June 28, 1938. M. L. LANDRETH 2,121,970

COIN CONTROLLED APPARATUS

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FIG. 1

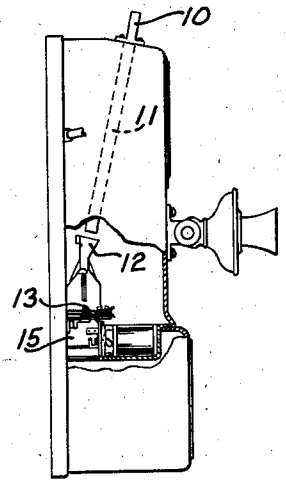


FIG. 2

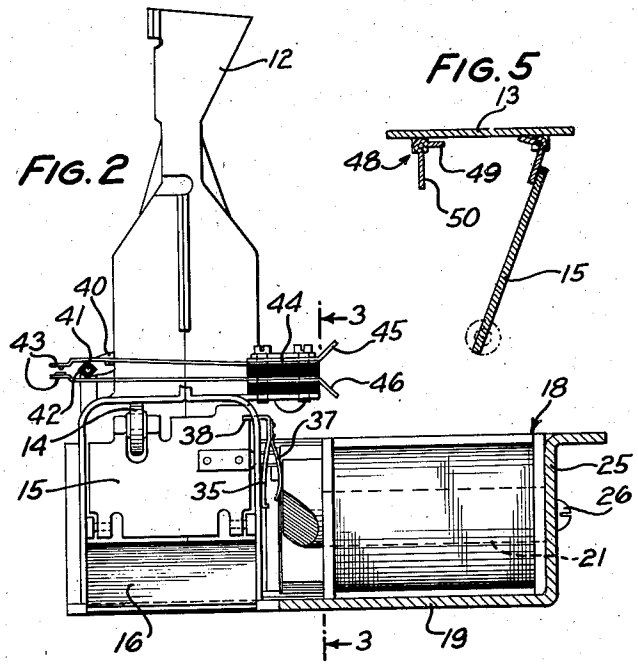


FIG. 5

FIG. 3

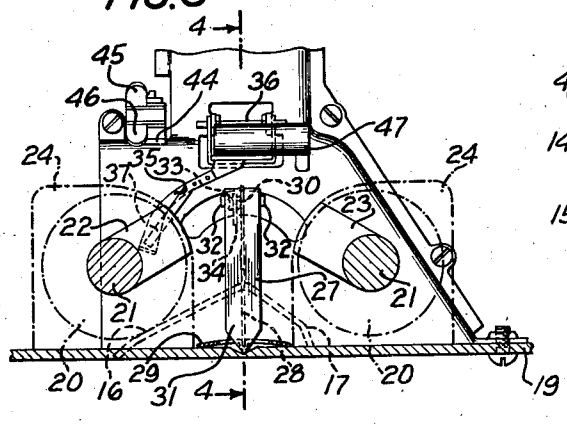


FIG. 4

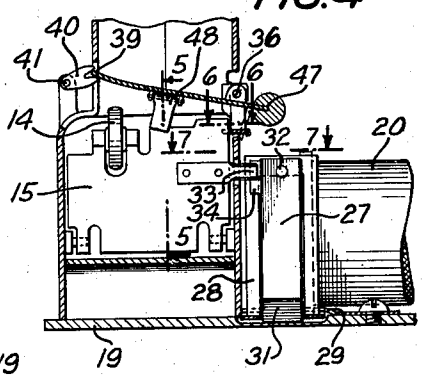


FIG. 7

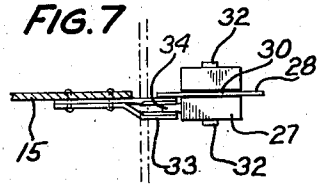


FIG. 8

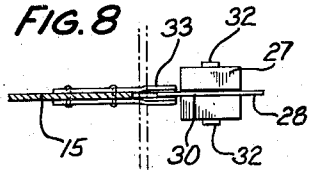
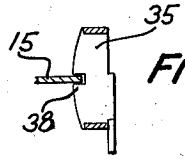


