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COIN IDENTIFYING CIRCUIT

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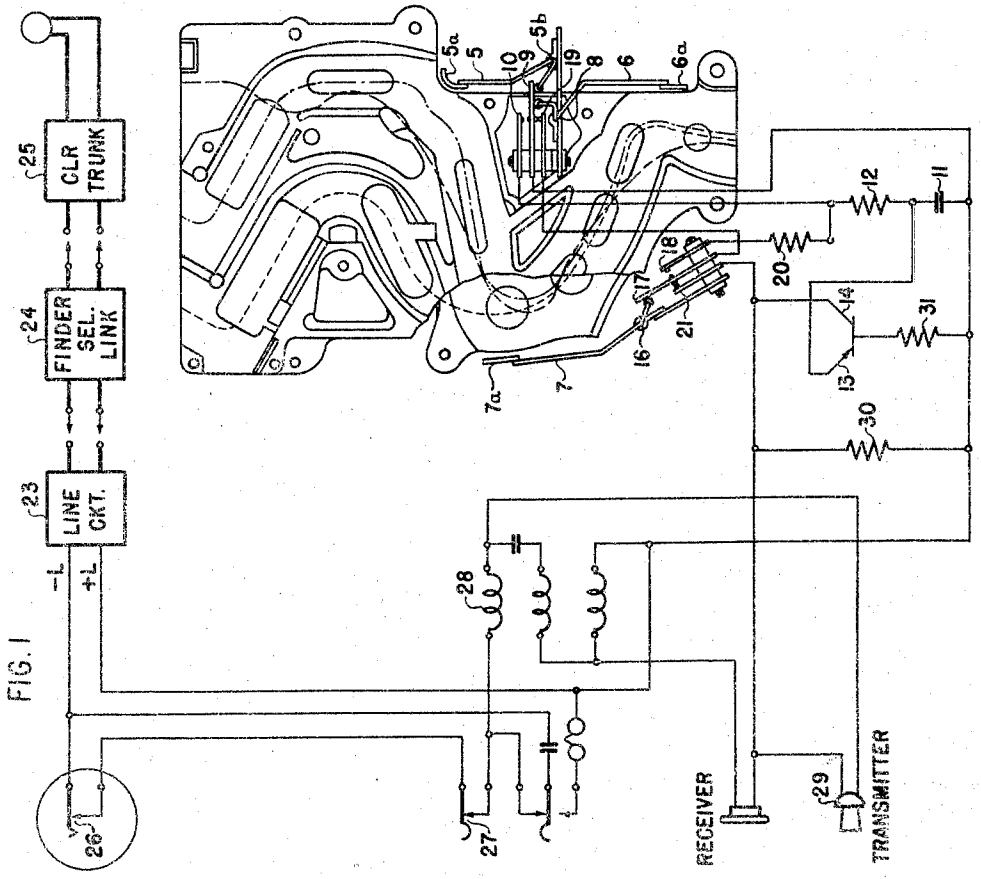

FIG. 1

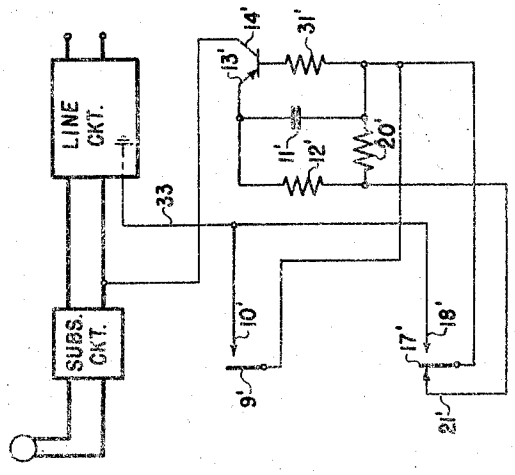

FIG. 1A

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COIN IDENTIFYING CIRCUIT

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This invention relates in general to an arrangement for identifying the value of a coin deposited in a coin receiving means and more particularly to an arrangement comprising an electronic tone generator to be used with a telephone paystation and controlled by a switch arrangement in the coin receiving means for the purpose of generating electrical pulsations, dependent on the value of a coin deposited at the paystation, to thereby enable the coin to be identified.

