

No. 749,824.

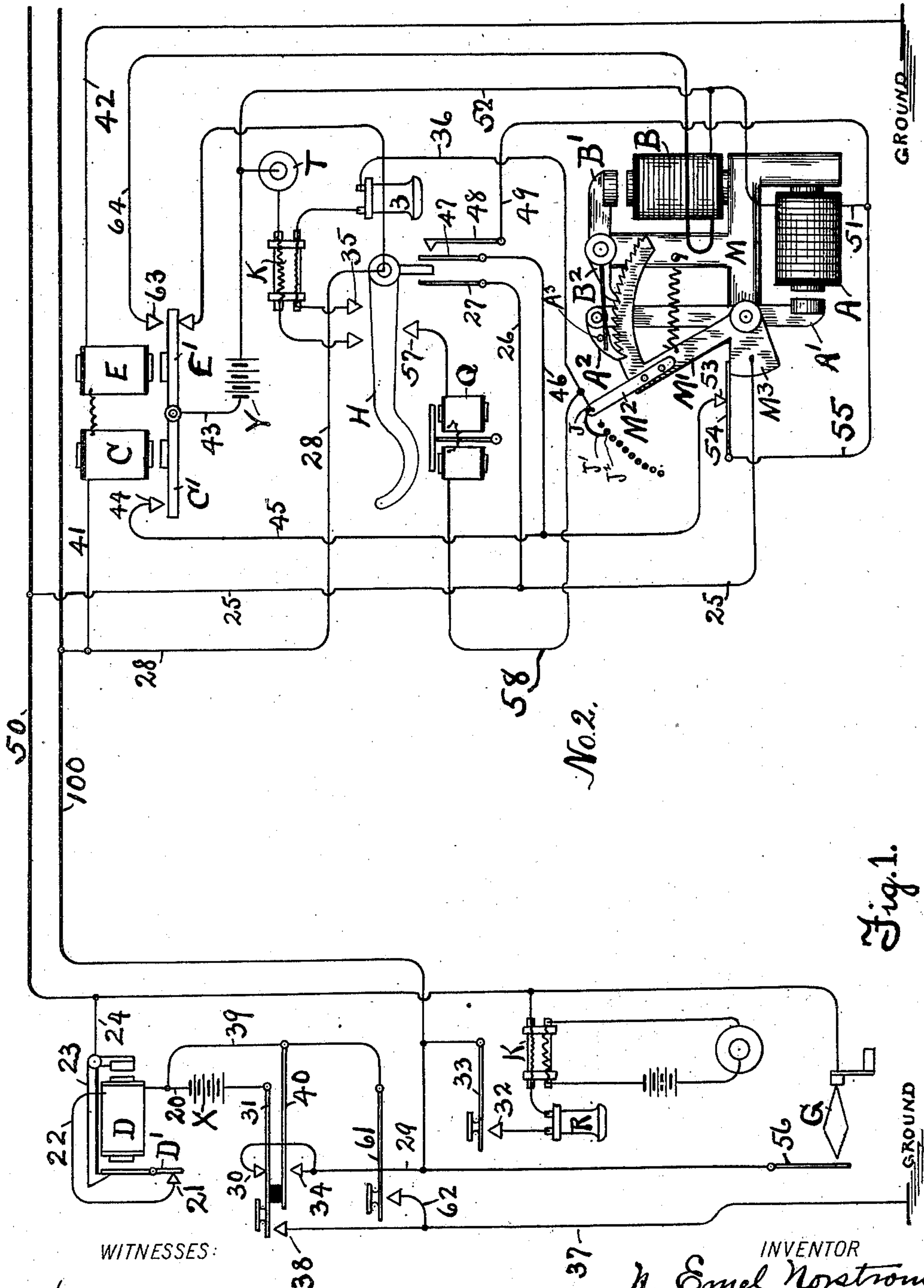
PATENTED JAN. 19, 1904.

N. E. NORSTROM.  
TELEPHONE EXCHANGE.

APPLICATION FILED NOV. 23, 1900.

NO MODEL.

