

Aug. 1, 1933.

T. D. BOTTOME

1,920,625

ELECTRICAL DETECTION AND SEPARATION OF COINS FROM SUBSTITUTES

Filed April 17, 1931

3 Sheets-Sheet 1

Fig. 1.

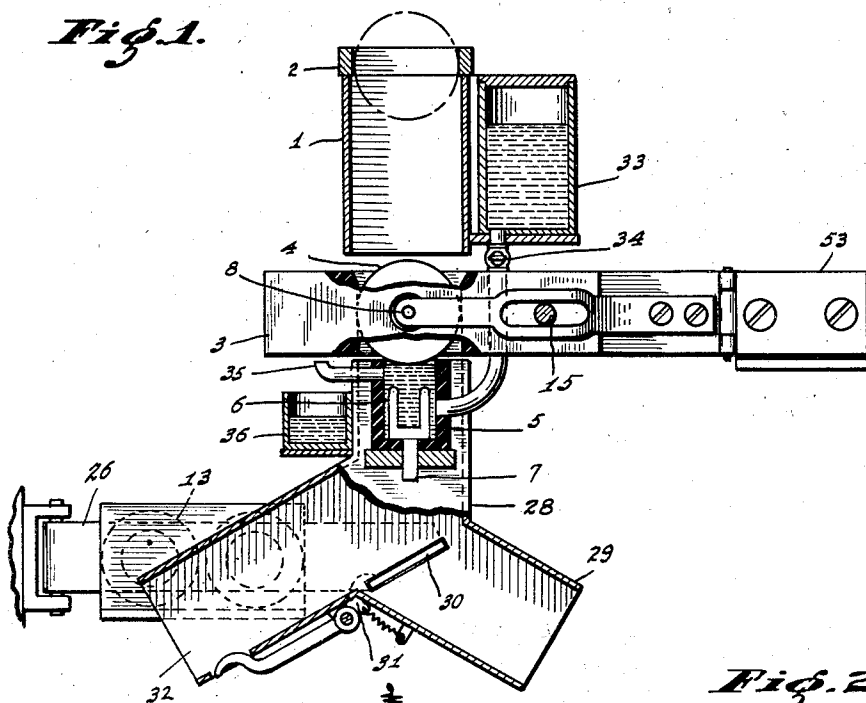
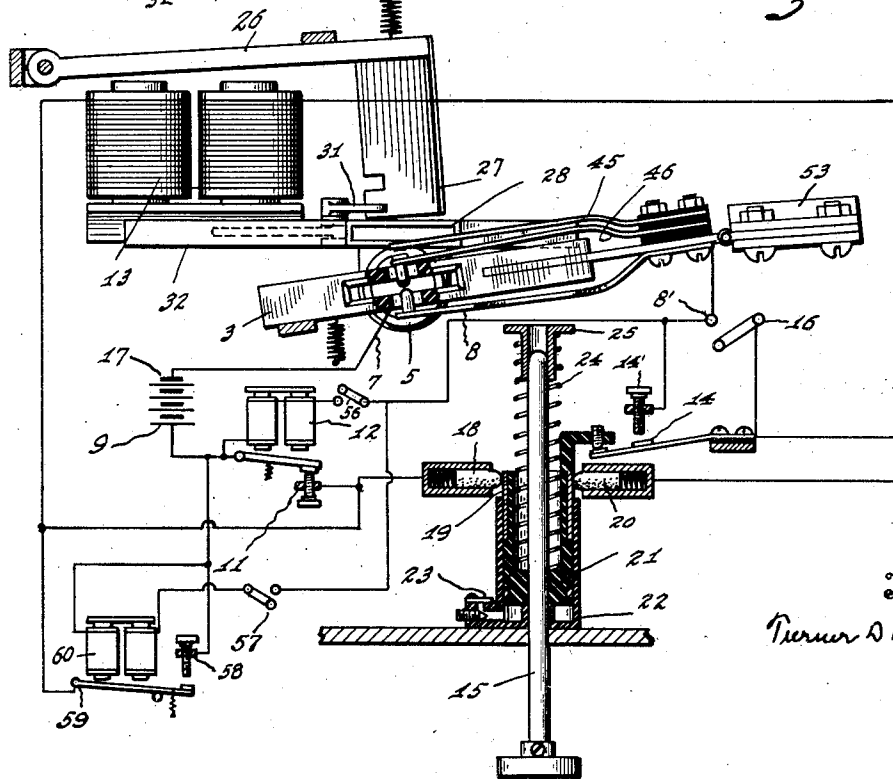


Fig. 2.