The usual practice today for identifying coins deposited in a telephone paystation is to have a number of gongs arranged along the coin chutes so that when a nickel is deposited one of the gongs is struck once; when a dime is deposited the same gong is struck twice and when a quarter is deposited another gong is struck once. An arrangement of this type is shown in a Patent No. 2,235,648, issued to Shann, March 18, 1941, wherein a coin transmitter is arranged in close proximity to the gongs and picks up the vibrations produced by the struck gong and transmits corresponding electrical pulsations over the line so that an operator may identify the coin according to the tone produced in her telephone set by the electrical pulsations. The gong which is arranged to be struck by a nickel or dime vibrates at one particular frequency so that the operator identifies a nickel by the fact that she hears one tone of the particular frequency transmitted over the coin transmitter and identifies the dime by hearing the same frequency twice in quick succession whereas the quarter gong gives rise to a vibration of another frequency which is transmitted by the coin transmitter to be heard by the operator and identified by her as a quarter. This arrangement gives rise to two important difficulties in that the coin transmitter provides an undesirable impedance in the line circuit and secondly the second stroke of the dime against its gong is difficult to distinguish from the first stroke as the gong may be still vibrating.

The present invention eliminates these problems by providing, in place of the gongs and coin transmitter, lever controlled switches operated by the coins to control a transistor oscillator for the purpose of producing an identifiable audio frequency on the line. A nickel on falling through the chute strikes one lever to control the oscillator accordingly. The dime strikes another lever and the first lever to control the oscillator for the purpose of producing two separate splashes of identifiable tones of the same frequency as the nickel. The quarter on deposit strikes a third lever for controlling the oscillator to produce a tone of another frequency to enable the operator to identify the quarter. The transistor oscillator as shown in one embodiment is shunted from the line except for a short period when a coin is deposited and therefore it provides no impedance to the line while connections are being established or during conversation. The oscillator avoids the problem of providing two distinct tones from a vibrating gong as it generaes tones only during a short interval that the various levers are activated by their respective coins to close their associated

switches or contacts. One modification of the present invention shown herein utilizes a transistor oscillator circuit normally incomplete and connected to one side of the line at all times so that even when completed and operative practically no impedance to the line is presented.

Present paystation practice generally allows completion of a local call without intervention by an operator, and only on toll calls is operator control utilized. However, no distinction will be made between local and toll calls or postpay and prepay paystations as these factors are of no consequence in the present invention and the calling party may be considered in the present invention as completing all calls with the aid of an operator on reaching any well-known type of combined line recording trunk after dialling a preliminary digit over any well-known type of finder-selector link.

Fig. 1 is a schematic diagram of a standard type of coin chute such as shown in the aforementioned patent modified by replacing the gongs adapted to be struck by the coins with levers **5**, **6** and **7** respectively. It also shows the physical arrangement of the switches controlled by levers; the essentials of a subscriber circuit; the manner in which the transistor oscillator is arranged with respect to the switches and subscriber circuit, and a line circuit, finder-selector link and a combined line recording trunk each in block form.

Fig. 1*a* is a modification of the invention showing the transistor oscillator arranged in shunt with the line. It is intended to be used with a similar type of coin chute and circuit arrangement as shown in Fig. 1 with the exception that an additional lead is provided which is grounded in the line circuit and one spring may be omitted from those controlled by nickels and dimes. Similar parts are designated by a primed number.