3 SHEETS—SHEET 1.



WITNESSES:

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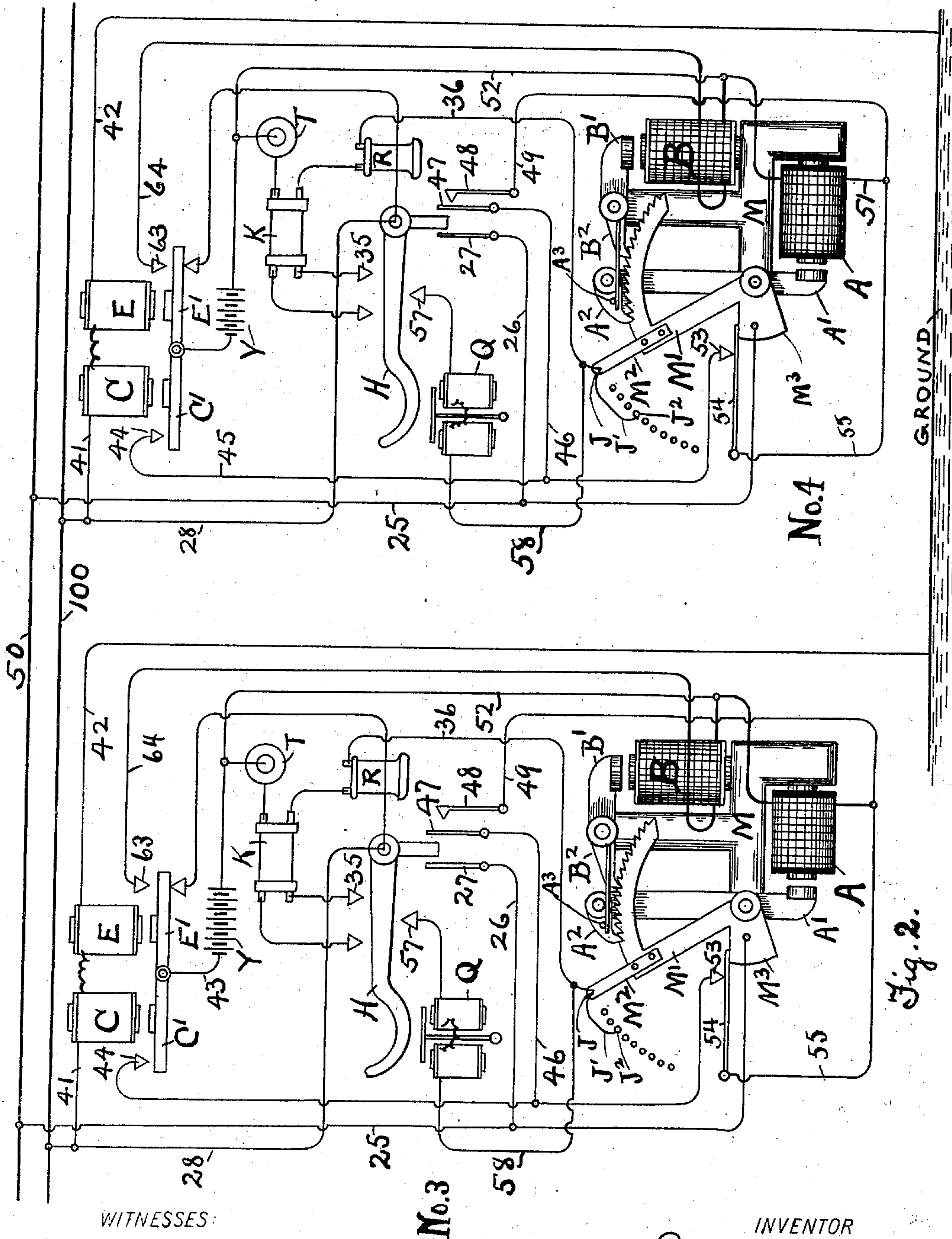
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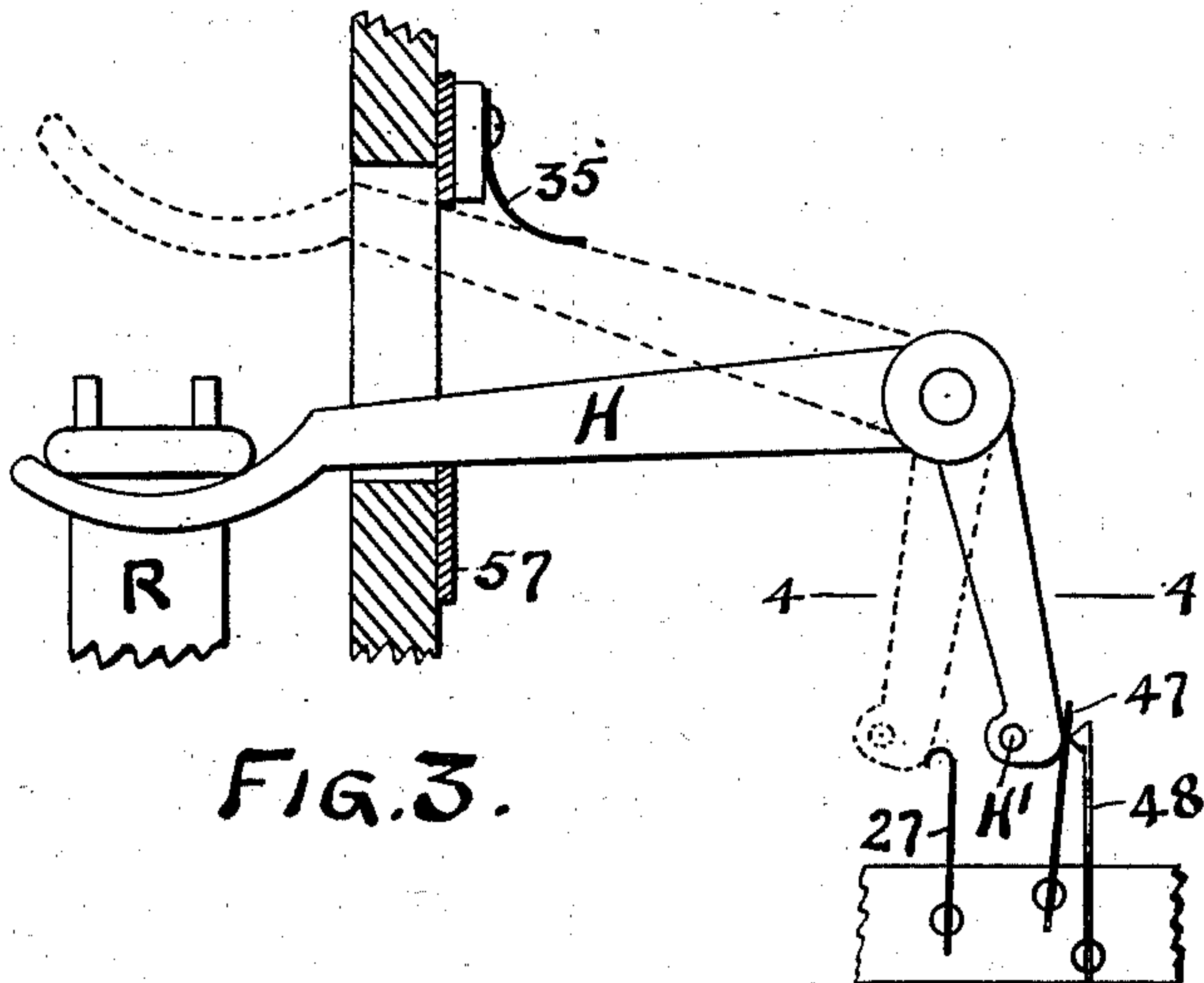
