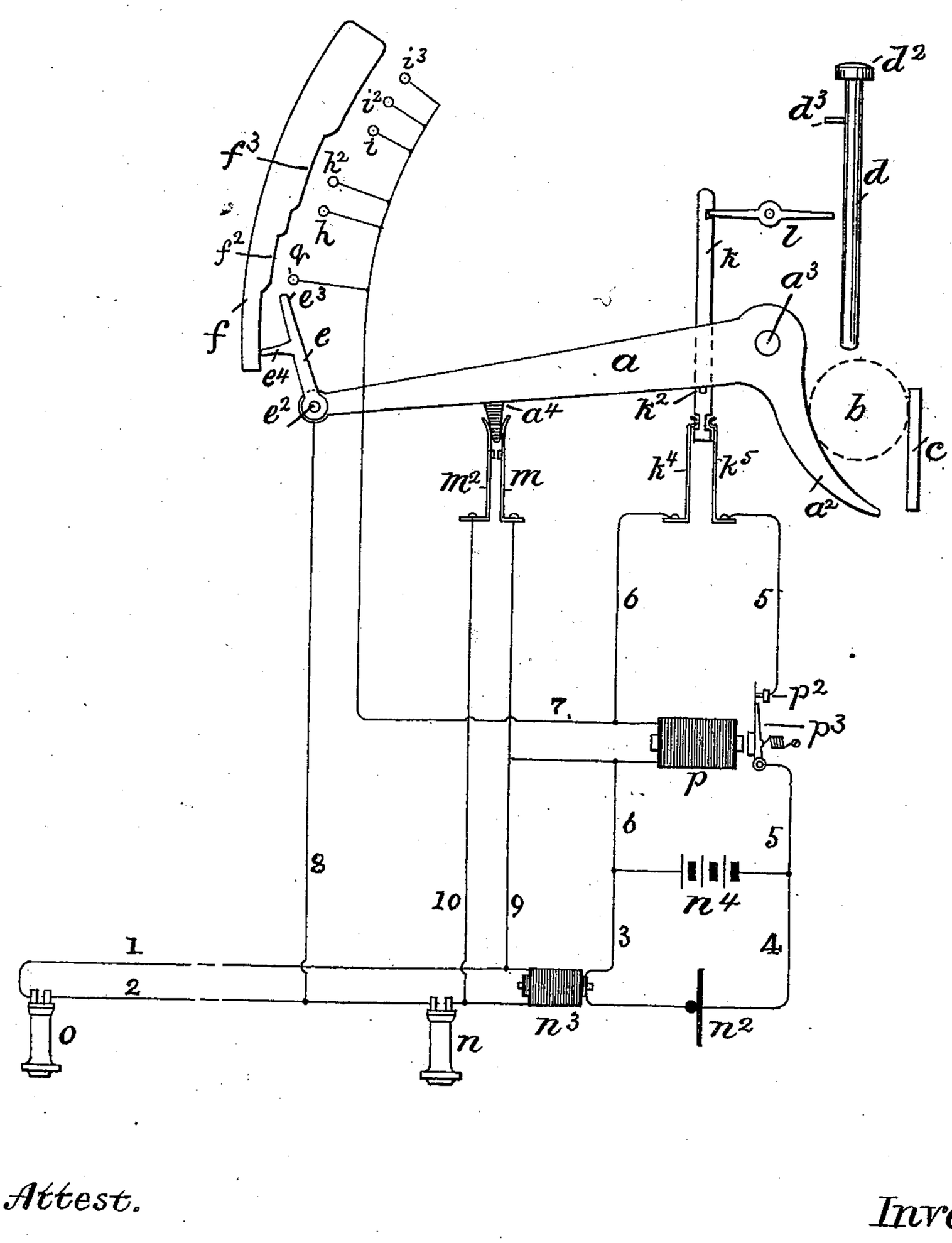
(No Model.) 2 Sheets—Sheet 1.

G. K. THOMPSON.

TOLL COLLECTING TELEPHONE APPARATUS.

No. 550,204. Patented Nov. 19, 1895.

Fig. 1.



Attest.

Joseph A. Gately

Geo. Willis Pierce

Inventor.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 2.