FIG. 6



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COIN CONTROLLED APPARATUS

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FIG. 9

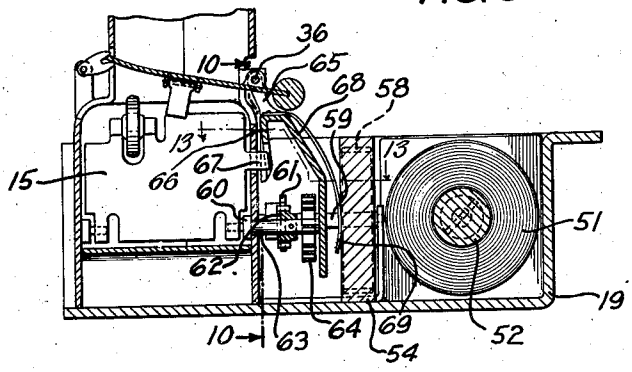


FIG. 10

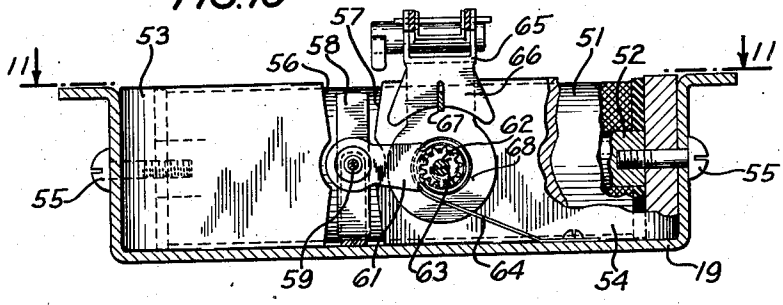
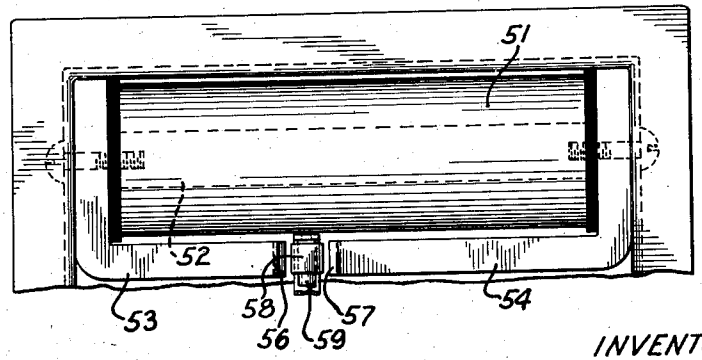


