

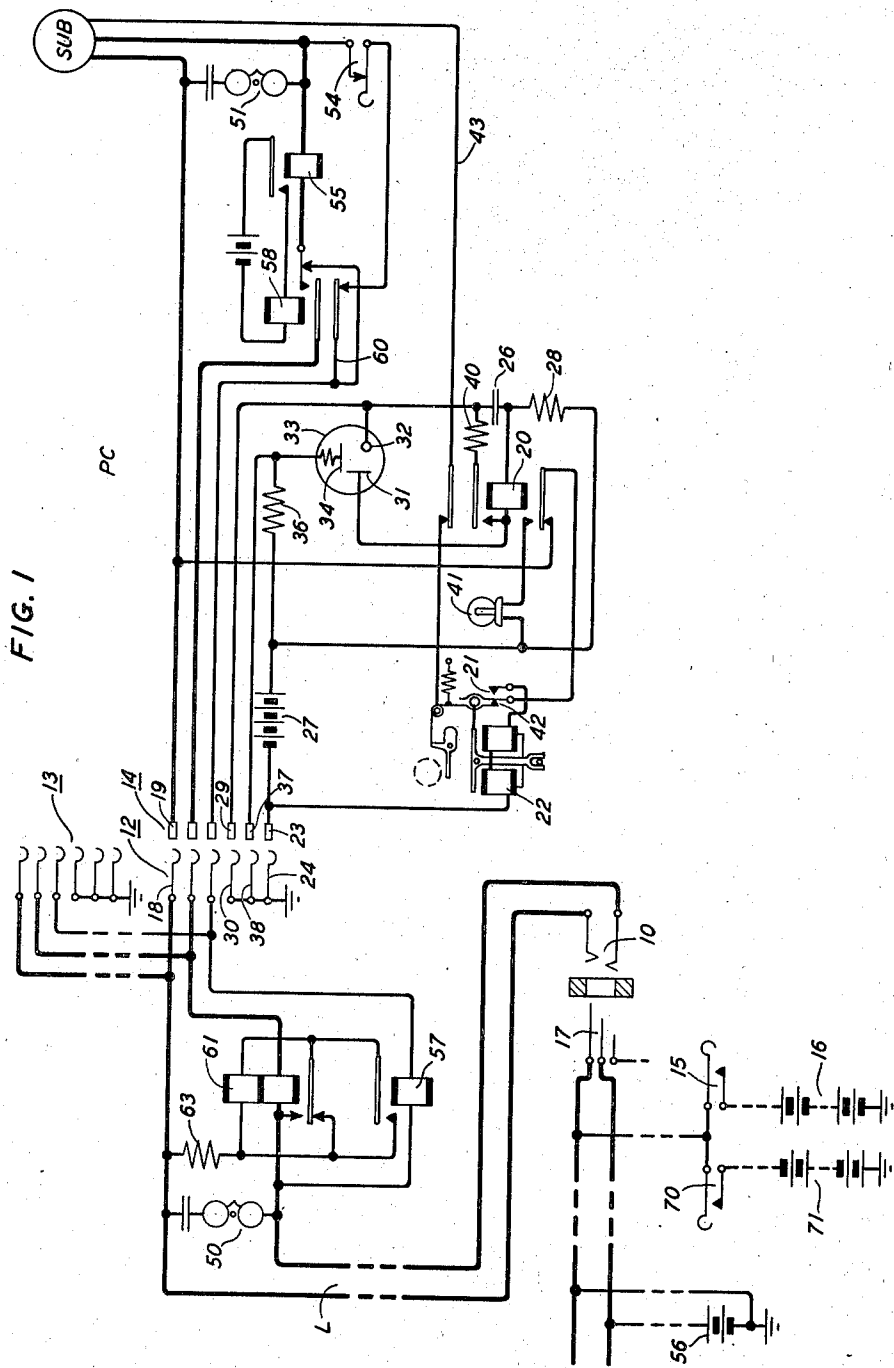
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L. E. VAN DAMME

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PORTABLE COIN COLLECTOR FOR TELEPHONE SYSTEMS

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INVENTOR
L. E. VAN DAMME
BY *A. J. Kane*
ATTORNEY

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PORTABLE COIN COLLECTOR FOR
TELEPHONE SYSTEMS

Louis E. Van Damme, Paramus, N. J., assignor to
Bell Telephone Laboratories, Incorporated,
New York, N. Y., a corporation of New York

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This invention relates to telephone systems and more particularly to pre-payment telephone systems of the portable type.

