

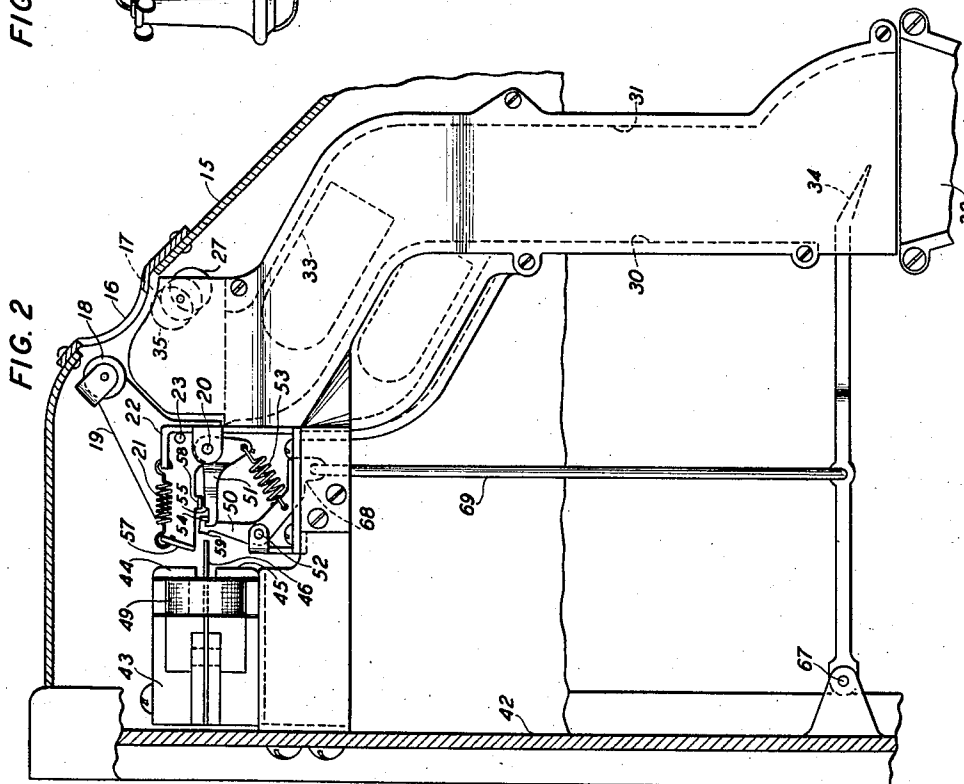
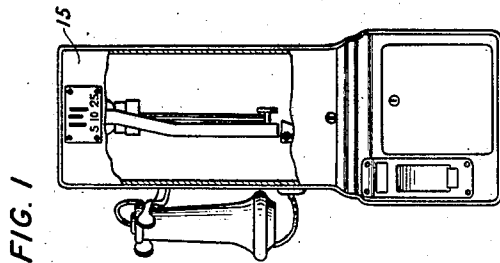
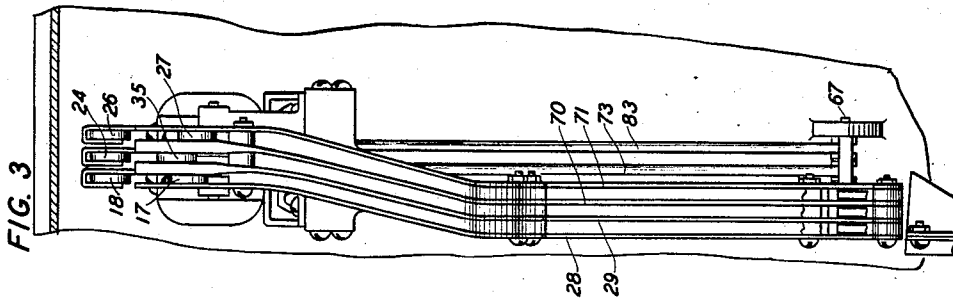
March 28, 1944.

