Dec. 24, 1957 H. V. ALEXANDERSSON 2,817,709

COIN BOX FOR TWO OR THREE KINDS OF COIN

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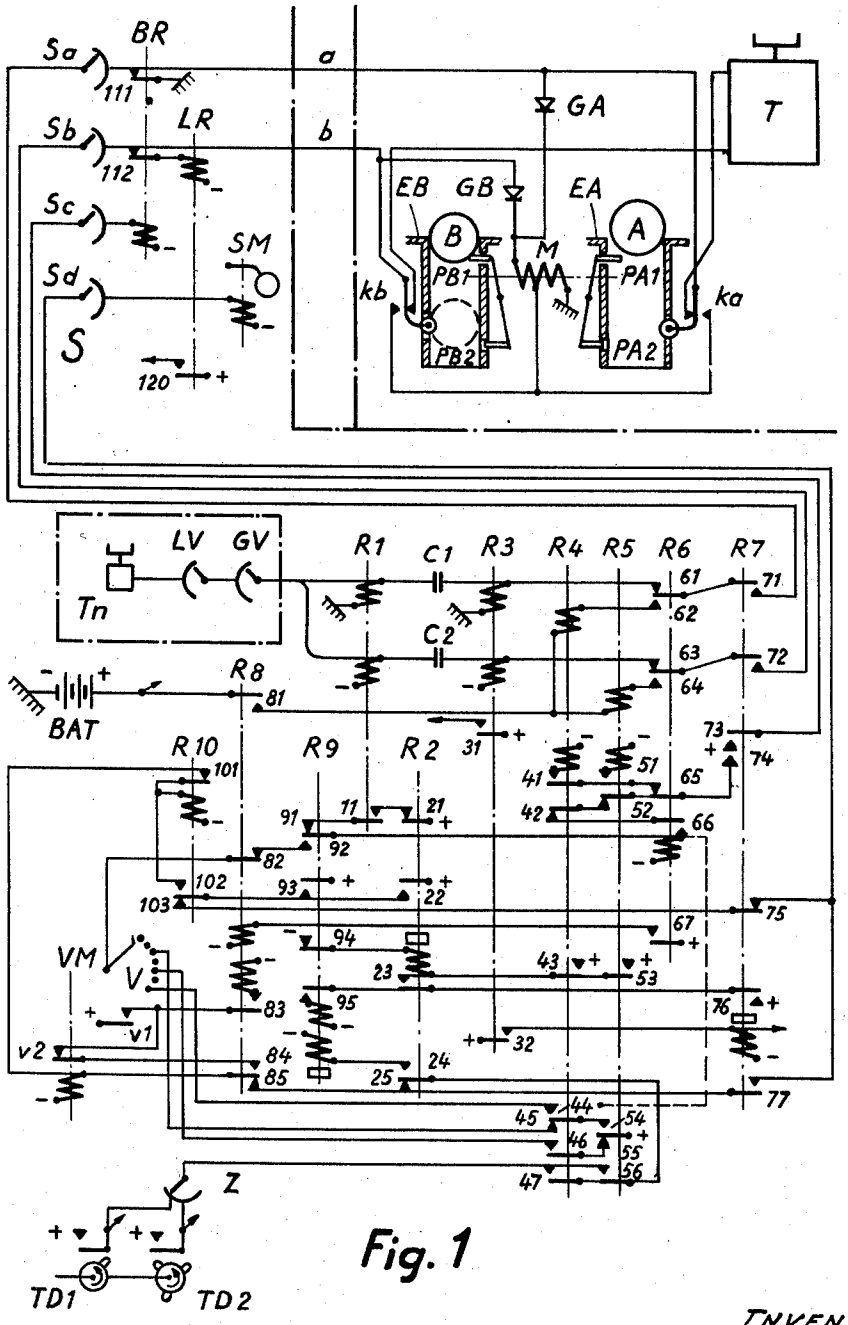