In large institutions, particularly those which cater to the sick and disabled, other facilities are provided whereby telephone calls may be received and originated at the bedside of those patients who, because of their infirmities, are unable to avail themselves of the regular communication facilities. Such other facilities involve portable instrumentalities which may be carried, or otherwise propelled to the bedside of a patient and plugged into a conveniently located jack terminal of a telephone line. The patients utilizing these facilities are usually billed at regular intervals for telephone calls originated by them. This practice imposes upon the institution the burden of keeping records of the numerous outgoing calls and of compiling individual bills to be rendered to each of the patients making such calls. In order to relieve the institutions of this task and to otherwise improve the telephone service which is furnished on a portable basis it has been proposed that such service be provided on a pre-payment basis. In order to provide such service it is essential that the portable unit include the necessary apparatus for receiving coins which are deposited in payment for calls to be originated, and for disposing of such coins in accordance with usual practice. In other words, the portable unit must embrace all the essentials of a coin box telephone station.

Since such portable units are plug-ended to facilitate their connection to the telephone lines by way of conveniently located jack type line terminals, it is essential that, at the termination of a call originated by means of the portable coin box station, the connection of the plug with the jack remain undisturbed until the coin disposal apparatus has been operated in the usual manner in order that the deposited coins may be collected, or refunded as required.

In a copending application, Serial No. 676,610, filed June 14, 1946, there is disclosed a telephone system of the prepayment portable type which provides for the automatic collection of coins deposited in a portable coin collector in payment for a call originated at the portable station, in the event the portable unit is disassociated from a telephone line before the coins have been disposed of in the usual manner.

It is the object of this invention to provide an improved portable coin collector of the general type disclosed in the above-mentioned copending application which insures the automatic collec-

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tion of coins, deposited in the portable unit, in response to the disconnection of the portable unit from a telephone line prior to the disposal of the coins in the usual manner.

5 This object is attained in accordance with a feature of the invention by utilizing, in the portable unit, a vacuum tube-relay-condenser combination which functions automatically when the portable unit is disassociated from a telephone
10 line to connect the coin control magnet, or relay to a local source of power, such as a battery, to cause the coin magnet to operate in such a manner as to effect the collection of the deposited coins. More particularly, the coin magnet, or relay
15 is normally connected between ground and the tip conductor of the line when the portable coin collector is connected to the line outlet and a coin has been deposited in the coin receptacle, by way of back contacts of a relay the operation of
20 which is controlled by the vacuum tube. The vacuum tube is of the trigger type and has its cathode and control electrode short-circuited through the contacts of the jack and plug connectors by which the portable unit is connected
25 to the telephone line and has its plate, or anode connected in series with the winding of the relay. Prior to the disconnection of the portable unit from the line the condenser is charged up to the full voltage of the local battery and this voltage
30 appears across the main gap of the vacuum tube. The tube, however, does not fire since this potential is below that required to break down the main gap. This same potential is also connected across the control gap of the tube but since this
35 gap, as stated above, is short-circuited, the tube does not fire. When the portable unit is disassociated from the line by the withdrawal of the plug from the jack terminal of the line, the short circuit is removed from the control gap of the tube
40 and the tube fires from the potential across the condenser. With the control gap fired, the main gap will also fire causing current to flow in the anode circuit which includes the control relay. This relay operates and transfers the coin control
45 relay from the tip conductor of the line to the local battery causing the coin control relay to operate and collect the deposited coins.

This and other features of the invention will be better understood from the following descriptions when read in connection with the accompanying drawing which is a circuit diagram illustrating a portable coin collector embodying the features of the invention.

To the left of the drawing an operator's telephone cord circuit is schematically illustrated.

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Only those elements of the cord which are essential to a complete understanding of the invention are indicated. A line L is shown terminating at a telephone exchange in a jack 10 and at a remote station in two jack outlets 12 and 13. These outlets are multipled together and obviously need not be limited in number to the two shown. In practice, these outlets would be located at convenient places in an institution or hospital, usually in close proximity to the beds in a ward or perhaps in a private room. The apparatus shown to the right of the jack 12 includes those elements of the portable coin collector of this invention. A coin collector of this type may be mounted on a wheel carrier which can be propelled from one location to another and the plug terminal thereof may be provided with a cable of suitable length and wound on a reel thereby accommodating the collector to various distances between the telephone line outlets and the location of the patients wishing to employ it.