T. L. DOWEY ET AL
COIN SIGNALING DEVICE

2,345,040

Filed Nov. 26, 1942

3 Sheets-Sheet 1



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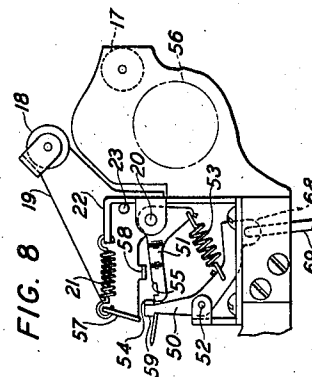
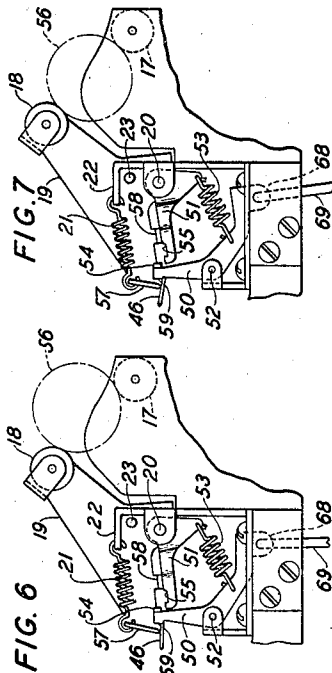
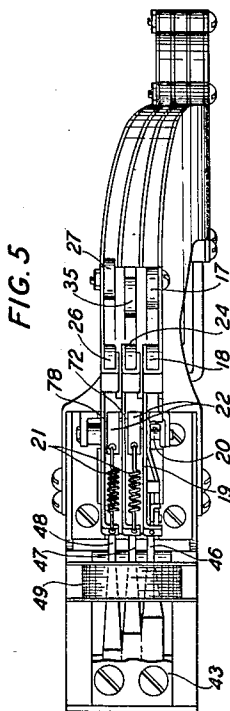
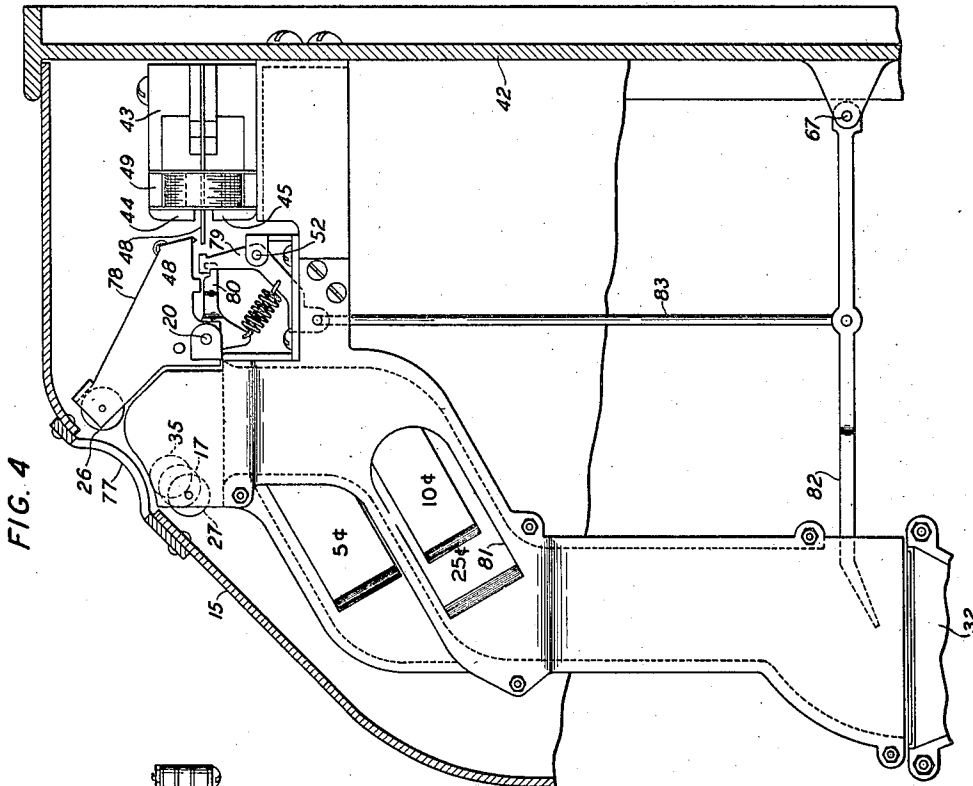
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3 Sheets-Sheet 2