FIG. 11



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COIN CONTROLLED APPARATUS

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FIG. 12

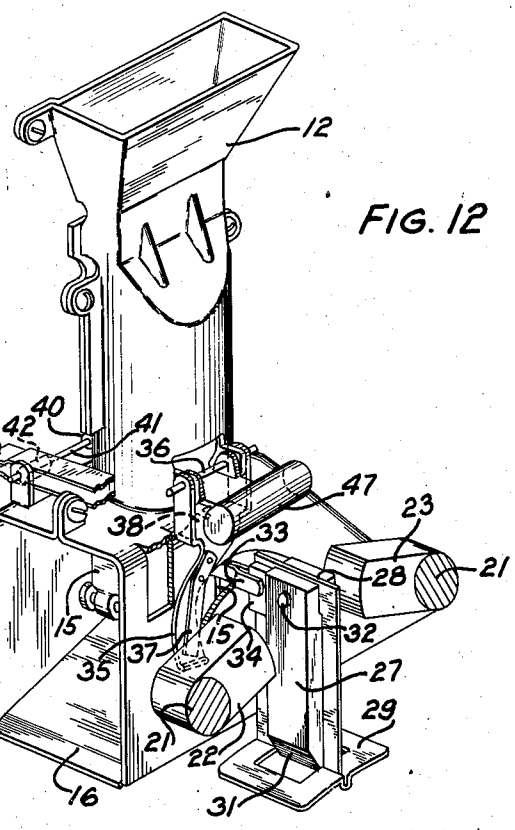


FIG. 14

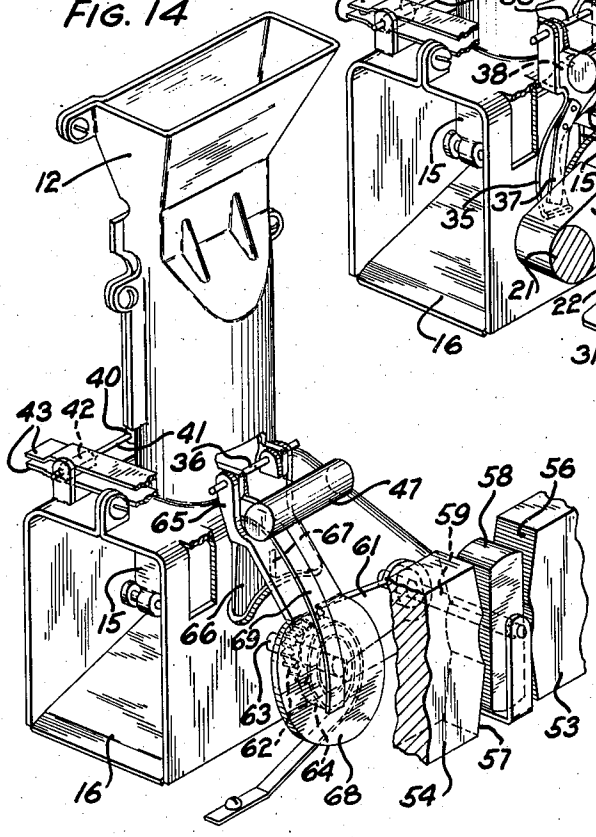
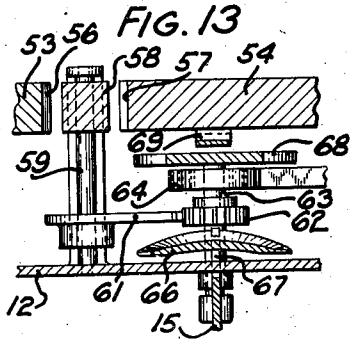


FIG. 13



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Patented June 28, 1938

2,121,970

UNITED STATES PATENT OFFICE

2,121,970

COIN CONTROLLED APPARATUS

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Application July 11, 1936, Serial No. 90,085

9 Claims. (Cl. 232—57.5)

This invention relates to coin controlled apparatus, and more particularly to coin collectors for use at telephone pay stations.

This invention is particularly applicable to telephone coin collectors of the type wherein the user tentatively deposits a coin which is subsequently collected or refunded by the central office operator, depending upon whether or not the desired telephone connection is obtained. A telephone coin collector of this general type is disclosed in O. F. Forsberg U. S. Patent 1,043,219, issued November 5, 1912, in which a deposited coin is temporarily held upon a coin trap supported by a pivoted vane under the control of an electromagnet. If the pivoted vane is moved by the electromagnet in one direction the deposited coin is collected, while if it is moved in the opposite direction the coin is refunded and the direction this vane is moved depends upon which direction the current is made to flow through the electromagnet. For accurately producing such a selective actuation to control the coin collection or coin refund, apparatus is required which is capable of consistent performance under a wide variety of conditions. Also, it is desirable to provide apparatus for this purpose that will successfully resist any attempts at fraudulent operation.

An object of this invention is to provide a coin controlled apparatus of simple and inexpensive construction and efficient operation.

In accordance with the above object there is provided in one embodiment of the invention a telephone coin collector comprising an electromagnet having a permanently magnetized armature mounted pivotally for limited rotative movement, a coin hopper for receiving a deposited coin, and a pivoted vane in the coin hopper operated directly by the armature for selectively directing the deposited coin into either a refund or collect chute in the hopper. A pivoted trap is provided in the hopper to support the deposited coin and to close a circuit connecting the apparatus to a central office when initially deflected by the weight of the deposited coin. To insure consistent and positive operation of the apparatus, a magnetic latch is provided to engage and lock the vane in its normal position and release it when the electromagnet is energized.

Other objects and advantages of the invention will appear from the following detailed description taken in conjunction with the appended drawings, in which

Fig. 1 is a side elevation, partly fragmentary, of one type of telephone coin collector with which this invention may be used;

Fig. 2 is a side view, partly in section, of an electromagnetically operated coin handling mechanism, embodying the invention;

Fig. 3 is a front view, partly in section, of the mechanism shown in Fig. 2, taken along the line 3—3;

Fig. 4 is a section of Fig. 3 taken along the line 4—4;

Fig. 5 is an enlarged sectional rear view taken on line 5—5 of Fig. 4, showing the coin diverting vane in an inclined position;

Fig. 6 is an enlarged fragmentary section of Fig. 4, taken along the line 6—6;

Fig. 7 is an enlarged fragmentary sectional view of Fig. 4 taken along the line 7—7;

Fig. 8 is a similar view to Fig. 7 showing an alternative construction for a coin directing vane and actuating armature;

Fig. 9 is a sectional view similar to Fig. 2 showing an alternative form of the invention;

Fig. 10 is a fragmentary view, partly in section, of the mechanism shown in Fig. 9 taken along the line 10—10;

Fig. 11 is a fragmentary view of the mechanism shown in Fig. 10 taken along the line 11—11;

Fig. 12 is a perspective view of a portion of the apparatus shown in Figs. 1 to 8;

Fig. 13 is an enlarged fragmentary section of Fig. 9, taken on the line 13—13, and

Fig. 14 is a perspective view of a portion of the apparatus shown in Figs. 9 to 11.