Assuming now that a calling party at a paystation such as in Fig. 1 has proceeded to reach combined line recording trunk **25** over finder-selector link **24** on dialling of a preliminary digit and on conversing with the operator has been requested to deposit forty-cents in the coin receiving mechanism. At this time a circuit is completed from battery at the combined line recording trunk **25**, over finder-selector link **24**, subscriber's line circuit **23**, the —L line, dial springs **26**, hookswitch springs **27**, coil **28**, transmitter **29**, springs **21**, **17**, **19** and **9**, over the +L line, back over line circuit **23**, link **24** and trunk **25** to ground. Resistor **30** is normally short circuited and is in the line only when springs **19** and **9** or **21** and **17** are open so that at most only an impedance of 150 ohms is added to the line and that only for an instant while a coin is deposited. Levers **5**, **6** and **7** are balanced on their pivots **5***b*, **8** and **16** respectively so that their respective coin pads **5***a*, **6***a* and **7***a* normally rest against the edges of their respective channel forming members adjacent their respective channel openings. Each lever is prevented from rotation until its pad is struck by a coin at which time the associated lever is moved away from its associated channel. The coin pads are attached to the coin levers for the purpose of providing a large surface to be struck by a coin as the levers themselves are wires, which do not provide sufficient surface to be sure that a coin in rolling through its channel will strike the lever more than a glancing blow.

The calling party deposits a nickel which on dropping through the coin chute strikes pad **6***a* causing lever **6** to rotate about pivot **8** and close springs **9** and **10** and open springs **9** and **19** to remove the shunt from resistor **30** and include it in the line. As 150 ohm resistor **30** is not now shunted from the line a drop in voltage occurs across it to bias the collector **14** with respect to the base circuit and cause collector current to flow. As collector current flows, the base is made negative with respect to the emitter **13** and the emitter circuit begins

to draw current, thereby increasing the flow of current in the collector circuit to in turn increase current flow in the emitter circuit until a saturation point in collector current flow is reached, after which both the collector and emitter current fall rapidly away. The .2 mf. condenser **11** which is charged during the period that the emitter current was increasing now discharges through the 10,000 ohm resistor **12**. The current passing through bias resistor **30** is of course increasing and decreasing in the same time sequence to provide a corresponding voltage fluctuation in the line. After condenser **11** discharges, collector current again flows to repeat the process. Thus the current passing through resistor **30** is periodically varied at an audio frequency rate to provide a tone signal to the operator. Reference may be made to pages 289, 290, Figs. 7*b* and 8 on pages 318 and 319 respectively and Fig. 1 on page 433 of the publication "The Transistor," by Bell Telephone Laboratories, for a more complete explanation of the transistor oscillator. A type 1692 Western Electric transistor may be used in the present invention while the base circuit resistor **31** may be between 2,000 and 10,000 ohms dependent on the characteristics of the particular transistor.

As lever **6** is returned quickly to normal after the nickel has struck it, springs **9** and **10** open to terminate operation of the transistor oscillator immediately and thus interfering vibrations in the event of another coin deposit are prevented, as oscillations caused by the first deposit cease before the second deposit is made. Pad *6a* on striking the edges of the channel forming members prevents lever **6** from oscillating on its pivot to again cause springs **9** and **10** to close and only one distinct tone is all that can be provided. Resistor **30** is again shunted from the line when springs **9** and **10** close.

A dime on deposit in the chute strikes pad *5a* to rotate lever **5** about pivot *5b* to close springs **9** and **10** and to complete the same circuit for causing the transistor oscillator to provide a tone of the same frequency and in the same manner as previously described when the nickel struck lever **6**. Lever **5** is prevented from oscillating about *5b* when pad *5a* strikes the edges of its respective channel forming members so that springs **9** and **10** are closed only once for a short interval when lever **5** is rotated by the dime. The dime travels on down the chute and strikes pad *6a* to rotate lever **6** by which time all oscillations generated by the transistor oscillator caused by operation of lever **5** have ceased, and a distinct tone is produced by the transistor in the same manner as previously described when the nickel rotated lever **6**.