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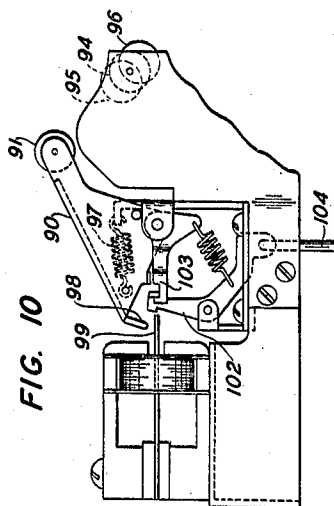
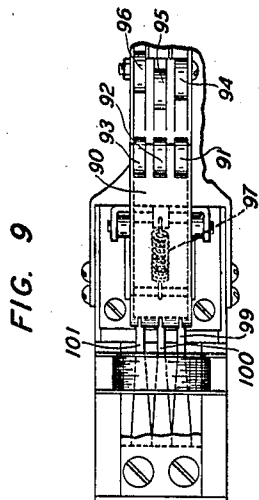
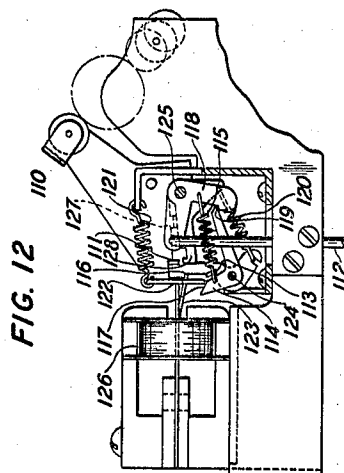
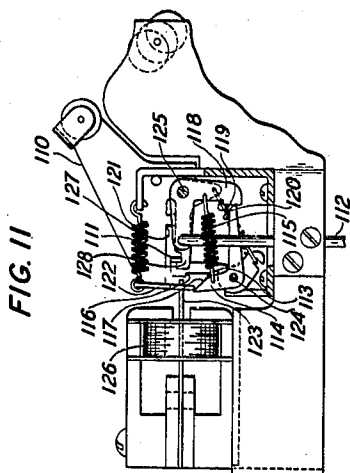
T. L. DOWEY ET AL

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COIN SIGNALING DEVICE

Filed Nov. 26, 1942

3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,345,040

COIN SIGNALING DEVICE

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Application November 26, 1942, Serial No. 467,009

9 Claims. (Cl. 194—1)

This invention relates to coin collectors and has for its object the provision of an improved coin actuated signaling device by means of which information as to coin deposit can be transmitted to a remote point.

In the usual type of telephone coin collector, each deposited coin under the influence of gravity is caused to strike a gong or bell, the resulting vibrations of which are transferred by a mechanical resonant connection to a telephone transmitter where the mechanical vibrations are translated into electrical currents of a corresponding frequency for transmission to the distant central office.

In the preferred form of this invention the coin signaling device is of the electromagnetic type comprising a vibratory member forming a part of the magnetic circuit, whereby the vibrations of said member induce voltages of a corresponding frequency in a coil associated with the magnetic circuit. The coin entrance slot of the collector includes means actuated by coin deposit to depress the vibratory member and lock the member in depressed position. After the deposited coin has been tested to determine that it is a genuine coin and not a slug, the coin is caused to actuate a trigger for unlocking the said member to permit said member to vibrate at its natural period, thereby generating in the associated coil a signaling current which can be transmitted in the usual manner to the remote central office.

In the event that the collector is adapted to receive coins of various denominations, the signaling arrangement may comprise a different vibratory member for each size of coin with all the vibratory members being included in the same magnetic circuit and controlling the same pick-up coil.

