

May 10, 1938.

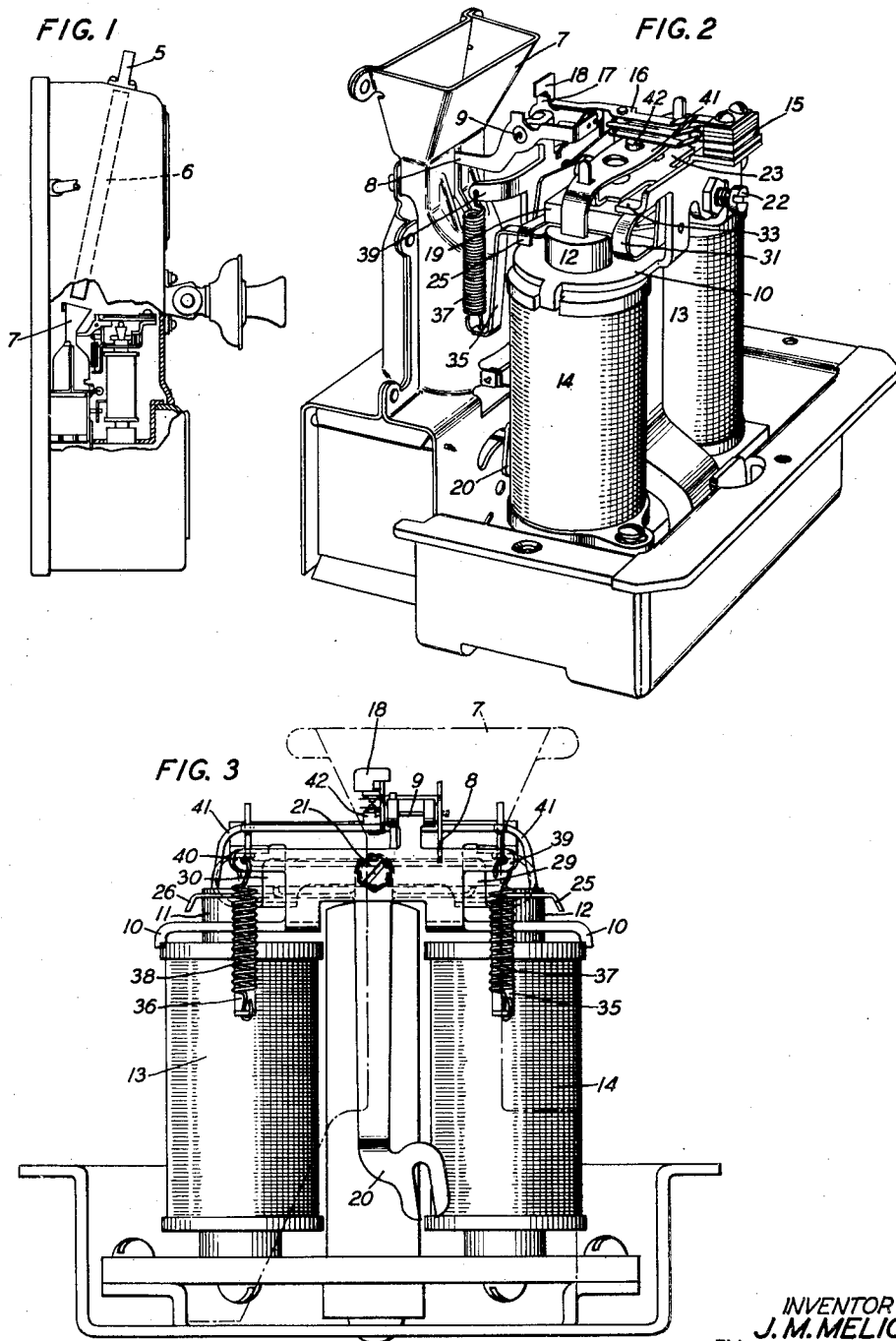
J. M. MELICK

2,116,580

COIN COLLECTOR ELECTROMAGNET

Filed July 2, 1935

2 Sheets-Sheet 1



INVENTOR
J. M. MELICK
BY *B. H. Jackson*
ATTORNEY

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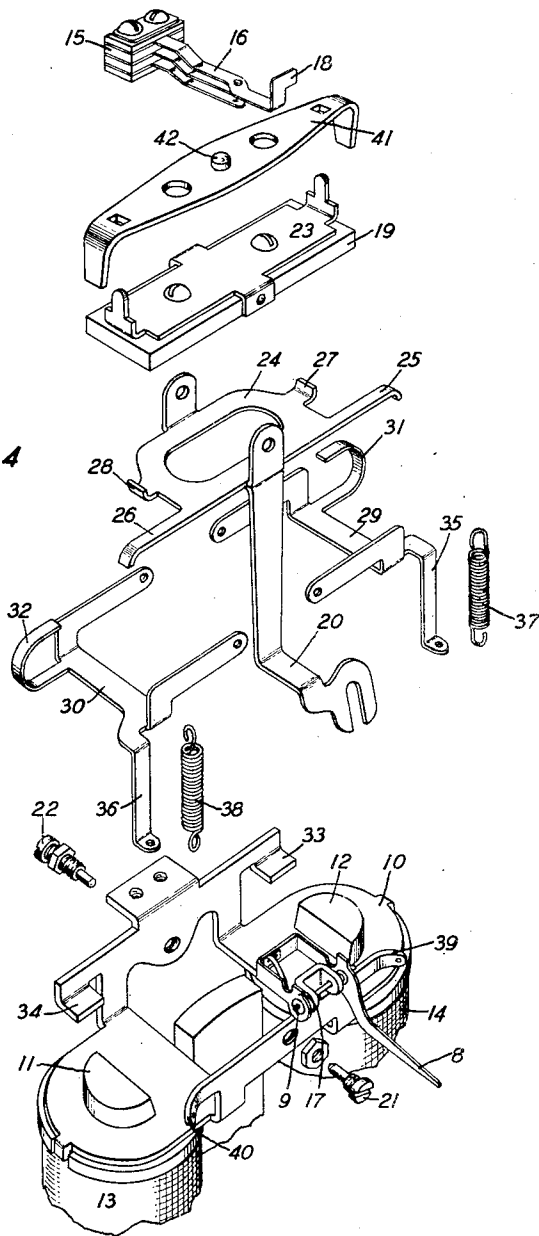
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FIG. 4



INVENTOR
J. M. MELICK
BY
B. H. Jackson
ATTORNEY

UNITED STATES PATENT OFFICE

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COIN COLLECTOR ELECTROMAGNET

John M. Melick, Cresskill, N. J., assignor to Bell Telephone Laboratories, Incorporated, New York, N. Y., a corporation of New York

Application July 2, 1935, Serial No. 29,436

1 Claim. (Cl. 175—336)

This invention relates to telephone coin collectors and particularly to the electromagnetic structure which controls the collection or refunding of the deposited coins.

In apparatus of the type mentioned there is usually provided an electromagnetic structure under the control of the central office operator so arranged that depending upon the direction of the current transmitted from the central office the armature will move to position directing vanes, etc. to either collect or refund the deposited coins. This general structure and method of operation is fully described in U. S. Patent 1,043,219, to O. F. Forsberg, November 5, 1912. With such a structure restoring springs are required to position the armature of the electromagnet in a neutral position after operation. These restoring springs in structures heretofore used have been mounted in such a manner that the forces due to them have been in the same direction as the attractive force due to the magnetic field but applied to the opposite end of the armature and hence the force exerted on the armature pivot has been substantially the sum of the forces thereby causing excessive load and friction at the pivot. The pivot bearings, therefore, require frequent adjustment or else must be made extraordinarily large. Also with excess friction at the bearings a large current flow is required through the windings of the electromagnet to produce a sufficiently large magnetic pull to move the armature.

