

March 28, 1944.

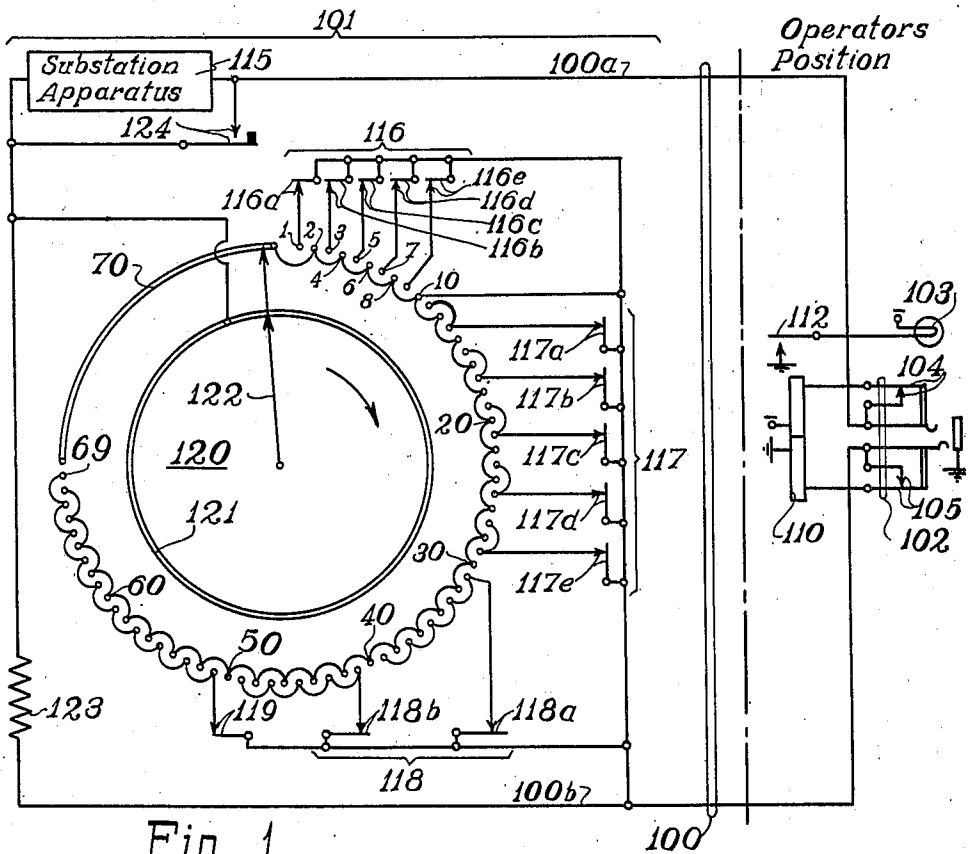
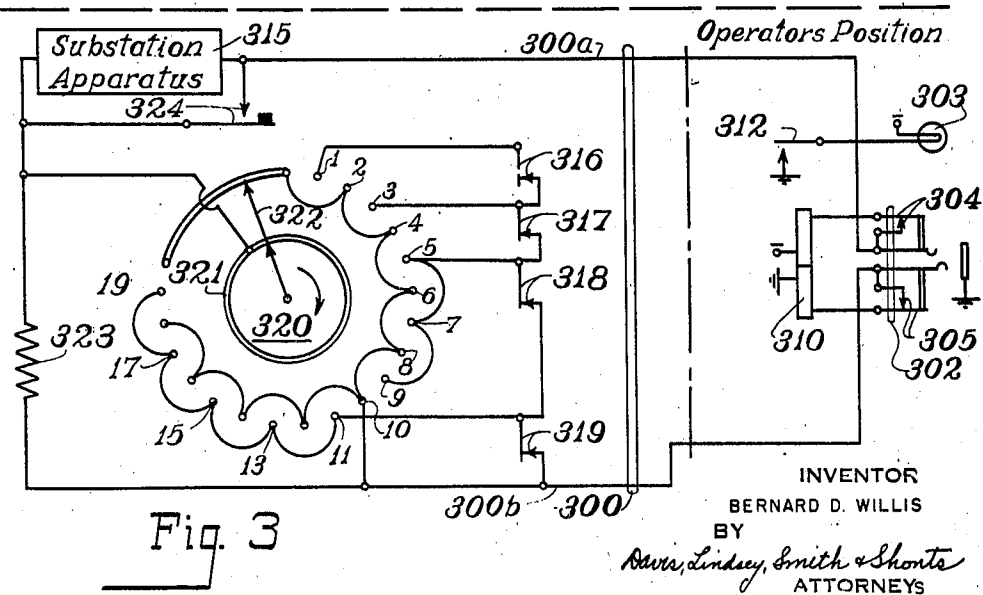
B. D. WILLIS

2,345,167

TELEPHONE SYSTEM AND APPARATUS

Filed Nov. 17, 1939

4 Sheets-Sheet 1



INVENTOR
BERNARD D. WILLIS
BY
Davis, Lindsey, Smith & Shontz
ATTORNEYS

March 28, 1944.

B. D. WILLIS

2,345,167

TELEPHONE SYSTEM AND APPARATUS

Filed Nov. 17, 1939

4 Sheets-Sheet 2

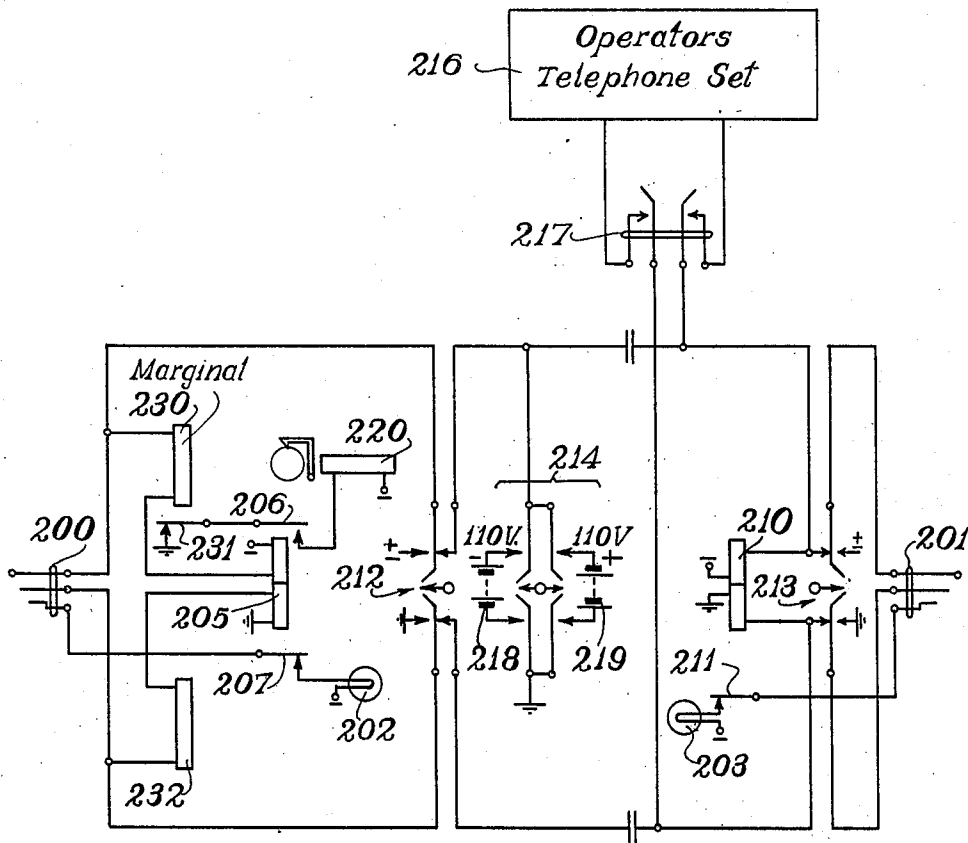


Fig. 2

INVENTOR
BERNARD D. WILLIS

BY
Rais, Lindsey, Smith & Shotts
ATTORNEYS

March 28, 1944.

