

July 29, 1941.

O. A. SHANN

2,251,073

COIN COLLECTOR

Filed May 25, 1938

7 Sheets-Sheet 1

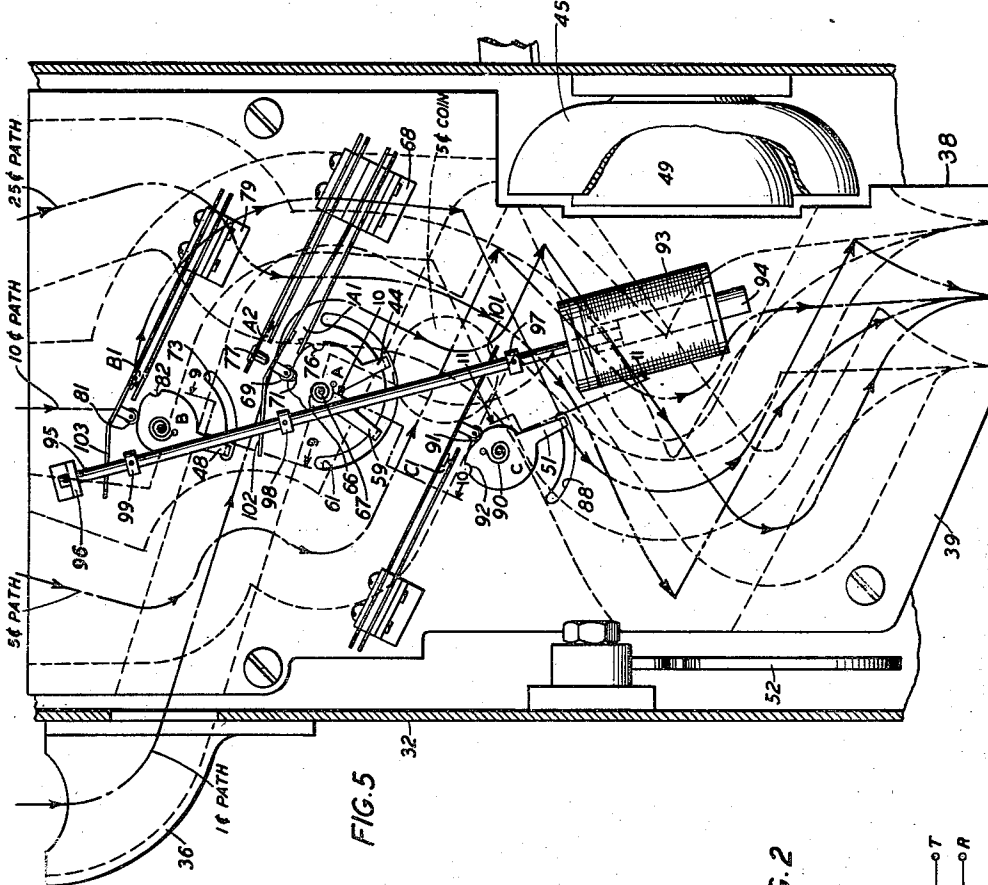


FIG. 5

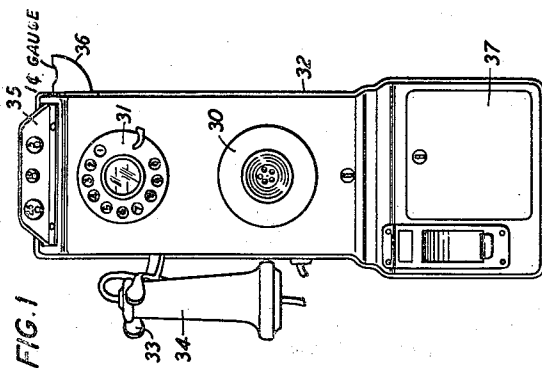


FIG. 1

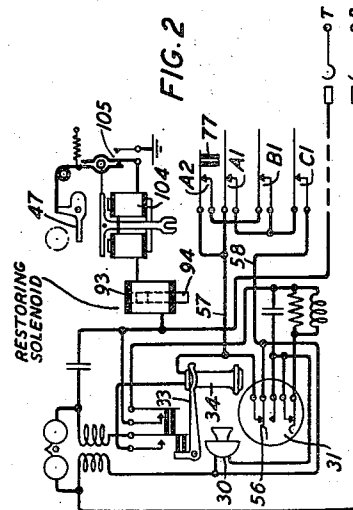


FIG. 2

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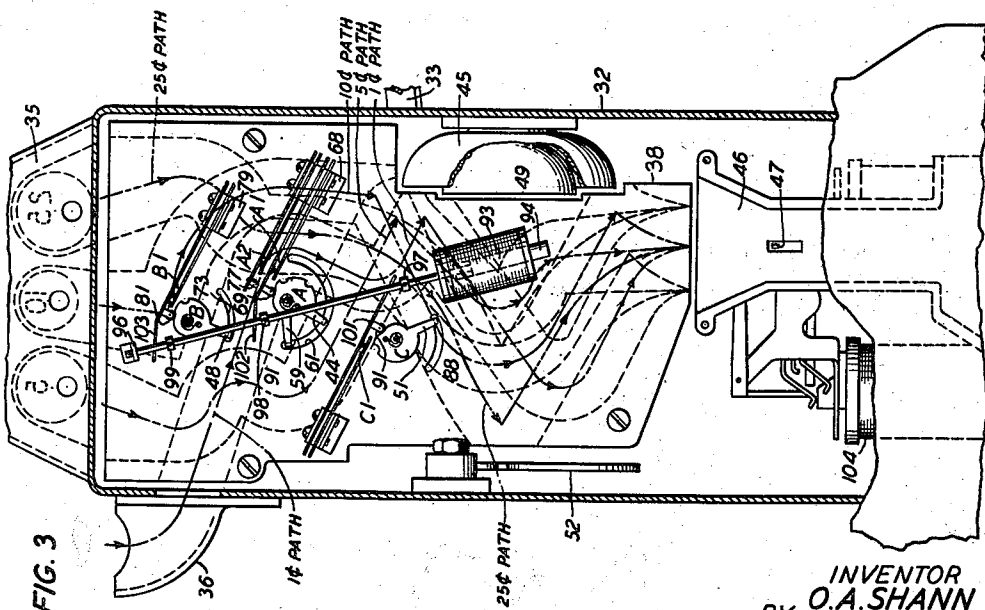
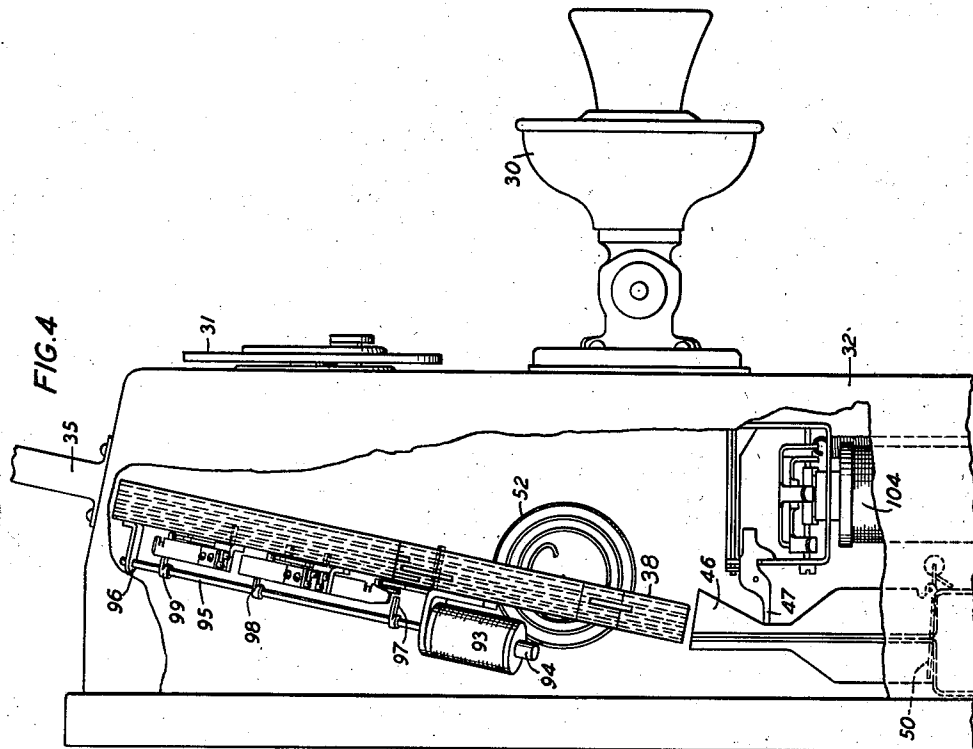
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7 Sheets-Sheet 2