A general object of the present invention is to improve the operation of the electromagnetic apparatus of telephone coin collectors.

A more specific object is to reduce the force acting on the armature pivots.

Another object is to reduce the amount of current necessary for the operation of the electromagnet.

These objects are accomplished by so mounting the restoring springs that the force due to them is in the opposite direction to the magnetic pull on the armature and is applied at substantially the same point thereby causing substantially no load or friction at the pivot.

The invention will be understood from the following description and accompanying drawings in which:

Fig. 1 is a side view of a prepayment telephone with the enclosing case partially cut away to show the general location of the electromagnetic structure;

Fig. 2 is a perspective view of the electromagnet, etc.;

Fig. 3 is an elevation from the left of the magnetic actuator portion of Fig. 2; and

Fig. 4 is an exploded view of the armature assembly.

As described in detail in Forsberg Patent 1,043,219, when it is desired to make a call a coin is deposited in the coin plate 5 and after passing through certain coin runways indicated generally at 6 is discharged into the coin hopper 7 and comes to rest on a coin trap at the bottom of the coin hopper.

A coin trigger 8 extends into the hopper 7 and is pivoted at 9 to an extension of a non-magnetic bridge plate 10 surrounding the pole-pieces 11 and 12 of the two windings 13 and 14.

Mounted on another extension of the bridge 10, on the opposite side thereof from the trigger mounting, is a contact spring pile-up 15. One of the springs 16 is adapted to ride on a cam portion 17 of the trigger normally maintaining the springs out of contact with each other.