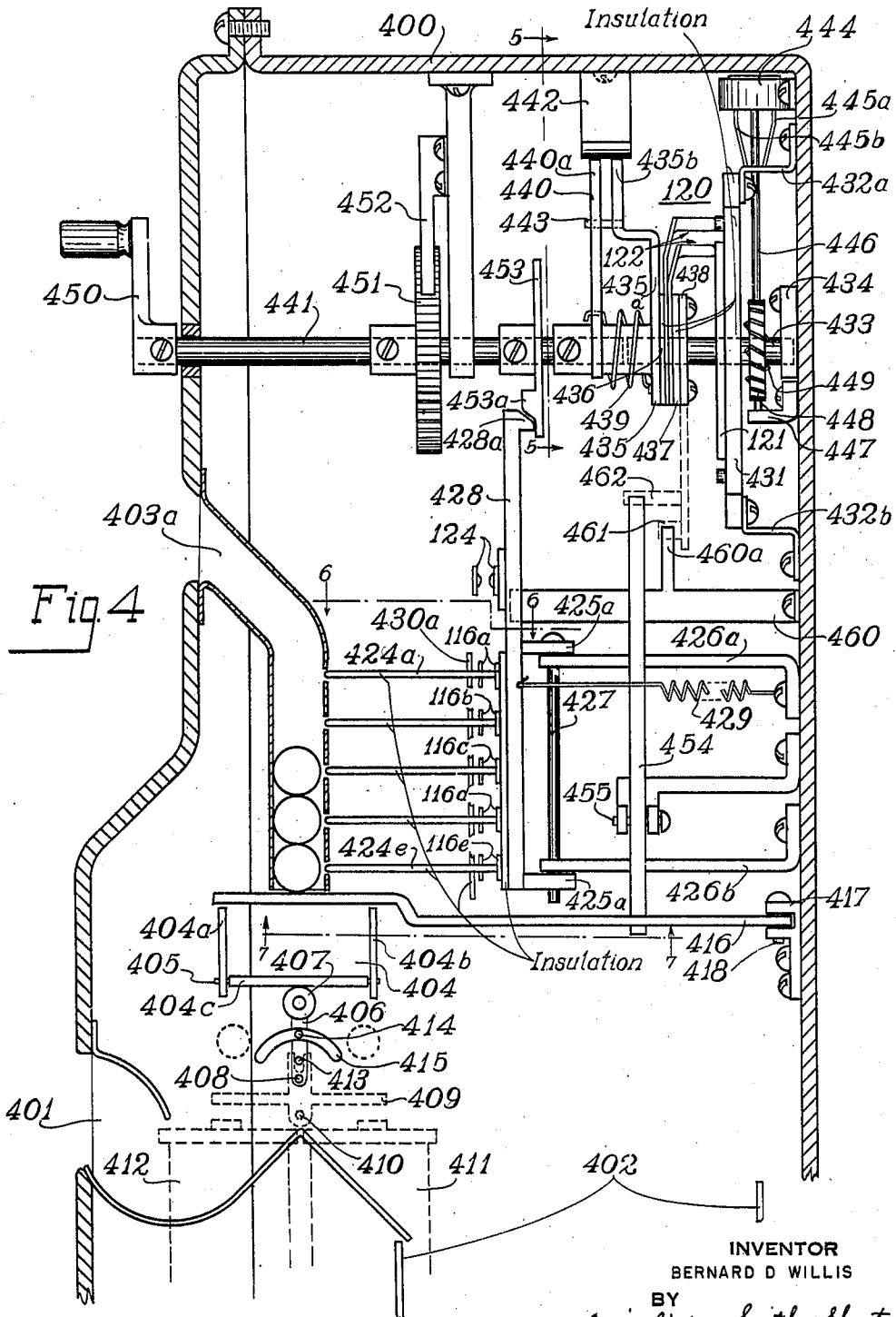
B. D. WILLIS

2,345,167

TELEPHONE SYSTEM AND APPARATUS

Filed Nov. 17, 1939

4 Sheets-Sheet 3



INVENTOR
BERNARD D WILLIS

BY
Lewis, Lindsey, Smith & Shorts
ATTORNEYS

March 28, 1944.

B. D. WILLIS

2,345,167

TELEPHONE SYSTEM AND APPARATUS

Filed Nov. 17, 1939

4 Sheets-Sheet 4

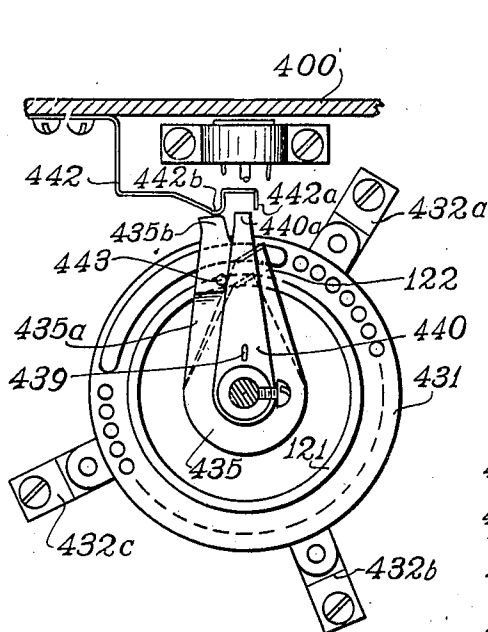


Fig. 5

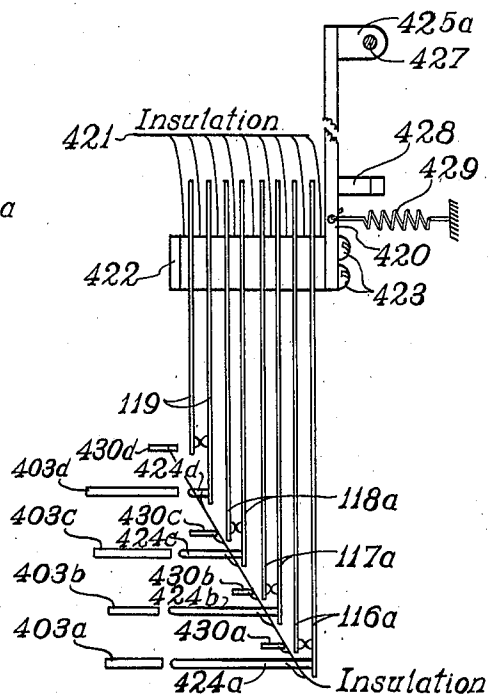


Fig. 6

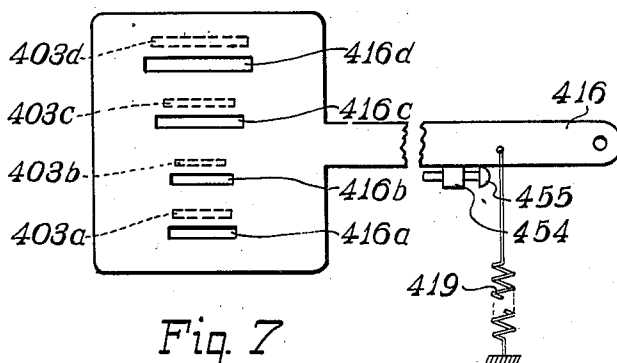


Fig. 7

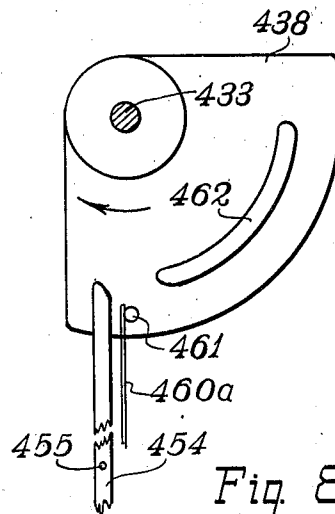


Fig. 8

INVENTOR
BERNARD. D. WILLIS

BY
Davis, Lindsey, Smith & Shonts
ATTORNEYS

UNITED STATES PATENT OFFICE

2,345,167

TELEPHONE SYSTEM AND APPARATUS

Bernard D. Willis, Oak Park, Ill., assignor to
Automatic Electric Laboratories, Inc., a corpo-
ration of Delaware

Application November 17, 1939, Serial No. 304,906

22 Claims. (Cl. 179—6.3)

The present invention relates to telephone systems and equipment and, more particularly, to improvements in apparatus for transmitting to an operator's position in a central office, information indicative of the amount of coin deposits made by a calling party or customer at a substation of the paystation type.

In present operating practice, multicoin paystations are usually equipped for the collection of coins of only three types, namely, nickels, dimes and quarters, these coins being collected one at a time as they are dropped into the proper coin slots or chutes. Incident to the deposit of each coin, an audible signal tone is propagated from the calling paystation over the associated line to inform the operator supervising the call of the value of the deposited coin. Should the supervising operator fail to have her telephone instrument bridged across the connection as the coins are deposited or fail to distinguish between the distinctive coin signals, she may fail correctly to compute the total value of the coins deposited and thus precipitate a dispute with the customer. In such case, it is necessary for the operator to refund the coins, ask for a redeposit and again compute the value of the coins as they are again deposited. In all systems of this character, no records whatever, other than those made by the operators, are obtainable in the central office. Moreover, the prior arrangements of the character described are susceptible of fraudulent use by unscrupulous customers.

It is an object of the present invention, therefore, to provide in a telephone system, having paystations incorporated therein an improved and exceedingly simple arrangement for obviating the difficulties briefly outlined above and which includes apparatus operative to give a visual indication at an operator's position of the total value of coins deposited by a customer in making a call at one of the paystations embodied in the system.

It is a further object of the invention to provide an improved substation of the paystation type which is so arranged that substantially non-audible signals, indicative of the total value of a coin or coins deposited in the coin receiving means of the station in making a call, are generated for transmission over an associated line.

It is a further and more specific object of the invention to provide an improved telephone paystation of the character described, which is so arranged that the individual values of coins deposited in making a call at the station are integrated before any coin value signals are trans-

mitted from the station, following which a plurality of signals of uniform character are generated; for registration at an operator's position in the central office the number of signals generated being equal to the integrated value of the deposited coins divided by a common base value.