In the operation of the telephone coin collector shown in the appended drawings, a person wishing to use the equipment inserts a coin in a coin gauge 10 mounted on the instrument housing. The deposited coin after traversing a coin chute 11 for testing its genuineness, drops into a coin hopper 12 and comes to rest on a coin trap 13 extending across the coin passageway. The trap is pivotally mounted and while supporting a deposited coin engages a roller 14 on a vertical vane 15 pivoted at its lower end. A coin passage below the trap is divided into two channels, a refund chute 16 leading to an opening where coins are accessible from outside the collector housing, and a collect chute 17 leading to a cash compartment within the housing. As explained in the Forsberg patent, if the vertical vane is moved to close the collect passageway, dropping of the trap will allow the deposited coin to fall into the refund chute while if the vane is moved to close the refund chute dropping of the trap will allow the deposited coin to be diverted into the chute lead-

ing to the cash compartment. The apparatus so far described is similar to that disclosed in the Forsberg patent.

This invention is concerned with improved means for actuating the coin directing vane and controlling the operation of line circuits connecting the apparatus with the central office when a coin is deposited in the hopper or released from the coin trap.

Referring now to Figs. 2 to 8, inclusive, an electromagnet 18 is suitably mounted adjacent to the coin hopper 12 on a common base 19. The electromagnet comprises two coils 20, each wound on a core 21 of soft iron or other magnetic material. The ends of the cores adjacent to the hopper terminate in pole pieces 22 and 23 of magnetic material, which project inwardly to the edge of spool heads 24 on the coils and have opposed curved faces. At the end of the coils opposite the pole pieces the magnetic cores are secured to a vertical flange 25 of the base 19 by means of screws 26. With this construction the flange portion between the screws completes a magnetic circuit between the cores. The two coils are connected in series and the introduction of direct current to their windings establishes opposed polarities in the pole pieces in accordance with the direction of the current as controlled by a central office operator.

A permanent magnet 27 having an elongated vertical axis is mounted pivotally on the base by means of a leaf or reed spring 28. The magnet is located between and in the same plane with the pole pieces of the electromagnet. One end of the leaf spring is secured to the base with a suitable mounting 29 and the center of the spring is cut out to yoke the permanent magnet and engage a slot 30 in the top portion of the magnet. The bottom end 31 of the magnet armature is V-shaped or knife-edged and rests in a corresponding V-shaped depression in the base. The leaf spring holds the permanent magnet armature resiliently in a normally vertical position, retaining the upper pole of the magnet about midway between the two pole pieces.

When the coils are energized the pole pieces, which are aligned with the upper pole of the magnet armature, attract and repel the upper pole of the magnet in accordance with the direction of current flow in the coils, thereby causing the armature to rotate in the V-shaped depression in the base against one of the pole pieces and carry the leaf spring with it. A disk 32 of non-magnetic material, such as brass, is secured to the two faces of the magnet which contact with a pole piece to prevent freezing of these members.

The coin diverting vane 15 is connected directly to the armature by means of an ear 33 on the vane having a U-shaped cross-section which projects through an opening in the hopper housing and engages a lug 34 on the armature as shown in Fig. 7. The lug projects from the side and near the top of the armature and may be offset slightly to clear the supporting leaf spring. Operation of the armature by the introduction of current to the coils, as controlled by the central office operator, causes the vane to rotate on its pivot. This permits the trap to drop and release the deposited coin into either the refund or collect chute. It is also practical to actuate the vane by engagement between the ear 33 on the vane and the leaf spring, as shown in Fig. 8.

In order to insure satisfactory operation of the coin controlling mechanism and to prevent fraudulent manipulation of the apparatus to effect the unauthorized return of deposited coins, the vane is locked in its normal or vertical position. This is accomplished with an elongated latch member 35 of magnetic material which is pivoted to the outside of the hopper on the same shaft 36 as the coin trap and extends downwardly into the plane of one of the pole pieces 22.