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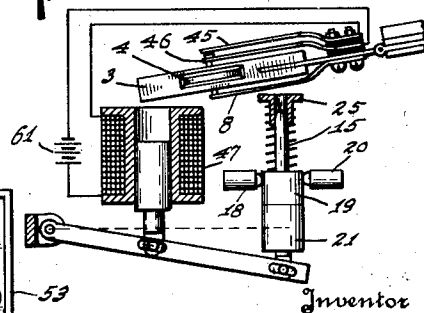
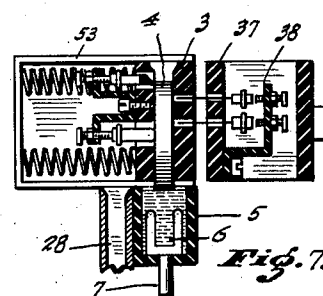
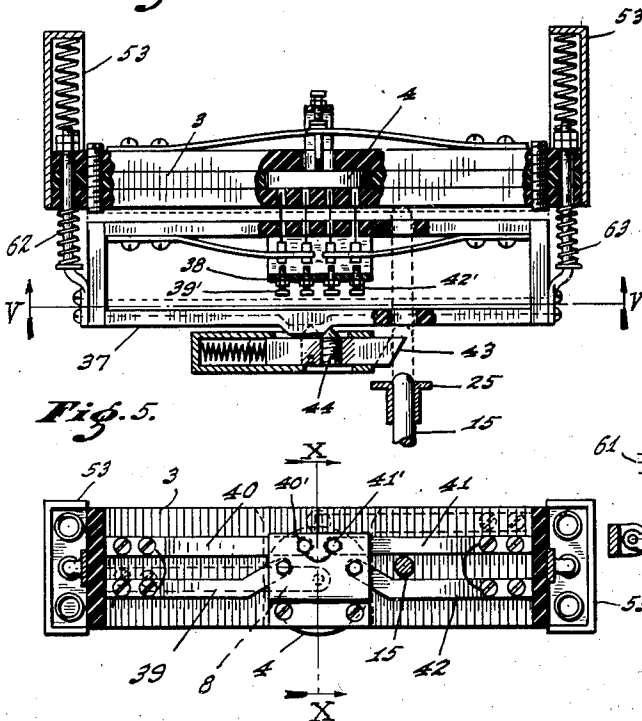
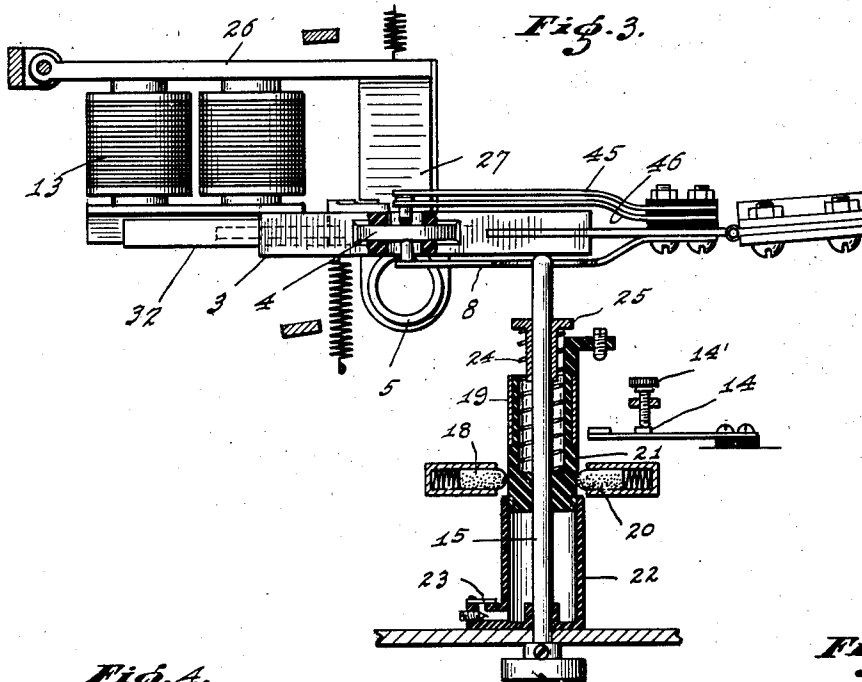
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3 Sheets-Sheet 2



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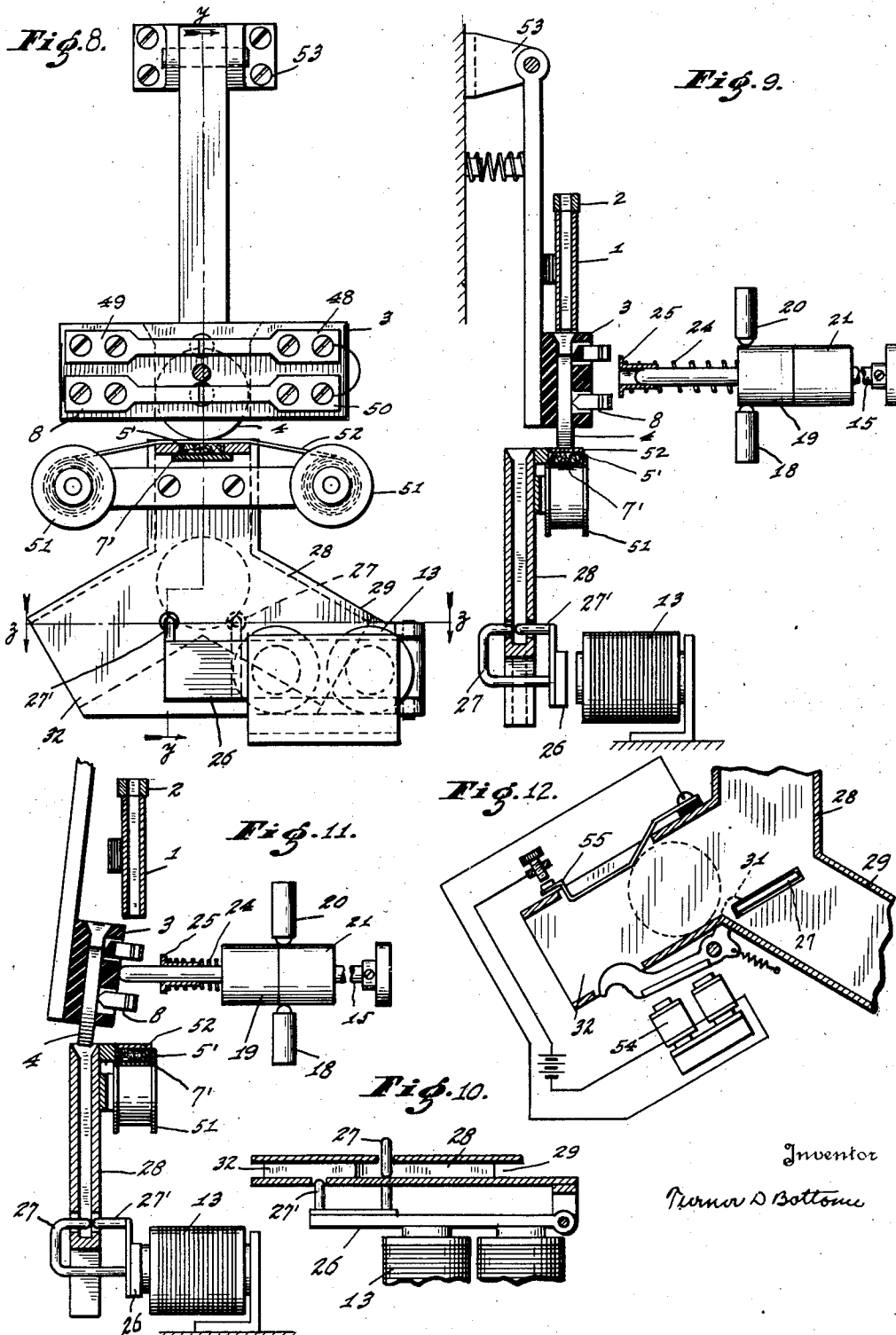
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ELECTRICAL DETECTION AND SEPARATION OF COINS FROM SUBSTITUTES

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UNITED STATES PATENT OFFICE

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ELECTRICAL DETECTION AND SEPARATION
OF COINS FROM SUBSTITUTES

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Application April 17, 1931. Serial No. 530,898

16 Claims. (Cl. 194—100)

This invention is an electrolytic method for the detection and separation of coins from substitutes which is similar to my application for patent Serial No. 562,835, filed Sept. 14, 1931, wherein the effect of the polarization of a metal when subjected to electrolysis is the essential means for the detection of one metal from another, and is adaptable for use in connection with coin operated devices or vending machines to reject coin substitutes.