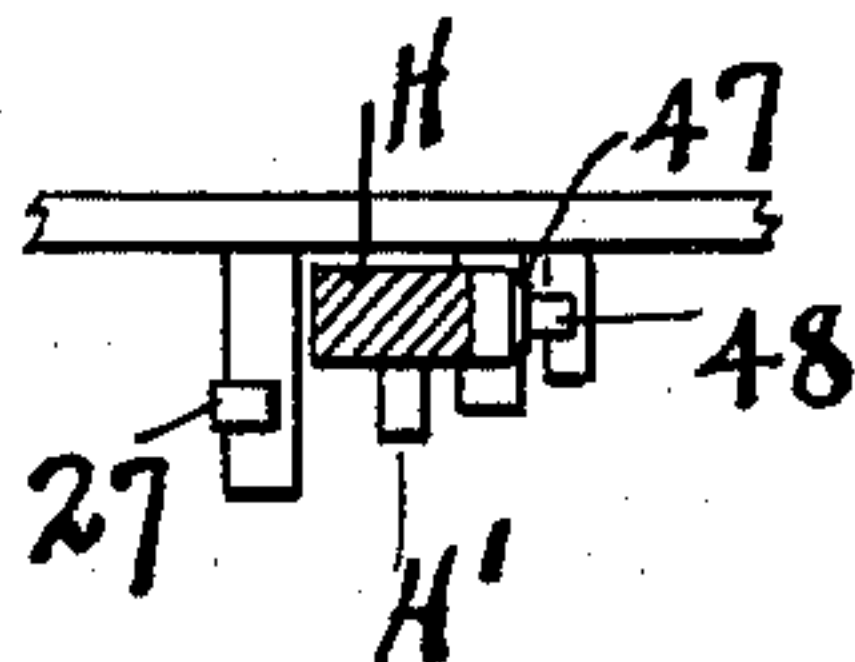
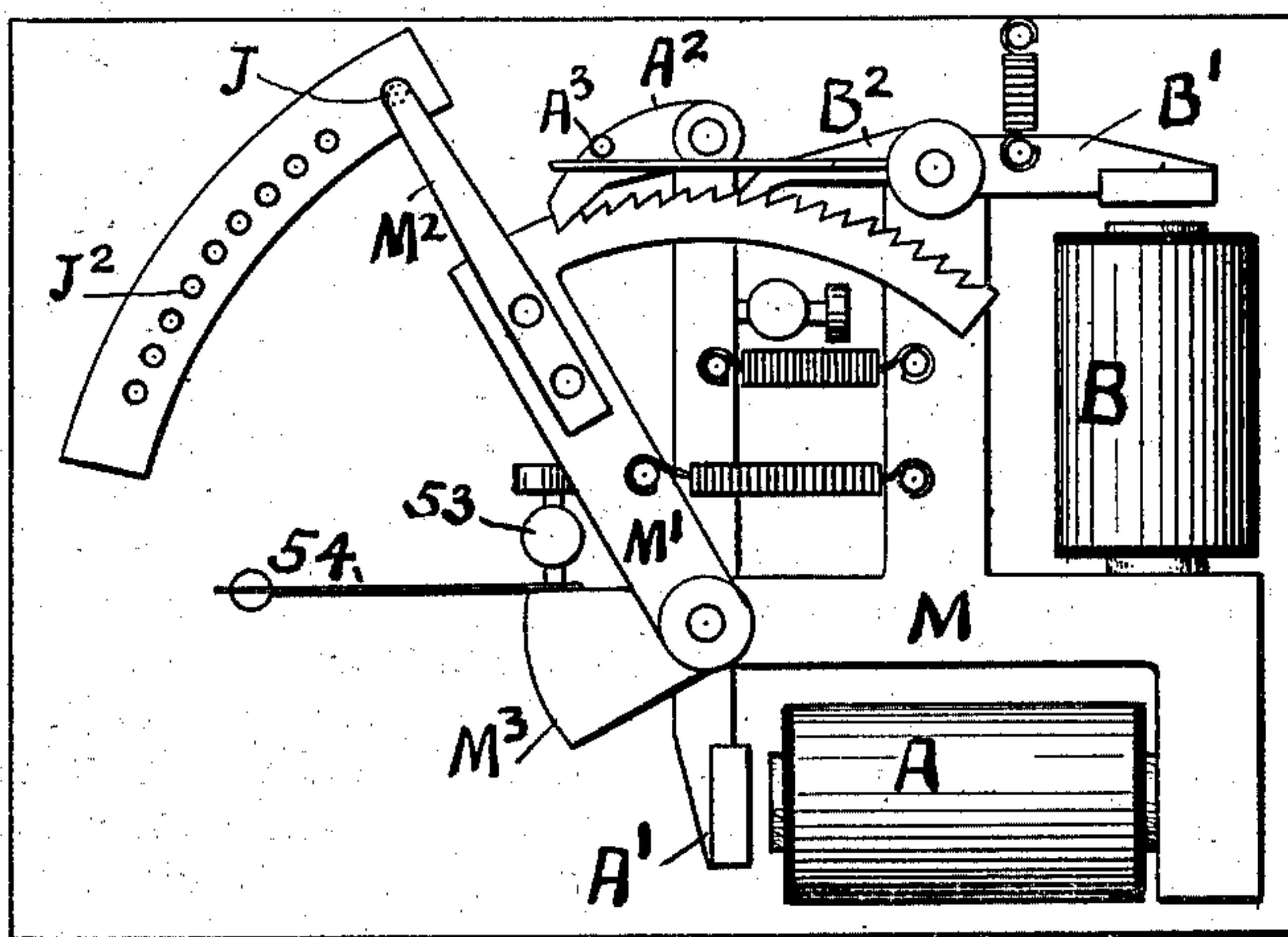