Fig. 1

INVENTOR
HARALD VALDEMAR ALEXANDERSSON

By Hane and Nydick
ATTORNEYS

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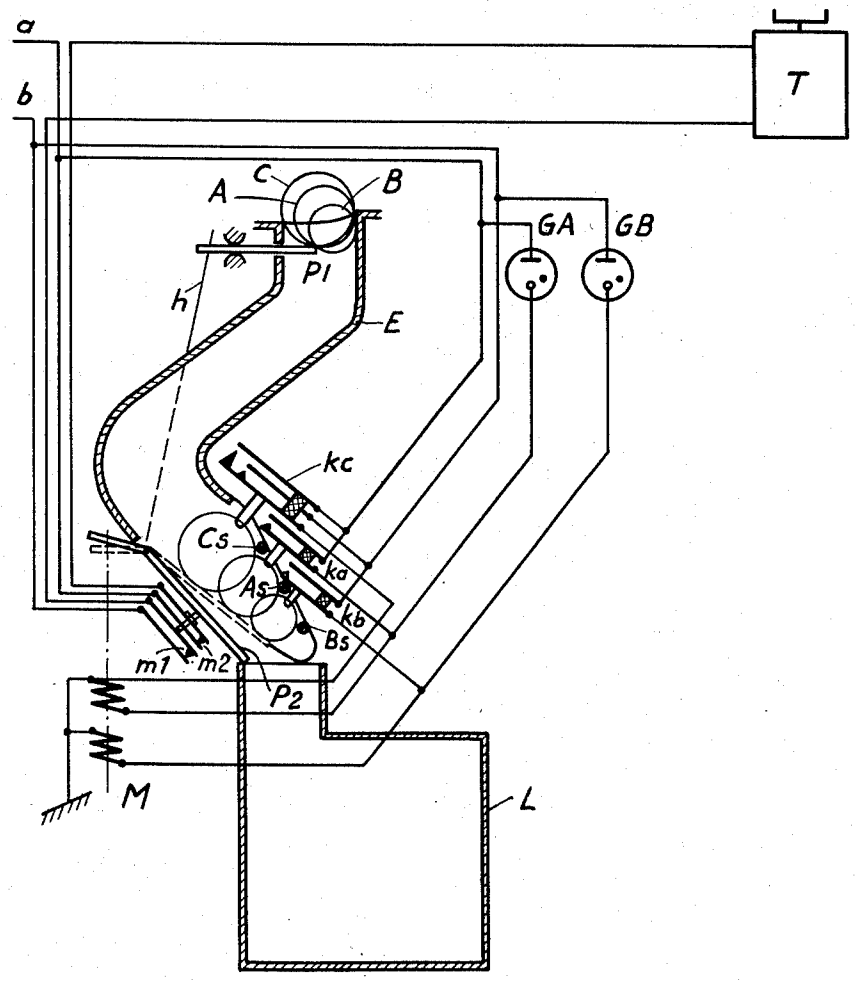
Fig. 2



INVENTOR
HARALD VALDEMAR ALEXANDERSSON
By Howe and Nydick
ATTORNEYS

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COIN BOX FOR TWO OR THREE KINDS OF COIN

Harald Valdemar Alexandersson, Lidingo, Sweden, assignor to Telefonaktiebolaget L M Ericsson, Stockholm, Sweden, a corporation of Sweden

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This invention relates to coin boxes for two or three kinds of coin of different size and value, each of said coin boxes being connected to a telephone exchange by means of a two-wire line. Hitherto known coin boxes for several coins are in themselves complicated and expensive and they demand a considerable relay equipment in the telephone exchange for the emitting and receiving of signals.

The rapidly progressing automatization of telephone systems demands that pay stations for local and long distance calls are available where the public needs the use of a telephone, e. g. shops, cafes, boarding-houses or the like. It is an object of the invention to produce a simple, cheap, conveniently operable and reliable coin box for said purpose. This object is achieved by means of a coin box containing at least one coin chute with a coin pawl which is controlled by a deposit magnet, and a coin chute contact for each of the coins to be used, and by means of a signal device in the telephone exchange for the operation of said deposit magnet at the beginning of each period of conversation, for which a coin should be paid. The system of the invention further comprises arranging at the coin box at least one valve, which in series with a winding on the deposit magnet is connected between a speech conductor and ground and which due to a voltage change in the line is made conductive by means of said signal device in the telephone exchange, when the deposit magnet should be operated. The system further comprises a contact device which breaks the connection between the telephone instrument in the pay station and the line during each deposit. The coin chute contacts control two circuits, one over each speech conductor in different combinations, and relays in the telephone exchange, which are connected to the speech conductors by said signal device are operated in said circuits and mark the kind of coin deposited in the coin box.