It is commonly known that a metal used as an anode in an electrolyte and subjected to electrolysis becomes more or less polarized, which has the effect of introducing electrical resistance to the flow of the electrolyzing current, the amount of resistance produced when different metals are used as an anode indicate that polarization may be a means for effecting the separation of one metal from another.

However, with the amperage per unit area of anode surface usually employed, any or a number of different metals may become polarized to an approximately equal extent, or the polarization may be so inconstant in value as to be worthless as a means for selecting one metal from another, this is especially true when only a very small area of anode surface is available.

In the present invention practical results have been made possible by the discovery that a very unusual effect in the polarization of a metal compared to that of a different metal is to be obtained by the conjoined use of a very simple polarizing circuit and the use of comparatively large current density per unit area of anode flowing through the polarizing circuit, this may amount up to three thousand or more amperes per square foot of anode surface; it is essential that the current be allowed to act for a definite but limited time interval, then after such time interval the resulting super-polarization becomes widely varying in value between different metals and becomes a ready means for selecting and separating one metal from another.

In addition to the separation of one metal from another, the object of this invention is also to separate oversize or undersize coins or substitutes from the proper size coin, and to separate from a proper coin, smooth faced or centrally perforated coins or substitutes whether made of the same metal as the proper coin or made of a different metal or a non-metal.

These additional objects are accomplished with the aid of certain mechanical and electrical means used in conjunction with the polarizing means in mutually contributing to a final single result, which is the approximately complete separation of all kinds of coin substitutes from genuine coins.

This invention is intended to be used in connection with various types and kinds of coin

operated devices, all of which may differ in the available space for the installation of a coin detector, hence no particular structure or design of a coin detector is suitable to meet the varying conditions to which it may be applied. A simple structure using only the electrolytic method may suffice as a slug rejector in one device, while in another device an approximately perfect slug rejector may be very desirable, and the present invention provides these varying requirements.

Briefly stated the operation of a simple structure follows, the coin or slug is dropped in a chute which directs it to the top of an electrolytic cell in contact with the electrolyte, a cathode being submerged in the cell, the coin or slug acts as the anode when connected in circuit with a battery and an electromagnetic coin deflector, the coin deflector magnet is normally short-circuited, then after a limited time the short-circuit is opened, during the interval of short-circuit the amount of polarization produced at the anode contact surface with the electrolyte is the means for actuating or not actuating the coin deflector either to retain or to reject the coin or the slug depending upon the metal of which they are made.

The electrolyte used for the separation of silver coins from substitutes may consist of one gallon of 2% hydrochloric acid to which is added one quart of glycerine and then dissolving therein one pound of ammonium chloride and two and one half pounds of ammonium sulphate. For the separation of nickel coins from substitutes, one quarter of a pound of ammonium chloride and four pounds of ammonium sulphate are dissolved in one gallon of liquid consisting of 20% glycerine in water.

Or the proportions of chemicals may be so adjusted that the same electrolyte may be used for either nickel or for silver separation from substitutes, or for separating both nickel and silver from their substitutes using the same device and the same electrolyte. I do not limit myself to the proportion nor to the particular chemicals above named as there may be additions of other substances or totally different electrolytes that may be used for the purpose without departing from this invention, the electrolytes named have the advantage of being non-poisonous and comparatively inexpensive.

When this invention is used for the separation of a silver coin, the amount of silver stripped from a 25 cent piece has been carefully determined from a large number of polarizations and has been found to be approximately one five-thousandth of one grain for one polarization.

In the following description and claims, the term "nickel coin" is used in a general sense, a nickel coin is made of an alloy of nickel and copper, and likewise the term "silver coin" is

also used in a general way, since a silver coin is made of an alloy of silver and copper, hence the terms "nickel" or "silver" include alloys of these metals. The term "check" is used herein as a general term to describe a disk, slug, washer, or other coin substitute or a coin.

In carrying this invention into effect, reference to the accompanying drawings will assist in the following explanation, in which Fig. 1 is an elevation of one form of device for the separation of one metal from another, portions of the drawings being shown in section. Fig. 2 is a plan view of Fig. 1 partly in section and showing a diagram of the associated electrical circuits, the structural parts being shown in the normal check receiving position. Fig. 3 is a view similar to Fig. 2 but showing the structural parts in the check discharging position. Fig. 4 is a plan view partly in section showing a check carrier with a modified system of electrical contacts upon one side for the separation of checks under size in diameter and for the separation of checks containing a central perforation; upon the other side of the carrier is shown a set of contour contacts used for the separation of smooth face checks from those having a surface in relief. Fig. 5 is a vertical elevation partly in section of Fig. 4 on the line *v-v* showing the arrangement of the set of contour contacts upon the front, and the arrangement of the sizing contacts upon the rear of the check carrier. Fig. 6 is a cross section of Fig. 4 on the line *x-x* in Fig. 5, showing the position of the check contacts and of the electrolytic cell with the parts in the check receiving position. Fig. 7 is a plan view of the check carrier shown in Fig. 2 with the addition of an electrical power device and a diagram of the electric circuit for automatically moving the check carrier from its check receiving to its check discharging position. Fig. 8 is an elevation partly in section showing a modified support for the check carrier and showing a front elevation of the check sizing contacts shown in Fig. 4; modifications of the electrolytic cell, the check discharging chute, and the check deflector are also shown. Fig. 9 is a vertical section of Fig. 8 on the line *y-y*, showing the parts in the check receiving position. Fig. 10 is a plan view partly in section on the line *z-z* in Fig. 8 showing the check deflector actuated by the electromagnet and in the check retaining position. Fig. 11 is a similar view to Fig. 9 but showing the parts in the check discharging position with the check deflector actuated to retain the check. Fig. 12 is a modification of the detent release shown in Fig. 1 showing electrical means for releasing the check deflector.

In Fig. 1 a check receiving chute 1 has an inlet 2 which is a slot in a comparatively thick plate of wear resisting material, the slot being of minimum length and of minimum width, to permit a check of proper diameter and thickness to be inserted, but not admitting a check of greater diameter or thickness. A check carrier 3 is hinged to a support 53, the carrier 3 is made of a block of insulating material fabricated with a slotted chamber which is adapted to receive and position a check 4 upon a support 5, this support also serves as the container with an open top for the electrolyte 6 and for the submersion of the cathode 7, which parts comprise an electrolytic cell. The check 4 when supported upon the container 5 serves as the anode for the electrolytic cell. The electrolyte 6 is maintained at a constant level nearly filling the

container so that the lower edge of the check makes contact with the electrolyte, means being provided for maintaining the supply and level of the electrolyte, a supply reservoir 33 contains the electrolyte which flows through a tubing fitted with an adjustable valve 34, the liquid being conducted into the electrolytic cell 5, an overflow 35 is provided to maintain a constant level, the excess of liquid overflowing into the receptacle 36. In practice the valve 34 may be adjusted to allow the liquid to flow at the rate of about 12 drops per hour depending upon the amount of usage of the device. An electrical contact 8 supported by the check carrier 3 is adapted to place the check 4 in connection with the positive terminal 9 of the battery as shown in Figs. 1 and 2; the spring contacts 45 and 46 are to be replaced by a duplicate of the spring contact 8 when the push rod 15 is designed to be operated by hand, thus providing a double contact 8, both of the No. 8 contacts being connected to 8'.