Referring to the drawings:

Fig. 1 represents the front view of a telephone coin collector embodying this invention;

Fig. 2 is a side view, partly in section, of the coin collector upper housing disclosing the coin signaling arrangement of this invention;

Fig. 3 is an end view of the apparatus of Fig. 2;

Fig. 4 is similar to Fig. 2 except that the apparatus is viewed from the opposite direction;

Fig. 5 is a top view of the apparatus of Fig. 2;

Figs. 6, 7 and 8 are details of certain portions of the coin signaling device of Fig. 2 disclosing how the insertion of a coin serves to depress the vibratory member of the coin signaling device to lock the same in depressed position and subsequently release the vibratory member after the coin has been tested for genuineness;

Figs. 9 and 10 disclose a modified form of the invention in which the deposit of a coin of any one denomination serves to depress all the vibratory members of the coin signaling device but

subsequently releases only that vibratory member defining the denomination of the particular coin deposited; and

Figs. 11 and 12 disclose a further modification of the invention, particularly suitable for operation by light-weight coins.

Fig. 1 is a front view of a telephone coin collector of the conventional type as disclosed for example in the United States Patent 1,043,219 of O. F. Forsberg, issued November 5, 1912, except that the coin entrance gauge and the coin signaling arrangement employed in Fig. 1 are in accordance with the present invention.

The front sloping surface of the upper housing 15 of the collector contains three coin entrance slots which in Fig. 1 are labeled 5, 10 and 25, respectively, to indicate that they are adapted to receive United States five-cent, ten-cent and twenty-five cent coins. The collector of this invention differs from the usual collector in that a certain amount of work is required from the coin depositor before a coin can be passed through its coin slot in the upper housing. As shown in Fig. 2, the effective length of the five-cent coin slot 16 is defined by a stationary roller 17 and a movable roller 18. Roller 18 is rotatably mounted on the outer end of a bell crank lever 19 which is pivoted about the axis 20. Lever 19 is urged in a clockwise direction by a spring 21, one end of which is connected to a stationary bracket 22; and lever 19 also carries a stop pin 23 adapted to engage bracket 22 to define maximum clockwise movement of lever 19 to such a position that movable roller 18 is spaced from stationary roller 17 a distance substantially less than the diameter of a five-cent coin, whereby a five-cent coin can be fully inserted in slot 16 only if sufficient force is applied to the coin to cause the coin to move lever 19 counter-clockwise until the distance between rollers 17 and 18 is equal to the coin diameter.

Similar arrangements are provided for the ten-cent coin slot and the twenty-five cent coin slot. Referring to Fig. 3 for the moment, movable roller 24 and stationary roller 35 are normally spaced apart a distance substantially less than the diameter of a ten-cent coin so that the bell crank lever carrying roller 24 will be moved away from stationary roller 35 a definite distance when a ten-cent coin is inserted. Similarly, the twenty-five cent coin slot is guarded by stationary roller 27 and movable roller 26, with the two rollers being normally spaced apart a distance substantially less than the diameter of a standard twenty-five cent coin.

A five-cent coin after passing between rollers 17 and 18 drops into a coin channel defined by vertical plates 28 and 29 and end walls 30, 31 by means of which the coin is directed into a coin hopper 32 where the coin is in the usual manner,

as described in the above-mentioned Forsberg patent, will be temporarily held on a pivoted coin trap for subsequent collection or refund. While traversing the initial portion of the five-cent coin channel, the coin may be tested in any suitable manner to determine its genuineness; and in Fig. 2 the deposited five-cent coin is made to pass along an under-diameter reject opening 33 to throw out under-diameter slugs or coins after which, if the coin is genuine, the coin is permitted to drop vertically a substantial distance to actuate a pivoted trigger 34 before entering the mouth of coin hopper 32.

The manner in which the engagement of trigger 34 by a legitimate coin is caused to send out a characteristic tone to the remote central office will now be described in connection with Figs. 2, 5, 6, 7 and 8.