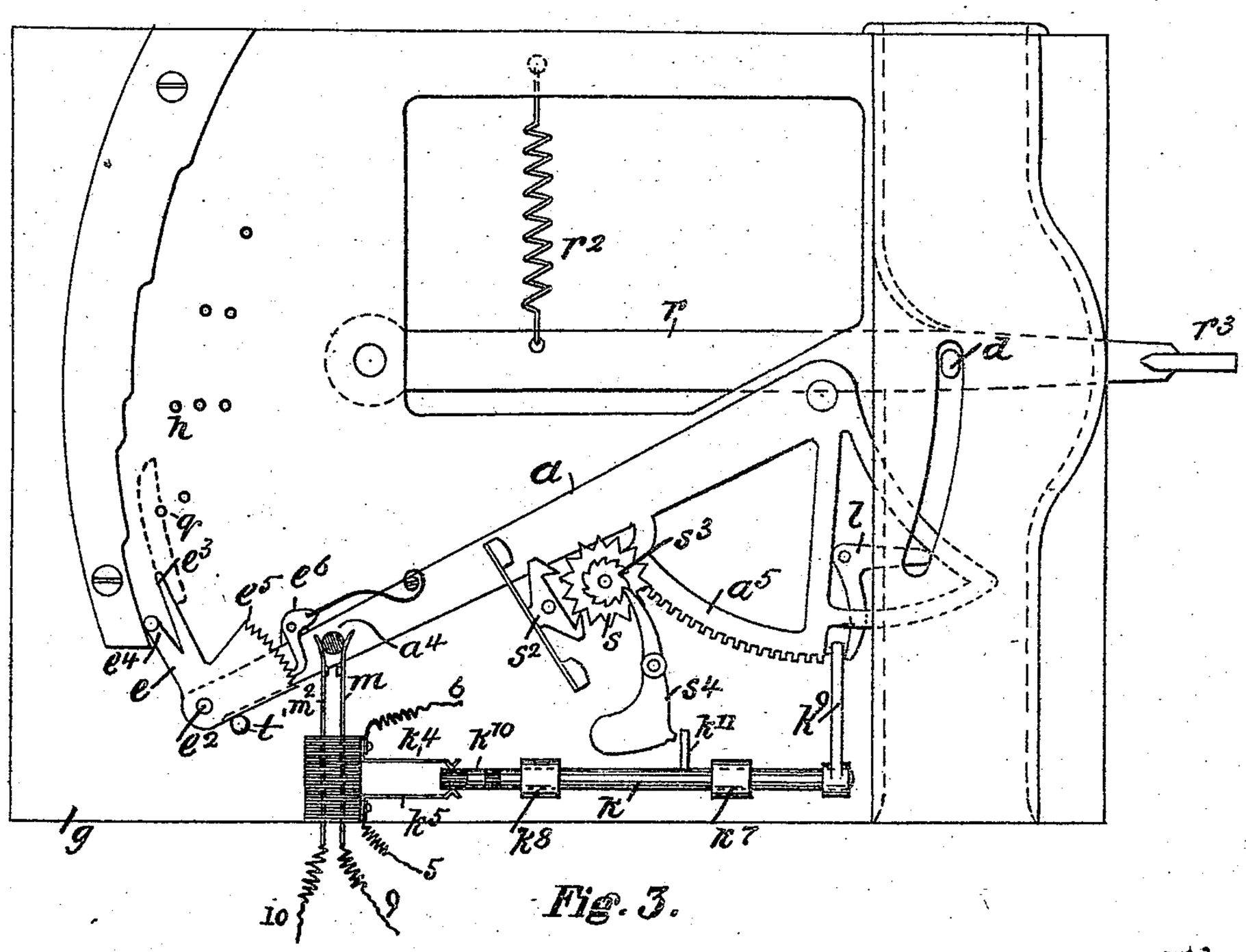
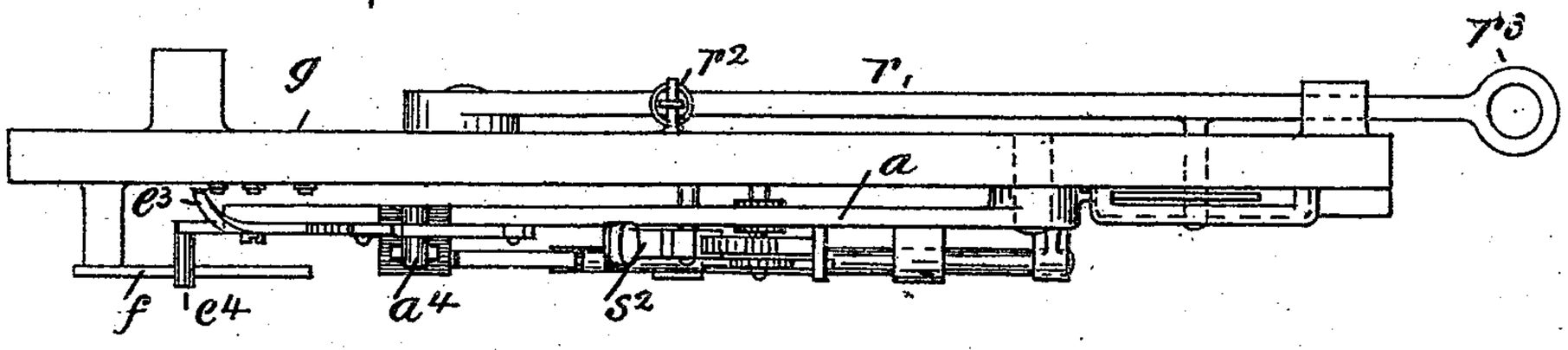