The invention will now be described more in detail with reference to the enclosed drawings, Figs. 1–2.

Fig. 1 shows a pay station including a coin box for two kinds of coin and a coin chute for each kind of coin and necessary devices in an automatic telephone exchange.

Fig. 2 shows a coin box for three kinds of coin and a coin chute common to all kinds of coin. The devices in the telephone exchange are the same as in Fig. 1.

In Fig. 1 a telephone apparatus T is associated with an auxiliary coin box consisting of two coin or token chutes EA and EB and two electric valves consisting of rectifiers GA and GB. In each coin chute there is an upper coin pawl PA1 and PB1, respectively, and a lower coin pawl PA2 and PB2, respectively. The coin pawls are controlled by a deposit magnet M which is common to both coin chutes and all coin pawls, said coin pawls being arranged in such a way that, when the upper coin pawls are opened, the lower will be closed. At each of the lower coin pawls there are coin chute contacts *ka* and *kb*, respectively, each comprising a make and break. The telephone apparatus T is by means of a line *ab* connected to an automatic telephone exchange containing a number

of line-finders S, each line-finder having a relay set R1—R10. The line *ab* is provided with a line relay LR and a cut-off relay BR and a subscriber's meter SM. A selector Z for registering the tariff of a call and a selector V for registering the metering impulses are associated with the relay set of the line-finder S. Common to a number of line-finders S is an interrupter TD1—TD2 emitting impulses with different time intervals for different tariffs and a current source BAT to make the rectifiers GA and GB current carrying.

As appears from the figure the line *ab* is connected to a negative voltage through the line relay LR for which reason the rectifiers GA and GB normally do not transmit current to the magnet M. At a call from the apparatus T a coin is first put into one of the coin chutes EA or EB, and then the handset is lifted. As a result the line relay LR is operated and closes by means of the contact 120 circuits for a selector which selects and activates a line-finder S. The line finder connects the line *ab* with the respective relay set R1—R10 and the selector operates the relay R7 which attracts its armature whereby contacts 71—77 are actuated. The circuits of the selection operation are of no importance to the function of the coin box and have been omitted. The cut-off relay BR is operated at the inter-connection in the following circuit: +, contact 73, the wiper Sc in the line-finder S, the winding on the relay BR, to minus. The contacts 111—112 are actuated and line relay LR is released. The relay R3 operates in the following circuit: ground, the upper winding of the relay R3, the contacts 61 and 71, the wiper Sa, the *a*-branch the coin chute contact *ka*, the telephone apparatus T, the coin chute contact *kb*, the *b*-branch, the wiper Sb, the contacts 72 and 63, the lower winding of the relay R3, to minus. The contacts 31—32 are actuated. The relay R7, which releases slowly, is then held operated by means of the contact 32.

The calling person causes an impulse series by means of the dial in the telephone apparatus T. The impulses are repeated by the relay R3 to a circuit over the contact 31, whereby a connection is set up in a known manner over selectors GV and LV to a called apparatus Tn. Also this switching process is completely unessential to the invention, for which reason the circuits pertaining hereto have been omitted in the drawing. The pay stations are grouped together in separate groups served by special line finders S with link circuits provided with means VM, R4—R6, R8—R10 and Z for metering. The selector Z can for instance be set in accordance with the setting of the group selector GV and each route selected by GV has a fixed tariff.