Suitably mounted on the upper portion of the back plate 42 of the collector housing is a permanent magnet 43 having opposed pole-faces 44, 45. Lying between the opposed pole-faces in a substantially horizontal plane are the free ends of three vibratory reeds 46, 47 and 48 of magnetic material, there being one reed for each denomination of coin which the collector is adapted to receive. Each of the reeds 46, 47 and 48 is shown to be of a different effective length so that each reed will have a different natural period of vibration from the other reeds whereby the vibrations of each reed can be clearly distinguished from the vibrations of the other reeds. Surrounding the three reeds 46, 47 and 48 is a suitable winding or coil 49, whereby the vibrations of any one of the reeds serve to induce in coil 49 a voltage of a frequency corresponding to the natural period of vibration of the reed. Electrical connections, not shown, may be provided for transmitting the signaling currents developed in coil 49 to the remote central office.

Individual to the five-cent coin channel is a reed depressor 19, a plucking finger 50 and a latching member 51. The plucking finger 50 is pivoted about an axis 52 and the latching member 51 is pivoted about the same axis 20 as the reed depressor 19. A coiled spring 53 which connects the two pivoted members 50, 51 serves to bias plucking finger 50 for counter-clockwise movement and to bias latching member 51 for a clockwise movement, but in their normal positions of Fig. 2 projection 54 on the plucking finger 50 lies in a slot 55 on the latching member to hold the plucking finger out of engagement with its reed 46. When a five-cent coin 56 (Fig. 6) is forced between rollers 17 and 18, the bell crank 19 is moved counter-clockwise from its position of Fig. 2 through an intermediate position shown in Fig. 6 to a maximum deflected position of Fig. 7 where the separation between rollers 17 and 18 is somewhat greater than the diameter of the five-cent coin deposited. This counter-clockwise movement of reed depressor 19 first causes its arm 57 to engage the tip of reed 46 and depress the reed, as shown in Figs. 7 and 8. Substantially at the same time, a projection 53 on depressor 19 depresses latch 51 to release plucking finger 50 so that finger 50 under the action of spring 53 is free to move counter-clockwise to catch the free end of reed 46 underneath its projecting tip 59, as shown in Figs. 7 and 8. As soon as coin 56 has passed between rollers 17 and 18, as indicated in Fig. 8, lever 19 is restored to its normal position by means of biasing spring 21 but reed 46 is held depressed due to engagement with the tip of plucking fin-

ger 50 and the latching member 51 is held in a depressed position because its outer end is caught underneath projection 54 of finger 50 (Fig. 8).

Trigger 34 which projects into the five-cent coin channel near the bottom of a substantially vertical portion of the channel is pivoted about an axis 67 and is connected to arm 68 of plucking finger 50 by means of a stiff wire or rod 69. The normal position of trigger 34 is shown in Fig. 2 but when coin 56 is inserted to permit plucking finger 50 to move counter-clockwise to engage the depressed reed 46, it will be obvious that trigger 34 will be moved slightly upwardly, in which upper position it will be held by spring 53. When the deposited coin 56 strikes trigger 34, trigger 34 will be moved downwardly to restore plucking finger 50 to its normal position of Fig. 2, thereby permitting the reed 46 to vibrate at its natural period and produce a characteristic signaling current in coil 49. It is, therefore, obvious from the above description that the apparatus of Figs. 2 to 8, inclusive, is adapted to send out a characteristic signal developed in pick-up coil 49 each time a genuine five-cent coin is inserted in coin slot 16.

The apparatus is also adapted to send out characteristic signals indicating the deposit of a ten-cent or a twenty-cent coin in substantially the same manner as just described for the deposits of a five-cent coin.

The ten-cent coin channel lies between the two vertical plates 29 and 70 and the twenty-five cent coin channel lies between the vertical plates 70 and 71. Movable roller 24 which defines one end of the ten-cent slot is mounted on a bell crank 72 (Fig. 5) similar to bell crank 19 and associated with bell crank 72 is a plucking finger and a latching member similar to the corresponding elements 50 and 51 of the five-cent signaling arrangement. The pivoted trigger which projects into the ten-cent coin channel lies in the same plane as trigger 34 and hence is not shown in Figs. 2 or 4 but in Fig. 3 is shown the vertical wire 73 which performs the same functions as wire 69 to release the ten-cent reed 47 from its plucking finger when the ten-cent trigger corresponding to trigger 34 is struck by a deposited ten-cent coin.