Fig. 3.



Attest,

Frank C. Lockwood.

Granville Pierce

Inventor.

George K. Thompson

UNITED STATES PATENT OFFICE.

GEORGE K. THOMPSON, OF MALDEN, ASSIGNOR TO THE AMERICAN BELL TELEPHONE COMPANY, OF BOSTON, MASSACHUSETTS.

TOLL-COLLECTING TELEPHONE APPARATUS.

SPECIFICATION forming part of Letters Patent No. 550,204, dated November 19, 1895.

Application filed August 24, 1895. Serial No. 560,411. (No model.)

To all whom it may concern:

Be it known that I, GEORGE K. THOMPSON, residing at Malden, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Toll-Collecting Telephone Apparatus, of which the following is a specification.

My invention is an attachment for telephones for receiving coins or tokens of different denominations in payment of tolls and indicating or signaling to a distant attendant in telephone connection with the line the identity of the token deposited. It belongs to that class of toll-collecting devices in which the dimensions of the deposited coin or token determine through suitable manually-operated mechanism the transmission of a particular series of characteristic signals, which being heard by the distant operator at the central station, indicate to her the denomination of the coin or token.

As exemplifying the art, I refer to Patents No. 442,342 to Vaughn, dated December 9, 1890, and No. 526,608 to Charles C. Blake, dated September 25, 1894. In the former of these patents a series of periodic pulsations of current are transmitted over the telephone-line corresponding in number to the dimensions of the coin. In the latter several sets or series of revoluble contact-points pass before a contact-lever, the position of the contact-lever with relation to any particular series of contact-points being determined by the size of the coin.

In my improvement I employ, in combination with a revoluble lever whose movement is determined by the size of the deposited coin, a transversely-movable contact-arm mounted upon the lever, several series of contact-points therefor normally out of range of the contact-arm, and a templet adapted to move the contact-lever to register with a particular series of contact-points corresponding to the travel of the lever.

My invention also embodies other minor improvements. Among these are an automatically-operated key for short-circuiting the secondary helix of the induction-coil at the station during the transmission of the distinctive signals, and a system of circuit connections by which the vibrating circuit breaker or buzzer rendered operative during the activity of the signal-transmitting device is caused to produce an intermittent current in the line-circuit whose completion and interruption constitute the signals. Other details also are involved in the invention, which will be hereinafter described at length, and pointed out in the claims.

I have illustrated the invention in the accompanying drawings.

Figure 1 of the drawings is an ideal representation of the essential parts of the device, all accessory and subordinate mechanism being omitted. Fig. 2 is a side elevation of the complete apparatus as provided for practical use. Fig. 3 is a plan view of the same.

I will describe the invention generally in connection with Fig. 1, considering later the various refinements which are necessary or desirable in practice.

In Fig. 1 a bell-crank lever a has its shorter arm a^2 curved and projecting into the path of the coin b, the lateral movement of the coin being prevented by an abutment c. A vertical rod d is provided, which may be retracted by a spring, in such position that when the rod is depressed by means of its button d^2 the coin b shall be pushed forward in opposition to the weight or retracting spring acting upon lever a. This lever will thereby be rotated about its pivot a^3 to an extent dependent upon the diameter of coin b. Lever a carries at the extremity of its longer arm a transversely-movable contact-arm e, pivoted at e^2 to the lever a. This contact-arm carries a contact-point e^3 and a stud or projection e^4, which is adapted to engage the edge of a templet f. Contact-points q h h^2 i i^2 i^3 are arranged in arcs of concentric circles, respectively. The curved edge of templet f is so formed that for any given upward movement of lever a the contact-arm e shall be rotated sufficiently to register with a corresponding series of contact-points.