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COIN COLLECTOR

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7 Sheets-Sheet 4

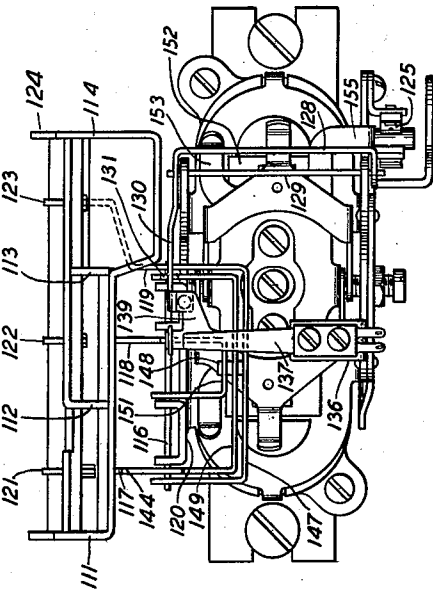


FIG. 16

FIG. 17

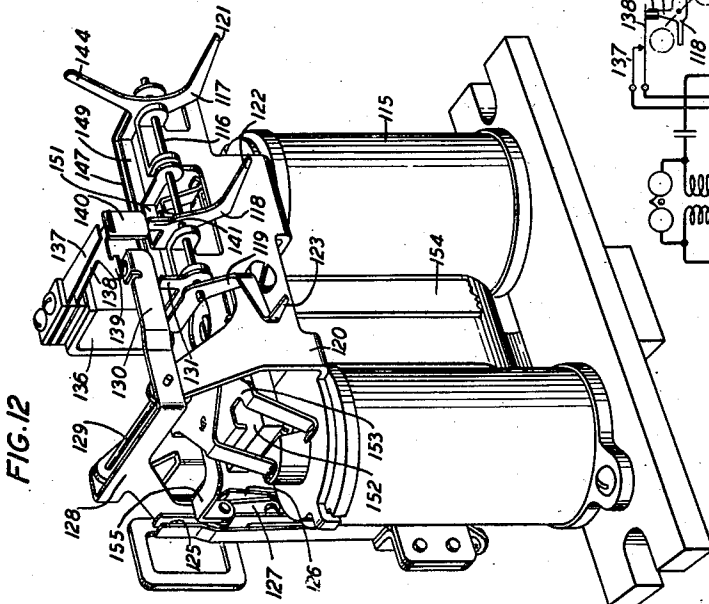
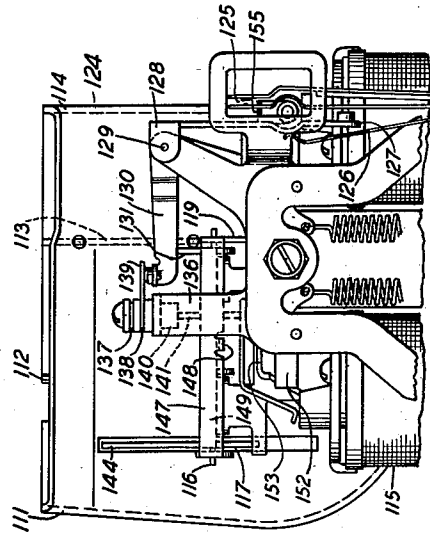
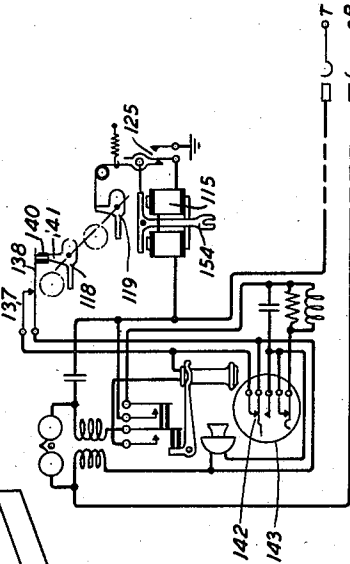