FIG. 3.



**FIG 4.**



**FIG. 5.**

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# UNITED STATES PATENT OFFICE.

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## TELEPHONE-EXCHANGE.

SPECIFICATION forming part of Letters Patent No. 749,824, dated January 19, 1904.

Application filed November 23, 1900. Serial No. 37,475. (No model.)

*To all whom it may concern:*

Be it known that I, NILS EMEL NORSTROM, a citizen of the United States of America, and a resident of Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Telephone-Exchanges, of which the following is a specification.

My invention relates to telephone-exchanges of the character in which a series of telephone-stations are connected by a party-line to a central office, and has for its object improvements in such exchanges.

One of the particular features of the present application is the provision of devices that will prevent a person at one of said stations from listening to conversation carried on between two other parties. For example, in the exchanges using party-lines as they are at present arranged a person located at one of the exchanges can by keeping his receiver removed from its hook listen to any conversations that may be carried on by any other parties on the line and at the same time he is always in position to be called from the central office. I overcome this objection to party-lines by arranging the switching mechanism at the several stations so that the connections cannot be controlled in this way by a person at one of the stations and cannot be controlled at all by him except by tampering with the mechanism of his switch. As the switching mechanism at each station in this class of devices is always inclosed within the telephone-box, is locked up, and presumed to be interfered with only by person authorized from the central office, it will be evident that the opportunities for tampering with the mechanism are reduced to a minimum.

In the accompanying drawings, Figure 1 is a diagram of the mechanism at the central office and that of one local station, and Fig. 2 is a diagram showing two additional telephone-stations that are connected to the central office by the line-wires 50 and 100. Fig. 3 is an elevation of the receiver-hook and the associated parts. Figs. 4 is a section on line 4 of Fig. 3, and Fig. 5 is a plan of the switching mechanisms at the local stations.

In the said drawings, M is a framework on which are secured the magnets A and B and to which are also pivoted their armature-levers A' and B'. Also pivoted on the frame M, and preferably at the same pivoting-point as the lever A', is a ratchet-quadrant M', on which is a contact-arm M<sup>2</sup>. In its normal position the pointer M<sup>2</sup> rests on a contact-point J, and in the path of the contact-arm M<sup>2</sup> when moved there are a series of other contact-points J<sup>2</sup>, one of which is connected to the normal contact-point J by a short wire J'. The connected contact-point J<sup>2</sup> is in each station a different distance from the normal contact-point. For example, at telephone-station No. 2 the connection is to the second contact-point, at telephone-station No. 3 it is to the third contact-point, and so on. On the armature-lever A' is a pawl A<sup>2</sup>, arranged to move the ratchet-quadrant M' when the magnet A is energized. The relationship of the ratchet to the contact-points is such that upon the first movement of the contact-arm it is moved to a blank position between the first contact-point and the normal contact-point. At the next movement it will reach the first contact-point and at each subsequent movement the next succeeding contact-points. On the armature-lever B' there is a holding-pawl B<sup>2</sup>, and from the armature-lever there is a pin projecting beyond that engages a small pin A<sup>3</sup> in the moving pawl A<sup>2</sup>. These parts are so arranged that when the magnet B is energized both of said pawls are lifted from engagement with the ratchet and the contact-arm M<sup>2</sup> is permitted to return to its normal position. Also located at each station are a pair of magnets C and E. The magnets C and E are polarized, so that when a current is sent through them in one direction the magnet C is energized, while when the current is sent through in the opposite direction the magnet E is energized. These magnets are provided with armatures C' and E' and contact-points adjacent thereto, as shown in the drawings. There are also at each local station the ordinary apparatus of a telephone-station, which is illustrated diagrammatically and will be read-



ily understood. Secured to the quadrant M' is an arm M<sup>3</sup> so arranged that when the contact-arm M<sup>2</sup> is at its normal position the arm M<sup>3</sup> will press a contact-spring 54 against the contact-point 53. When the contact-arm M<sup>2</sup> has been moved one step, the connection between 53 and 54 is broken. At the central office there is the usual apparatus the nature of which and its connections will become apparent in a description of the operation.