When the device is used for the separation of nickel coins from their substitutes, the electrical circuits shown in Fig. 2 are as follows, the switches 56 and 57 are to remain open, then beginning with the positive terminal 9 of the battery the current is directed through 10 and the contact 11 to the contact 18, thence to and through the metal cylinder 19, to and through the contact 23, and connecting to the switch contacts 14 and 16, the contact 14 is adapted to make connection with 14' when the push rod 15 is moved slightly inwards by hand, (the contacts 14 and 14' are not necessary and are not used when the pushrod 15 is operated by electrical power as shown in Fig. 7, in which case the switch 16 is closed to connect with 8'), the current is then directed to the check contact 8 and to the check 4 (shown in Fig. 1) the lower edge of the check being in contact with the electrolyte 6, the current being conducted through the electrolyte to and through the cathode 7 to the negative terminal 17 of the battery which completes a circuit that acts to short-circuit the electromagnet 13, one terminal of the electromagnet 13 being connected to 11 and the other terminal of the electromagnet being connected to 8' either by means of contact 14 or the switch 16. The electromagnets 12 and 60 are disregarded when the device is used for nickel separation. The push rod 15 is fitted with a piston 21 and a cylinder 22 having an air valve 23, which comprises a means for slowly moving or retarding the rod 15 when pushed inwards to the end of its stroke, and then by means of the spring 24, the guide 25, and the air valve 23, the rod is enabled to make a quick return to its normal position of rest.

In operation a check 4 is inserted in the check receiving means 1 shown in Fig. 1, the check carrier 3 being in its normal check receiving and supporting position shown in Fig. 2, the push rod 15 is then slowly moved inwards, requiring approximately two seconds for the complete stroke, during a part of the time of the push rod stroke the current from the battery electrolyzes the lower edge of the check while the electromagnet 13 remains short-circuited by the contacts 18, 19, 20, but at about the time the tip of the push rod 15 engages with the check carrier 3, the cylinder 19 becomes disengaged from the contacts 18, 20, opening the short-circuit across the terminals of the electromagnet 13, the polarizing current then flows

through the electromagnet. The amount of polarization produced at the point of contact of the check 4 with the electrolyte 6 will vary according to whether the check is a nickel coin or is made of a different metal.

The action of the polarization is approximately as follows, a nickel coin placed in the device will be affected by a minimum amount of polarization upon instantaneous contact of the coin with the electrolyzing current, the strength of current flowing through the short-circuit may amount to about 550 milliamperes which may fall within a second or two to about 450 mils and then remain comparatively constant for several seconds. The electromagnet 13 and its armature 26 are adjusted to become mutually energized when a current of about 350 mils or more flows through the electromagnet 13, but not to become energized when a current of less than 350 mils flows through the electromagnet. A substitute check made of copper or brass may have a sufficiently minimum polarization upon instantaneous contact to permit a current of 500 mils to flow through the short-circuit, but the strength of current will rapidly fall due to increasing polarization to perhaps 200 mils within a very limited time interval, other metals act in a similar manner while some of them may be so highly polarized upon instantaneous contact that a current of perhaps only 25 mils will flow through the short-circuit, but which may rapidly increase up to perhaps 250 mils within the time interval during the short-circuit, hence the length of time of the short-circuit is adjusted so that when the short-circuit is opened, a nickel coin will be the means for producing a greater amperage through the electromagnet 13 than will be produced by a substitute metal during an equal time interval.

When the device is used for the separation of silver coins from their substitutes, the electrical circuits shown in Fig. 2 are the same as for the separation of nickel coins excepting that the relay 12 and its companion contact 11 are placed in circuit by closing the switch 56, the relay contact 11 is adapted to open the battery circuit through the electro-magnet 13, the armature-connected terminal of relay 12 is connected to terminal 10, the other terminal of the relay 12 is connected to the terminal 8', which completes relay 12 circuit in parallel with the electromagnet 13. The relay 60 and its connections are disregarded.

The action of the polarization when the device is adapted for the separation of silver coins from substitutes is about as follows, a silver coin placed in the device will be affected by a maximum amount of polarization, the strength of current flowing through the short-circuit 18—19—20 upon instantaneous contact of the coin with the electrolyzing current may amount to about 50 milliamperes which may drop to 25 mils during the time of the short-circuit, while within the same time, the strength of current flowing through the short-circuit when substitute metals for silver are used, may amount to a range of about 100 to perhaps 400 mils, therefore the relay 12 and its armature are adjusted to become energized when the strength of current flowing through both the relay 12 and the electromagnet 13 amounts to about 75 or more mils, but relay 12 not to be energized when a current of less than 75 mils flows through the two circuits, the energizing of the relay 12 serves to open the circuit flowing through the electro-

magnet 13 by means of the retraction of the armature of relay 12 and the opening of contact 11, which prevents the energizing of the electromagnet 13 and the associated check deflector 27, the armature 26 is made slow acting, while the armature attached to relay 12 is made quick acting, but when the current flowing through the relay and electromagnet circuits is less than 75 mils, relay 12 is not energized, and the electromagnet 13 and its armature 26 are adjusted to become energized to project the check deflector 27 into the exit chute 29 which acts to direct the check to be retained by its passage through the branch chute 32. Therefore the check deflector 27 is actuated only when a silver coin is used, the checks made of substitute metals all being rejected from the apparatus because the exit chute 29 remains normally in the check rejecting position.

When the device is used for the retaining of both nickel and of silver coins and for the rejection of their substitutes, the circuits shown in Fig. 2 are the same as for the separation of silver from its substitutes excepting that the switch 57 is closed, and the relay 60 is placed in circuit with the other circuits, one terminal of relay 60 being connected to and through the switch 57 to the terminal 8', the other terminal of relay 60 being connected to terminal 10, the armature 59 of the relay 60 is connected to terminal 11, and the adjustable relay contact 58 is connected to terminal 10, the switches 56 and 57 being closed.