FIG. 12

FIG. 13



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2,251,073

COIN COLLECTOR

Filed May 25, 1938

7 Sheets-Sheet 5

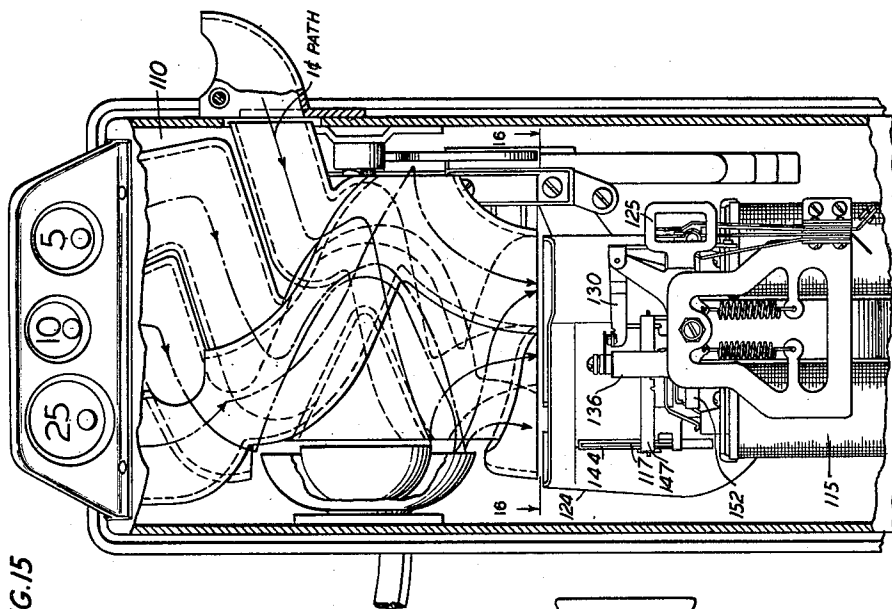


FIG. 15

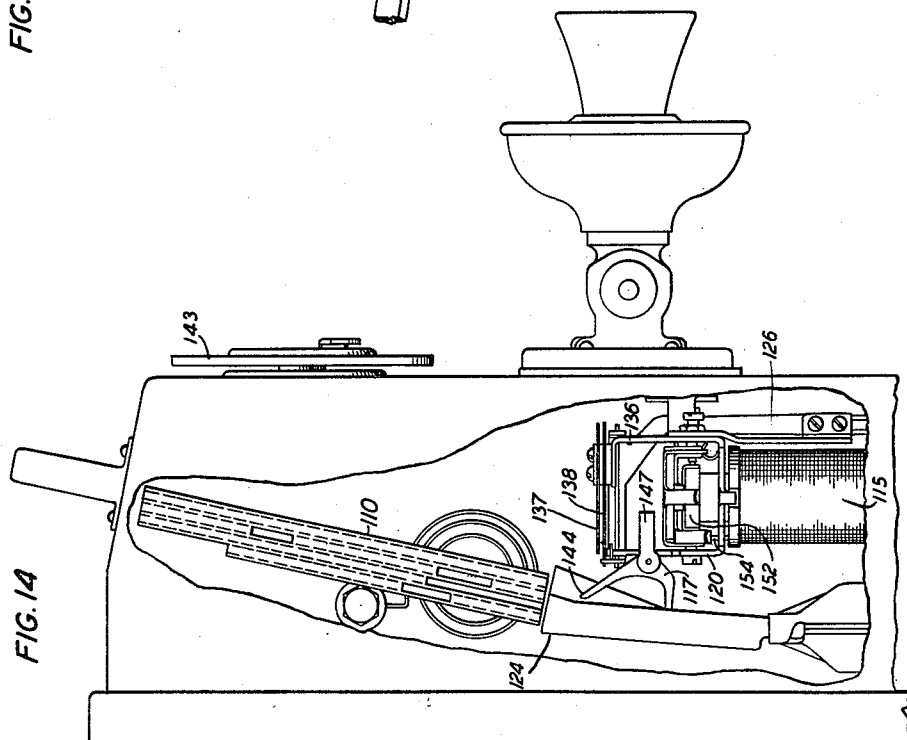


FIG. 14

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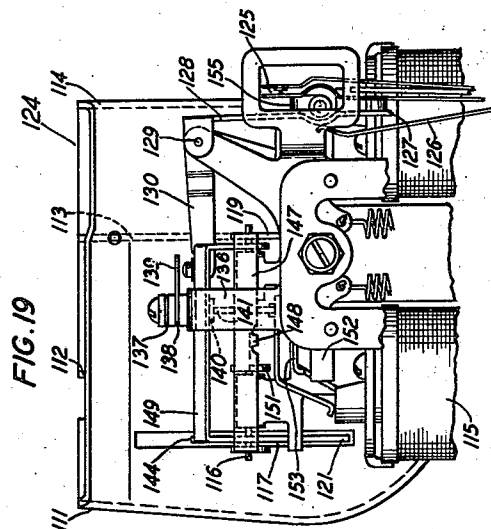
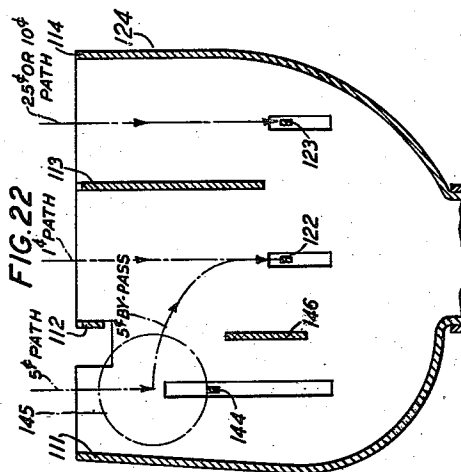
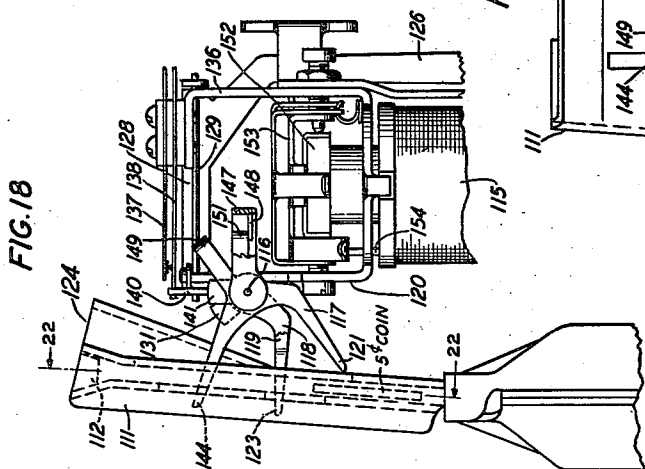
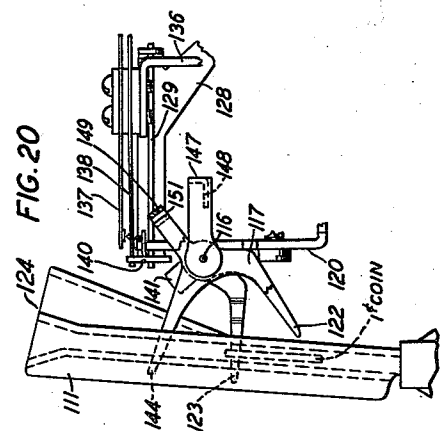
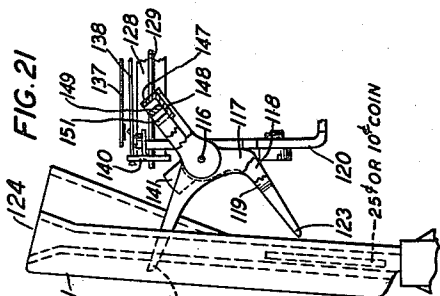
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2,251,073

COIN COLLECTOR

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7 Sheets-Sheet 6



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2,251,073

COIN COLLECTOR

Filed May 25, 1938

7 Sheets-Sheet 7

FIG. 25

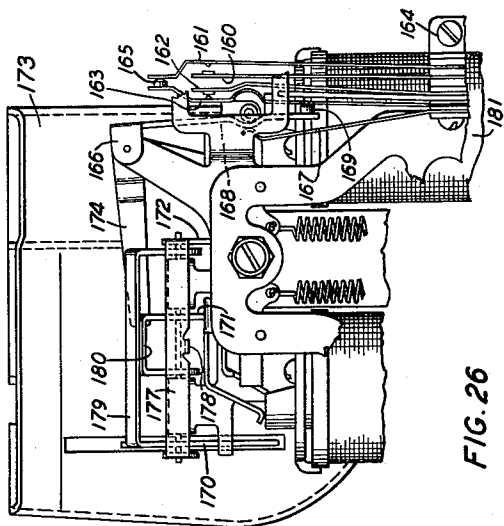


FIG. 26

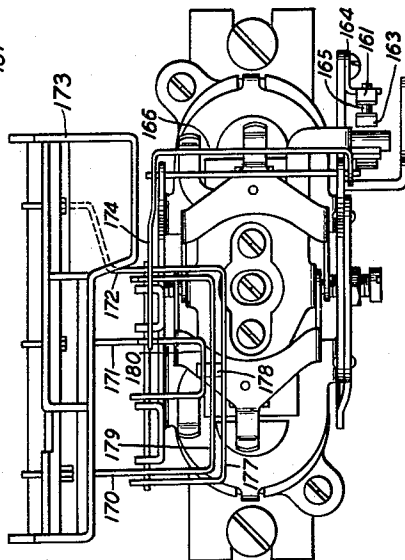


FIG. 24

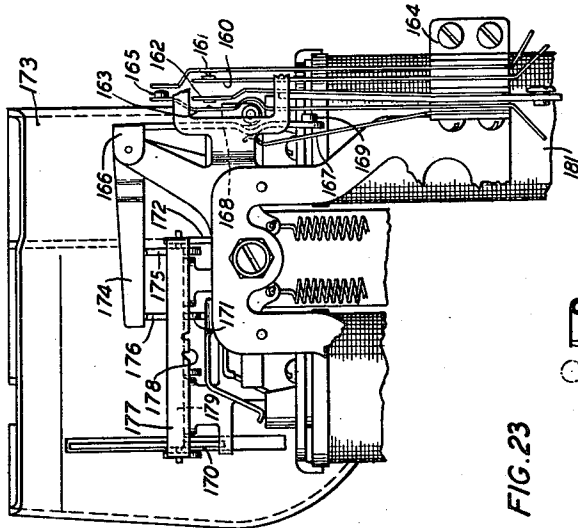
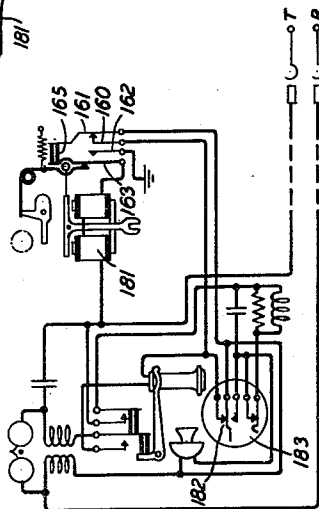


FIG. 23



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UNITED STATES PATENT OFFICE

2,251,073

COIN COLLECTOR

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Application May 25, 1938, Serial No. 209,883

22 Claims. (Cl. 179—6.5)

This invention relates to coin collectors and particularly to those collectors where the deposit of more than one coin is required for obtaining certain services from the instrument.

As applied to telephone coin collectors, one object of the invention is to provide a collector arranged to require the deposit of two or more coins of the same or different denomination before the collector may be utilized.

In the usual type of telephone coin collector as shown, for example, in the O. F. Forsberg U. S. Patent 1,043,219, a deposited nickel passes down a coin chute into a coin hopper where it strikes a coin trigger and temporarily comes to rest on a coin trap. The actuation of the coin trigger serves to close certain contacts to ground one side of the line through the windings of a coin relay and this ground connection serves for a machine switching system to prepare apparatus at the central office to permit the dialing of a local call, and this ground connection is also subsequently utilized to energize the coin relay to collect or refund the deposited money.

In the preferred form of this invention the arrangement is such that a nickel and a penny must be deposited before the collector may be utilized. In accordance with one form of the invention the coin actuated means for establishing the above described local connection to ground is ineffective until the desired number of coins have been deposited. In accordance with another form of the invention the said local ground connection is established upon the deposit of a single coin such as a nickel but the pulsing springs of the calling dial are normally short-circuited and coin actuated means are provided for removing the short circuit only after the deposit of a plurality of coins such as a nickel and a penny.