The deposited coin passing down the hopper strikes the trigger, moving the part within the hopper downwardly and moving the cam portion so that it no longer supports spring 16 in its raised position. Spring 16 under its own tension forces the other springs of the pile-up together, thereby closing a circuit to the central office where a signal is given indicating that it is desired to make a call. These springs also establish a circuit by means of which the action of the magnet comprising windings 13 and 14 may be controlled from the central office. The trigger is held in its lowered position by means of the extension 18 of spring 16 which has moved down behind the cam portion 17 of the trigger.

After the call desired is completed the deposited coin is collected or if the call is not completed the deposited coin is refunded. In either case the central office operator closes a circuit extending through the contact springs and the windings 13 and 14 to cause the armature 19 to move from its neutral position and by means of the forked extension 20 (see Fig. 4) which is attached to the armature, a vane supporting the coin trap is moved to refund or collect the coin held on the coin trap all as explained in the Forsberg patent noted.

The armature 19 is supported by trunnion screws 21 and 22 mounted in the upwardly projecting portions of bridge plate 10. These screws enter bearings in a plate 23 permanently attached to armature 19. A plate 41 is loosely mounted on tabs extending upwardly from plate 23 and has an insulating knob 42 so fixed thereon that

when the armature is moved in either direction this plate and knob are raised, thereby raising the springs of spring pile-up 15, releasing the trigger and allowing cam portion 17 of trigger 8 to move under extension 18 of spring 16. The springs in the pile-up maintain the circuits closed until the armature returns to normal position.

Also supported by trunnion screws 21 and 22 is a plate 24 of which the forked extension 20 forms a part. This plate fits under armature 19 and is provided with projecting portions 25 and 26 having downwardly projecting tabs which act as stops to the movement of the armature by contacting with bridge plate 10. Upwardly projecting tabs 27 and 28 on the main portion of plate 24 contact with armature 19 to move the plate 24 and forked arm 20 when the armature moves.

Independently movable restoring arms 29 and 30 in the general form of yokes are also pivoted on trunnion screws 21 and 22. Armature 19 rests between the side pieces of these restoring arms. Each arm is provided with a curved projecting piece, 31 for arm 29 and 32 for arm 30. These projecting pieces act as stops for the arms by contacting with horizontal tabs 33 and 34 on the outer upwardly extending portion of plate 10. On the sides away from the curved portions 31 and 32 are downwardly extending brackets 35 and 36 having perforated horizontal extensions to which the lower ends of restoring springs 37 and 38 are attached. The upper ends of springs 37 and 38 are attached to bent out perforated ear portions 39 and 40 of the inner upwardly extending portion of plate 10.

The direction of the forces due to the restoring springs and to the magnetic pull on the armature may be more readily seen from Fig. 3 which is a view from the coin chute side of the structure, the position of the coin chute being indicated by the dot-dash line.

Assume the magnetic pull on the armature to be in such a direction as to move the armature in a clockwise direction about the pivot indicated by trunnion screw 21. The force due to this pull will be downward on the pivot. Restoring spring 37 will be extended since the armature will move restoring arm 29 in a clockwise direction. Restoring arm 30 will not move. The force exerted on the armature by spring 37 will be upward or counter-clockwise and will partially neutralize the downward force of the magnetic pull so that only the difference between the two forces will be transferred to the pivot. The friction of the bearing will, therefore, be reduced which will

correspondingly reduce the wear at the pivots. Since the friction to be overcome is reduced the magnetic force required to move the armature need not be so great and hence the current through the windings may be smaller than heretofore required. This permits wider variation in operating requirements and reduces the chances of non-operation due to slightly reduced current or voltage of the current supply source.

What is claimed is:

In combination, an electromagnetic structure comprising a pair of electromagnetic elements, an armature, pivots supporting said armature centrally and about which said armature is adapted to move, said armature having one branch extending substantially between its pivoting axis and one of said elements, said armature having a second branch extending substantially between its pivoting axis and the second of said elements, said armature being adapted to be moved clockwise or counter-clockwise when said elements are energized, a pair of independently movable armature restoring levers pivoted coaxially with said armature, one of said levers extending from its pivoting axis toward said first element, the second of said levers extending from its pivoting axis toward said second element, said first lever being actuated by said armature when said first branch is attracted toward said first element, said second lever being actuated by said armature when said second branch is attracted toward said second element, spring means for said first lever opposing any movement of said first lever caused by the movement of said armature toward said first element, other spring means for said second lever opposing any movement of said second lever caused by the movement of said armature toward said second element, fixed stops for limiting the movement of said levers by said spring means, the force applied to said first lever by the movement of the armature toward said first element and the force applied to said first lever due to said first spring means being effective in directions substantially 180 degrees apart and being applied at points substantially the same distance from the pivoting axis of said first lever, the force applied to said second lever by the movement of said armature toward said second element and the force applied to said second lever due to said second spring means being effective in directions substantially 180 degrees apart and being applied at points substantially the same distance from the pivoting axis of said second lever.

JOHN M. MELICK.