Secured to one face of the magnetic latch adjacent to the pole piece is a spring 37 of non-magnetic material which is compressed against the pole piece and normally holds a notch 38 in the latch member in engagement with the vane to prevent movement thereof. When the electromagnet is energized to cause rotation of the coin directing vane, the magnetic latch member is attracted by the adjacent pole piece with sufficient force to overcome the resistance of the spring and rotate the latch member on its pivot, thus releasing the vane. The spring and latch are comparatively light in weight and when the pole piece is energized the latch responds instantaneously to release the vane before initial motion of the electromagnet armature, which is restrained by greater inertia and the supporting leaf spring, is applied to rotate the vane.

After the coin is collected, the line circuit is opened by the central office operator. The coils and pole pieces are immediately deenergized which permits the spring to restore the latch member into the path of the returning vane and forces the notch in the latch into engagement with the vane, locking it in normal position. The spring 37 is made of non-magnetic material which prevents freezing of the latch to the armature and facilitates the restoring action of the spring when the pole piece is deenergized.

The coin trap is also employed to signal the deposit of a coin to the central office operator. A projection 39 extends from the edge of the trap opposite the trap pivot and projects through an opening in the hopper wall to engage a notched lug 40 secured to a horizontal shaft 41 on the outside of the hopper wall when the trap is in a horizontal or highest position. The shaft also carries at its outer end an insulated cam 42 which actuates a pair of contact springs 43. The contact springs are mounted on a bracket 44 on the upper housing of the coin hopper. They are individually insulated and provided with terminals 45 and 46 which are suitably connected to a line circuit running to the central office as explained in the Forsberg patent.

In a complete cycle of operation the coin trap assumes three significant positions. Normally it is retained in its highest position by frictional engagement between the cam 42 and the two tensioned contact springs, aided by a counterweight 47, as shown in Fig. 4. In this position the projection 39 on the trap is in engagement with the lug 40 and the insulated cam on the connecting shaft 41 is positioned to hold the two contact springs apart. When a coin is deposited on the trap the weight of the coin overcomes this frictional resistance and depresses the trap against the roller on the vertical vane beneath the trap. This movement rotates the shaft 41 and the cam 42 sufficiently to permit the contact springs to close and complete the line circuit to the central office.

As the next step in the cycle, the vane is rotated by operation of the electromagnet to col-

lect or return the deposited coin. After the coin is released from the trap the electromagnet is deenergized, permitting the leaf spring to return the armature and the connected vane to their normal positions. In this action the roller on the vane and counterweight on the trap combine to raise the trap to a horizontal position. To insure positive return of the trap to its normal or elevated position cam members **48** are secured pivotally to the bottom of the trap to engage the top of the vane on its return stroke. As shown in Fig. 5 this cam has a flange **49** secured at an angle of approximately 90° to a relatively long arm **50** which is normally in a vertical position. When the coin directing vane is moved from its vertical position to drop the trap, the cam is free to swing on its pivot and avoid interference with the vane movement. On the return stroke of the vane the cam arm is positioned in its path by the flange **49** which rests against the trap bottom. In this position the cam arm presents an inverted inclined plane to the vane which causes the vane to lift the trap to its normal position. The projecting member on the coin trap engages the notched lug which rotates the horizontal shaft and the insulated cam positioned between the line switch contact springs sufficiently to spread the springs and open the line circuit.

An alternative mechanism for actuating the coin deflecting vane is shown in Figs. 9, 10 and 11. This construction comprises an electromagnet having a single coil **51** wound on a core **52** of magnetic material. Two pole pieces **53** and **54** are secured to the ends of the core with screws **55**. The pole pieces each have bent portions extending parallel to the core along the side of the coil and terminating in opposed pole faces **56** and **57**. The use of a single coil and this type of pole piece construction are also suitable for the embodiment of the invention previously described.

An elongated permanent magnet **58** is mounted on a pivotal horizontal shaft **59** at its center in the gap between the two pole pieces. The magnet and pole faces are in the same plane and when the pole faces are energized by the introduction of current to the coil, the magnet armature is rotated about its center, which causes rotation of the shaft. The direction of this rotation is determined by the selective direction of current flow in the coil winding and consequent polarity of the pole pieces.