One manner in which the object of this invention may be accomplished for a multi-coin collector is to provide a coin hopper with three channels, one for dimes and quarters, one for nickels and one for pennies, with the coin chute arranged to direct the deposited coins into the proper channel of the hopper. A pivoted coin trigger projects into each hopper channel for actuation by any deposited coin, and each coin after striking its coin trigger is not held thereby in the coin hopper but the coin immediately drops upon the usual coin trap at the bottom of the hopper. Two sets of spring contacts are provided, one normally open and one normally closed, the normally open contacts when closed establishing the usual local ground connection through the coin relay windings, and the normally closed contacts when open serving to remove a short circuit around the pulsing springs of the calling dial. A biased switch lever has an arm resting on a shoulder of the nickel trigger and on a shoulder of the

penny trigger. When both of these shoulders are removed by coin actuation of the two triggers, the switch lever is free to move, and by its movement enables an extension thereof to actuate the spring contacts in such a manner that the ground connection is closed and the short circuit around the dial pulsing springs is removed. When the coin relay is subsequently energized to dispose of the deposited coins on the coin trap, the relay armature has an extension which in operating restores the switch lever to a position permitting the counterweighted coin triggers to be restored to their normal positions so that upon the deenergization of the coin relay the switch lever will be maintained in a position to permit the opening of the ground connection contacts and to close the contacts establishing the short circuit around the dial pulsing springs.

Referring to the drawings,

Fig. 1 is a front view of a telephone coin collector;

Fig. 2 is a circuit schematic of a coin collector substation circuit for the apparatus of Figs. 3 to 11, inclusive;

Fig. 3 is a rear view of the upper housing of the coin collector of Fig. 1 showing certain features of one form of this invention;

Fig. 4 is a side view partly in section of the upper housing of Fig. 3;

Fig. 5 is an enlarged rear view of a portion of the upper housing of Fig. 3;

Fig. 6 is an enlarged view of a portion of the nickel and penny runways of Fig. 3;

Fig. 7 is another view of a portion of the nickel runway of Fig. 3;

Fig. 8 is a view of a portion of the dime and quarter runways of Fig. 3;

Figs. 9, 10 and 11 are sectional views of different portions of the coin chute of Fig. 3 taken along the line 9—9, 10—10 and 11—11 of Fig. 5;

Fig. 12 is a rear view of a coin relay associated with a multiple coin trigger arrangement of this invention;

Fig. 13 is a coin collector substation circuit adapted for use with the form of the invention disclosed in Figs. 12 to 22, inclusive;

Fig. 14 is a side view of a coin collector upper housing embodying the apparatus of Fig. 12;

Fig. 15 is a front view partly in section of the upper housing of Fig. 14;

Fig. 16 is a top view of the apparatus of Fig. 12 associated with a multi-channel coin hopper;

Fig. 17 is a front view of the apparatus of Fig. 16;

Fig. 18 is an end view of the coin trigger arrangement of this invention after the deposit of a first nickel;

Fig. 19 is a front view of the apparatus of Fig. 18 after a nickel deposit;

Fig. 20 is an end view of the apparatus of Fig.

18 after the deposit of both a nickel and a penny;

Fig. 21 is an end view of the apparatus of Fig. 18 after the deposit of a dime or a quarter;

Fig. 22 is a sectional view of the multi-channel coin hopper of Figs. 18 to 21;

Fig. 23 is a circuit schematic of a coin collector substation embodying the form of the invention disclosed in Figs. 24 to 26, inclusive;

Fig. 24 is a front view of a modified coin trigger arrangement with all coin triggers in normal position;

Fig. 25 represents the apparatus of Fig. 24 after the deposit of a nickel and a penny; and

Fig. 26 is a top view of the apparatus of Fig. 24.

Referring to Fig. 1 the front view of a telephone coin collector is disclosed having the usual transmitter 30 and calling dial 31 mounted on the front wall of the upper housing 32 and extending from one side of the upper housing is the usual switch-hook 33 for receiver 34. Mounted on top of the upper housing is a coin gauge 35 for receiving quarters, dimes and nickels while the right-hand side of the upper housing has a separate coin gauge 36 for receiving pennies. Below upper housing 32 is the usual lower housing 37 containing a cash compartment and a refund chute opening.

Referring more particularly to Figs. 3 and 4 it will be seen that the multiple coin chute 38 mounted in upper housing 32 is in general similar to the coin chute disclosed in the Forsberg Patent 1,043,219. This multiple coin chute as shown more clearly in Figs. 9 to 11 comprises five spaced plates 39 to 43, inclusive, between which lie the suitably formed coin runways for quarters, dimes, nickels and pennies. A coin channel for nickels is provided between rear plate 39 and intermediate plate 40 whereby a nickel deposited in coin gauge 35 follows the arrow marked "5¢ path," strikes a finger 44 of pivoted member A to move it counter-clockwise as viewed in Fig. 3, strikes the upper edge of bell 45, and then drops into coin hopper 46 where it comes to rest upon a suitable coin trap 50 after actuating the usual coin trigger 47 as in the Forsberg patent. A penny deposited in coin gauge 36 follows a coin channel marked "1¢ path" lying between intermediate plates 40 and 41, strikes finger 48 of pivoted member B to move it counter-clockwise as viewed in Fig. 3, strikes the upper edge of bell 49 after which it drops into coin hopper 46 where it actuates coin trigger 47 unless trigger 47 has already been removed from the coin hopper due to the prior deposit of another coin. A dime deposited in coin gauge 35 follows a runway marked "10¢ path" lying between intermediate plates 41, 42, strikes the upper edge of bell 45, strikes finger 51 of pivoted member C to move it clockwise as viewed in Fig. 3 and then strikes the lower edge of bell 45 after which the dime drops into hopper 46. A deposited quarter follows the runway marked "25¢ path" lying between intermediate plate 42 and front plate 43, moves finger 51 of pivoted member C clockwise as viewed in Fig. 3 (unless finger 51 has already been actuated by an earlier deposited dime), strikes gong 52 and then drops into hopper 46.

Pivoted member A controls two sets of spring contacts, the normally closed contacts A-1 and the normally closed contacts A-2. The pivoted member B controls the normally closed contacts B-1 and the pivoted member C controls the normally closed contacts C-1.

It will be noted from the circuit schematic of Fig. 2 that the pulsing springs 56 of the calling

dial 31 are shunted by a path comprising the first-nickel controlled contacts A-1 and the dime or quarter controlled contacts C-1, connected in series between conductors 57 and 58, and the pulsing springs 56 are also shunted by a path comprising the second-nickel controlled contacts A-2, the penny controlled contacts B-1 and the dime or quarter controlled contacts C-1 all connected in series between conductors 57 and 58. Hence, it will be obvious from the circuit diagram of Fig. 2 that the short circuit around the pulsing springs will be removed to render the dial operative under any of the following alternative conditions: If a dime or quarter is deposited to open contacts C-1; if two nickels are deposited to open both contacts A-1 and A-2; or if a nickel is deposited to open contacts A-1 and a penny is deposited to open contacts B-1. On the other hand, the deposit of only a nickel or only a penny will fail to remove the short circuit around the pulsing spring contacts 56.

Before proceeding with a detailed description of the form of the invention shown in Figs. 2 to 11, inclusive, it may be pointed out that in Fig. 3 coin controlled members A, B and C, and their associated contacts, are all in normal position; in Fig. 5 the pivoted member A is shown in a partially advanced position due to the deposit of a first nickel; in Fig. 6 pivoted member A is in a partially advanced position as in Fig. 5 due to a deposited first nickel, and the pivoted member B is in advanced position due to the deposit of a penny; in Fig. 7 pivoted member A is in its fully advanced position due to the deposit of a second nickel; and in Fig. 8 the pivoted member C is in advanced position due to the deposit of a dime or quarter.