A quarter on deposit in the chute strikes pad *7a* to rotate lever **7** about pivot **16** to open the shunt around bias resistor **30** at springs **21** and **17** so that the aforedescribed operations take place except, that as springs **18** and **17** are closed, the discharge circuit for condenser **11** is through the 10,000 ohm and 100,000 ohm resistors **12** and **20** respectively. The constants of this oscillator circuit are different from that previously described as the 100,000 ohm resistor **20** is now in the discharge circuit and therefore a tone of a different frequency from that generated before is now generated so that the operator may identify the deposited coin as a quarter. Lever **7** returns to normal as the coin continues to fall and is prevented from further rotation by pad *7a* in a manner similar to that described.

The values of the resistors **12** and **20** may each be varied between 10,000 and 100,000 ohms to provide suitable tones of audio frequency and resistor **31** may be varied within the range of 2,000 to 10,000 ohms as before described dependent on the transistor used.

The modification shown in Fig. 1*a* of the present invention provides a normally open circuited transistor oscillator which is in shunt with the line only when a coin is deposited and therefore draws very little line current even during the period when utilized. An additional lead **33** shown grounded in the subscriber's line circuit is provided, however, the provision of such a lead is often standard practice for the purpose of securing additional control functions. Such a ground may be furnished from equipment other than the line circuit.

The operation of the coin levers is similar to that previously described with the exception that as a shunt around the transistor circuit need not be opened when a coin is deposited spring **19** is omitted and spring **21** is used for a different purpose. The transistor circuit is open circuited unless a coin is deposited, at which time, either springs **9'** and **10'** are closed and opened twice in rapid succession if a dime is deposited, once if a nickel is deposited or springs **17'** and **18'** are closed and opened once if a quarter is deposited.

Closure of springs **9'** and **10'** completes a circuit from one side of the line through collector **14'**, resistor **31'**, springs **9'** and **10'** to ground in the subscriber's line circuit over lead **33** so that the collector begins to draw current. The emitter **13'** also begins to draw current and after saturation is reached condenser **11'** discharges through resistor **12'** and springs **17'** and **21'** which short resistor **20'** to enable the collector to again draw current. Thus the collector current is varied in a manner similar to that already described. As the collector current varies, the current in the line is varied accordingly at an audio frequency rate to provide a corresponding tone signal during the short period of time springs **9'** and **10'** are closed.

When springs **17'** and **18'** are closed on deposit of a quarter the same procedure takes place with the exception that as springs **17'** and **21'** are open and springs **17'** and **18'** closed the collector circuit is completed through these latter springs instead of springs **9'** and **10'** and condenser **11** discharges through resistors **12'** and **20'**. The collector current and therefore the line current is therefore varied at a different audio frequency rate than before and thereby a different tone signal is provided.

In the described modification of the present invention it is preferred that resistor **20'** be 27,000 ohms; resistor **12'** be 47,000 ohms, resistor **31'** be 47,000 ohms and condenser **11'** be .22 mf.

The foregoing is a description of one embodiment of our invention and one modification thereof in a form suitable for use with a telephone paystation, however we do not wish to limit ourselves thereto and have set forth in the appended claims the structure that we think encompasses the invention.

What is claimed is:

1. In a telephone system utilizing a line for establishing a call and having a coin receiving means including a coin controlled means, said last means controlled in accordance with the denomination of a coin deposited in said receiving means, an oscillator circuit, said oscillator circuit shunted from said line by said last means so as to normally provide no impedance to said line, said last means controlled on deposit of a coin to remove said shunt and cause said oscillator to provide electrical pulsations in said line corresponding to the denomination of a coin deposited in said receiving means.

2. In a telephone system, a line having a coin receiving means associated therewith and a coin controlled switch operated a number of times corresponding to the denomination of a coin deposited in said means, a tone generator associated with said line through contacts of said switch so that said generator is normally inoperative, operation of said switch by one coin of one denomination deposited in said receiving means rendering said generator operative and causing it to apply a tone frequency to said line for one particular time period only, operation of said switch by a coin of another denomination deposited in said receiving means rendering said generator operative a plurality of time periods and causing it to apply a tone frequency during each of said plurality of periods to said line.