If an answer is not received from the calling apparatus Tn, the handset at the apparatus T is put down and the calling person can recover his coin. If an answer is received from the apparatus Tn, a circuit is closed for the relay R1, which attracts its armature. The contact 11 is actuated. The relay R6 operates in the following circuit: +, the contacts 21, 11 and 91, the winding on the relay R6, to minus. The contacts 61—67 are actuated. The relay R6 is then held operated over the contacts 74, 52, 42 and 66. The relay R6 is operated over the contact 67 and attracts its armature. The contacts 81—85 are actuated. The deposit magnet M in the coin box is operated in the following circuits: ground, the battery BAT, the contact 81, the upper windings of the relay R4 and R5, the contacts 62, 64 and 71, 72, the wipers Sa and Sb, respectively, the line *ab*, the rectifiers GA and GB, respectively, the windings on the magnet M, to earth. The coin pawls PA1 and PB1 are removed and the pawls PA2 and PB2 are closed. If no coin falls into one of the coin chutes EA—EB, none of the relays R4—R5 is operated in this circuit, whereby the relay R7, after a short while, releases its armature and the connection with the apparatus

Tn is disconnected. If a coin rests against one of the upper coin pawls it will fall into the coin chute and rest at the lower pawl where the corresponding coin chute contacts *ka* and *kb*, respectively, is actuated. The connection to the telephone apparatus T is broken by the actuated coin chute contact and at least one of the rectifiers GA or GB and the upper winding of the magnet M are short-circuited. At least one of the relays R4—R5 attracts its armature and the contacts 41—47 and 51—56, respectively, are actuated. The relay R2 operates in a circuit over the contact 94 and either of the contacts 43 or 53. The contacts 21—25 are actuated. The relay R6 releases its armature and a communication between the apparatuses T and Tn is obtained over the condensers C1—C2. The relay R3 is again operated. The relay R8 releases its armature. The one of the relays R4 and R5 that is operated is held operated over the contacts 74, 65, 41, respectively 51, and the lower winding of the respective relay. The relay R2 is held operated in a circuit over the contacts 76 and 23.

After a coin has been deposited at least one metering impulse should be registered on the subscriber's meter SM of the coin box. The coin may however entitle to a number of periods of conversation and if the call is interrupted before these have elapsed, no refund will be made. The charging for calls from the coin box occurs according to the subscriber's meter SM and each step that progresses the subscriber's meter SM corresponds to a unit amount, which need not correspond with the value of any of the coins A and B, for which the coin chutes EA and EB are designed. The coin box may thus be rented by a subscriber in the manner of ordinary telephone apparatus, and the subscriber himself empties his coin container but pays according to the registering of the subscriber's meter SM. The subscriber may thus make a certain profit on maintaining the rental of the apparatus.

For the call metering there is, as mentioned above, a selector Z pertaining to the relay set R1—R10 in the telephone exchange. The selector Z is set simultaneously with the selectors GV and LV in dependence on the impulse series from the contact 31 and its setting indicates the rate of the call. An interrupter TD1—TD2 corresponding to the rate is thus connected to the connection and an impulse from the interrupter corresponds to said unit amount. The time between the impulses varies with the rate. The interrupters TD1—TD2 rotate with a regular velocity and are independent of the points of time for the beginning of the calls. So as not to make the first time interval too short, the time metering is not started until an impulse has been received, whereby the relay R9 is operated in the following circuit: +, the interrupter TD1 or TD2, the selector Z, the contact 47 or 56, the contact 24, the lower winding of the relay R9, to minus. The contacts 91—95 are actuated. The relay R9 is then held operated in a circuit through its upper winding and the contacts 95 and 76. The relay R2 releases its armature, but is slow-releasing so that that impulse which operates the relay R9 is ended, when the contact 25 is closed. All the following impulses from the interrupter TD1—TD2 then operate on one hand the subscriber's meter SM in a circuit over the contact 77 and the wiper Sd, on the other hand the stepping magnet VM of the selector V in a circuit over the contact 85.

So as to have at least one metering impulse registered on the subscriber's meter SM after each deposit there is a relay R10. If the call is interrupted before still another impulse has actuated the selector V, the subscriber's meter is operated during the disconnection, after the relay R7 has released. During the release time for either of the relays R2 and R9, which are slow releasing, the following circuit is closed: +, the contact 22 or 93, the contacts 103 and 75, the wiper Sd, the winding on the subscriber's meter SM, to minus. If, on the other hand,

an impulse from the interrupter TD1—TD2 actuates the subscriber's meter SM, the relay R10 is at the same time operated in the following circuit: +, the interrupter TD1—TD2, the selector Z, one of the contacts 47 and 56, the contacts 25, 85 and 101, the winding on the relay R10, to minus. The contacts 101—103 are actuated. Then the relay R10 is held operated over the contacts 102 and 93 or 22 until the connection has been disconnected.