The manner in which pivoted members A, B and C are controlled by deposited coins will be explained in connection with Fig. 5 and the following figures. Members A, B and C are rotatably mounted on pins suitably supported by rear plate 39 in the coin chute. Member A has two fingers 44 and 59 and each finger has a right angle extension passing through arcuate slot 61 in rear plate 39; and in Fig. 10 extension 62 of finger 44 is shown projecting across the nickel runway between its upper and lower walls 63, 64 and into a corresponding arcuate slot 65 in plate 40. With member A in its normal position of Fig. 3 the angular extension of finger 59 corresponding to extension 62 lies above the nickel runway and in substantial contact with the upper end of slot 61 to which position member A is biased due, for example, to a coiled spring 66, one end of which is fastened to the stationary pin 67 and the other end to the outer face of member A.

Also suitably supported on coin chute 39 is a mounting block 68 for the spring contacts A-1 and A-2. The upper spring of contacts A-1 has an extension carrying an insulating roller 69 which bears upon the upper edge of member A, the normal position of roller 69 on member A being shown in Fig. 3. However, when a first nickel is deposited the force of the nickel in striking extension 62 of finger 44 causes member A to rotate counterclockwise until roller 69 rides into depression 71 whereby restoring spring 66 is temporarily ineffective to restore member A to its normal position. That is, with the deposit of a first nickel the movement of member A is stopped with extension 62 of finger 44 effectively out of the nickel runway as shown in Figs. 5 and 6, and with the second nickel finger 59 now

occupying a nickel obstructing position as shown in the same figure. As shown in Figs. 5 and 6, the partial movement of member A due to a first deposited nickel in lifting roller 69 until it rests in depression 71 causes spring contacts A—1 to open, but as explained previously with respect to Fig. 6, this is not sufficient to remove the short circuit from the pulsing springs in the calling dial 31.

However, if a second nickel is deposited the second nickel strikes the angular projection of finger 59 and moves finger 59 from its position of Fig. 6 to its position of Fig. 7 where the rotative movement of member A is stopped when roller 69 enters depression 76, whereby spring 66 is still temporarily ineffective to restore member A to its normal position. It will be noted that depression 76 is located farther from the pivoting axis of member A than depression 71 and this movement of member A due to the deposit of the second nickel, therefore, lifts the upper spring of contacts A—1 a distance sufficient to contact with insulating lug 77 on the upper spring of contacts A—2 and lift the upper spring of contacts A—2 until contacts A—2 are opened. As explained above in connection with Fig. 2 the pulsing springs of the calling dial 31 are operative when both contacts A—1 and A—2 are opened and hence the deposit of the second nickel renders dial 31 operative.

The penny finger 48 of pivoted member B as shown in Fig. 9 has a right angle extension 72 which passes through an arcuate slot 73 in plate 39 through a corresponding slot in plate 40 and into an arcuate slot in plate 41 thereby obstructing the penny runway between its upper and lower walls 74, 75 but passing between plates 39 and 40 at a point lying outside the nickel runway as is evident from Fig. 3. Block 79 mounted on plate 39 suitably supports spring contacts B—1 and when member B is in normal position as in Fig. 5 a roller on the upper spring of contacts B—1 rests on a portion of member B adapted to permit contacts B—1 to be closed. Member B, as is the case with member A, has a coiled spring which biases the member to a position such that finger extension 72 lies at the left end of slot 73 as viewed in Fig. 5. However, when a deposited penny strikes finger extension 72 member B is rotated counter-clockwise until the insulating roller 81 rides into depression 82 whereby the coiled spring is temporarily prevented from restoring member B to its normal position. With member B in its advanced position finger extension 72 now lies out of the path of a subsequently deposited penny as is evident from Fig. 6, and this rotation of member B due to a deposited penny is sufficient to open contacts B—1 as is evident from Fig. 6. It is obvious from the circuit of Fig. 2 that the pulsing springs of the calling dial 31 are made operative when contacts A—1 and B—1 are opened and hence dial 31 can be made operative by the deposit of one penny and one nickel.

Referring now to Figs. 8 and 11, it will be seen that finger 51 of pivoted member C has a right-angle extension 83 which projects through arcuate slots in plates 39 to 42 and into an arcuate slot in the front plate 43, normally occupying a coin obstructing position in the dime chute between the upper and lower walls 84, 85 and normally occupying a coin obstructing position in the quarter channel between the upper and lower walls 86, 87. However, extension 83 projects between plates 39 and 41 at a point not

passed by a deposited nickel or a deposited penny and hence extension 83 can be actuated by a deposited quarter or a deposited dime but not by a nickel or a penny. A coiled spring similar to spring 66 serves to bias member C to a position where extension 83 lies against the right end of slot 88 as shown in Fig. 5. Supported by plate 39 is a mounting block for the spring contacts C—1 and the upper spring of contacts C—1 carries an insulating roller 91 bearing against the edge of member C. When either a dime or a quarter is deposited, member C is moved by the coin to the position of Fig. 8 where the upper spring of contacts C—1 is lifted to open the contacts with roller 91 now resting in depression 92 whereby the coiled spring 90 is temporarily prevented from restoring member C to its normal position. It will be evident from the circuit of Fig. 2 that when contacts C—1 are opened, the shunt circuit around the pulsing springs 56 is opened and hence the deposit of either a dime or a quarter will render dial 31 operative.

After a deposited coin has actuated one of the members A, B or C, the actuated member remains in its advanced position until released by apparatus now to be described particularly with reference to Fig. 5. Mounted on chute plate 39 is an electromagnet 93 having a movable core armature 94 connected to a rod 95 the upper end of which passes through a slot in lug 96. In Fig. 5 it is assumed that electromagnet 93 is deenergized with rod 95 and armature 94 in their lowermost position to which position they are biased by gravity. Rod 95 has three spaced lugs 97, 98 and 99 fastened thereto and projecting towards the face of plate 39 as seen in Fig. 4. With the electromagnet 93 deenergized lug 97 is just below and in line with extension 101 of the upper spring of contacts C—1, lug 98 is just below and in line with extension 102 of the upper spring of contacts A—1, and lug 99 is just below and in line with extension 103 of the upper spring of contacts B—1. When electromagnet 93 is energized, the resulting upward movement of rod 95 causes lugs 97, 98 and 99 to contact respectively with spring extensions 101, 102 and 103, thereby raising these spring extensions an amount sufficient to lift rollers 91, 69 and 81 away from the upper edge of their respective pivoted members A, B and C, thereby allowing any one of members A, B and C occupying an advanced position due to coin deposit, to be restored to normal by its restoring spring. Thus, in Fig. 5 member A is held in a partially advanced position due to roller 69 lying in depression 71, but when roller 69 is lifted out of depression 71 by the energization of electromagnet 93 coiled spring 66 is free to rotate member A clockwise to restore the member to its normal position of Fig. 1 where contacts A—1 are closed. In other words, any of the contacts A—1, A—2, B—1 or C—1 which have been opened by coin deposit may subsequently be closed by supplying energizing current to electromagnet 93. As shown in Fig. 2 the winding of electromagnet 93 is connected in series with the windings of the usual coin relay 104 so that the application of collect or refund current to the line to energize coin relay 104 will also energize electromagnet 93 to restore members A, B and C and their respective contacts to their normal positions.

As in the type of coin collector shown in the Forsberg patent, any deposited coin after reaching coin hopper 46 actuates a coin trigger 47 to close ground contacts 105 and temporarily come

to rest upon a coin trap 50 and such coins may be later collected to refunded by the application of current of the proper polarity to relay 104, and it will be apparent from Fig. 2 that electromagnet 93 will be energized at the same time to restore any of the members A, B or C to its normal position.

In the form of the invention shown in Figs. 2 to 11, inclusive, the short circuit for the dial is controlled by coin triggers mounted on the coin chute. In an alternative form of the invention disclosed in Figs. 12 to 22, inclusive, the short circuit for the pulsing springs of the calling dial is controlled by coin triggers projecting into the coin hopper located below the coin chute.

In the type of coin collector upper housing shown in Figs. 14 and 15 the multiple coin chute 110 is the same as that described above for Figs. 3 and 4 except that chute 110 contains no coin actuated fingers and except that the coin outlets at the lower end of chute 110 are so arranged that a deposited nickel falls into one portion of the coin hopper, a deposited penny falls into a second portion of the coin hopper, and a deposited dime or quarter falls into a third portion of the coin hopper. Thus, as shown in Fig. 17 a deposited nickel falls into a channel between end wall 111 and intermediate wall 112, a deposited penny falls into a channel between intermediate walls 112 and 113 and a deposited dime or quarter falls between walls 113 and 114.