In the illustrated embodiment of the invention, there is provided a telephone system which includes a paystation line having a substation of the paystation type connected thereto, and a central office operator's position at which toll calls originating on the paystation line are handled. The paystation includes a plurality of coin chutes for receiving coins or the like of different denominations, and apparatus for transmitting signals over the line to the operator's position indicative of the total value of coins deposited in the coin chutes by a customer making a call. At the operator's position there is provided an indicating device in the form of a register which responds to the received signals to give a visual indication of the total value of the coins deposited by the customer in the coin chutes of the paystation. The apparatus embodied in the paystation is so arranged that the value or values of a coin or coins deposited in one or more of the coin chutes are first integrated, following which apparatus controlled by the integrating means operates to generate a plurality of signals equal in number to the integrated value of the deposited coin or coins divided by a common base value. These signals are in the form of marginal direct current pulses which are transmitted over the associated paystation line to control the energization of a pair of series connected relays embodied in the operator's cord circuit used by the operator attending the position at which the paystation line terminates. One of these relays functions as a supervisory relay and is so wound that it does not respond to the marginal current pulses. The other of the two relays constitutes a register control relay and is of the marginal type such that it responds to the marginal current pulses and functions to repeat these pulses to the associated registering device. More specifically, the coin value integrating apparatus embodied in the paystation comprises contacts individually corresponding to the coin positions of the various coin chutes provided, and means for impressing a predetermined potential upon those of the contacts which correspond to positions in the chutes occupied with coins, together with a test switch which is operative successively to test the contacts for the indicated predetermined potential and to cause the transmission

of one or more signals over the associated line for each contact having the predetermined potential thereon. The contacts corresponding to the coin positions of the various coin chutes are each connected to one or more of the bank contacts of the test switch, the number of bank contacts connected to each coin position contact being predetermined in accordance with the value represented by the associated coin position. For example, the contacts corresponding to the coin positions of the nickel chute are each connected to one bank contact of the test switch, the contact corresponding to the coin positions of the dime chute are each multiplied to two alternate bank contacts of the test switch and so on. By virtue of this arrangement the number of signals transmitted over the associated line during each cycle of operation of the test switch is equal to the total value of the coins deposited, divided by five. Two embodiments of the test switch bank contact wiring are disclosed. In one embodiment, individual bank contacts are provided for each coin position of each coin chute, whereby all coin positions may be successively tested during each cycle of operation of the test switch. In the other embodiment, the wiring is such that certain of the contacts of the test switch are common to more than one coin position, whereby one cycle of operation of the test switch is required for each coin deposit.

Further features of the invention pertain to the particular arrangement of the apparatus, whereby the above outlined and additional operating features are attained.

The novel features believed to be characteristic of the invention are set forth with particularity in the appended claims. The invention, both as to its organization and method of operation, together with further objects and advantages thereof, will best be understood by reference to the specification taken in connection with the accompanying drawings, in which Figure 1 illustrates the circuit arrangement of a telephone paystation and associated line equipment connected and arranged in accordance with the present invention and forming a part of a telephone system; Fig. 2 illustrates an operator's cord circuit adapted for use in setting up connections between the paystation line shown in Fig. 1 and the other lines of the system; Fig. 3 illustrates an alternative circuit arrangement of a telephone paystation embodying the present invention; Fig. 4 is a partially schematic side view of a telephone paystation having embodied therein apparatus constructed and arranged in accordance with the present invention; and Figs. 5, 6, 7 and 8 illustrate certain of the details of the mechanism shown in Fig. 4.

Referring now more particularly to Figs. 1 and 2 of the drawings, the telephone system there illustrated comprises a line 100 which extends from a paystation indicated generally at 101 to an operator's position in a distant central office where it terminates in a jack 102. The line equipment associated with the line 100 at the operator's position in the central office further comprises a call lamp 103 which is arranged to be energized under the control of a line relay 110. For the purpose of setting up connections between the various lines terminating at the operator's position, there is provided at this position an operator's cord circuit which is illustrated in Fig. 2 as comprising an answer plug 200, a call plug 201 and the usual supervisory and control

comprises a calling party supervisory lamp 202 and a called party supervisory lamp 203 which are arranged respectively to be controlled by supervisory relays 205 and 210. This equipment further includes a pair of ringing keys at 212 and 213, respectively, which are operative to connect a ringing current source, not shown, to the calling and called ends of an established connection, respectively, and a coin refund and collect key at 214. The talking conductors of the operator's cord circuit are arranged to be bridged by an operator's telephone set 216 under the control of a connect key 217.

Referring now more particularly to the equipment provided at the substation 101, this equipment comprises the usual substation apparatus, indicated generally at 115, and including a receiver, a transmitter, an induction coil, a ringer and a hook switch normally connected to the conductors 100a and 100b of the line 100, and interconnected in the usual manner. This apparatus further includes a coin collect and refund electromagnet having windings connected between the line conductor 100a and ground. Since the enumerated elements may be connected in any manner well known in the art, these elements have been only schematically illustrated. The substation 101 being of the paystation type, further includes a plurality of coin receiving chutes adapted to receive coins of different denominations and deposited by a customer in making a call. In accordance with the present invention, there is further provided at the substation 101, apparatus for integrating the value or values of a coin or coins deposited in one or more of the coin chutes in making a call, and for transmitting to the operator's position in the distant central office a plurality of signals indicative of the total value of the coin or coins deposited. This apparatus comprises a group of contact springs 116 individually associated with the coin positions provided in the chute for receiving coins of one denomination, such, for example, as nickels; a second group of contact springs 117 individually associated with the coin positions of the chute provided for receiving coins of the next larger denomination, such, for example, as dimes; a third group of contact springs 118 individually associated with the coin positions provided in the chute for receiving coins of the next larger denomination, such, for example, as quarters; and an additional set of contact springs 119 provided in association with the single coin position of the coin chute adapted to receive coins of the largest denomination, such, for example, as half dollars. The various enumerated contact springs are arranged to control the marking of certain of the bank contacts embodied in a test or integrating switch 120 in accordance with the occupied or unoccupied condition of the respective associated coin positions. The switch 120 is of the rotary or radial type, being provided with sixty nine bank contacts numbered from 1 to 69, respectively, which are disposed in an arc of substantially 270 degrees curvature. A contact segment 70 having the same radius of curvature as the arc defined by the contacts 1 to 69, inclusive, is also provided, this segment extending between the contacts 1 and 69. The switch 120 also includes an inner collector ring 121 which is arranged to be traversed by a bridging wiper set 122 so that it is successively connected to the wipers numbered from 1 to 69, inclusive, and the contact segment 70. In order to utilize the contact testing operation of the

switch 120 to transmit signals to the operator's position in the distant central office in accordance with the settings of the contact springs 116, 117, 118 and 119, a circuit arrangement is provided which comprises a resistor 123 serially included in one side of the line 100. These signals are prevented from being reproduced as clicks by the receiver embodied in the substation apparatus 115 through the provision of a set of off-normal springs 124 which are arranged to be moved into engagement to short-circuit the substation apparatus 115 in response to operation of the wiper set 122 from its normal position.

The signals transmitted over the line 100 to the operator's position in the central office, through operation of the apparatus just described may be utilized to control a registering device of any desired form. Preferably, one such device is incorporated in each operator's cord circuit in the manner illustrated in Fig. 2. More particularly, the registering means embodied in the illustrated cord circuit for producing a visual indication of the total value of coins deposited by a customer at the substation 101 in making a call is in the form of an electromagnetic metering device 220, the operating magnet of which is arranged to be energized over a circuit controlled by the supervisory relay 235 and a second control relay 230, which latter relay is connected in series with the relay 205 and is of the marginal type. In order to balance the two sides of a connection established to the operator's cord circuit, there is also provided an impedance element 232 having its winding arranged to be connected in series with the lower winding of the supervisory relay 205. The impedance of the winding of this element is arranged to balance the impedance of the winding of the relay 230. Preferably, the metering device 220 is of the clock type, being provided with a large hand which is operated step by step in response to repeated energization of the associated operating magnet to positions opposite successive numerical digits and which may be manually restored to normal after each stepping operation thereof is completed, and with a small hand which is operative to indicate cumulatively the registrations made during a plurality of operations of the large hand.