The signaling apparatus for indicating the deposit of a twenty-five cent coin is shown more clearly in Fig. 4. Roller 26 which defines one end of the twenty-five cent coin entrance slot 77 is mounted on a bell crank 78 so that when bell crank 78 is moved clockwise by coin deposit, reed 48 will be depressed and finger 79 will be released from latch 80 to hold reed 48 in its depressed position until the twenty-five cent coin after passing the under-diameter reject opening 81 will strike pivoted trigger 82 to move trigger 82 downwardly. Since trigger 82 is connected to plucking finger 79 by wire 83, this coin actuated movement of trigger 82 will cause the counter-clockwise movement of plucking finger 79 to free reed 48 and permit the reed to vibrate at its natural period, thereby developing in coil 49 a voltage of a frequency corresponding to the natural period of vibration of reed 48 for transmission in the usual manner to the central office.

Figs. 9 and 10 illustrate a modification of the apparatus of Fig. 2. In the apparatus of Figs. 2 to 5, inclusive, the three bell cranks 19, 72 and 78 are mounted on the same axis but are independently movable so that the deposit of a single coin will move only that bell crank individual to the denomination of the particular coin deposited.

In Figs. 9 and 10, a common bell crank 90 is employed which carries at one end three rollers 91, 92, 93 for the five-cent, ten-cent and twenty-five cent runways, respectively; while the three stationary rollers 94, 95 and 96 are properly spaced from the movable rollers to define the proper length of coin slot as in the earlier figures. When bell crank 90 is moved against the biasing action of spring 97 by deposit of a five-cent, ten-cent or twenty-five cent coin the downwardly projecting arm 98 of bell crank 90 depresses all three reeds 99, 100 and 101 and releases each of the three plucking fingers (such as plucking finger 102) from its latching member such as member 103 to hold all three reeds in depressed condition in the same manner as for Fig. 2. Thus, in Fig. 10, the five-cent plucking finger 102 upon deposit of any coin will be released from its latching member 103 to hold its reed 99 in depressed position and a similar action will simultaneously occur for the plucking finger and the latching member associated with the ten-cent reed 100 and the twenty-five cent reed 101. However, it is assumed that for the apparatus of Fig. 10, each coin channel of the associated coin chute will have an independently operated coin trigger similar to trigger 34 of Fig. 2 so that a single deposited coin while causing the depression of all three reeds 99, 100 and 101 will subsequently release only that reed intended to define the denomination of the particular coin deposited. Thus, wire 104 which is fastened to the five-cent plucking finger 102 will be connected to a coin trigger similar to trigger 34 and located only in the five-cent runway. Hence, if the coin deposited is a five-cent coin, this trigger in the five-cent runway when struck by the deposited coin will pull wire 104 downwardly to release reed 99 while still permitting reeds 100 and 101 to remain locked in their depressed condition. One advantage of the arrangement of Figs. 9 and 10 is that there is no danger of any vibration of the wrong reed; for example, reeds 100 and 101 cannot be set into vibration when a five-cent coin is deposited. In the modification of Figs. 9 and 10 the three reeds 99, 100, 101 may be of equal length but differently loaded at their tips to give each reed a different natural period of vibration.

It is evident from the above description that the kinetic energy developed by each falling coin must exceed a certain amount in order to insure the full operation of the coin trigger, such as trigger 34, by the falling coin. The distance through which a deposited coin must fall in order to develop the minimum required kinetic energy is substantially reduced by the alternative arrangement disclosed in Figs. 11 and 12 which is adapted for use either in the reed arrangement of Fig. 5 or Fig. 9; and the arrangement in these figures is particularly suitable for operation by a ten-cent coin because of the relatively small mass of such a coin. The normal position of the modified apparatus is shown in Fig. 11. Bell crank 110 which is biased to a normal position by spring 121, has a downwardly extending arm 122 adapted to depress the reed 123; and by means of its arm 127 is adapted to release plucking finger 111 from its latching member 128 which normally holds finger 111 out of contact with reed 123. Plucking finger 111 is pivoted about the stationary axis 124 and is biased to counter-clockwise movement by a coiled spring 126. Rotatably mounted on the same axis 123 is a bell crank 114 biased for clockwise movement by a coiled spring 115. Bell crank 114 is held in its normal position of Fig. 11 due to