In Fig. 12 the coin hopper has been removed in order to obtain a clearer view of the coin trigger arrangement of this invention. Suitably mounted upon a bracket 120 above the polarized coin relay 115 is a stationary pin 116 upon which are rotatably mounted a two-finger nickel trigger 117, a penny trigger 118 and a quarter or dime trigger 119. These three fingers are counterweighted so that they are biased to occupy positions as in Fig. 12 with finger extensions 121, 122 and 123 extending laterally from the mounting bracket 120. As shown in Fig. 16 the trigger arms 121, 122 and 123 normally extend through slots in both the front and rear walls of hopper 124 to obstruct, respectively, the nickel channel, the penny channel and the quarter or dime channel.

In Figs. 12, 15, 16 and 17 the three coin triggers and associated apparatus are shown in their normal positions; in Figs. 18 and 19 trigger 117 is shown in an advanced position due to the deposit of a first nickel with the other triggers in normal position; in Fig. 20 trigger 117 is shown advanced due to the deposit of a first nickel and trigger 118 is shown in its advanced position due to the deposit of a penny; in Fig. 21 all three triggers are shown in their actuated position due to the deposit of a dime or quarter.

The ground spring contacts 125 are normally open and spring member 126 is prevented from closing these contacts by the interposed arm 127 (Fig. 17) of a switch lever 128 pivoted about pin 129, and spring member 126 is prevented from closing contacts 125 because arm 130 of switch lever 128 normally rests on a shoulder 131 forming a part of the nickel trigger 117. Considering the view in Fig. 12, if arm 121 of the nickel trigger is knocked downwardly by a first deposited nickel, shoulder 131 moves from beneath lever arm 130 and hence allows spring 126 to move towards the contacts 125 and cause their closure to establish a connection to ground through the windings of coin relay 115 as is evident from the circuit diagram of Fig. 13.

Mounted upon arm 136 of mounting bracket 120 are the normally closed spring contacts 137, 138, and spring contact 138 has a lateral arm 139 bearing an insulating stud normally resting on a lateral portion of switch lever arm 130 (Fig. 12). Spring 138 also has a downwardly extending portion 140 of insulating material which normally rests on shoulder 141 forming a part of the penny trigger 118. As long as either the nickel trigger shoulder 131 or the penny trigger shoulder 141 remains in its normal position of Fig. 12, contacts 137 and 138 will remain closed. Thus, when a first deposited nickel reaches coin hopper 124, the resulting movement of the nickel trigger will move shoulder 131 from beneath lever arm 130 and allow arm 130 to drop downwardly and close the ground contacts 125. This will free spring extension 139 of its support but will still keep contacts 137, 138 closed due to spring extension 140 resting on shoulder 141 of penny finger 118. However, if a penny is now deposited as well as a nickel, the penny upon entering the penny channel of the coin hopper 124 will knock finger 122 downwardly thereby removing shoulder 141 from beneath spring extension 140, and spring 138 is now free to drop downwardly and open the contacts 137, 138. If we assume that a penny is deposited before a nickel, trigger 118 will be actuated by penny deposit to remove shoulder 141 from beneath spring extension 140 and this will allow extension 140 to drop slightly to prevent trigger 118 from being restored to normal while still keeping contacts 137, 138 closed; and the subsequent deposit of a nickel will actuate finger 117 to remove shoulder 131 from beneath lever arm 130 and allow contacts 137, 138 to be opened and contacts 125 to be closed as previously described.

As shown in Fig. 13 spring contacts 137 and 138 normally provide a short circuit around the pulsing contacts 142 of calling dial 143. However, it has just been shown how the deposit of one nickel and one penny will cause spring contacts 137, 138 to open and render dial 143 operative.

The dial shorting contacts 137, 138 may also be opened by the deposit of two nickels instead of a nickel and a penny. When a first nickel is deposited, the first nickel as previously described strikes the trigger arm 121 and moves it approximately to the position of Fig. 18 where further movement is prevented by trigger 117 contacting with a portion of the supporting bracket 120. After the passage of the first nickel the counterweight for trigger 117 is prevented from restoring the nickel trigger to its normal position due to the fact that switch lever arm 130 has now dropped down into the path of shoulder 131. The position of the nickel trigger 117 after the deposit of the first nickel is, therefore, shown in Fig. 18. Note also that in this position of the nickel trigger 117 its second arm 144 now occupies a corn obstructing position in the nickel channel of the coin hopper. If a second nickel 145 is now deposited as shown in Fig. 22, arm 144 in blocking the nickel channel causes the second nickel to roll off arm 144 through an opening between walls 112 and 146 into the penny channel where the second nickel will actuate the penny trigger 122 and fall onto the coin trap. That is, actuation of the penny trigger by the second nickel insures that the calling dial is made operative by removal of the short circuit as described above in connection with the deposit of a nickel and a penny.

The dial shorting springs 137, 138 may be opened and the ground spring contacts 125 closed

by the deposit of a single dime or a single quarter. If a quarter, for example, is deposited the quarter when it reaches the coin hopper will actuate arm 123 of the quarter trigger 119 to remove arm 123 from the coin channel. It will be noted from Fig. 16 that the U-shaped portion 147 of quarter trigger 119 has a lateral tab 148 lying just beneath the U-shaped portion 149 of the nickel trigger 117 and beneath U-shaped portion 151 of the penny trigger 118 when all three triggers are in their normal non-actuated positions. When the quarter finger 123 is knocked downwardly out of the coin hopper by a deposited quarter, tab 148 is lifted upwardly, thereby moving the penny trigger and the nickel trigger in the same manner as if they were actuated by the deposit of a penny and a nickel. The completed movement of all three triggers due to a deposited dime or quarter is shown in Fig. 21. Hence, the deposit of a dime or a quarter also functions to close the ground contacts 125 and open the dial short-circuiting contacts 137, 138.

The dime or quarter trigger 119 after the passage of a dime or quarter is immediately restored to normal due to its counterweight portion 147, but the penny and nickel triggers after actuation by the quarter trigger remain in their actuated positions because switch lever arm 130 lying in the path of shoulder 131 of the nickel trigger temporarily prevents the nickel trigger from being restored to normal and because portion 140 of spring 138 lies in the path of shoulder 141 of the penny trigger 118.

There remains to be described how the nickel and penny triggers may be restored to normal after coin actuation or after actuation by the quarter or dime trigger 119. At an appropriate time after coin deposit, apparatus at the telephone central office may be operated to transmit coin collect or coin refund current over line conductor T (Fig. 13) through the windings of coin relay 115, and through closed contacts 125 to ground. Relay 115 has a pivoted armature 152 and pivoted coaxially with the armature and movable therewith is a member 153 having an extension 154 which in operating serves in the usual manner to release the coin trap (not shown) to direct the deposited coin into a collect chute or refund chute. Member 153 also has another extension 155 which due to armature movement forces spring 126 and arm 127 of switch lever 128 away from contacts 125 and the resultant movement of switch lever 128 is in such a direction that its other arm 130 is moved upwardly out of the path of shoulder 131 on nickel trigger 117 and its upward movement at the same time lifts spring 138 upwardly to remove projection 140 out of the path of shoulder 141 on the penny trigger 118. Hence, with the armature actuated either for coin refund or coin collection, the arrangement is such that the penny trigger and the nickel trigger are restored to normal due to their counterweights so that when coin relay 115 is deenergized switch lever arm 130 drops back onto shoulder 131 with spring projection 140 on shoulder 141, thereby closing the dial short-circuiting contacts 137, 138 and opening the ground contacts 125. For a more detailed explanation of the manner in which armature 152 controls the coin trap and reopens the ground contacts, reference may be made to the O. F. Forsberg U. S. Patent 1,117,485.

The apparatus of Figs. 12 to 22, inclusive, is particularly applicable for use with these machine switching systems where on a straight dial call the initially deposited money is automati-

cally collected after a certain time interval whereupon an operator will come in and demand, say, another nickel, as an overtime charge. The collection of the first nickel and the first penny as explained above automatically restores all triggers to normal, opens ground contacts 125 and closes the dial spring short circuit 137, 138. When the additional nickel is now deposited for the overtime charge, this nickel is sufficient as explained above to reclose ground contacts 125 to enable the second nickel to be collected at the end of the overtime period but this second nickel unaided by a penny is not sufficient to reopen the spring contacts 137, 138 short-circuiting the calling dial.