The construction and mechanical arrangement of the contact springs 116, 117, 118 and 119 and the switch 120, and of the apparatus for operating these elements, are illustrated in Figs. 4 to 8, inclusive, of the drawings. As best shown in Fig. 4, this apparatus is enclosed within a shell or housing 400 which may also house other portions of the substation apparatus, such, for example, as the induction coil and ringer. This housing is provided with a coin refund pocket 401 and a coin collect box 402 and has extending through the outer face thereof four coin receiving chutes 403a, 403b, 403c and 403d, which are of such size as to receive nickels, dimes, quarters and half dollars, respectively. These chutes extend through and are mounted upon the outer side wall of the shell 400, and the lower ends thereof are disposed to discharge coins deposited therein into a coin hopper 404, which may be of conventional construction and arrangement. Briefly described, the hopper 404 comprises side walls 404a and 404b, and a bottom 404c which is mounted on a pivot pin 405 to pivot around one of its ends. The coin hopper bottom 404c is normally restrained in the hopper closed position illustrated in Fig. 4 of the drawings by means of a coin directing gate 406

which carries a roller 407 contacting the free end of the bottom 404c, and is pivotally mounted at 408 so that it may be rocked about one of its edges in either direction. In order selectively to rock the coin directing gate 406 in either a clockwise or a counterclockwise direction, thereby to determine whether coins collected in the hopper 404 are to be refunded or collected, there is provided an electromagnetic device which comprises an armature 409 pivotally mounted at 410 and arranged to be rotated in either a clockwise or a counterclockwise direction under the control of a pair of electromagnets 411 and 412. The field structure of the electromagnetic operating means just described preferably includes a permanently magnetized polarizing element which is so arranged that, when current of one polarity traverses the windings 411 and 412, the armature 409 is pivoted in one direction, and, when current of the opposite polarity traverses these windings, the armature 409 is pivoted in the opposite direction. A pin and slot connection including the pin 413 is provided between the armature 409 and the gate 406 for the purpose of rocking this gate in one direction or the other in response to a corresponding pivotal movement of the armature 409. Operation of the gate 406, in either of its two directions of movement, is limited through the provision of a pin 414 carried by one end of the gate and extending through an arcuately formed slot 415 provided in a side wall, forming a part of the supporting structure not shown, for the hopper 404.

For the purpose of normally blocking the passage of coins from the coin chutes 403a to 403d, inclusive, into the coin hopper 404, there is provided a coin discharge gate 416, one end of which is pivotally mounted by means of a bracket 417 and a pivot pin 418 upon the rear wall of the shell 400. As best shown in Fig. 7, this gate is provided with an enlarged left end having slots 416a, 416b, 416c and 416d formed therein, which are adapted to register with the discharge mouths of the chutes 403a, 403b, 403c and 403d, respectively, when the gate 416 is pivoted from its normal position to its registering position. This gate is normally spring biased to its normal or coin blocking position by means of a coil spring 419 which extends between the shank of the gate 416 and one side wall of the housing 400, and is adapted to be rocked to its coin discharge position through operation of an engaging lever 454. This lever is pivotally mounted upon a pivot pin 455, is lightly spring biased so that the lower end thereof normally engages the side of the shank of the gate 416, and is arranged to be rocked in response to operation of the mechanism for operating the switch 120.

With the coin discharge gate 416 occupying its normal position to block the passage of coins from the chutes 403a to 403d, inclusive, into the hopper 404, a number of coin positions are provided in each of these chutes. Thus, the length of the nickel chute 403a is such that five coin positions for receiving five end stacked nickels are provided therealong. The five sets of contact springs 116a, 116b, 116c, 116d and 116e forming the group 116 individually correspond to these five coin positions provided in the nickel receiving chute. Similarly, the five sets of contact springs 117a, 117b, 117c, 117d and 117e forming the group 117 individually correspond to the five coin positions provided in the dime receiving chute, and the two sets of contact springs 118a

and 118_b in the group 118 individually correspond to the two coin positions in the quarter receiving chute. Finally, the set of contact springs 119 corresponds to the single coin position provided in the chute arranged to receive half dollars. As best shown in Fig. 6, the contact springs 116_a to 116_e, inclusive, forming the group 116, the contact springs of the group 117 and including the spring set 117_a, the contact springs forming the group 118 and including the spring set 118_a, and the set of contact springs 119 are cantilever mounted upon a plate 420 by means of insulated spacing strips 421, an assembly plate 422 and assembly screws extending through the pile-up of springs and spacing strips and threaded into the assembly plate 422. When arranged in this manner, the free ends of the various contact springs are disposed opposite the coin positions of the four coin chutes to which they respectively correspond. The springs of each pair, such, for example, as the spring pair 116_a, carry, at points adjacent the free ends thereof, contacts which are normally in engagement. The rear spring of each pair also carries, at the extreme free end thereof, a coin feeler which is positioned opposite an opening provided in one side of the associated coin chute so that the free end thereof is adapted to be moved through the opening into the corresponding coin position at the point along this position which corresponds to the diameter of a coin occupying the position. Thus, coin feelers 424_a, 424_b, 424_c and 424_d are respectively mounted upon the free ends of the rear springs in each of the spring sets 116_a, 117_a, 118_a and 119, respectively. The enumerated coin feelers have free ends adapted to extend into oppositely disposed openings formed in the edges of the coin chutes 403_a, 403_b, 403_c and 403_d. In order to actuate the various contact springs so that the feeler carried by the rear spring of each set is moved into the associated opening provided along the edge of the associated coin chute, the supporting plate 420 is mounted for pivotal movement about the back edge thereof by means of mounting brackets 425_a, 425_b, 426_a and 426_b and a pivot pin 427. More particularly, the ends of the brackets 425_a and 425_b, carried by the plate 420, respectively overlap two associated mounting brackets 426_a and 426_b which are secured to one wall of the housing 400, and the pivot pin 427 extends through registering openings provided in the brackets 425_a, 425_b, 426_a and 426_b. With this mounting arrangement, the plate 420 may be rocked to a position such that the feelers carried by the contact springs are moved into the respective corresponding coin positions provided in the associated chutes. In order to impart pivotal movement to the plate 420 an operating arm 428 is provided which is secured to the back side of the plate 420 in any desired manner and is arranged to be actuated by the operating mechanism, hereinafter described, for the rotary switch 120. The arm 428 is also arranged to actuate the off-normal springs 124 into engagement when moved to its off-normal position. The plate 420 is normally biased to its normal position, wherein the feelers are withdrawn from the respective oppositely disposed openings in the associated coin chutes, by means of a coil spring 429 which extends between the plate 420 and any suitable portion of the associated mounting structure. In order to restrain the plate in its off-normal position, wherein the ends of the feelers are projected through the oppositely dis-

posed openings in the coin chutes, against the bias of the spring 429 there is provided a resilient latching element 460 mounted upon the back wall of the housing 400 and provided with a free end normally restrained against movement to its normal position back of the arm 428 by abutment with the side of this arm. The latching element 460 is also provided with an arm 460_b which is adapted to be engaged by a camming element embodied in the operating mechanism for the switch 120 to move the latching element to its unlatching position. For the purpose of limiting the movement of the free ends of the contact springs when the plate 420 is rocked about its pivot pin 427, there are provided a number of strip-like stops 430_a, 430_b and 430_c and 430_d which are suitably mounted upon the associated supporting structure and are disposed opposite the free ends of the various contact springs, in the manner shown in Figs. 4 and 6.

The mechanism of the rotary switch 120, briefly described, comprises a block of insulating material 431, within which the contacts numbered from 1 to 69, inclusive, are moulded in an arc representing approximately three quarters of a circle and upon which is mounted the contact segment 70 and the collector ring 121. This block of insulating material is supported upon the back wall of the housing 400 by means of supporting brackets 432_a, 432_b and 432_c. The contact points arranged around the periphery of the block 431 are so spaced that adjacent ones thereof are bridged by the associated wiper face of the wiper set 122 during rotary movement of this wiper set. The wiper set 122 is mounted for rotation with a stub shaft 433 which is journaled in bearings, one of which is indicated at 434, carried by the associated supporting structure. More specifically, the wiper set 122 is mounted upon an end plate 435 carried by the left end of the stub shaft 433, by means of an assembly comprising spacing washers 436 and 437 formed of insulating material, a face plate 438 and assembly screws extending through registering openings provided in the stacked spacing washers, face plate and wiper arm assembly and threaded into the end plate 435. As best shown in Fig. 8, the face plate 438 is in the form of a sector and carries at its periphery and near its leading edge a pin 461 which is adapted to engage the arm 460_a to release the arm 428 and the plate 420 after the wiper set 122 has traversed all of the associated contacts 1 to 69, inclusive. The plate 438 also carries, at a point trailing the pin 461, a camming sector 462 which is adapted to engage the upper end of the lever 454 and thus rock this lever in the direction required to move the gate 416 to the coin discharge position.

In order to impart rotary movement to the stub shaft 433, thereby to drive the wiper assembly 122 over its associated contacts, spring driving means comprising a coil spring 439 are provided. One end of the coil spring 439 is secured to the end plate 435 and the other end is secured to an arm 440 which is mounted upon an operating shaft 441, the shaft 441 being journaled in bearings suitably mounted upon the associated supporting structure.