the engagement of its cam surface 117 with the downwardly extending arm 122 of bell crank 110; and the horizontal arm of bell crank 114 normally engages a vertical surface on the lower arm of another bell crank 118 pivoted about the stationary axis 125. The wire 112 which leads to the coin trigger projecting into the coin runway for that denomination of coin to be represented by the vibration of reed 123 is connected to the horizontal arm of bell crank 118.

When the proper coin is deposited to move bell crank 110 counter-clockwise, its arm 122 rides down the sloping surface 117 of bell crank 114, thereby causing the counter-clockwise movement of bell crank 114; and at the same time arm 122 engages reed 123 to depress the reed to the position shown in Fig. 12. Also arm 127 releases plucking finger 111 from its latching member 128 so that finger 111 is now free to move counter-clockwise to catch the tip of reed 123 beneath its shoulder 116. The counter-clockwise movement of bell crank 114 is continued until its horizontal arm is locked against shoulder 119 of bell crank 118. After the passage of the deposited coin, bell crank 110 is free to return to its normal position but because of the locking of bell crank 114 against shoulder 119 of bell crank 118, the plucking finger 111 is maintained in its advanced position to hold reed 123 depressed. When the coin trigger coupled to wire 112 is struck by the assumed deposited coin thereby causing the downward movement of wire 112, bell crank 118 is moved counter-clockwise to release bell crank 114 from its locking engagement with shoulder 119. Coiled spring 115 thereafter moves bell crank 114 clockwise so that the vertical arm of bell crank 114 engages lug 113 or finger 111 to move plucking finger 111 from its reed holding position of Fig. 12 to its reed freeing position of Fig. 11, thereby permitting reed 123 to vibrate at its natural period and develop the proper coin signal in winding 126. The apparatus is now restored to its normal position of Fig. 11 and is adapted to repeat its cycle of operation upon the deposit of the next coin of the same denomination.

Representative embodiments of the invention are disclosed in the drawings but it is to be understood that various modifications may be made therein without departing in any wise from the spirit of this invention as defined in the appended claims.

What is claimed is:

1. In a coin collector, a vibratory member adapted to vibrate at a definite frequency when plucked and biased to a normal position, coin operated means for moving said member to an advanced position, means for latching said member in said advanced position, other coin operated means for releasing said member from said latching means to permit the vibration of said member, and means for translating the vibrations of said member into a signaling current.

2. In a coin collector, a coin entrance slot, a vibratory member adapted to vibrate at a definite frequency when plucked and biased to a normal position, coin operated means adjacent said slot and actuated by a coin entering said slot for moving said member to an advanced position, means for latching said member in said advanced position, a downwardly inclined coin channel for receiving coins from said slot, other coin operated means actuated by a coin traversing said channel for releasing said member from said latching means to permit the vibration of said member,

and means for translating the vibrations of said member into a signaling current.

3. In a coin collector, a vibratory member adapted to vibrate at its natural period, a magnetic circuit including said member, an electrical coil surrounding a portion of said magnetic circuit, coin operated means for moving said member to a position in which said member is under tension, means for latching said member in said position, and other coin operated means for releasing said member from said latching means to permit the vibration of said member.

4. In a coin collector, a coin entrance slot, a vibratory member adapted to vibrate at its natural period, a magnetic circuit including said member, an electrical coil surrounding a portion of said magnetic circuit, coin operated means adjacent said slot and operated by the movement of a coin through said slot for moving said member to a position in which said member is under tension, means for latching said member in said position, a downwardly inclined coin channel for receiving coins from said slot, and other coin operated means actuated by a coin traversing said channel for releasing said member from said latching means.