As explained above for Figs. 12 to 22, inclusive, the deposit of only a nickel is needed to close ground contacts 125 but the deposit of both a nickel and a penny is needed to open the dial short circuit 137, 138. In the modification of the invention shown in Figs. 23 to 26, inclusive, the deposit of only a nickel will not close the ground contacts but the deposit of both a nickel and a penny, or two nickels or a dime or a quarter is needed to close the ground contacts and open the calling dial short circuit.

The apparatus of Figs. 23 to 26 is in many respects similar to that described above in connection with Figs. 12 to 22, inclusive, and hence will not require a detailed description. The normally closed calling dial short-circuiting contact springs 160, 161 are placed parallel to the normally open ground spring contacts 162, 163 and mounted vertically from the same mounting block 164. Spring 163 has an extension carrying an insulating stud 165 so that when switch lever 166 is released by the proper coin deposit, spring 167 will move to the right as viewed in Fig. 24 to actuate lever arm 168 carrying stud 169 to close ground contacts 162, 163 and to open contacts 160, 161. It will be apparent from Fig. 23 that the closing of contacts 162, 163 will establish a ground connection for the windings of coin relay 181 and the opening of contacts 160, 161 will remove a short circuit from across the pulsing contacts 182 of the calling dial 183.

The three coin triggers 170, 171 and 172 have fingers projecting respectively into the nickel channel, the penny channel and the dime-quarter channel of the coin hopper 173 in the same manner as in the apparatus of Figs. 12 to 22. Switch lever arm 174 is longer than the corresponding arm 130 of Fig. 12 and is normally held in an upper position by contacting with shoulder 175 on nickel trigger 170 and by contacting the shoulder 176 on the penny trigger 171. It will, therefore, be obvious that the deposit of only a nickel will fail to permit the movement of switch lever 166 by biasing spring 167 to close ground contacts 162, 163 and open the dial short-circuiting contacts 160, 161. The deposit of the nickel will free switch lever arm 174 of its supporting shoulder 175 but lever arm 174 will still be held in its upper position by shoulder 176 on the penny trigger. If, however, a penny is now deposited it will be apparent that shoulder 176 will be removed from beneath switch lever arm 174 so that with both shoulders 176 and 177 out of the way, spring member 167 is free to close contacts 162, 163 and open contacts 160, 161.

It will also be apparent that the deposit of a dime or a quarter will close ground contacts 162, 163 and open the dial short-circuiting contacts 160, 161 much in the same manner as in Fig. 21

since the U-shaped portion 177 of the dime-quarter trigger has a lateral lug 178 normally lying between the U-shaped portion 179 of the nickel trigger and beneath the U-shaped portion 180 of the penny-trigger. Hence, when a dime or quarter is deposited the movement of trigger 172 out of the coin hopper will cause the upward movement of lug 178 to move triggers 170, 171 in the same manner as if actuated by a deposited nickel and penny. It will also be apparent that the deposit of two nickels will act in the same manner as the deposit of one nickel and one penny to close the ground contacts 162, 163 and open the dial short-circuiting contacts 160, 161. The coin triggers 170, 171, 172 after coin actuation may be restored to normal in the same manner as described above for the purpose of Figs. 12 to 22, inclusive.

In the above arrangements it has been convenient to describe them as applicable to United States coins of certain denominations but it will be readily understood that the apparatus of this invention may be controlled by coins or tokens of any desired denomination or size.

What is claimed is:

1. A telephone coin collector housing comprising a plurality of coin channels for receiving coins of different denominations, a pivoted finger projecting into one of said channels for actuation by a deposited coin traversing said one channel, a second pivoted finger projecting into a second of said channels for actuation by a coin traversing said second channel, an impulse sending device having a set of signaling contacts for transmitting code signals to the central office, a normally closed shunt circuit around said contacts for rendering said device inoperative, and means contingent upon the coin actuation of both of said fingers for opening said shunt circuit to render said device operative.

2. A telephone coin collector housing comprising an impulse sending device having signaling contacts for transmitting code signals to the central office, a plurality of coin channels for receiving deposited coins of different denominations, means projecting into one of said channels for actuation by a coin traversing said one channel, means projecting into a second channel for actuation by a coin traversing said second channel, each of said means operating independently of the other when struck by a deposited coin, and a short circuit for said contacts jointly controlled by said two means.

3. A telephone coin collector housing comprising an impulse sending device having a set of signaling contacts for transmitting code signals to a central office, a normally closed shunt circuit around the said contacts for rendering said device inoperative, a plurality of coin channels in which coins of various denominations may be deposited, a trigger projecting into one of said channels for operation by a deposited coin, a trigger projecting into a second channel for operation by a deposited coin, means for holding each of said triggers in its operated position after operation by a deposited coin, means contingent upon the coin actuation of both of said triggers for opening said shunt circuit to render said device operative, and an electromagnet for releasing said holding means.

4. A telephone coin collector housing comprising an impulse sending device having signaling contacts for transmitting code signals to the central office, a short circuit for said contacts including in parallel two sets of normally closed

electrical contacts, a plurality of coin runways having openings accessible outside said housing, a trigger projecting into one of said runways for operation by a coin traversing said one runway, a trigger projecting into a second of said runways for operation by a coin traversing said second runway, means responsive to the coin operation of said first trigger for opening one set of said electrical contacts, and means responsive to the coin operation of said second trigger for opening said second set of electrical contacts.

5. A telephone coin collector housing comprising an impulse sending device having signaling contacts for transmitting code signals to the central office, a short circuit for said signaling contacts including a first set of normally closed electrical contacts connected in series with two other sets of normally closed electrical contacts connected in parallel, a plurality of coin runways having openings accessible outside said housing, a pivoted trigger projecting into one of said runways for operation by a coin traversing said one runway, a second pivoted trigger projecting into a second of said runways for operation by a coin traversing said second runway, a third trigger projecting into a third of said runways for operation by a coin traversing said third runway, means responsive to the coin operation of said first trigger for opening one of said sets of electrical contacts, means responsive to the coin operation of said second trigger for opening a second of said sets of electrical contacts, and means responsive to the coin operation of said third trigger for opening the third set of said electrical contacts.

6. A telephone coin collector housing comprising an impulse sending device, a plurality of coin runways having openings accessible outside said housing, a trigger biased to a normal position and projecting into one of said runways for actuation to an advanced position by a coin traversing said one runway, electrical contacts controlled by said trigger, a short circuit for said device controlled by said contacts, means for holding said trigger in an advanced position after operation by a deposited coin, and an electromagnet for releasing said holding means.

7. A telephone coin collector housing comprising an impulse sending device, a plurality of coin runways having openings accessible outside said housing, a pivoted trigger biased to a normal position and projecting into one of said runways for actuation to an advanced position by a coin traversing said one runway, electrical contacts controlled by said trigger, a short circuit for said device controlled by said contacts, means for holding said trigger in said advanced position, a coin relay for disposing of deposited coins, and an electromagnet in series with said relay for releasing said holding means.

8. A telephone coin collector comprising an impulse sending device for transmitting code signals to a central office, normally closed electrical contacts shunting a portion of said device and normally rendering said device ineffective to produce said code signals, a plurality of coin runways in which coins of various denominations may be deposited, a pivoted finger normally projecting into one of said runways for actuation by a deposited coin, means effective after coin actuation for holding said finger effectively out of said one runway, and means responsive to the removal of said finger from said runway for opening said contacts.

9. A telephone coin collector comprising an im-

pulse sending device having a set of signaling contacts for transmitting code signals to the central office, a normally closed shunt circuit around said contacts for rendering said device inoperative to transmit said signals, a plurality of coin runways in which coins of various denominations may be deposited, a pivoted finger normally projecting into one of said runways and adapted to be advanced out of the coin path in said runway when struck by a coin passing down said first runway, a second pivoted finger normally projecting into a second runway and adapted to be advanced out of the coin path in the second runway when struck by a coin passing along said second runway, each of said fingers operating independently of the other when actuated by a deposited coin, and means contingent upon the coin advancement of both of said fingers for opening said shunt circuit to render said device operative.

10. A telephone coin collector comprising an impulse sending device for transmitting code signals to the central office, a normally closed shunt path across the signaling contacts of said device, a second normally closed shunt path across the signaling contacts of said device in parallel with said first path, a plurality of coin runways in which coins of various denominations may be deposited, a pivoted finger normally projecting into one of said runways and adapted to be advanced out of the coin path in the runway when struck by a coin traversing said first runway, a second pivoted finger normally projecting into a second of said runways and adapted to be advanced out of the coin path in the runway when struck by a coin traversing said second runway, each of said fingers operating independently of the other when actuated by a deposited coin, means responsive to the coin advancement of said first finger for opening said first shunt path and means responsive to the coin advancement of said second finger for opening said second shunt path.