Movement of the armature and connected shaft actuates the coin vane **15** on its pivot **60** through a gear sector **61** mounted on the armature shaft and a gear **62** on an extension **63** of the shaft that supports the vane in its pivot. The vane, armature and their connecting mechanism are retained in normal positions by means of a coiled spring **64**, one end of which is secured to the base **19** and the other end to the vane supporting shaft **63**, aided by the magnetic balance between the armature **58** and the pole pieces **56** and **57**. The spring also functions to restore the members to their normal positions when the electromagnet is released at the end of an operating cycle. A modified form of magnetic latch is shown in Figs. 9 and 10. A latch member **65** pivoted on the trap supporting shaft **36** has a latch arm **66** normally extending parallel to the hopper housing and engaging a projection **67** on the vane which extends through an opening in the housing wall. An actuating arm **68** of magnetic material extends downwardly into the plane of one of the electromagnet pole pieces. A spring **69** of non-magnetic material is secured to the actuating arm and compressed against the pole piece to normally hold the latch arm in engagement with the vane. When the pole piece is energized the actuating arm is magnetically attracted, causing the latch member to rotate on its pivot and withdraw the latch arm clear of the vane projection. After the electromagnet is released the spring restores the member to its normal position and forces the latch into engagement with the vane. This construction can be used with the other required elements defined and described above to provide a complete coin actuated mechanism of satisfactory operation.

Either construction provides a simple and efficient mechanism for actuating a coin controlled apparatus. The use of an electromagnet having an armature directly connected to the coin diverting vane minimizes the number of component parts required. The permanent magnet armature can be made of cobalt steel or other high coercive force materials to produce a compact and positively operating device. For applications where less selective actuation is required an armature of magnetic material can be employed advantageously with mechanism of this general description.

Other modifications and adaptations of the above constructions are feasible and it is to be understood that further variations and combinations are contemplated within the scope of the appended claims.

What is claimed is:

1. A coin collector comprising a coin hopper, a pivoted coin directing vane in the hopper, and a single coil electromagnet adjacent to the hopper having a permanently magnetized armature directly connected to the coin directing vane.

2. A telephone coin collector comprising a single coil electromagnet having a permanently magnetized armature mounted pivotally for limited rotative movement, a hopper for receiving a deposited coin, a refund chute, a collect chute, and a pivoted member in the hopper directly connected to said armature and responsive to the movement of the armature for engaging and selectively directing a coin deposited in said hopper into one of said chutes.

3. In a coin collector, a hopper for receiving a deposited coin, a movable member mounted within the hopper for directing the deposited coin, a latch for engaging said member to lock it in one position, and an electromagnet for releasing said latch and operating said member.

4. In a coin collector, a hopper for receiving deposited coins, a movable member within the hopper for directing the deposited coins, a pivoted latch of magnetic material having a notched portion to engage the coin directing member and lock said member in normal position, a spring to normally hold the notched portion in engagement with the member, and an electromagnet for rotating the latch on the pivot and releasing the member from the notched portion.

5. In a coin controlled apparatus, a pivotally mounted coin directing member, a single coil electromagnet having an elongated permanently magnetized armature directly connected to the coin directing member to pivot said member in accordance with the movement of the armature, said armature being supported on a bevelled portion at its lower end and having a slot in its top surface, and a U-shaped leaf spring yoking the

armature and engaging the slot for holding the armature in normal position.

6. In a telephone coin collector, a coin hopper, a refund chute, a collect chute, a pivoted member within the hopper, an electromagnet having a permanently magnetized armature, and a hinged leaf spring yoking the armature and connected to the pivoted member for moving said member responsive to the position of the armature and directing a coin deposited in the hopper into one of the chutes.

7. In a coin controlled apparatus, a movable coin directing vane hinged at its lower end, and a single coil electromagnet having a permanent magnet armature directly connected to the vane and supported for pivotal movement around an axis parallel to the axis of the vane.

8. In a coin controlled apparatus, a movable coin controlling member, and an electromagnet for actuating the member, comprising an elongated armature having a slot in one end thereof and a leaf spring yoking the armature and engaging the slot for resiliently supporting the armature.

9. In a telephone coin collector, a coin hopper, a shaft rotatably mounted in the hopper wall, a coin directing vane secured to the shaft inside the hopper, a gear on the shaft outside of the hopper, and a single coil electromagnet adjacent to the hopper comprising a pair of spaced pole pieces, a rotatable shaft between the pole pieces, a permanent magnet armature fixed to the shaft, and a gear segment fixed to the shaft for engaging the gear on the vane shaft and moving the vane in accordance with the movement of the armature.

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