Normally, the stub shaft 433 is restrained against rotation by means of an arm 435_a extending from the plate 435 and carrying, at its outer end, a finger 435_b which cooperates with a latching element 442 formed of resilient ma-

terial and mounted upon the upper wall of the housing 400. More particularly, the resilient element 442 is provided with a latching finger 442_a which is arranged to restrain the cooperating finger 435_b of the arm 435_a against movement under the influence of the coil spring 439. In order to disengage the cooperating latching fingers 442_a and 435_b, the arm 440 carried by the operating shaft 441 is provided with a finger 440_a which is adapted to cooperate with the camming surface provided by the reversely bent portion 442_b of the resilient element 442. In order to arrest movement of the arm 435_a after each revolution of the stub shaft 433, there is provided a pin 443 which is mounted upon the arm 435_a and is adapted to engage one side of the arm 440 after each revolution of the shaft 433. For the purpose of insuring a uniform speed of rotation of the wiper set 122 when the shaft 433 is released for movement under the influence of the driving spring 439, a flyball governor mechanism is provided, which includes a ball race 444 within which the flyballs of the governor are disposed. These balls, not shown, are respectively carried by resilient arms 445_a and 445_b mounted upon a governor shaft 446, one end of which is journaled within the ball race 444 and the other end of which is journaled in a bearing bracket 447. This governor shaft is geared to the stub shaft 433 by means of a worm gear drive which includes a spur gear 448 and a worm gear 449.

In order to tension the coil spring 439 preparatory to releasing the stub shaft 433 for rotation under the influence of this spring, an operating handle or crank 450 is mounted on the end of the operating shaft 441 extending externally of the housing 400. Reverse rotation of the shaft 441 under the influence of the spring 439 is prevented through the provision of a ratchet wheel 451 mounted upon the shaft 441 and arranged to cooperate with a latching pawl 452 mounted upon the upper wall of the housing 400. Rotation of the shaft 441 to tension the spring 439 is also utilized for the purpose of actuating the arm 428 and the plate 420 to move the contact springs 116, 117, 118 and 119 so that the coin feelers respectively carried by certain thereof are moved into the corresponding coin positions of the associated coin chutes. To this end, the upper end of the arm 428 is provided with a camming projection 428_a which is disposed in the path of movement of a projection 453_a provided on the front face of a collar 453 which is mounted upon the shaft 441.

In the operation of the system and apparatus thus far described, if a customer desiring to use the paystation 101 initiates a call at this station by removing the receiver provided thereat from its associated switchhook, the hook switch is operated to complete a loop circuit through the windings of the line relay 110, this circuit extending from ground through the lower winding of the relay 110, the jack springs 105, the line conductor 100_b, the segment 70 of the switch 120, the wiper set 122, the collector ring 121, the direct current bridge established from the collector ring 121 to the line conductor 100_a; through the hook switch springs embodied in the apparatus 115, over the conductor 100_a, and through the jack springs 104 and the upper winding of the relay 110 to battery. When energized over this circuit, the relay 110 operates to complete, at its armature 112, an obvious circuit for energizing the call lamp 103. Upon ob-

serving the lighted condition of this lamp, the operator attending the operator's position at which the jack 102 is located may answer the call by inserting the answer plug 200 in this jack. In response to this operation, the jack springs 104 and 105 are respectively disengaged to open the above-traced operating circuit for the relay 110, causing this relay to restore and open the circuit for energizing the signal lamp 103. Simultaneously with this operation, the tip and ring contacts of the plug 200 engage the tip and ring contacts of the jack 102 so that the two relays 230 and 205 are energized in series over the established loop, talking battery being supplied to this loop through the windings of the supervisory relay 205. The relay 230 operates, when energized in this circuit, and opens, at its armature 231, a point in the circuit for energizing the operating magnet of the registering device 220. Shortly following the operation of the relay 230, the relay 205 operates to prepare, at its armature 206, the circuit for energizing the operating magnet of the registering device 220. At its armature 207, the relay 205 opens a point in the circuit for energizing the supervisory lamp 202. After inserting the answer plug 200 in the jack 102, the operator may establish a talking circuit between her telephone set 216 and the calling substation 101 by operating the connect key 217 to its off-normal position so that the line terminals of the telephone set 216 are bridged across the talking conductors of the cord circuit. Following this operation, the operator may converse with the calling subscriber and ascertain the substation or party desired. From this information she may calculate the minimum charge to be made for the call and instruct the calling subscriber to deposit coins equal to the minimum charge and to operate the crank 450 for the purpose of causing the coin deposits to be indicated by the registering device 220. Assuming that the call is a toll call and, further, that the minimum charge is one and one-quarter dollars, the calling party, after being informed of this charge, may pay the assessment by depositing one half dollar, two quarters, one dime and three nickels in the chutes 403_a, 403_c, 403_b and 403_a respectively provided for receiving coins of these denominations. When deposited, these coins fall downward to occupy the lowermost coin positions of the chutes in which they are deposited, the first deposited coin in each chute abutting the discharge gate 416 to occupy the lowermost coin position of that chute, the second coin deposited in each chute being stacked edgewise on the first deposited coin and occupying the second coin position of the chute, and so on. After depositing the coins having the requisite total value, the calling party operates the crank 450 through an arc equal to substantially one revolution of the shaft 441. During such rotation of the shaft 441, the spring 439 is tensioned preparatory to imparting rotary movement to the stub shaft 433, this stub shaft being restrained during such movement of the operating shaft 441 through engagement of the latching finger 435_b of the arm 435_a with the latching finger 442_a of the latching element 442. During the initial movement of the shaft 441, the camming projection 453_a of the collar 453 engages the camming projection 428_a to move the arm 428 to the left from the position shown in Fig. 4 of the drawings. In response to this movement of the arm 428, the off-normal springs 124 are moved into engagement to

short-circuit the substation apparatus 115 and the plate 420 is pivoted clockwise about its pivot pin 427 so that the free ends of the contact springs 116, 117, 118 and 119 are moved to the left to project the coin feelers carried thereby into the corresponding openings provided in the respective associated coin chutes. Those of the coin feelers which correspond to occupied coin positions in the coin chutes engage the edges of the coins to limit the movement of the contact springs upon which they are respectively mounted. Thus, in the case assumed, wherein the single coin position of the coin chute 403a provided to receive half dollars is occupied, the feeler 424a engages the edge of the coin deposited in this chute during the initial movement of the plate 420, thereby to prevent further movement of the free end of the spring upon which it is mounted. During further movement of the plate 420, this spring is flexed so that the normally engaged contacts respectively carried by this spring and the associated spring are disengaged. In a similar manner, the contacts carried by the springs of the contact sets corresponding to other occupied coin positions are respectively disengaged when the plate 420 is pivoted in response to rotation of the shaft 441, in the manner just described. Those of the coin feelers which correspond to unoccupied coin positions in the coin chutes are free to move into these positions without restraint. Accordingly, the contacts carried by the contact springs, upon which the last-mentioned feelers are mounted, are not disengaged during rotation of the plate 420. As indicated previously, movement of the free ends of the contact springs is limited by the stop strips 430a, 430b, 430c and 430d, these stop strips being so disposed as to prevent the associated coin feelers from engaging coins of wrong denominations deposited in the associated coin chutes. For example, if a penny is deposited in the nickel chute 403a to occupy the lowermost coin position in this chute, the stop 430a will arrest movement of the spring set 116a before the coin feeler 424a engages the edge of the penny, and will thus prevent the contacts of this contact spring set from being separated. By virtue of this arrangement the false registration of deposited coins or slugs of improper dimensions is positively prevented. During the translation of the arm 428 in the manner just explained, the free end of the latching element 460 is disengaged from the side of this arm. As a result, the element 460 assumes its unflexed position wherein the free end thereof prevents the arm 428 from returning to its normal position under the influence of the spring 429 when the camming projections 453a and 428a are disengaged in response to continued rotation of the shaft 441.

From the foregoing explanation it will be apparent that in the present assumed case wherein one half dollar, two quarters, one dime and three nickels are deposited in the coin chutes, the contact springs 116a, 116b, 116c, 117a, 118a, 118b and 119 are respectively disengaged, so that open-circuit or zero potential markings are present on the contacts 1, 3, 5, 11 and 13 and the odd-numbered ones of contacts 31 to 69, inclusive, of the contact bank embodied in the rotary switch 120. In this regard, it will be apparent that each odd-numbered contact point of the contact bank corresponds to a unit or base value of five cents, appropriate multiples between two or more adjacent odd-numbered contacts being provided for

those portions of the contact bank which correspond to coins of larger denominations. Thus, one contact spring of each spring set, such, for example, as the set 117a, corresponding to a coin position in the dime chute, is multiplied to two adjacent odd-numbered contacts of the contact bank embodied in the switch 120. Similarly, one contact spring of each contact spring set, such, for example, as the set 118a, corresponding to a coin position in the quarter chute, is multiplied to five adjacent odd-numbered contacts of the bank, embodied in the switch 120, and one contact spring of the spring set 119 is multiplied to ten adjacent odd-numbered contacts of this bank.