The action of the polarization when the device is adapted for joint separation of nickel and of silver coins from substitutes, is approximately the same as that for the separation separately of nickel coins and of silver coins from their substitutes, the only difference being in the addition of relay 60 which is adjusted to energize its armature 59 when the strength of current flowing through the combined circuits amounts to about 350 or more milliamperes, the energizing of its armature closing the contact 58 which acts to close the electrolytic cell circuit through the electromagnet 13 whether the relay 12 contact 11 is open or not, hence when a nickel coin is used, the strength of current in the combined circuits is sufficient to energize relay 12, relay 60, and electromagnet 13 which energizes its armature 26 to actuate the check deflector 27 to direct the nickel coin to be retained. When a silver coin is used, the strength of current being less than 75 mils, the relays 12 and 60 both fail to become energized while the circuit through the electromagnet remains intact through the relay contact 11, hence the electromagnet 13 becomes energized to actuate the check deflector 27 to direct the silver coin to be retained. When a substitute for either a nickel or a silver coin is used, the range of strength of current will be more than 75 mils and less than 350 mils, hence the relay 60 and its armature is adjusted to become energized when the current flowing through the combined circuits amounts to more than 350 mils, but not to become energized when a current of less than 350 mils flows through the three circuits, which will result in relay 12 becoming energized which acts to open the contact 11 and to open the circuit through electromagnet 13, and the relay 60 remains non-energized, hence no current flows through electromagnet 13 and the check deflector 27 remains in its check rejecting position, rejecting all substitute metals for both the nickel and the silver coins.

The relay 60 is connected in parallel with the relay 12 and the electromagnet 13, these units however may be connected in series, and in which case the armature contacts to the two relays would have to be reversed in action and be connected in series with each other and adapted to short-circuit the electromagnet 13, as follows, the relay 12 would be adapted to short-circuit magnet 13 when the current through the series circuit amounted to over 75 mils and less than 350 mils, the relay 60 remaining in its reversed normal circuit closing position, this provides for the rejection of substitutes for nickel and for silver, when a nickel coin is used the relay 60 will be energized to open its contact to allow the magnet 13 to become energized, and when a silver coin is used it will not provide sufficient current to operate relay 12 hence its reversed contact 11 will remain open and will allow the electromagnet 13 to become energized to retain the silver coin.

It is to be understood that the strength of current named herein will vary considerably according to the kind and strength of electrolyte used as well as upon the size of the coins or checks used, hence all of the above named amperages are to be considered relative, they have been cited in order to clearly explain the action of various metals when subjected to the short-circuited super-polarization which is the essential part of this invention.

The push rod 15 when started upon its inward movement must continue to be pushed in to the limit of its stroke, and in which position the check carrier 3 will be placed to permit the check 4 to fall by gravity into the exit chute 28 shown in Figs. 1, 2, 3.

The exit chute 28 consists of a vertical portion with its lower end fitted with an obtuse elbow 29, the combined chute is adapted to receive a check at its upper end and to normally direct the check to be rejected through the elbow 29, an opening 30 is made through one or both walls at about the junction of the parts 28 and 29 of the exit chute, this opening is adapted to receive the projected end of the check deflector 27 when the electromagnet 13 becomes energized, and at the same time the detent lever 31 is adapted to engage with a notch in the check deflector 27 which is a means for holding the check deflector in the check deflecting position until the check has been deflected and directed to fall through the branch chute 32 to be retained within the apparatus, the check in falling through the exit chute 32 depresses the lower end of the detent lever 31 releasing the lever from the notch in the check deflector, thus allowing the deflector to regain its normal check rejecting position.

In Fig. 12 electrical means is shown for releasing the detent lever 31 from the notch in the check deflector, the electrical means is desirable when the device is used for the separation of silver dimes from substitutes, checks the size of a ten cent silver coin being comparatively light in weight. The electrical detent release is also useful in connection with any size check.

In action a light contact spring 55 having a companion contact (preferably spring mounted) is placed in circuit with an electromagnet 54 and a battery as shown in Fig. 12, in the drawings the contact spring 55 is shown with a portion of the spring projected through one edge of the chute 32 for ease of illustration, but in practice the projected part of the spring is best

placed in one side of the chute at a point lower down in a more vertical portion of the chute not shown in the drawings, so that the check will have greater velocity and power to pass by and at the same time depress the spring contact into electrical connection with its companion contact, whereupon the electromagnet 54 becomes energized to release the detent lever 31 and the check deflector 27, the lower end of the detent lever acting as an armature to the magnet 54.

Figs. 4, 5, 6, show a check carrier adapted to be moved upon slides 53, instead of being hinged as shown in Fig. 3. Upon the check carrier 3 is mounted an auxiliary carrier 37 for supporting a set of contour contacts 39, 40, 41, 42, and their companion contacts 39', 40', 41', 42', each of these spring mounted contacts consists of a needle or its equivalent mounted in an insulating material supported in the end of a flat spring upon the inner side of the spring and provided with an electrical contact at its end upon its outer side, each spring contact is provided with an adjustable companion contact which is mounted upon and projects through an insulating block 38, the needle attached to each of the spring contacts is adapted to project through the supporting wall of the carrier 37 and also to project through the adjacent wall of the check carrier 3, each needle point being positioned to normally almost touch a check 4 when it is supported within the check carrier 3, the push rod 15 when moved inwards a slight distance is adapted to depress the latch action 43 forcing a detent 44 to engage with and push the auxiliary carrier 37 towards the carrier 3 to press the needle points against the face of the check 4 before the push rod 15 engages with and pushes the check carrier 3, the companion contacts to the needle spring contacts are adjusted so that all four of these contacts will be pressed together in electrical contact by the pressure of the needle points against a smooth face check, but one or more of the needle points not pressing its spring contact against its companion contact when such needle is in a position over a depression in a check having a contour in relief.

The electrical connections of the set of four contacts is as follows; the adjustable companion contact 39' is connected to the contact 11 shown in Fig. 2, the spring contacts 39 and 40 are connected together, the companion contacts 40' and 41' are connected together, the spring contacts 41 and 42 are connected together, and the companion contact 42' is connected to the contact 8' which is shown in Fig. 2. These connections place the four sets of contacts in series make and break circuit with each other, and when all these contacts are pressed together in electrical contact by a smooth face check, the circuit will be completed through the set of contacts which circuit will act to short-circuit the electromagnet 13 to prevent it from becoming energized particularly when a smooth face check made of nickel or of silver is inserted in the device as a substitute for a nickel coin or a silver coin as the case may be, otherwise a check having a smooth face and made of the same metal as that of the coin for which the device is intended to separate, would be retained by means of the electrolytic cell whereas by the addition of the set of contour contacts such a coin substitute would be rejected.

