energized as shortly will be described, the armature 26 is suddenly attracted into engagement with the pole 24, and stops upon engaging the pole. The inertia of the weight 44 causes the arm or reed 40 to overshoot, and then to swing back, bringing the contacts 48 and 50 into engagement as it swings back. The vibrating reed comprising the arm 40 and weight 44 will continue to vibrate for several seconds after the armature 36 has been attracted into engagement with the pole 24. The frequency at which the reed vibrates depends on the mass of the weight 44 and on the compliance of the arm 40, these constants being chosen so as to cause vibration preferably in the low audio range, for example at a constant frequency from about ten cycles per second up to thirty-two cycles per second. It will be evident that engagement between the contacts 48 and 50 will be made and broken off in accordance with the rate of vibration of the reed.

In Fig. 3 there is shown diagrammatically a circuit in which the keying and coding device heretofore illustrated might be incorporated. The unit again is indicated generally at 10. One end of the coil 22 is connected through one of the prongs 52 of the plug 16 to a source of positive potential, for instance the six volt storage battery of an automobile. The other end of the coil is connected through another one of the prongs 54 of the plug to a switch 56 indicated at X—X, the other end of the switch being grounded as at 58. The arm 42 carrying the contact 50 is connected through a third prong 60 to the ground connection 58, while the arm 40 carrying the contact 48 is connected through a fourth prong 62 to one of the input connections 64 of a device such as a radio transmitter 66, the other input connection 68 being grounded. The output connections of the transmitter 26 are respectively grounded at 70 and connected to an antenna 72 as at 74.

It will be apparent that when the contact 56 is closed, the armature 36 will be snapped against the pole piece 24 and that the reed thereafter will vibrate for several seconds while the switch is closed at a predetermined natural frequency depending upon the mass of the weight 44 and the compliance of the arm 40. When the switch 56 is opened, this switch preferably being of the push-button type and opening automatically upon release, the armature 36 and parts carried thereby will return to the position shown in Fig. 1. In this position the weight 44 engages the pad or damper 46 to prevent further vibration of the reed.

It will be apparent that the keying and coding device heretofore described can be simply and economically

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produced. As a plug-in unit, it readily can be assembled with a device such as a transmitter to which it is ancillary. The remote electromagnetic actuation of the keying and coding device allows the device to be positioned conveniently in an out of the way position, and simultaneously allows it to be actuated from a convenient location remote to the device. The actual keying is mechanical and radiated disturbances are completely avoided.

It is to be understood that the specific example herein shown and described is for illustrative purposes only. Various structural modifications will doubtless occur to those skilled in the art, and will be understood as comprising a part of the invention insofar as they fall within the spirit and scope of the appended claims.

The invention is hereby claimed as follows:

1. A keying and coding device comprising a base, a substantially rigid member, a pivotal mount comprising a spring mounting said rigid member on said base, said rigid member comprising a substantially L-shaped arm, said spring being affixed to one leg of the L-shaped arm, a stop mounted from said base and against which the other leg of said L-shaped arm moves, a flexible vibrating reed of predetermined frequency mounted on said other leg and set in vibration by movement of said other leg against said stop, resilient means carried by said rigid member in proximity to said reed, and electrical contact means carried respectively by said reed and said resilient means and opened and closed many times upon vibration of said flexible reed as effected by movement of said other leg against said stop.

2. A keying and coding device comprising a base, an electromagnet carried from said base, an armature movably carried from said base and attracted toward said electromagnet upon energization thereof, a stop carried from said base and against which said armature moves, a flexible vibrating reed of predetermined frequency mounted on said armature and extending therefrom, said reed being set in vibration by movement of said armature against said stop, a resilient contact carried by said armature and extending therefrom in substantially the same direction as said reed, said reed and said resilient contact being electrically insulated from one another, and a pair

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of contact points respectively mounted on said reed and on said resilient contact and engageable with one another upon vibration of said reed, said contact points normally being out of engagement with one another.

3. A keying and coding device as set forth in claim 2, and further including a spring pivotally mounting said armature from said base.

4. A keying and coding device as set forth in claim 3, wherein the electromagnet includes a pole, said pole comprising the stop against which said armature moves.

5. A keying and coding device comprising a base, a vibrating reed pivotally mounted from said base adjacent one end thereof, an electromagnet on said base adjacent the pivotally-mounted end of said reed and including a pole and a winding thereon, said pole comprising a stop against which said reed is movable, said reed having a magnetically susceptible portion associated therewith engageable with said pole for setting said reed in vibration, said reed extending a substantial distance beyond said stop in a direction away from the pivotally-mounted end of said reed, a spring member pivotally mounted with said reed in spaced-apart parallelism therewith, said spring member being mounted on the opposite side of said reed from said electromagnet, electrical contact means respectively carried by said reed and by said spring member and periodically engageable with one another as a result of vibration of said reed, means for energizing said electromagnet winding independently of said contact means to attract the magnetically susceptible portion against said pole, and a pad carried from said base and engaged by the end of said reed when not moved toward said electromagnet, said pad holding said reed free of vibration with the electrical contact means out of engagement.

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