During the final rotary movement of the shaft 441, the finger 440a of the arm 440 rides into engagement with the camming surface provided by the under side of the reversely bent portion 442b of the latching element 442. As a result, the finger 442a of this latching element is moved upward to the position shown in Fig. 5 of the drawings to release the latching finger 435b of the arm 435a. When this finger is released, the stub shaft 433 is freed for rotation under the influence of the tensioned spring 439, the speed of this shaft during rotation being maintained substantially constant through operation of the worm driven flyball governor arrangement previously described. As the stub shaft 433 and the arm 435a rotate, the wiper set 122 is rotated therewith so that the outer brush of the wiper set successively engages the contacts of the associated contact set numbered from 1 to 69, inclusive, and finally the conducting segment 70. During this movement of the wiper set and when the outer brush thereof is positioned solely in engagement with the contact 1 of the associated contact bank, the normally completed path through the switch 120 for short-circuiting the resistor 123 is opened so that this resistor is serially included in the circuit over which the relays 230 and 205 are being held energized. More particularly, with the first coin position of the nickel chute occupied, the contact springs 116a are disengaged so that, when the outer brush of the wiper set 122 is moved solely to engage the contact 1 of the contact bank, the line conductor 100b is disconnected from the collector ring 121, thus effectively opening the short circuit normally maintained across the resistor 123. Thereafter and when the wiper 122 is moved to connect the contact 2 of the contact bank to the collector ring 121, the short-circuiting path just described is recompleted. In a similar manner, when the wiper set 122 is moved to bridge the contact 3 of the contact bank and the collector ring 121, the short-circuiting path is again interrupted since the coin position corresponding to the contact springs 116b is occupied with a coin and these contact springs are separated. The short-circuiting path is thereafter recompleted when the wiper set 122 is moved to engage the contact 4 of the contact bank, is interrupted when this wiper set is moved to engage the contact 5 of the contact bank, and is again completed and held completed when the wiper set is traversing the contacts numbered from 6 to 10, inclusive. Further, the path short-circuiting the resistor 123 is opened and completed twice while the wiper set 122 is traversing the contacts numbered from 11 to 14, inclusive, of the contact bank, due to the fact that the lowermost coin position of the dime chute is occupied with a coin so that the contact springs 117a are separated. During further movement of the wiper set 122, no further interruption of the

short-circuiting path occurs until the wiper set engages the contact 31 of the contact bank. From this point on and until the wiper set 122 is moved to engage the conducting segment 70, the path short-circuiting the resistor 123 is alternately completed and interrupted as the wiper set is moved to engage succeeding contacts. From the foregoing explanation, it will be apparent that the path normally short-circuiting the resistor 123 is interrupted and recompleted twenty-five times, thus causing twenty-five pulses of direct current to be transmitted over the line 100 and through the windings of the relays 230 and 205. More particularly, each time the resistor 123 is included in the circuit for energizing these relays, the marginal relay 230 restores to complete the circuit for energizing the operating magnet of the registering device 220, this relay reoperating each time the path short-circuiting the resistor 123 is recompleted to increase the energization of the winding thereof. Thus, in the example under consideration, twenty-five current pulses are delivered to the operating magnet of the registering device 220, causing twenty-five registrations to be made by this device. During this registering operation, the relay 205 remains in its operated position, this relay being adjusted not to restore when the resistor 123 is included in its operating circuit. Each registration of the metering device 220 represents a deposit of five cents at the paystation 101. Accordingly, the twenty-five registrations which are made by this device indicate that the total value of the coins deposited is equal to one and one-quarter dollars or the minimum charge assessed by the operator for the call. It will be observed that all of the bank contacts of the test switch 120 are traversed by the wiper set during the first three-quarters of the revolution of the stub shaft 433.

During the initial portion of the final quarter turn of the stub shaft 433, the pin 461 carried by the plate 438 rides over the end of the arm 460a, thereby to move the latching element 460 from behind the arm 423. As a result, the arm 423 and the plate 420 are moved to normal under the influence of the spring 429. During such movement, the arm 423 is positioned to restrain the latching element 460 in its flexed position after the pin 461 has passed over the end of the arm 460a, the off-normal contacts 124 are disengaged to open the path short-circuiting the substation apparatus 115, and the coin feelers are withdrawn from the coin chutes. Shortly following the release of the coin feelers and during continued rotation of the stub shaft 433 the cam segment 462 rides into engagement with the upper end of the lever 454 to rock this lever in the direction required to move the gate 416 to its coin discharge position against the bias of the spring 419. In response to this operation the openings 416a, 416b, 416c and 416d are brought into registration with the discharge ends of the chutes 403a, 403b, 403c and 403d, respectively, permitting the coins deposited in the chutes to pass into the coin hopper 404. After further rotation of the shaft 433 the cam segment 462 rides out of engagement with the upper end of the lever 454 permitting this lever and the discharge gate 416 to be returned to normal under the influence of the spring 419. During the final movement of the stub shaft 433, the finger 435b, carried by the arm 435a, rides into engagement with the camming surface provided by the lower side of the reversely bent portion 442b, of the latching ele-

ment 442. As a result, the latching finger 442a is moved upward and out of engagement with the finger 440a of the arm 440, thereby to permit the arm 440 to be rotated through another revolution. Following the disengagement of the fingers 442a and 440a, the pin 443 carried by the arm 445a engages the arm 440 so that the arm 435a is restrained against further rotation and is left standing in the position illustrated in Fig. 5 of the drawings. When the arm 435a reaches this position, the two shafts 433 and 441 are again at normal and the wiper set 122 again bridges the collector ring 121 and the contact segment 70.

From the foregoing explanation, it will be apparent that, as a result of depositing the enumerated coins and operating the crank 450, the customer using the paystation 101 has caused the metering device 220 to make twenty-five registrations, thus visually indicating to the operator handling the call that coins representing the assessed charge have been deposited at the paystation. If desired, the operator may, by actuating the key 217, utilize her telephone set 216 to answer or supervise other calls while the coins are being deposited and the coin registrations are made by the metering device 220. After this metering device has registered the total value of the coins deposited, the operator may proceed to secure a connection with the desired line by inserting the plug 201 in a jack at her position which terminates a trunk extending to an operator's position in a distant exchange, and thereafter operating the ringing key 213 to project ringing current over the trunk for the purpose of energizing the signal device associated with the distant end of the trunk. From this point on, the call may be progressively routed to the desired subscriber line of the system in the usual manner. After the desired connection is completed, the operator may free her telephone set 216 for use in completing other connections by restoring the connect key 217 to normal. Following this operation, the supervisory relays 205 and 210, in conjunction with the associated supervisory signal lamps 202 and 203, may be relied upon to indicate when the connection is ready to be released. In this regard, it will be apparent that, when the customer at the paystation 101 restores the receiver at this station to its supporting hook, the loop circuit extending through the windings of the relays 230 and 205 is interrupted and these relays restore. The relay 205, upon restoring, completes a circuit, extending from ground, through the sleeve contacts of the jack 102 and the plug 209, and the armature 207, for energizing the supervisory lamp 202, thus indicating to the operator that the calling party has released the connection. If the calling party has used the established connection for a period exceeding the minimum charge period, the operator may signal this party by operating the ringing key 212 to cause ringing current to be projected over the line 100 and through the windings of the bell or ringer conventionally embodied in the substation apparatus 115. The resulting operation of the ringer serves to inform the customer that he is being recalled by the operator. Assuming that the customer answers, the loop circuit extending by way of the line 100 is again completed to cause the reoperation of the relays 230 and 205. Following the re-completion of the talking circuit in this manner, the operator may instruct the calling party to make the required additional deposit and to again operate the crank 450 for the purpose of

causing the total value of the additional coins deposited to be registered by the registering or metering device 220, all in the manner explained previously. Before making such request, the operator may manually restore the metering device 220 to normal so that only the value of the additional deposits will be registered thereby during the second operation of the pulse generating apparatus provided at the paystation 101.

After the call has been terminated, the operator may cause the coins held in the hopper 404 to be collected by momentarily operating the key 214 to its coin collect off-normal position. When this key is moved to its coin collect position, the negative terminal of a booster battery source 218 is connected to the line conductor 100a and the positive terminal of this source is connected to ground. As a result, current is caused to traverse the windings 411 and 412 of the coin collect and refund electromagnet in a direction such that the armature 409 is pivoted in a counterclockwise direction from the position shown in Fig. 4 of the drawings. In response to this operation, the gate 406 is also rotated in a counterclockwise direction, causing the roller 407 to be moved to the left and downward, thus permitting the free end of the hopper bottom 404c to move downward. As a result of the cooperating inclined surfaces of the hopper bottom 404c and the gate 406, the coins are discharged into the coin receiving box 402. When the key 214 is released by the operator to disconnect the booster battery source 218 from the line conductor 100a, the windings 411 and 412 of the coin collect and refund electromagnet are deenergized, permitting the armature 409 to be restored to its normal position under the influence of spring means, not shown. During the movement of this armature to its normal position, the gate 406 is rotated clockwise back to its normal vertical position, and the roller 407 carried thereby elevates the free end of the hopper bottom 404c to its normal position.