A detailed description of the operation of the system disclosed in the drawing follows:

Automatic coin collection

It will now be assumed that a patient desires to initiate an outgoing call by means of the portable coin collector PC and that the jack 12 is nearest the point at which the patient is located. An attendant would roll the portable unit up to the bedside of the patient and insert the plug 14 thereof into the jack 12 of the line L. The patient then inserts a coin in the coin box of the portable unit and lifts the telephone from its support in the usual manner of originating a telephone call from a pay station. These operations and the results thereof are well known in the art and require no further discussion. It will now be assumed that the coin deposited by the patient has been returned, if insufficient to cover the toll for the connection desired, and that the correct amount in coins has been deposited in the coin box and further, that the desired connection has been completed and the conversation period ended. In the event that the calling party hangs up the telephone and the plug 14 is not immediately withdrawn from the jack, the deposited coins are automatically collected in the usual manner if the call has been completed on an automatic basis and in the following manner if the connection has been completed by an operator at a central office. The operator actuates the coin collect key 15 so as to connect positive coin collect battery 16 to the tip conductor of her cord. Coin collect current then traverses a path from battery 16, over the closed contacts of key 15, tip contacts of plug 17 and jack 10, contact 18 of the jack outlet 12 of line L, contact 19 of plug 14, left back contact and armature of relay 20 in the portable unit, coin contacts 21 of the collector PC, windings of coin relay 22, plug contact 23, and jack contact 24 to ground. The direction of the current in this circuit is such as to cause the coin relay 22 to operate in a manner to cause the deposited coins to be collected.

It will now be assumed that prior to restoring the telephone of the portable collector PC to its switchhook the calling party, inadvertently or otherwise, withdraws the plug 14 from jack 12. Obviously, under this condition and with no provision to guard against such a contingency, the deposited coins remain in the hopper of the coin box without having been disposed of since the line to the exchange is severed at the contacts of the plug 14 and jack 12. It will be observed that

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should a subsequent call be originated and the operator should perform a refund operation on a coin collector of the usual type, all the coins deposited on a previously completed call would be refunded and would come into the possession of the party making the subsequent call. Applicant's invention precludes this possibility.

It will be observed that while the plug 14 is in the jack 12 and during the pendency of the established connection condenser 26 is charged up to the voltage of the local battery 27. The charging circuit for condenser 26 is traced from the right terminal of battery 27, over resistance 28, condenser 26, contact 29 of plug 14, contact 30 of jack 12, contact 24 of jack 12 and contact 23 of plug 14 to the left terminal of battery 27. This same potential appears across the main gap, anode 31, cathode 32, of tube 33 through the winding of control relay 20. The tube 33 does not fire since this potential is below that required to break down the main gap of the tube. This same potential is connected across the control gap, cathode 32, control electrode 34 of tube 33 through resistances 36 and 28 but the control gap is short-circuited through the contacts 29 and 37 of plug 14 and contacts 30 and 38 of jack 12 and therefore, the tube does not fire by way of the control gap. However, when the plug 14 is withdrawn from jack 12, the short circuit is removed from the control gap of the tube 33 so that the tube fires from the potential across condenser 26 through resistances 28 and 36. With the control gap fired, the main gap of the tube is rendered conductive causing current to flow through the winding of relay 20.

Relay 20 operates when the tube 33 fires and at its inner right armature and front contact closes a holding circuit for itself through resistance 40 and condenser 26. At its inner left armature and back contact relay 20 disconnects the coin relay 22 from the tip conductor of the portable collector circuit and at its outer armature and front contact it connects the coin relay 22 across the local dry battery 27 through the filament of resistance lamp 41. At its outer right armature and back contact relay 20 removes the coin relay back contact 42 from the conductor 43.

Relay 22 now operates in such a manner as to cause the deposited coins to be collected.

With relay 20 operated, the potential across the main gap of the tube 33 is reduced below its sustaining voltage and the tube extinguishes. Relay 20, however, remains operated for approximately one-half second until the condenser 26 is effectively discharged, at which time the relay 20 releases and restores the circuit to normal condition.