In practice I prefer that the signal shall be transmitted in the return movement of lever a, rather than in its initial upward movement. Hence I have arranged the apparatus so that no operative circuit connection shall be made by the contact-point e^3 in its upward movement, but it is pushed by the templet into such a position that it shall register with the required series of contact-points in its return. Thus, if lever a be moved upward until the stud e^4 has engaged the projection f^2 of the templet,

and then be permitted to return to its normal position, the contact-point e^3 will in this return movement be drawn across the point q and will thus momentarily close a circuit. If, however, the arm were advanced so that projection e^4 registered with the portion f^3 of the templet, contact e^3 would have been thrown into position to connect successively with the points h h^2, thus closing the circuit twice. Obviously, the construction of templet f must be appropriate to the coins which are to be collected, the coins of different denominations acting through the medium of arm a^2, templet f, and the intermediate mechanism to cause contact-arm e^3 to pass over corresponding rows of contact-points in order to transmit suitable distinctive signals. It is sometimes desirable in structures for this purpose that certain coins shall not operate the mechanism—for example, coins of lower denomination than the required toll. In this invention provision may be made to prevent the transmission of any signal when such a coin is deposited by so constructing the templet at a point corresponding to the size of the insufficient coin that the contact-arm e^3 shall pass over no contact-points whatever in its return movement. Hence, no signal would be transmitted upon the deposition of an inferior coin.

Near the lever a is placed a sliding rod k, carrying projecting pin k^2, which registers with the lever, and by which the rod is forced to its lowest position by the lever when in its normal position. Engaging with the upper extremity of the rod k is a centrally-pivoted lever l, whose extremity projects into the path of movement of a pin d^3 in the push-bar d. When this bar is depressed to push the coin b through the chute, this pin d^3 engages lever l, and through it shifts bar k longitudinally, the lever a being then out of engagement with pin k^2. Two springs k^4 k^5 are thereby brought into contact with the bar k and become electrically connected together.

On the lever a is fixed a projection a^4, of insulating material, which, when the lever is in its normal position, enters between and spreads the two contact-springs m m^2. When the stud a^4 is withdrawn from between these springs, they close together and complete an electric circuit. In this diagram are shown the usual telephone appliances of a sub-station and their circuits, together with the additional circuits which have been provided for the operation of my invention. A receiving-telephone n and a transmitting-telephone n^2, with their induction-coil n^3 and local battery n^4, comprise the telephone instruments. The receiving-telephone n and the secondary helix of the induction-coil n^3 are in a telephone-circuit 1 2, which may be a line to a distant station where a receiving-telephone o is also placed in the circuit. This may be the operator's telephone at the central station. The transmitting-telephone n^2, battery n^4, and the primary helix of coil n^3 are in a closed local circuit 3 4. From opposite terminals of battery n^4 conductors 5 and 6 are led to the two springs k^4 k^5, respectively, the former conductor including the contact-pieces p^2 and p^3 of a buzzer or vibrating circuit-breaker, and the latter conductor the helix of the magnet constituting part of the same instrument. A wire 7 is led from one terminal of magnet p to the different signal-transmitting contact-pieces q h i, &c., the contact-pieces being connected with it in parallel. The other terminal of the magnet is connected with the line through wire 9. The contact-arm e is united through wire 8 with line-conductor 2.

Conductors 9 and 10 are led from the terminals of the secondary helix of coil n^3 to the springs m and m^2, respectively, so that when these springs are permitted to close together the secondary helix of the induction-coil is short-circuited. The object of this contrivance is to prevent interference with the transmitted signal by extraneous noises repeated into the circuit through the transmitter and the induction-coil.

The operation of the essential features of my invention may be traced in this diagram. After the required coin has been deposited and has fallen into the position indicated in the drawings the bar d is depressed. Its movement forces the coin through the chute, whereby the lever a is rotated and the contact-arm e^3 is brought by the templet f into position to make connection with a particular series of contact-pieces in its return movement. The movement of lever a permits the springs m and m^2 to short-circuit the secondary helix of the induction-coil. The extreme movement of the push-rod d brings the contact-making portion of the rod k between springs k^4 k^5 and closes the local circuit of battery n^4 through the circuit-breaker p. When the coin has passed entirely through the chute, the lever a is returned by its weight or retractive spring to its normal position, drawing the contact-arm e^3 over the particular row of contact terminals, as h h^2, and transmitting through the line 1 2 a corresponding series of signals, the elements of the signal being sounds of short duration produced by the extra current from buzzer p.