In Fig. 7 is shown one method of applying a power unit to move the check carrier 3 from its normal check receiving position to its check discharging position, the circuit being completed when a check 4 is inserted into the carrier 3, the contacts 45 and 46 are pressed together completing a circuit through the battery or electrical supply 61 and the electrical power device 47, the contacts 45 and 46 are normally separated when a check is not positioned in the check carrier 3. The power device 47 is preferably a slow acting unit.

Figs. 8, 9, 10, 11, illustrate modifications of parts shown in the preceding drawings. The electrical contacts upon the check carrier 3 shown in Figs. 8, 9, 11, are also shown upon the rear of Figs. 4, 5, 6. Fig. 8 shows an elevation of a set of four contacts which consist of an upper set and a lower set; the upper set of contacts comprise an under spring 49 supporting an insulated contact upon its inner extremity, this contact point projects through an orifice in the contact supporting wall of the check carrier 3 and is adapted to non-electrically contact with the upper edge of a check of proper size when in position in the check carrier, shown in Figs. 9 and 11, the under spring 49 is also provided with an electrical contact which is supported upon its outer side near the free end of the spring which contact is adapted to electrically connect with a companion contact that is supported upon the extremity of the inner side of an over spring 48, said upper set of contacts are adapted to be pressed together by means of the diameter and thickness of a check of proper size, but not to be pressed together when a check of less diameter or less thickness than that of a proper size when in position in the check carrier.

The lower set of contacts comprise an under spring 8 which supports an electrical contact upon its inner extremity, this contact being placed as shown in Figs. 1, 2, 3, when it is used alone as a means of connecting a check in anode contact with the battery, but when this spring contact is used in connection with the other three springs 48—49—50 it is projected through an orifice in the wall of the check carrier 3 and is positioned to make contact with the center of a check of proper diameter, this spring contact 8 becomes an under spring which also supports an electrical contact upon its outer extremity which contact is adapted to electrically connect with a companion contact supported upon the inner extremity of an over spring 50, this lower set of contacts is adapted to be pressed together in electrical connection when a proper check is positioned in the check carrier as shown in Figs. 5, 6, 8, 9, but not to be pressed together nor to complete an electrical connection by means of a check containing a central perforation nor to make an electrical connection with a non-metallic check, the positive terminal 9 of the battery at the point 8' shown in Fig. 2 being connected to the under spring 49 of the upper set of contacts, the over spring 48 being connected to the over spring 50 of the lower set of contacts, no connection being made to the spring 8 when these other three springs are in use.

The use of the above upper and lower sets of contacts supplies a make and break series circuit which is adapted to insure the rejection of all checks that are less in diameter and less

in thickness than the proper size checks independently of the kind of material of which they are made, also all checks containing a central perforation and checks made of non-metals are rejected.

In Fig. 8 is shown a pair of reels 51 supporting a ribbon 52 which is drawn over a porous pad 5' which is supported by a plate of metal 7', the pad 5' may be made of felt or other porous material but preferably of a block of insulating material such as bakelite fabricated with a series of narrow slots which are adapted to hold the liquid electrolyte in continuous vertical sheets so as to provide direct electrical connection through the electrolyte between the check anode and the cathode, the anode resting upon the ribbon 52, the ribbon resting upon the porous body 5', and the porous body resting upon the cathode 7', means being provided similar to that shown in Fig. 1 for maintaining a supply of electrolyte to the pad 5', the arrangement as described constitutes a form of electrolytic cell, and as shown in Figs. 8 and 9 the check 4 acts as the anode, the ribbon 52 and the pad 5' together act as a container for the electrolyte and a support for the anode 4, while the cathode 7' is placed in contact with the absorbed electrolyte within the pad 5', the electrical connections being the same as shown in Fig. 2.

Figs. 8, 9, 10, 11, show a modification of the check deflector shown in Figs. 1, 2, 3, this modified type of check deflector permits the use of a symmetrically bifurcated exit chute and is adaptable when for any reason a very positive action of check deflector is required. The exit chute is approximately the same as shown in Figs. 1, 2, 3, the check deflector consisting of a front pin 27' which is affixed to the end of the armature 26, and of a rear pin 27 affixed a short distance from the end of the armature, these pins being oppositely directed at right angles to the plane of the exit chute 28 shown in Fig. 10, the front pin 27' being normally projected through an aperture in the exit chute 28 and positioned to act as an obstruction to the check retaining exit 32 and at the same time acting as a deflector or directing means for rejecting a check through the check rejecting exit 29, the armature 26 is normally held in its non-energized position as shown in Fig. 2, the rear pin 27 being normally held outside of the exit chute 28, the two pins 27 and 27' are adapted to reverse their positions when the electromagnet 13 becomes energized, the front pin being withdrawn and the rear pin being projected through an aperture in the chute 28 which is adapted to position the pin 27 to act as an obstruction to the check rejecting exit 29, and at the same time to act as a directing means for retaining a check by directing it into the check retaining exit 32.

The auxiliary carrier 37, (Fig. 4) is adapted by means of springs 62 and 63 to release the pressure of the needle points 39, 40, 41, 42, from the check 4 when the push rod 15 moves the check carrier 3 towards, but before it reaches its check discharging position.

I claim:

1. A check detector and separator consisting of an electrolyzing circuit and structure comprising an electrolytic cell, means for receiving a check in said circuit to act as an anode in said cell, a separate source of electrical current connected in said circuit, said current being of sufficiently great amperage to produce super-polarization of said anode during a limited time

interval, and an electromagnet having an energizable armature, said electromagnet being electrically connected in and completing said electrolyzing circuit; means for short-circuiting said electromagnet during said limited time interval, then for opening said short-circuit; means for removing and for directing a check from said electrolytic cell, said directing means being controlled by the amount of amperage flowing through said electromagnet after said short-circuit has been opened to energize or not to energize said armature to direct the check to be retained or to be rejected depending upon the material of which the check is made.