After an answer has been received from the calling apparatus Tn and a first impulse from the interrupter TD1—TD2 has been registered through operation of the relay R9 and release of the relay R2, each impulse is registered both on the subscriber's meter SM and in the selector V. When the selector V has left its initial position the contact *v* is closed. The coin B, which is intended for the coin chute EB, is in Fig. 1 of smaller size and value than the coin A. If only one coin B has been deposited, only the relay R5 is operated during the call. When the selector V has stepped forward e. g. two steps, i. e. after two meterings on the subscriber's meter SM, the following circuit is closed: +, the contacts 54 and 45, the wiper on the selector V, the contacts 82 and 92, the winding on the relay R6, to minus. The contacts 61—67 are actuated. The one of the relays R4—R5 that is operated, in this case R5, releases its armature during the make-time for the relay R8. When the relay R8 is operated, the deposit magnet M is again operated. If the subscriber wishes to continue the call, he has during the preceding period of conversation put a new coin into the coin slot of one of the coin chutes EA—EB, e. g. a coin A. The coin A is deposited and the relay R4 operates. The contacts 41—47 are actuated. The relay R6 releases and the relay R4 is held operated during the following period of conversation. The relay R8 is held operated in a circuit over the contacts *v*1 and 83 and the lower winding of the relay. The stepping magnet VM drives the selector V to its initial position due to a circuit over the contact *v*1 and the contact breaker *v*2, which is actuated by VM. When the selector V reaches its initial position the relay R8 releases, whereafter the selector is again stepped forward one step for each impulse from the interrupter TD1—TD2. This time the selector V must go a larger number of steps than the time before, before the relay R6 is again operated, because a coin of higher value has been paid. In the figure it is supposed that the coin A entitles to a period of conversation which is double as long as for the coin B. After the selector V has been moved forward four steps, the following circuit is closed: +, the contacts 55 and 46, the wiper of the selector V, the contacts 82 and 92, the winding on the relay R6, to minus. The deposit process is repeated, if there is any coin to deposit. If that is not the case, the connection is disconnected.

Of course the calling person can put a coin in each coin chute EA and EB which causes that the two coins are deposited and both relays R4 and R5 are operated. In this case the calling person is entitled to a period of conversation, the length of which corresponds to the sum of the two coins A and B. The selector V must now be moved forward six steps in the example shown in the figure, whereby the following circuit is completed: +, the contacts 54 and 44, the wiper of the selector V, the contacts 82 and 92, the winding on the relay R6, to minus. In the embodiment shown in Fig. 1 there exists the disadvantage that, if a coin B is put into the coin chute EA, the coin will be lost.

Therefore Fig. 2 shows another embodiment with a common coin chute for all coins. As a result that three kinds of coin A, B and C may be used. In the coin chute E there is an upper coin pawl P1 and a lower coin pawl P2, which are operated by the deposit magnet M. The lower coin chute P2 is shaped as an armature for the magnet M and operates a spring set containing two break contacts *m*1 and *m*2 intended for the breaking of

the telephone apparatus T. Besides there are two electric valves GA and GB consisting of glow discharge tubes and three coin chute contacts *ka, kb* and *kc,* each combined with a coin stop AS, BS and CS, respectively. The upper coin pawl P1 is removed by means of an arm *h* fixed to the armature P2 simultaneously as the lower coin pawl stops the passage to the coin container L, shown below in the figure.