Assuming that subscriber at telephone No. 2 wishes to talk with the subscriber at telephone No. 4, he first removes his receiver, when the hook H rises, making electrical connection to a contact-spring 27. This contact between the hook and spring 27 is made during the rising movement of the hook and is released just before the hook reaches its elevated position. A current then flows from the battery X at central office to 20, D, 22, 21, D', 23, 24, 50, 25 of telephone No. 2 to 26, 27, H, 28, 100, 29, 30, 31, X. This operates the drop D at the central office to call the operator. By pressing key 33 the operator is then in telephonic connection with the subscriber at telephone No. 2 and can inquire what subscriber is wanted. The talking-circuit is from the induction-coil at the central office to K, R, 32, 33, 100, 28, H, 35, K, R, 36, M<sup>2</sup>, M', M<sup>3</sup>, 25, 50, K at the central office. The subscriber then hangs up his receiver until called by the operator at central or depresses the hook H by hand, when the operator presses the key 31 and the current flows as follows: Ground at central office to 37, 38, 31, X, 20, 39, 40, 34, 29, 100, 28 of each station to 41, C, E, 42 to ground at the several local stations. This operates the magnets C, closing the armatures C' to the contact-points 44, when in each station a current flows to Y, 43, C', 44, 45, 46, 47, 48, 49, 51, A, 52, Y. This advances each contact-arm M<sup>2</sup> one step and is repeated until the contact-arms are all on the second contact-point, when the operator turns her generator-crank, and the current flows as follows: G, 56, 29, 100, 28, H, 57, Q, 58, J, J', J<sup>2</sup>, M<sup>2</sup>, M<sup>3</sup>, 25, 50, G. This calls the subscriber who originally called the central office and who again removes the receiver, thereby breaking the connection between 47 and 48, so that the magnet A cannot again be energized, and consequently the contact-arm M<sup>2</sup> cannot be moved beyond the contact-point J<sup>2</sup>, to which is connected the wire J'. The operator at central then presses the key 31 as before, advancing all of the other contact-arms to the fourth contact-point, when she again turns her generator-crank, calling the subscriber at telephone No. 4. The talking-circuit between the two telephones thus connected is as follows: K of No. 2, to R, 36, J', M<sup>2</sup>, M', M<sup>3</sup>, 25, 50, to 25 of telephone-station No. 4, to M<sup>3</sup>, M', M<sup>2</sup>, J 36, R, K, 35, H, 28, 100, back to 28 of telephone-station No. 2, to

H, 35, K. By pressing the key 33 the operator at central can listen into the talking-circuit, and thus determine when the subscribers are through. She then presses key 61, when the current flows as follows: Ground at the several local stations to 42, E, C, 41, 100, 29, 30, 31, X, 39, 61, 62, 37, to ground at the central office. This reverses the direction of the current through the magnets C and E, thereby energizing the magnet E and moving the armature E' into connection with the contact-point 63, when a current flows as follows at each local station: Y, 43, E', 63, 64, B, 52, Y. This releases the pawls from the quadrant and permits the contact-arms M<sup>2</sup> to return to their normal position.

Referring back to the local circuit through the magnet A, if a subscriber should attempt to prevent his contact-arm from moving to one of the contact-points which is not connected to the normal contact-point the first closure of the key 31, which energizes magnet C, and thereby closes the circuit through magnet A, will flow as follows: Y, 43, C', 44, 45, 53, 54, 55, 51, A, 52, Y. As soon as the contact-arm is moved one step the connection is opened between 53 and 54, and consequently the contact-arm of the subscriber who has removed his receiver is left with said contact-arm at a blank connection, in which case he is not in telephonic connection with any line.

What I claim is—

1. The combination with the switching mechanism of a telephone-station comprising a series of contact-points, a contact-arm therefor, and a magnet for moving said contact-arm, of a battery and connections for operating said magnet, a circuit-breaking device in said connection, a receiver-hook arranged to close said device when in one position and to open it when in another position, a branch connection around said circuit-breaking device arranged to permit of a single movement of said contact-arm, a central office, connections from the central office to the station, and means whereby said magnet may be operated from said central office.

2. The combination with a switching mechanism arranged to be moved step by step to different positions, connections for causing such movement, and a receiver-hook arranged to make and break said connections, of a branch connection not including said receiver-hook, and means whereby said switching mechanism may be operated through said branch connection so as to give said switching mechanism a movement limited to one step.

Signed at Chicago, Illinois, this 30th day of October, 1900.

N. EMEL NORSTROM.

Witnesses:

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