The connections of the tip conductor and conductor 43 are open during the operation of relay 20 to prevent interference with the automatic collect feature of the portable collector circuit should plug 14 be partially withdrawn from jack 12 in such a manner as to open the plug and jack contacts 29, 37—30, 38 while the other contacts of the jack 12 and plug 14 remain closed.

Resistance 28 is made high in value to prevent false operation of tube 33 under plug fumbling conditions.

Incoming call

Ringling current from the central office operates the line ringer 50 and the ringer 51 if the plug 14 is inserted in the jack 12. Ringling is tripped in the usual manner when the switchhook of the portable unit is raised.

If the call is to be held while the portable unit is moved to another location, the hold key 54 is

operated while the switchhook is raised. This removes a short circuit from the winding of relay 55 which relay then operates from the central office battery 56 and ground in series with relay 57 and the closed loop at the portable substation. Relay 57 performs no useful function at this time. Relay 55 operates however, and completes an obvious operating circuit for relay 58. Relay 58 in operating opens the short circuit around relay 55 at another point and transfers the operating circuit of relay 55 from the ring conductor of the connection to the hold conductor 60. This connects relay 55 in series with the lower winding of relay 61 which relay also operates from central office battery. Relay 57 releases at this time.

When relay 61 operates it closes a holding circuit through its own front contact and armature, its upper winding and the non-inductive winding 63 across the tip and ring conductors on the central office side of the line L. Relay 61 is now held operated on its upper winding and its non-inductive winding 63 directly across the line and on its lower winding in series with relay 55 and the subset bridge. Relays 55 and 58 remain operated after the hold key 54 is restored as long as the subset switchhook is raised.

When plug 14 is removed from the jack 12, or if the subset switchhook is restored prior to the removal of plug 14 from jack 12, relays 55 and 58 release, but relay 61 remains held up on its upper winding only to central office battery 56 and holds the central office connection.

When the plug 14 is reinserted in another jack, such as jack 13 at another location and the switchhook of the portable substation is raised, relay 57 operates in series with the subset bridge and short-circuits the upper winding of relay 61 causing relay 61 to release. Relays 55 and 58 do not operate at this time since relay 55 is short-circuited through the hold key 54 and the back contact of relay 58. The central office connection is now held in the usual manner through the subset bridge. If the hold condition is applied and not restored at the portable subset it may be released from the central office. If the hold condition is applied during the course of a regular call by inadvertent operation of the hold key 54, it may be released by momentarily depressing and releasing the subset switchhook.

Outgoing call

With plug 14 inserted in a jack such as 12 or 13 the deposit of a coin in the coin receptacle will connect ground through the coin relay 22 to the tip conductor of the line L as a signal to the central office in accordance with usual practice. If the coin collector is arranged for dial operation, the dial pulsing contacts (not shown) are kept short-circuited through the back contact 42 of the coin relay 22 until a coin is deposited. At the completion of the call, the operator or the dial central office equipment will collect or refund the coin in the usual manner. The collection of the coin is effected on a manual connection as previously described, by the actuation of coin collect key 15 which connects positive collect battery 16 to the tip conductor of the line L, whereas a coin refund is effected by the actuation of key 70 which connects coin refund battery 71 to the tip conductor of the line.

It is apparent from the foregoing descriptions that the fraudulent or inadvertently false disposal of coins deposited in a portable coin collector is rendered impossible in a simple, reliable manner and with a minimum of apparatus.

What is claimed is:

1. The combination, in a telephone system, of a line and a coin collector removably connected to said line, said coin collector including a local battery, a coin disposal magnet normally disconnected from said battery, a vacuum tube, means effective incident to the connection of said coin collector to said line for conditioning said vacuum tube for response to the disconnection of said coin collector from said line, and means controlled by said vacuum tube incident to its response to the disconnection of said coin collector from said line for connecting said coin disposal magnet to said battery.

2. The combination, in a telephone system, of a line terminating in a jack, a portable coin collector having a plug for insertion in said jack whereby said coin collector is removably connected to said line, said coin collector including a local battery, a coin disposal magnet, a vacuum tube having a normally short-circuited control gap, means normally applying potential from said battery to the short-circuited control gap of said tube, means effective incident to the withdrawal of said plug from said jack for removing the short circuit from the control gap of said tube whereby said tube is caused to operate, and means responsive to the operation of said tube for connecting said coin disposal magnet to said battery.