If, for any reason, the call is not successfully completed, the operator may refund the coins deposited by the customer at the paystation 101 by momentarily operating the key 214 to its coin refund off-normal position. In response to this operation, the positive terminal of a booster battery source 219 is connected to the line conductor 100a and the negative terminal of this source is connected to ground. In this case, the windings 411 and 412 of the coin collect and refund electromagnet are energized in a direction such that the armature 409 is pivoted in a clockwise direction. As a result, the gate 406 is also pivoted in a clockwise direction so that the roller 407 is moved to the right and lowered to permit the free end of the hopper bottom 404c to move downward. In this case, the inclined coacting surfaces of the hopper bottom 404c and the gate 406 are so positioned relative to each other that the coins held in the hopper 404 are discharged into the coin refund pocket 401 from which they may be extracted by the customer. When the key 214 is released by the operator and thus permitted to return to its normal position, the booster battery source 219 is disconnected from the line conductor 100a, causing the windings 411 and 412 of the coin collect and refund magnet to be deenergized. As a result, the armature 409 is moved under the influence of the spring biasing means, not shown, back to its normal position and, during such movement, pivots the gate 406 in a clockwise di-

rection back to its normal position. During the return movement of the armature 409, the roller 407 carried by the gate 406 forces the free end of the hopper bottom 404c upward so that, when movement of the armature is completed, this element also occupies its normal position.

Following a coin collect or coin refund operation of the character just described, the operator may fully release the cord circuit employed in setting up the connection by withdrawing the plug 200 from the jack 102.

From the foregoing explanation, it will be apparent that in the arrangement shown in Fig. 1 of the drawings, provisions are made at the paystation for transmitting to the operator's position signals indicative of the total value of a plurality of deposited coins, all in one operation. If desired, the arrangement illustrated in Fig. 3 of the drawings may be employed, whereby the signals representing the value of each coin are transmitted to the operator's position after each coin is deposited. Due to the similarity between the arrangements respectively shown in Figs. 1 and 3, corresponding elements of the two sets of apparatus have been identified by reference numerals having the same tens and units digits but different hundreds digits which respectively designate the figure number. The primary difference between the apparatus shown in Fig. 3 and that shown in Fig. 1 of the drawings, resides in the arrangement and size of the contact bank provided in the rotary switch 320 and in the number of sets of contact springs which are provided in association with the four coin chutes. More particularly, in the Fig. 3 arrangement, only one coin position is provided in each chute and, accordingly, only one set of associated contact springs is required. Thus, the contact springs 316, 317, 318 and 319 are respectively provided in association with the nickel, dime, quarter and half dollar coin chutes, respectively. These sets of contact springs are connected in series in the order named, the last set thereof being connected to the line conductor 300b. The mechanical construction and arrangement of the switch 320 and of the contact springs 316 and 319, inclusive, and of the operating mechanism for these elements, may be substantially identical with the corresponding apparatus illustrated in Figs. 4 to 8, inclusive, for the circuit arrangement shown in Fig. 1. With the wiring arrangement illustrated in Fig. 3, if a nickel is deposited in the nickel chute such that the contact springs 316 are caused to be disengaged prior to operation of the wiper set 322, the contact 1 of the contact bank is open-circuited so that the path normally short-circuiting the resistor 323 is interrupted and recompleted once during the revolution of the wiper set. As a result, a single current impulse is transmitted over the line 300. On the other hand, if a dime is deposited in the dime chute such that the contact springs 317 are disengaged prior to operation of the wiper set 322, the contacts 1 and 3 of the contact bank are open-circuited so that the path normally short-circuiting the resistor 323 is interrupted and recompleted twice during the revolution of the wiper set 322. Accordingly, two current pulses are transmitted over the line 300. Alternatively, if a quarter is deposited in the quarter chute such that the springs 318 are disengaged prior to rotation of the wiper set 322, the contacts 1, 3, 5, 7 and 9 of the contact bank are open-circuited to cause five current pulses to be transmitted over the

line 300 during one revolution of the wiper set 322. Finally, if a half dollar is deposited in the corresponding coin chute such that the contact springs 319 are disengaged prior to rotation of the wiper set 322, all of the odd-numbered contacts of the contact bank are open-circuited, causing ten current pulses to be transmitted over the line 300 during the revolution of the wiper set 322. By virtue of the arrangement just described, the total number of contacts which are required in the contact bank of the switch 320 is reduced to a minimum with a consequent reduction in the cost of construction. The primary disadvantage of this wiring arrangement, as compared with that shown in Fig. 1 of the drawings, resides in the fact that the signal generating apparatus must be separately operated once for each coin deposited in order to cause the required signals to be transmitted over the line 300.

While there has been described what is at present considered to be the preferred embodiments of the invention, it will be understood that various modifications may be made therein, and it is intended to cover in the appended claims all such modifications as fall within the true spirit and scope of the invention.

What is claimed is:

1. In a telephone system which includes an exchange provided with registering means operative to make one registration in response to each of a plurality of received signals; a paystation including means for receiving a plurality of coins of different denominations having either a base value or a multiple of said base value, testing means operative to determine the total value of a plurality of coins previously deposited in said coin receiving means, and means controlled by said testing means for transmitting a plurality of signals to said registering means equal in number to the value of the deposited coins divided by said base value.

2. In a telephone system which includes an exchange provided with indicating means operative in response to different numbers of received signals to produce different visual indications; a paystation including a plurality of coin receiving chutes adapted to receive coins of different denominations, coin feelers arranged to extend into said chutes at the positions therealong corresponding to the diameters of coins deposited in said chutes, means for moving said feelers into said chutes so that a coin deposited in one of said chutes is engaged by the feeler corresponding to the position of the deposited coin and the other feelers move into the corresponding positions provided to receive coins, contact sets individually corresponding to said feelers and individually set in accordance with the positions occupied by the respective associated feelers following the operation of said last-named means, and circuit means controlled in accordance with the setting of the contact set corresponding to said deposited coin for transmitting one or more signals to said indicating means indicative of the value of said deposited coin.

3. In a telephone system which includes an exchange provided with indicating means operative in response to different numbers of received signals to produce different indications; a paystation including a plurality of coin receiving chutes adapted to receive coins of different denominations, coin feelers arranged to

extend into said chutes at the positions therealong corresponding to the diameters of coins deposited in said chutes, means for moving said feelers into said chutes so that the coins deposited in said chutes are engaged by the feelers corresponding to the positions of the deposited coins and the other feelers move into the corresponding positions provided to receive coins, contact sets individually corresponding to said feelers and each including contact springs arranged to occupy different relative positions depending upon the position occupied by the respective associated feeler following operation of said last-named means, and a test switch operative successively to test said contact sets and to transmit at least one signal to said indicating means each time a set of contacts is tested which includes springs occupying a relative position indicating that a coin is deposited in the corresponding position of one of said chutes.

4. In a telephone system which includes an exchange provided with registering means operative to make one registration in response to each of a plurality of received signals; a paystation including a plurality of coin receiving chutes adapted to receive coins of different denominations having either a base value or a multiple of said base value, coin feelers arranged to extend into said chutes at the positions therealong corresponding to the diameters of coins deposited in said chutes, means for moving said feelers into said chutes so that coins deposited in said chutes are engaged by the feelers corresponding to the positions of the deposited coins and the other feelers are moved into the corresponding unoccupied positions provided to receive coins, contact sets individually corresponding to said feelers and individually set in accordance with the positions occupied by the respective associated feelers following the operation of said last-named means, and circuit means controlled in accordance with the settings of said contact sets for transmitting to said registering means a plurality of signals equal in number to the total value of coins deposited in said chutes in making a call divided by said base value.

5. In a telephone system which includes an exchange provided with registering means operative to make one registration in response to each of a plurality of received signals; a paystation including a plurality of coin receiving chutes adapted to receive coins of different denominations having either a base value or a multiple of said base value, coin feelers arranged to extend into said chutes at the positions therealong corresponding to the diameters of coins deposited in said chutes, means for moving said feelers into said chutes so that coins deposited in said chutes are engaged by the feelers corresponding to the positions of the deposited coins and the other feelers are moved into the corresponding unoccupied positions provided to receive coins, contact sets individually corresponding to said feelers and each including contact springs arranged to occupy different relative positions depending upon the position occupied by the respective associated feeler following operation of said last-named means, and a test switch operative successively to test said contacts and controlled in accordance with the settings of said contacts to transmit to said registering means a plurality of signals equal in number to the total value of coins deposited in

said chutes in making a call divided by said base value.

6. A telephone paystation comprising a coin chute constructed to receive a plurality of coins, contacts individually corresponding to the coin positions in said chute and means for impressing a predetermined potential upon those of said contacts corresponding to positions in said chute occupied with coins, a test switch operative to test said contacts for said predetermined potential, and circuit means controlled in accordance with the number of said contacts having said predetermined potential thereon for generating a number of current pulses indicative of the total value of coins deposited in said coin chute.

7. A telephone paystation comprising a coin chute constructed to receive a plurality of coins, a coin hopper disposed below said chute, a discharge gate normally positioned to block the passage of coins from said chute into said hopper, contacts individually corresponding to the coin positions in said chute and means for impressing a predetermined potential upon those of said contacts corresponding to positions in said chute occupied with coins, a test switch operative to test said contacts for said predetermined potential, circuit means controlled in accordance with the number of said contacts having said predetermined potential thereon for generating a number of current pulses indicative of the total value of coins deposited in said coin chute, and means for moving said gate to discharge coins from said chute into said hopper following the operation of said test switch to test all of said contacts.