In putting my invention into practical form I have applied to it various mechanical refinements for the purpose of insuring reliability of operation. For instance, I have found it necessary to provide an escapement or other retarding device to control the movement of lever a, so that the signals shall not be too rapidly transmitted. I have found it desirable, also, to provide means for retaining the contact-arm e^3 during its return movement in the relative position to which it was moved by the templet during its initial movement and for restoring it to its normal position after it has performed its function. These different contrivances are illustrated in Figs. 2 and 3 of the drawings.

The bar or push d is carried upon a pivoted

lever r, which is acted upon by a retractive spring r^2 and which carries a handle r^3 accessible at the side of the instrument-case. Lever a carries a toothed sector a^5, which meshes with a pinion on the shaft with an escapement-wheel s, which is controlled by the usual pallet s^2. Upon the same spindle, also, is a ratchet-wheel s^3, with which a pivoted and weighted dog s^4 rests normally in engagement. The switch-rod k is arranged horizontally, supported in bearings k^7 k^8, and communicates with lever l through a lateral extension or projection k^9. When the pin d comes to bear upon the projecting extremity of lever l, this lever moves the rod k laterally, so that the metallic portion k^{10} enters between springs k^4 and k^5. The same rod k carries, also, a stud k^{11}, which is adjusted to engage the weight of dog s^4 in the first lateral movement of the rod to release the ratchet-wheel s^3 from the dog.

The contact-arm e, pivoted upon arm a, is provided with a toothed sector e^5, with which a pivoted spring-impelled dog e^6 registers. The dog e^6 permits the rotation of the lever about its pivot e^2 when a sufficient force is applied, but hinders its shifting sufficiently to render certain its return over the desired course, or, in other words, to prevent it from being moved laterally by friction on the contact-pieces in its return. The stud t, fixed in the base g, lies in the path of the sector e^5 in its normal position, so that as the lever a comes to rest after its return movement the contact-arm e is pushed back to its proper position against the resistance of dog e^6 and sector e^5.

I claim as my invention and desire to secure by Letters Patent—

1. The combination with a coin chute, a lever, and means for rotating the lever through an arc proportional to the size of the coin, of a contact piece carried by and movable relatively to the said lever, several rows of contact points, and a templet adapted to determine the movement of the contact piece over a particular row of contact points corresponding to the travel of the lever, as described.

2. The combination with a coin chute of a revoluble contact arm having an extension projecting into the coin chute, a device for impelling the coin through the chute, a movable contact piece mounted on the contact arm, several series of contact points, and a templet registering with the contact piece adapted to move said contact piece laterally to different positions corresponding to different travels of the lever in which it shall register with the corresponding series of contact points, as described.

3. The combination with a coin chute, a lever, and means for moving the lever through an arc corresponding to the dimension of a coin passed through the chute, of a transversely movable contact piece on the lever, several contact points at different distances from the pivotal point of the lever, a templet controlling the lateral movement of the contact piece, formed to throw the said contact piece into different positions corresponding to different travels of the lever, a telephone circuit and an operator's telephone therein, and a source of current and circuit connections with the contact points and contact piece adapted to produce signals in the telephone circuit, as described.

4. The combination with a lever whose travel is determined by a deposited coin, of a pivoted contact arm and a templet adapted to move the contact arm into different positions, a ratchet on the contact arm, and a spring actuated dog engaging the ratchet, whereby the contact arm is retained in the position to which it is moved by the templet, as described.

5. The combination with a lever whose travel is determined by a deposited coin, of a contact arm pivoted thereon, carrying a ratchet, a dog engaging the ratchet, a templet adapted to register with the contact arm to move it into different positions corresponding to the travel of the lever, a series of contact points arranged in the path of the contact arm in its return movement, and a stop adapted to engage the arm to restore it to its normal position when the lever comes to rest, as described.

6. The combination with a telephone line of an induction coil having its secondary helix therein and having its primary helix in circuit with a transmitting telephone and a source of current, mechanism adapted to transmit a series of characteristic signals in the telephone line during its operation, a normally open switch controlling a short circuit about the secondary helix of the induction coil, and means actuated by the said mechanism in its movement for closing the switch, as described.

7. The combination with a coin chute of a lever having an arm projecting into the path of the coin and a push for impelling the coin through the coin chute, a local circuit including a source of current and a vibrating circuit breaker controlled by a switch, a device operated by the said push in its extreme movement to close the said switch, and a device in the path of the lever adapted to turn the switch to its normal position upon the return of the lever, a series of contact points and a contact arm registering therewith carried by the lever, and circuit connections between the said contact points and the switch whereby the continuity of the connections with the contact points is controlled by the switch, as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 8th day of August, 1895.

GEORGE K. THOMPSON.

Witnesses:

GEO. WILLIS PIERCE,

JOSEPH A. GATELY.