3. In a telephone paystation having chutes for receiving deposited coins of different denomination, a switch adjacent said coin chutes, said switch arranged to be operated once by a deposited coin of one denomination and arranged to be operated successively by a coin of another denomination, a transistor oscillator associated with said switch, and means controlled by said switch for causing said oscillator to generate a tone of one frequency for one time period for each operation thereof whereby a coin of one denomination is identified by said tone for one time period and a coin of said other denomination is identified by successive tones.

4. In a telephone system of the type having a station associated with a line over which a connection and a talking circuit to a central office may be established and wherein a coin receiving means is provided at said station, the improvement comprising a switch having several sets of contacts arranged to be operated by a coin deposited in said coin chute, and an oscillator connected to said line through one set of contacts of said switch so as to be normally inoperative and connected to said line through another set of contacts of said switch so as to provide electrical oscillations to said line conforming to the deposited coin for the purpose of enabling said coin to be identified.

5. In a telephone system of the type having a station associated with a line over which a connection and a talking circuit to a central office may be established and wherein a coin receiving means is provided at said station, the improvement comprising an oscillator connected to said line and normally ineffective to provide electrical oscillations to said line, a switch, a pair of arms associated with said coin receiving means whereby one of said arms is operated by a coin of one denomination deposited in said receiving means to operate said switch and said one arm and the other arm are arranged to be operated successively on the deposit of a coin of another denomination deposited in said receiving means to operate said switch successively, the contacts of said switch arranged when operated by a deposited coin to connect said oscillator to said line so as to render said oscillator effective to provide a burst of electrical oscillations of a particular frequency to said line whereby a coin of one denomination may be identified and whereby a coin of said other denomination may be identified by the successive bursts of electrical oscillations provided to said line.

6. A combination for use with a coin receiving means adapted to receive coins of different denominations comprising a control means operated in accordance with the denomination of a coin deposited in said receiving means, and an oscillator circuit normally ineffective to provide

electrical pulsations and controlled by said control means on operation thereof by a deposited coin of one denomination to provide one group of electrical pulsations of one of two audible frequencies dependent upon the denomination of the deposited coin and controlled by said control means on operation thereof by a deposited coin of another denomination to provide successive groups of said pulsations of one frequency.

7. An arrangement such as claimed in claim 6, in which said oscillator circuit comprises a transistor, a plurality of circuits each individually corresponding to different coin denominations and each controlled in response to the deposit of a coin of its individually corresponding denomination to control said transistor accordingly.

8. An arrangement claimed such as claimed in claim 6 in which said control means comprises a plurality of coin controlled switches each controlled in accordance with the denomination of a coin deposited in said receiving means.

9. An arrangement such as claimed in claim 6, in which said control means comprises a switch having contacts, and means for closing said contacts once for rendering said oscillator effective to provide said one group of electrical pulsations on deposit of a coin of said one denomination and for closing said contacts twice for rendering said oscillator effective to provide successive groups of said electrical pulsations on deposit of a coin of said other denomination.

10. In an arrangement such as claimed in claim 6, means responsive to the deposit of a coin of a predetermined denomination for controlling said oscillator to provide a group of electrical pulsations of the other audible frequency.

11. A combination adapted for use in a telephone system having a paystation with a coin receiving means adapted to receive coins of different denomination and wherein a talking circuit is completed from said paystation to a central office over a pair of line conductors on initiation of a call comprising an oscillator circuit, and means controlled in accordance with the denomination of a coin deposited in said receiving means for connecting said oscillator to said line in a particular manner for a discrete time interval dependent on the denomination of a coin deposited in said receiving means so as to supply electrical oscillations to said line only during the time interval.

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