8. A telephone paystation comprising a plurality of coin chutes constructed to receive coins of different denominations, contacts individually corresponding to the coin positions in said chutes and means for impressing a predetermined potential upon one of said contacts corresponding to a position in one of said chutes occupied with a coin, a test switch operative to test said contacts for said predetermined potential, and circuit means controlled in accordance with the potential on said one contact for generating one or more current pulses indicative of the value of the coin deposited in said one chute.

9. A telephone paystation comprising a plurality of coin chutes constructed to receive coins of different denominations, a coin hopper disposed below said chutes, a discharge gate normally positioned to block the passage of coins from said chutes into said hopper, contacts individually corresponding to the coin positions in said chutes and means for impressing a predetermined potential upon one of said contacts corresponding to a position in one of said chutes occupied with a coin, a test switch operative to test said contacts for said predetermined potential, circuit means controlled in accordance with the potential on said one contact for generating one or more current pulses indicative of the value of the coin deposited in said one chute, and means for moving said gate to discharge the deposited coin from said one chute into said hopper following the operation of said test switch to test all of said contacts.

10. A telephone paystation comprising a plurality of coin chutes constructed to receive coins of different denominations having either a base value or a multiple of said base value, contacts individually corresponding to the coin positions in said chutes and means for impressing a predetermined potential upon those of said contacts corresponding to positions in said chutes occu-

pied with coins, a test switch operative to test said contacts for said predetermined potential, and circuit means controlled in accordance with the number of contacts having said predetermined potential thereon for generating one current pulse when one of said contacts corresponding to an occupied base value coin position is tested by said switch and for generating, when one of said contacts corresponding to an occupied multiple base value coin position is tested by said switch, a number of current pulses equal to said multiple, whereby the total number of current pulses generated during operation of said switch is indicative of the total value of coins deposited in said chutes.

11. A telephone paystation comprising a plurality of coin receiving chutes, means for integrating the values of coins deposited in said chutes, and means controlled by said integrating means and operative only after all of said coins have been deposited for generating a plurality of signals equal in number to said integrated value divided by a common base value.

12. A telephone paystation comprising a plurality of coin receiving chutes, means for integrating the values of coins deposited in said chutes, and means controlled by said integrating means and operative only after all of said coins have been deposited for generating a plurality of signals indicative of said integrated value.

13. A telephone paystation comprising a chute constructed to receive a plurality of coins, means for integrating the values of coins deposited in said chute, and means controlled by said integrating means and operative only after all of said coins have been deposited for generating a plurality of signals equal in number to said integrated value divided by a common base value.

14. A telephone paystation comprising a chute constructed to receive a plurality of coins, means for integrating the values of coins deposited in said chute, and means controlled by said integrating means and operative only after all of said coins have been deposited for generating a plurality of signals indicative of said integrated value.

15. A telephone paystation comprising a coin chute constructed to receive a plurality of coins, coin feelers arranged to extend into said chute at the positions therealong corresponding to the diameters of stacked coins deposited in said chute, means for moving said feelers into said chute so that the coins deposited in said chute are engaged by the feelers corresponding to the positions of said deposited coins and the other feelers are moved into the corresponding unoccupied positions provided to receive coins, contact sets individually corresponding to said feelers and set in accordance with the positions occupied by the respective associated feelers following the operation of said last-named means, and circuit means controlled in accordance with the settings of said contacts for generating a plurality of current pulses indicative of the total value of coins deposited in said chute.

16. A telephone paystation comprising a coin chute constructed to receive a plurality of coins, coin feelers arranged to extend into said chute at the positions therealong corresponding to the diameters of stacked coins deposited in said chute, means for moving said feelers into said chute so that the coins deposited in said chute are engaged by the feelers corresponding to the positions of said deposited coins and the other feelers are moved into the corresponding unoccupied

positions provided to receive coins, contact sets individually corresponding to said feelers and arranged to have different settings depending upon the positions occupied by the respective associated feelers following operation of said last-named means, and a test switch operative successively to test said contacts and controlled in accordance with the settings of said contacts to generate a plurality of current pulses indicative of the total value of coins deposited in said chute.

17. A telephone paystation comprising a plurality of coin receiving chutes adapted to receive coins of different denominations having either a base value or a multiple of said base value, coin feelers arranged to extend into said chutes at the positions therealong corresponding to the diameters of coins deposited in said chutes, means for moving said feelers into said chutes so that coins deposited in said chutes are engaged by the feelers corresponding to the positions of the deposited coins and the other feelers are moved into the corresponding unoccupied positions provided to receive coins, contact sets individually corresponding to said feelers and set in accordance with the positions occupied by the respective associated feelers following operation of said last-named means, and circuit means controlled in accordance with the settings of said contact sets for generating a plurality of current pulses equal in number to the total value of coins deposited in said chutes divided by said base value.

18. A telephone paystation comprising a plurality of coin receiving chutes adapted to receive coins of different denominations having either a base value or a multiple of said base value, coin feelers arranged to extend into said chutes at the positions therealong corresponding to the diameters of coins deposited in said chutes, means for moving said feelers into said chutes so that coins deposited in said chutes are engaged by the feelers corresponding to the positions of the deposited coins and the other feelers are moved into the corresponding unoccupied positions provided to receive coins, contact sets individually corresponding to said feelers and arranged to have different settings depending upon the positions occupied by the respective associated feelers following operation of said last-named means, and a test switch operative successively to test said contacts and controlled in accordance with the settings of said contacts to generate a plurality of current pulses equal in number to the total value of coins deposited in said chutes divided by said base value.

19. A telephone paystation comprising a coin chute constructed to receive a plurality of coins, coin feelers arranged to extend into said chute at points therealong corresponding to the diameters of coins stacked in said chute, pairs of contact springs each including a spring carrying one of said feelers at the free end thereof, whereby each pair of said springs occupies different circuit controlling positions depending upon the engagement or disengagement of the associated feeler with a coin in said chute when said springs are operated to move said feelers into said chute, a test switch including bank contacts connected to said contact springs and a wiper adapted to traverse said bank contacts, spring means for driving said wiper over said bank contacts, locking means normally restraining said wiper against rotary movement; operating means operative to bias said contact springs so that said feelers are moved into said chute, to tension said spring means and to release said locking means so that

said wiper is driven over said bank contacts; and circuit means controlled in accordance with the positions of said contact springs for generating a plurality of current pulses indicative of the total value of coins deposited in said chute.

20. A telephone system comprising a plurality of coin chutes constructed to receive coins of different denominations having either a base value or a multiple of said base value, coin feelers adapted to extend into said chutes at positions therealong corresponding to the diameters of coins deposited in said chutes, pairs of contact springs each including a spring carrying one of said feelers at the free end thereof, whereby the springs of each pair occupy different relative positions depending upon the engagement or disengagement of the associated feeler with a coin in one of said chutes when said springs are operated to move said feelers into said chutes, a rotary test switch including bank contacts connected to said contact springs and a wiper adapted to traverse said bank contacts, spring means for driving said wiper over said bank contacts, locking means normally restraining said wiper against movement; operating means operative to move said contact springs so that said feelers are moved into said chute, to tension said spring means and to release said locking means so that said wiper is driven over said bank contacts; and circuit means controlled in accordance with the relative positions of said contact springs for generating a plurality of current pulses equal in number to the total value of coins deposited in said chutes divided by said base value.

21. A telephone paystation including a coin chute constructed to receive a plurality of coins, a coin hopper disposed below said chute, a discharge gate normally blocking the passage of coins from said chute into said hopper, a plurality of coin feelers arranged to extend into said chute at points therealong corresponding to the diameters of coins stacked in said chute, pairs of contact springs each including a spring carrying one of said feelers at the free end thereof, whereby the springs of each pair occupy different relative positions depending upon the engagement or disengagement of the associated feeler with a coin in said chute, a rotary switch including bank contacts connected to certain of said contact springs and a wiper adapted to traverse said bank contacts; operating means for moving said contact springs to move said feelers into said chute, for driving said wiper over said bank contacts and for actuating said gate to pass coins held in said chute into said hopper, all in the order named; and circuit means controlled in accordance with the relative positions of said contact springs for generating a plurality of current pulses indicative of the total value of coins deposited in said chute.

22. A telephone paystation comprising a plurality of coin chutes constructed to receive coins of different denominations having either a base value or a multiple of said base value, a coin hopper disposed below said chutes, a discharge gate normally positioned to block the passage of coins from said chutes into said hopper, a plurality of coin feelers arranged to extend into said chute at points therealong corresponding to the diameters of coins deposited in said chutes, pairs of contact springs each including a spring carrying one of said feelers, whereby the springs of each pair occupy different relative positions depending upon the engagement or disengagement of the associated feeler with a coin in one of said

chutes, a test switch including bank contacts connected to certain of said contact springs and a wiper adapted to traverse said bank contacts; operating means for biasing said contact springs to move said feelers into said chutes, for driving said wiper over said bank contacts and for actuating said gate to pass coins held in said chutes

into said hopper, all in the order named; and circuit means controlled in accordance with the relative positions of said contact springs for generating a plurality of impulses equal in number to the total value of coins deposited in said chutes divided by said base value.

BERNARD D. WILLIS.