5. In a coin collector, a vibratory member of magnetic material adapted to vibrate when placed under tension and then released, a magnetic circuit including said member, an electrical coil surrounding a portion of said circuit, a coin entrance slot for a standard coin of a certain diameter, a pivoted member biased to a normal position, said pivoted member having an arm normally rendering the effective length of said slot insufficient to permit the entrance of said standard coin unless sufficient force is applied to said coin to displace said arm and enlarge the slot, means on said pivoted member effective upon its coin actuated displacement for engaging said vibratory member to move said vibratory member to a position where said vibratory member is under tension, means for latching said vibratory member in said position, a downwardly inclined coin channel for receiving coins from said slot, and other coin operated means actuated by a coin traversing said channel for releasing said member from said latching means to permit the vibration of said member.

6. In a coin collector having a coin entrance slot for a coin of a standard diameter, pivoted means biased to a position partially closing said slot whereby the manual insertion of a coin in said slot temporarily forces said pivoted means to an advanced position permitting the entrance of a standard coin, a movable member adapted to vibrate at a definite frequency when plucked, said member being biased to a normal position and engageable by said pivoted means for actuation to an advanced position when said pivoted means is moved by coin insertion, means for latching said member in said advanced position, a downwardly inclined coin channel for receiving coins from said slot, means projecting into said channel for actuation by a coin traversing said channel for releasing said member from said latching means to permit the vibration of said member, and means for translating the vibrations of said member into a signaling current.

7. In a coin collector having a coin entrance slot for a standard coin of one diameter and a second coin entrance slot for a standard coin of a second diameter, pivoted means having arms partially closing each of said slots whereby the

insertion of a standard coin in either one of said slots temporarily forces said pivoted means to an advanced position permitting coin entrance, a first vibratory member and a second vibratory member each biased to a normal position, means on said pivoted means for engaging both of said members to move both of said members to advanced positions when said pivoted means is moved by the deposit of a standard coin in one of said slots, individual means for latching said members in their advanced positions, a downwardly inclined coin channel for receiving coins from said first slot, a second downwardly inclined coin channel for receiving coins from said second slot, means actuated by a coin traversing said first channel for releasing said first member from its latching means, means actuated by a coin traversing said second channel for releasing said second member from its latching means, and means for translating the vibrations of the unlatched member into a signalling current.

8. In a coin collector having a coin entrance slot for a standard coin of one diameter and having a second coin entrance slot for a standard coin of a second diameter, pivoted means having arms partially closing each of said slots whereby the insertion of a coin in one of said slots temporarily forces said pivoted means to an advanced position permitting entrance of a standard coin, a vibratory reed of magnetic material, a second vibratory reed of magnetic material, means on said pivoted means for engaging both of said reeds to move said reeds to advanced positions in which they are placed under tension when said pivoted means is moved by the insertion of a standard coin in one of said slots, individual means for latching said reeds in their advanced positions, a first downwardly inclined coin channel for receiving coins from said first slot, a second downwardly inclined coin channel for receiving coins from said second slot, means actuated by a coin traversing said first channel for releasing said first reed from its latching means, means actuated by a coin traversing said second channel for releasing said second reed from its latching means, a magnetic circuit including both of said reeds and containing a variable magnetic flux when either of said reeds is vibrated, and an electrical coil surrounding a portion of said magnetic circuit.

9. In a coin collector, a vibratory reed adapted to be moved to an abnormal position placing said reed under tension, a first pivoted member biased to engage said reed to latch said reed in its abnormal position, a second pivoted member biased to a position engaging said first pivoted member to hold said first pivoted member in a reed-freeing position, said collector having a coin entrance slot, coin operated means adjacent said slot for moving said reed to said abnormal position and for moving said second pivoted member to an advanced position freeing said first pivoted member to latch said reed in said abnormal position, pivoted means for latching said second pivoted member in said advanced position, a downwardly inclined coin channel for receiving coins from said slot, means actuated by a coin traversing said channel for releasing said second pivoted member from said pivoted means, and means for translating the mechanical vibrations of said reed into an electrical signal.

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