2. A check detector and separator consisting of an electrolyzing circuit and structure comprising an electrolytic cell consisting of a container with an electrolyte therein and a cathode in contact with said electrolyte, a source of electrical current having a positive and a negative terminal connected in said circuit, said negative terminal being connected to said cathode; a check support, a movable check carrier including electrical contacts supported thereto for receiving and positioning a check upon said support and for connecting the check in said electrolyzing circuit in anode contact with said electrolyte; a check directing member, means for actuating said check carrier, said actuating means being a movable member adapted to remove a check from said carrier and from said check support and to place the check into said check directing member, said check directing member consisting of an exit chute having an inlet adapted to receive a check from said check carrier, said exit chute having a check retaining discharge outlet and a check rejecting discharge outlet, said check rejecting outlet being positioned to normally discharge and reject a check received into said exit chute inlet, an electromagnet including an energizable armature, the free end of said armature being adapted to act as a check deflector by being magnetically projected into said exit chute at a point near the entrance to said check rejecting outlet to obstruct said rejecting outlet and to direct a check to be passed into and to be discharged through said check retaining outlet when said electromagnet becomes energized; the positive terminal of said electrical source being connected to one terminal of said electromagnet, the other terminal of said electromagnet being connected to said check contacts, said contacts being adapted to connect with a check in completion of said electrolyzing circuit; short-circuiting means, said short-circuiting means being a comparatively slow acting member having electric terminals connected to the terminals of said electromagnet and adapted to normally short-circuit said electromagnet and then to open said short-circuit after a limited interval of time has elapsed after a check has been received in anodic contact with said electrolyte, during which interval of time super-polarization is produced at the point of contact of the check with said electrolyte, the amount of amperage flowing through said electrolyzing circuit being controlled in inverse proportion to the amount of said super-polarization, then when said short-circuit is opened the instantaneous greater or lesser amperage flowing through said electromagnet becoming the essential means for actuating or not actuating said check deflector depending upon the material of which the check is made.

3. The structure defined in claim 2, including a quick acting relay having circuit closing contacts, said check deflector being slow acting, one terminal of said relay being connected to the positive terminal of said electrical source, the other terminal of said relay being connected to said check contacts, the circuit-closing contacts of said relay being adapted to normally remain closed, one of said relay contacts being connected to the positive terminal of said electrical source, the other relay contact being connected in series circuit with and to the positive terminal of said electromagnet, said relay contacts being adapted to open said electrolyzing circuit flowing through said electromagnet when the amperage in said circuit exceeds a certain minimum, said excess of minimum amperage being produced in said electrolyzing circuit when a check made of a different metal than a silver coin is used as an anode, which results in sufficient amperage flowing through said relay to actuate the relay to open its contacts and to open the circuit flowing through said electromagnet before said slow acting checks deflecting armature has had time to become actuated, said check deflector remaining in its normal check rejecting position to direct the non-silver check to be rejected, and wherein the minimum amperage produced in said electrolyzing circuit when a silver coin is used as an anode results in less amperage than sufficient to actuate said relay, but results in sufficient amperage to actuate said electromagnet to magnetically actuate said check deflector to direct the silver coin to be discharged through said check retaining outlet.

4. The structure defined in claim 2 including a check receiving chute having a contracted inlet, the outlet end of said receiving chute being positioned to direct a check into said check carrier, said contacted inlet consisting of a comparatively thick plate of metal perforated with a slot, said slot being of minimum length and of minimum width to admit a proper size check, said check carrier consisting of a block of insulating material having a check positioning slot therein adapted to receive a check admitted from said check receiving chute, said positioning slot being adapted to hold a check in approximately an upright position upon said check support, said check carrier being the means for supporting said check contacts, said check contacts being adapted to press against said check in spring controlled electrical contact.

5. The structure defined in claim 2, including a switch, the terminals of said switch being connected in series in said electrolyzing circuit, said switch being adapted to normally hold said circuit open by means of said movable member when said member is in its normal non-actuated position, the actuating of said member being the means for immediately closing said switch and for closing said electrolyzing circuit.

6. The structure defined in claim 2, including a detent lever, its upper end being adapted to engage with a notch in a check deflector to hold said deflector in its retracted position when said deflector becomes actuated by said electromagnet to retain a check, said check deflector being released from said detent lever by means of a check, the lower end of said lever being positioned within that part of said exit chute that is adapted to retain a check, said lower end of detent lever being adapted to be depressed by the weight and velocity of the check in its passage through said exit chute, the depressing of 150

said lower end being the means for disengaging the upper end of said lever from said notch.

7. The structure defined in claim 2, including means for maintaining a constant level of electrolyte in said cell at the point of contact of a check with the electrolyte, said container for electrolyte being made of insulating material provided with an open top and being positioned to place the electrolyte in electrical contact with the lower edge of said check when the check is positioned in said check carrier, said check being supported by the top edge of said container.

8. The structure defined in claim 2, including an absorbent for said electrolyte, said absorbent being adapted to act as a support for placing said electrolyte in contact with said check when the check is positioned in said check carrier, means for maintaining a constant supply of electrolyte in said absorbent at the point of contact of said check with the electrolyte, means for supporting said cathode in contact with said absorbed electrolyte to complete said electrolytic cell.

9. The structure defined in claim 2, including two sets of check contacts, said check carrier comprising two walls parallel to each other and spaced a distance apart to correctly position said check upon its support, one or both of said walls being adapted to support said check contacts, said check contacts comprising an upper set and a lower set, the upper set of said contacts comprising an under spring supporting an insulated contact upon its inner extremity, said insulated contact being projected through an orifice in one wall of said check carrier and adapted to non-electrically contact with the upper edge of said check, said under spring supporting an electrical contact upon its outer side which contact is adapted to electrically connect with a companion contact supported upon the inner side of an over spring, said upper set of contacts being adapted to be pressed together by means of the diameter and thickness of a check of proper size when said check is in position in said check carrier, said contacts being adapted not to be pressed together when a check of less than proper diameter or less than proper thickness is positioned in said check carrier, the lower set of contacts comprising an under spring which supports an electrical contact upon its inner extremity, said contact being projected through an orifice in said wall of the check carrier and positioned to contact with the center of a proper diameter check, said under spring supporting an electrical contact upon its outer extremity which contact is adapted to electrically connect with a companion contact supported upon the inner extremity of an over spring, said lower set of contacts being adapted to be pressed together in electrical connection with and by means of a proper check positioned in said check carrier, said lower set of contacts being adapted not to be pressed together nor to complete an electrical connection with a check containing a central hole, nor to make an electrical connection by means of a non-metallic check, the positive terminal of said battery being connected to the under spring of the upper set of contacts, the over spring of the upper set being connected to the over spring of the lower set of contacts, no connection being made to the under spring of the lower set.

10. In the structure defined in claim 2, said

exit chute comprising a vertical length of chute, the lower end of said vertical portion being asymmetrically bifurcated to provide a check retaining exit, and a check rejecting exit, said check rejecting exit being adapted to normally reject a check inserted in said vertical length, an aperture, said aperture being placed in one wall of said check rejecting exit and positioned to receive a projected check deflector when said electromagnet becomes energized, the energizing of said electromagnet being the means for actuating said check deflector to project into said aperture and adapting said deflector to obstruct said check rejecting exit to the passage of said check, said deflector at the same time being adapted to direct said check into said check retaining exit to be retained.