When the battery BAT in Fig. 1 is connected to the line *ab*, the glow discharge tubes GA—GB are ignited. The magnet M receives current through its two windings and attracts its armature P2. The coin pawl P1 is removed and a coin A, B or C falls down through the coin chute and stops against the coin pawl P2 and one of the stops AS, Bs or GS dependent on the size of the coin. The coin chute contact corresponding to the coin stop is actuated, whereby one or the other or both glow discharge tubes GA—GB are short-circuited. Thus the current in one, the other or both conductors of the line increases and one, the other or both of the relays R4—R5 in Fig. 1 attract their armatures. When the pawl P2 stops, the cut-off relays *m1* and *m2* open, whereby the apparatus T is disconnected and the speech conductors *a* and *b* become free from each other so that two different signal circuits are obtained.

When the coin box shown in Fig. 2 is used for only two coins A and B the contact 44 on the relay R4 in Fig. 1 is suitably connected directly to the winding on the relay R6 as is indicated in the figure by means of a line of short dashes. Thus the subscribers cannot imitate the payment of a coin by grounding a point of the telephone apparatus T. If the ground connection is made after the magnet M is operated, the apparatus T is disconnected and the grounding will be of no effect. If the ground connection is made before the magnet M is operated, the two relays R4—R5 are operated and the connection is disconnected by the relay R6 being held operated until the relay R7 releases its armature.

In the description above and in the drawings there exist, for reasons of symmetry, two electric valves GA and GB. As a matter of principle no more than one valve is ever required because a circuit over one speech conductor is sufficient for the operation of the deposit magnet M. The combination signals from the coin chute contacts *ka, kb, kc* are independent of the electric valves GA and GB. In Fig. 1 as well as in Fig. 2 e. g. the valve GB may be omitted.

I claim:

1. In an automatic telephone system, in combination, a telephone exchange, a pay station, and a two-wire telephone line interconnecting said exchange and said pay station, said pay station including a telephone instrument and a coin controlled switching device for at least two kinds of coins of different size, said coin controlled switching device comprising at least one coin receiving chute, coin chute contacts for stopping either kind of coins, a coin catching member movably extending into said chute, electromagnetic means controlling the position of said catching member to withdraw the latter into a coin releasing position upon energization of the electromagnetic means, circuit means in the exchange determining the toll for a call made from the pay station and sending a check signal over said line when a coin

is due for a call made from the pay station, relays each connected to one wire of said line, a switch contact means operable by said check signal, a source of current having one terminal grounded, a normally non-conducting circuit component in said pay station connecting at least one of said line wires to ground through said electromagnetic means, timing circuit means controlling the period of time allowed for a call initiated by the insertion of a coin in the chute, operation of said switch contact means by the check signal closing an energizing circuit including said source of current, at least one of said relays and the respective line wire, said normally non-conducting means and said electromagnetic means whereby said normally non-conductive means becomes conductive to pass current actuating said electromagnetic means, actuation of said electromagnetic means causing withdrawal of said coin catching member into the release position for passage of a coin through the chute, the passage of the coin actuating the respective coin chute contact, said actuation closing a circuit connecting at least one of the line wires to ground for actuating at least one of said relays, energization of said relays closing circuits for marking the value of the collected coin, restoring of said switch contact means to its position opening said energizing circuit and closing said timing circuit means for controlling the period of time for which the connection between the line and the telephone instrument in the pay station is maintained.

2. An automatic telephone system according to claim 1, wherein said coin receiving chute includes means forming a first coin position in which a coin deposited prior to the establishment of the connection between the telephone apparatus and the exchange is retained by said catch member and from which it may be recovered, and means forming a second coin position into which the coin moves upon actuation of said electromagnetic means and in which it actuates the respective coin chute contact.

3. An automatic telephone system according to claim 1, wherein said coin chute is adapted to receive coins of three different sizes, and comprises an upper and a lower movable catch member disposed in said chute, both said catch members being operated by said electromagnetic means, linkage means interconnecting said catch members so that the upper catch member is moved into its coin releasing position and the lower catch member into its coin retaining position in the chute in response to an actuation of said electromagnetic means, said coin chute contact being disposed at said lower catch member and operable by a coin having any of said three different sizes.

4. An automatic telephone system according to claim 1, wherein said electromagnetic means interrupt the circuit connection between said telephone instrument in said pay station and said line in response to the release of a coin by said catch member.

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