3. The combination, in a telephone system, of a telephone line, a portable coin box unit removably connected to said line, said unit comprising a battery, a coin disposal magnet normally disconnected from said battery, and means responsive to the disconnection of said unit from said line for automatically connecting said coin disposal magnet to said battery comprising a vacuum tube having an anode, cathode, and control electrode, a relay included in the anode circuit of said tube, a condenser for applying potential from said battery across the anode and control electrodes of said tube and across the cathode and control electrodes of said tube, the potential connected across the anode and cathode being of insufficient magnitude to cause said tube to fire, means normally short circuiting the cathode and control electrode of said tube whereby the potential applied by said condenser to said anode and control electrode is rendered ineffective to cause said tube to fire, and means effective incident to the removal of said unit from connection with said line for removing the short circuit from the cathode and control electrode of said tube to cause said tube to fire and to complete an operating circuit for said anode circuit relay.

4. In a portable coin collector having a plug connector for insertion in a jack terminal of a telephone line, a coin disposal magnet, a source of power, means responsive to the deposit of a coin in said collector for preparing said coin disposal magnet for connection to said battery, a vacuum tube, means controlled thereby for completing the connection of said coin disposal magnet to said battery, means responsive to the insertion of said plug connector into said jack terminal for conditioning said vacuum tube for operation, and means effective upon the withdrawal of said plug connector from said jack terminal for causing said vacuum tube to operate and to effect the operation of said connection completing means.

5. In a portable coin collector having a plug connector for insertion in a jack terminal of a telephone line, a coin disposal magnet, a source of power, a vacuum tube having a control gap,

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a condenser chargeable from said source, means including contacts of said plug connector and said jack terminal effective upon the insertion of said plug connector into said jack terminal for connecting said condenser to said source of power and across the control gap of said vacuum tube and for short-circuiting the control gap of said vacuum tube whereby said condenser is charged and said vacuum tube is precluded from operation by way of its control gap, said contact means functioning upon withdrawal of said plug connector from said jack terminal to remove the short circuit from the control gap of said vacuum tube so as to cause said vacuum tube to operate on the condenser charge by way of its control gap, and switching means responsive to the operation of said vacuum tube for connecting said coin disposal magnet to said source of power.

6. The combination in a telephone system of a line, a jack terminating said line at a remote point, a portable coin collector unit, a plug associated therewith and inserted in said jack whereby said unit is removably connected to said line, said unit comprising a source of power, a condenser charged by said battery, a vacuum tube having anode, cathode and control electrodes, a relay connected across said condenser in series with the anode and cathode of said tube, a short-circuiting path for the cathode and control electrode of said tube including contacts of said plug and said jack, a coin disposal magnet normally on open circuit with respect to said battery, and means controlled by said relay incident to the withdrawal of said plug from said jack for connecting said coin disposal magnet to said battery, the withdrawal of said plug from said jack causing the opening of said short-circuiting path, whereupon the charge on said condenser is effectively applied to the cathode and control electrodes of said tube to cause said tube to fire and to the anode and cathode of said tube to sustain said tube in its operated condition and to

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operate said relay, and means controlled by said relay, when operated, for discharging said condenser through the winding of said relay whereupon said relay releases after a time interval to disconnect said coin disposal magnet from said battery.

7. In a telephone system, a telephone exchange, a remote station, a line extending from said exchange and terminating at said remote station in a plurality of line outlets, a portable substation at said remote station, a connector associated with said portable substation cooperating with said line outlets for connecting said portable substation to said line, a holding bridge for said line, a first relay included in said substation, a second relay included in said substation, a hold key in said substation, the said first relay being normally short circuited by serially connected contacts of the said second relay and of said hold key whereby said first relay is operated in response to the actuation of said hold key, means controlled by said first relay when operated for operating said second relay whereby the short circuit of said first relay is maintained opened independent of the continued operation of said hold key, means responsive to the operation of said second relay for connecting said holding bridge across said line, locking means controlled by said connecting means for maintaining said holding bridge connected to said line independent of said second relay whereby the connector of said portable substation may be disconnected from said line terminal to disconnect said portable substation from said line without disturbing the connection of said holding bridge to said line, and means included in said line responsive to the reconnection of said substation connector to one of said line terminals while the telephone of said substation is removed from its support for releasing said locking means, whereupon said holding bridge is disconnected from said line.

LOUIS E. VAN DAMME.