11. The structure defined in claim 2, said exit chute being asymmetrically bifurcated and comprising an exit entrance, a check retaining exit and a check rejecting exit, said entrance being positioned to receive a check discharged from said check carrier, said check deflector consisting of a front pin affixed to the end of said armature and of a rear pin affixed a short distance from the end of said armature, said pins being opposed and directed at right angles to the plane of said exit chute, said front pin being normally projected into an aperture in said exit chute and positioned to act as an obstruction to said check retaining exit and at the same time act as a directing means for rejecting a check through said check rejecting exit, said armature being held normally in its non-energized position, said rear pin being normally held outside of said exit chute, said pins being adapted to reverse their positions when said electromagnet becomes energized, which results in the front pin being withdrawn from said exit chute and said rear pin being projected through an aperture in said chute and being positioned to act as an obstruction to said check rejecting exit and at the same time act as a directing means for retaining a check by directing said check into said check retaining exit.

12. In the structure defined in claim 2, said movable member being a push rod supported near both of its ends, means for moving said push rod from its normal position of rest to an inward limit of its stroke, then to be quickly returned to its normal position, said rod being provided with stops to limit its length of stroke, the inner end of said push rod being adapted to engage with one side of said check carrier and to move said carrier from its normal check receiving position to a position placing said check directly over the entrance to said exit chute, said short-circuiting device comprising a length of electrical conductor insulated from and supported by said movable push rod, a pair of short-circuiting contacts, said contacts being electrically connected to the terminals of said electromagnet and being adapted to press against said length of conductor to short-circuit said electromagnet during the time interval in which said push rod is being moved to engage with said check carrier, said length of conductor being adapted to disengage from said short-circuiting contacts to open said short-circuit just before said push rod engages with said check carrier, the movement of the push rod being continued to the inward limit of its stroke to position the check in said check carrier to be discharged by gravity into said exit chute.

13. The structure defined in claim 2, with the

addition of a plate of insulating material resiliently supported by said check carrier, said plate being adjacent to and parallel with one side of said check carrier, a set of circuit closing contacts fitted with points projecting through said plate and adapted to project through the adjacent wall of said check carrier, said contacts being supported upon said plate, said points being adapted to be pressed against the face of a check when said check is in position on said check carrier, means for pressing said points against said check, said pressure being made before said short-circuit device opens said short-circuit, means for releasing said pressure of the points after said movable member engages with the check carrier and removes said check from said electrolytic cell, each of said points being electrically insulated from and affixed to the inner side of a supporting spring, each spring being provided with an electrical contact upon its outer side, each of said outer contacts being adapted to engage with an adjustable companion contact, said adjustable contacts being insulated and supported by means of said plate, all of said outer contacts and their companion contacts being electrically connected in make and break series circuit, one terminal of said series circuit being connected to one terminal of said electromagnet, the other terminal of said series circuit being connected to the other terminal of said electromagnet, all of said contacts being adjusted to make electrical connection with their adjustable companion contacts when said insulated points are pressed against a smooth face check supported in position in said check carrier, which results in completing said make and break series circuit and in short-circuiting said electromagnet and in preventing said check deflector from being actuated when a smooth face check is used as an anode, said deflector remaining in the check rejecting position to direct said check to be rejected, and wherein a check having a face in relief is used as an anode and said insulated points are pressed against the surface of said check, one or more of said points will be positioned over a depression in said relief surface and will not press its associated contact into electrical connection with its companion contact and no short-circuit will be made, under which condition the check will be directed according to whether the electromagnet is energized or not energized.

14. In the structure defined in claim 2, said actuating means movable member being a hand operated push rod adapted to be operated by an electric power device which comprises an electric supply, an electric power device, and a pair of circuit closing contacts, one terminal of said power device being connected to one terminal of said electric supply, the other terminal of said electric supply being connected to one of said circuit closing contacts, the other circuit closing contact being connected to the other terminal of said power device, said circuit closing contacts being adapted to normally remain in open circuit position, and being adapted to be pressed together by means of the thickness of said check, said movable member being operable by said power device when said circuit closing contacts are pressed together in electrical contact by means of said check in closing said power circuit.

15. In the structure defined in claim 2, after said short-circuit is opened, the instantaneous

amperage flowing through said electromagnet

being greater when a nickel coin is used as an anode than when a substitute for a nickel coin is used as an anode which results in said electromagnet being energized and actuating said check deflector to direct a nickel coin to be retained, but the lesser amperage flowing through said electromagnet when a substitute for a nickel coin is used as an anode being insufficient to energize said electromagnet, said check deflector not being actuated, which results in directing said substitute for a nickel coin to be rejected.

16. The structure defined in claim 2, including a first relay and a second relay, both relays being quick acting, the first relay having circuit closing contacts, said check deflector being slow acting, one terminal of said first relay being connected to the positive terminal of said electrical source, the other terminal of said first relay being connected to said check contacts, the circuit-closing contacts of said first relay being adapted to normally remain closed, one of the said first relay contacts being connected to the positive terminal of said electrical source, the other first relay contact being connected in series with and to the positive terminal of said electromagnet, said first relay contacts being adapted to open said electrolyzing circuit flowing through said electromagnet when the amperage in said circuit exceeds a certain minimum, said excess of minimum amperage being produced in said electrolyzing circuit when a check made of a substitute metal for a silver coin is used as an anode; one terminal of said second relay being connected to the positive terminal of said battery, the other terminal of said second relay being connected to said check contacts to complete a parallel electrical connection with said first relay, the circuit-closing contacts of said second relay being adapted to normally remain open, one of said contacts being connected to the positive terminal of said battery, the other contact being connected to the positive terminal of said electromagnet, said second relay contacts being adapted to close said electrolyzing circuit flowing through said electromagnet when the amperage in said circuit exceeds a certain maximum, said maximum amperage being produced in said circuit when a nickel coin is used as an anode which results in sufficient amperage in said circuit to energize said second relay to close its contacts and to close the circuit flowing through said electromagnet, which current energizes said electromagnet to actuate said check deflector to direct said nickel coin to be retained, whereas the lesser amperage produced in said electrolyzing circuit when a substitute for a nickel coin or a substitute for a substitute for a silver coin is used as an anode, results in less amperage than sufficient to actuate said second relay, but results in sufficient amperage to actuate said first relay, which relay opens the circuit through said electromagnet which prevents said electromagnet from being energized, said check deflector remaining in its normal check rejecting position to reject said nickel or silver substitute, whereas the minimum amperage produced in said electrolyzing circuit when a silver coin is used as an anode results in less amperage than sufficient to actuate said first relay, and less than sufficient amperage to actuate said second relay, but results in sufficient amperage to actuate said electromagnet to magnetically actuate said check deflector to direct the silver coin to be retained.