11. A telephone coin collector comprising an impulse sending device for transmitting code signals to the central office, a shunt path across the signaling contacts of said device comprising a first set of normally closed contacts connected in series with a second set of normally closed contacts, a third set of electrical contacts in shunt to said first set, a plurality of coin runways in which coins of various denominations may be deposited, a pivoted finger normally projecting into one of said runways for actuation by a coin traversing said first runway, a second pivoted finger normally projecting into a second of said runways for actuation by a coin traversing said second runway, a third pivoted finger projecting into a third of said runways for actuation by a coin traversing said third runway, each of said fingers when coin actuated operating independently of the other fingers, means responsive to the coin actuation of said first finger for opening said first set of contacts, means responsive to the coin actuation of said second finger for opening the second set of contacts, and means responsive to the coin actuation of said third finger for opening the third set of contacts.

12. A telephone coin collector comprising an impulse sending device for transmitting code signals to the central office, a shunt path across the signaling contacts of said device comprising a first set of normally closed contacts connected in series with a second set of normally closed contacts, a third set of electrical contacts in

shunt to said first set, a plurality of coin runways in which coins of various denominations may be deposited, a pivoted finger normally projecting into one of said runways for actuation by a coin traversing said first runway, a second pivoted finger normally projecting into a second of said runways for actuation by a coin traversing said second runway, a third pivoted finger projecting into a third of said runways for actuation by a coin traversing said third runway, means responsive to the coin actuation of said first finger for opening said first set of contacts, means responsive to the coin actuation of said second finger for opening the second set of contacts, means responsive to the coin actuation of said third finger for opening the third set of contacts, means for holding each of said fingers in an advanced position after being actuated by a deposited coin, and electrical means for releasing said holding means.

13. A telephone coin collector comprising an impulse sending device for transmitting code signals to a central office, a shunt path across the signaling contacts of said device comprising a first set of normally closed electrical contacts connected in series with a second set of normally closed electrical contacts, a third set of electrical contacts connected in shunt to said first set, a multi-channel coin chute for receiving coins of various denominations, a pivoted finger normally projecting into one of said channels for actuation by a coin traversing said first channel, a second pivoted finger normally projecting into a second of said channels for actuation by a coin traversing said second channel, a third pivoted finger projecting into a third channel for actuation by a coin traversing said third channel, means responsive to the coin actuation of said first finger for opening said first set of contacts, means responsive to the coin actuation of said second finger for opening said second set of contacts, means responsive to the coin actuation of said third finger for opening said third set of contacts, a coin hopper for receiving coins from said coin chute, relay means for disposing of coins deposited in said hopper, other electrical contacts adapted to be connected in circuit with the winding of said relay, a coin trigger projecting into said hopper and actuated by a coin deposited in said hopper for controlling said other contacts, means for holding each of said fingers in an advanced position after being actuated by a deposited coin, and an electromagnet having a winding in circuit with said relay for releasing said holding means.

14. A telephone coin collector comprising an impulse sending device having a set of signaling contacts for transmitting code signals to a central office, a normally closed shunt circuit around said contacts for rendering said device inoperative, a coin chute comprising a plurality of coin channels for receiving deposited coins of various denominations, a pivoted coin trigger projecting into one of said channels for actuation by a deposited coin, means responsive to the actuation of said trigger for opening said shunt circuit to render said device operative, a coin hopper for receiving coins from said chute, means in said hopper for holding the deposited coins, relay means for releasing said holding means, and a second pivoted coin trigger projecting into said hopper and actuated by a coin reaching said hopper for controlling the energizing circuit for said relay.

15. A telephone coin collector comprising an

impulse sending device having a set of signaling contacts for transmitting code signals to a central office, a normally closed shunt circuit around said contacts for rendering said device inoperative, a multi-channel coin chute for receiving coins of various denominations, a multi-channel coin hopper for receiving coins from said chute, one channel of said hopper receiving coins of one denomination, a second channel of said hopper receiving coins of a second denomination, a pivoted finger projecting into said first hopper channel for operation by a coin traversing the channel, a second pivoted finger projecting into said second hopper channel for actuation by a coin traversing the channel, relay means for disposing of coins deposited in said hopper, means responsive to the coin actuation of said first finger for controlling an energizing circuit for said relay, and means contingent upon the coin actuation of both of said fingers for opening said shunt circuit to render said device operative.

16. A coin collector comprising a multi-channel coin hopper, one channel receiving coins of one denomination, a second channel receiving coins of a second denomination, a coin actuated device projecting into said first channel, a second coin actuated device projecting into said second channel, electrical contacts, a spring pressed lever adapted to operate said contacts, and means on each of said devices for supporting said lever in a non-operative position when said devices are in their normal positions while rendering said lever operative when both devices have been actuated by deposited coins.

17. A coin collector comprising a multi-channel coin hopper, one channel receiving coins of one denomination, a second channel receiving coins of a second denomination, electrical contacts, spring means biased to operate said contacts, a plurality of pivoted members, means supported by a first pivoted member for restraining said spring means, means supported by a second pivoted member for restraining said spring means, said first member having an extension projecting into said first channel for actuation by a deposited coin to rotate said first member to free said first restraining means, said second member having an extension projecting into said second channel for actuation by a deposited coin to rotate said second member to free said second restraining means.

18. A coin collector comprising a multi-coin channel, one channel receiving coins of one denomination, a second channel receiving coins of a second denomination, normally open electrical contacts, normally closed electrical contacts, a first spring means biased to close said first contacts, a second spring means biased to open said second contacts, a first pivoted member, a second pivoted member, means supported by said first member for restraining both of said spring means, means supported by said second member for restraining said second spring means, said first member having an extension projecting into said first channel for actuation by a deposited coin to rotate said first member to free said first restraining means, said second member having an extension projecting into said second channel for actuation by a deposited coin to rotate said second member to free said second restraining means.

19. A coin collector comprising a multi-coin

channel, one channel receiving coins of one denomination, a second channel receiving coins of a second denomination, a third channel receiving coins of a third denomination, normally open electrical contacts, normally closed electrical contacts, a first spring means biased to close said contacts, a second spring means biased to open said second contacts, a first pivoted member, a second pivoted member, means supported by said first member for restraining both of said spring means, means supported by said second member for restraining said second spring means, said first member having an extension projecting into said first channel for actuation by a deposited coin to rotate said first member to free said first restraining means, said second member having an extension projecting into said second channel for actuation by a deposited coin to rotate said second member to free said second restraining means, and a third pivoted member extending into said third channel and having means effective upon actuation by a coin in said third channel to free both said first restraining means and said second restraining means.

20. A coin collector comprising a multi-channel coin hopper, one channel receiving coins of one denomination, a second channel receiving coins of a second denomination, a pivoted member having a finger projecting into said first channel, a second pivoted member having a finger projecting into said second channel, a shoulder on said first pivoted member, a shoulder on said second pivoted member, and a switch controlling arm adapted to be held under tension on both of said shoulders and to be released upon the movement of said members by the fall of a coin on each of said fingers.

21. A coin collector comprising a multi-channel coin hopper, one channel receiving coins of one denomination, a second channel receiving coins of a second denomination, a third channel receiving coins of a third denomination, a pivoted member having a finger projecting into said first channel, a second pivoted member having a finger projecting into said second channel, a third pivoted member having a finger projecting into said third channel, a shoulder on said first pivoted member, a shoulder on said second pivoted member, a switch controlling arm supported under tension by both of said shoulders, and means on said third member for moving said first member and said second member to release said switch arm.

22. A coin collector comprising a multi-channel coin hopper, one channel receiving coins of one denomination, a second channel receiving coins of a second denomination, a pivoted member having a finger projecting into said first channel, a second pivoted member having a finger projecting into said second channel, a shoulder on said first member, a shoulder on said second member, a switch controlling arm supported under tension by both of said shoulders and adapted to be released upon the movement of said members by the fall of a coin on each of said fingers, and a second switch controlling arm supported under tension by said first shoulder and adapted to be released upon the movement of said first member by the fall of a coin on said first finger.

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