

No. 794,112.

PATENTED JULY 4, 1905.

J. L. McQUARRIE.
SERVICE METER FOR PARTY TELEPHONE LINES.

APPLICATION FILED JAN. 29, 1903.

2 SHEETS—SHEET 1.

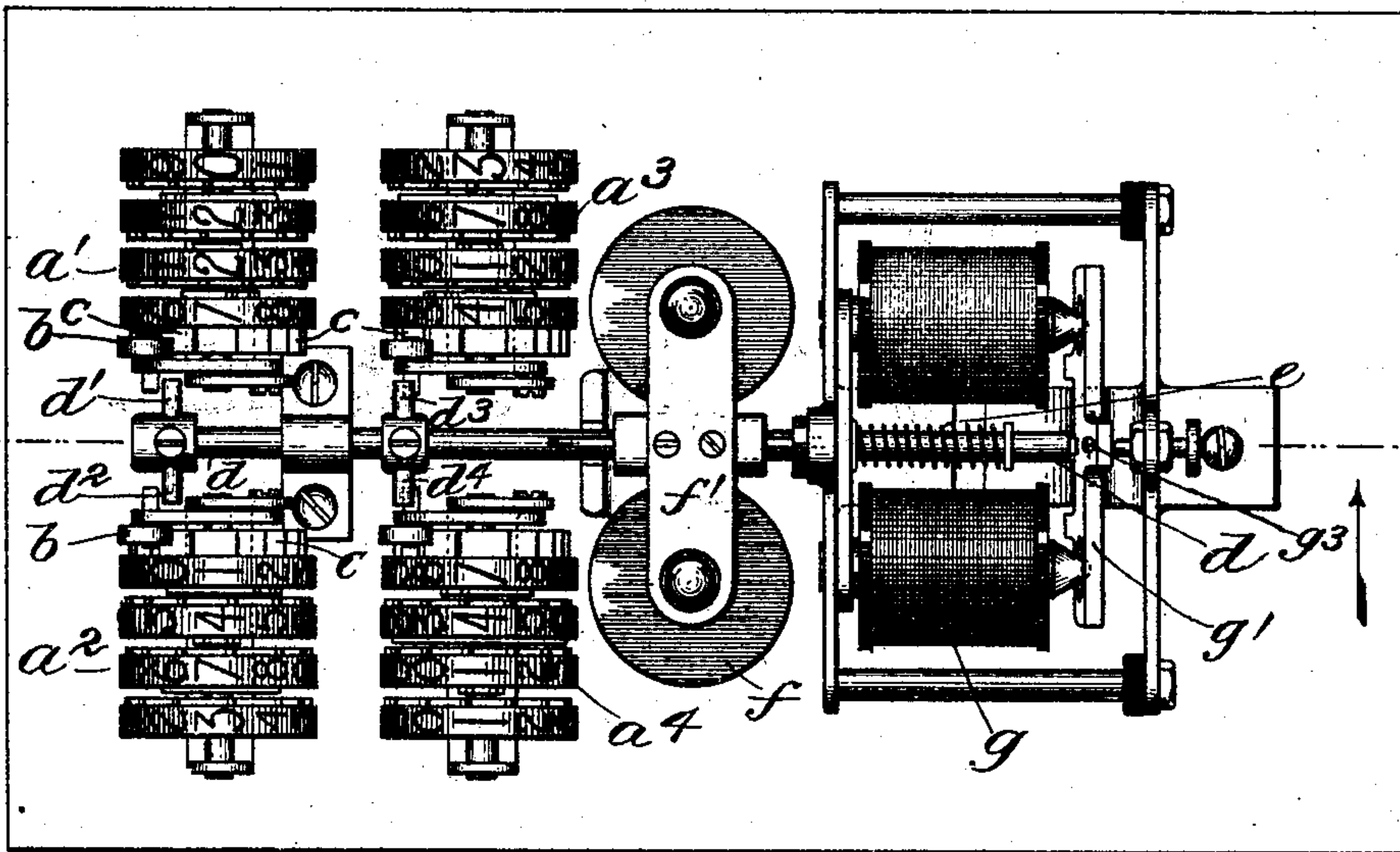


Fig. 1.

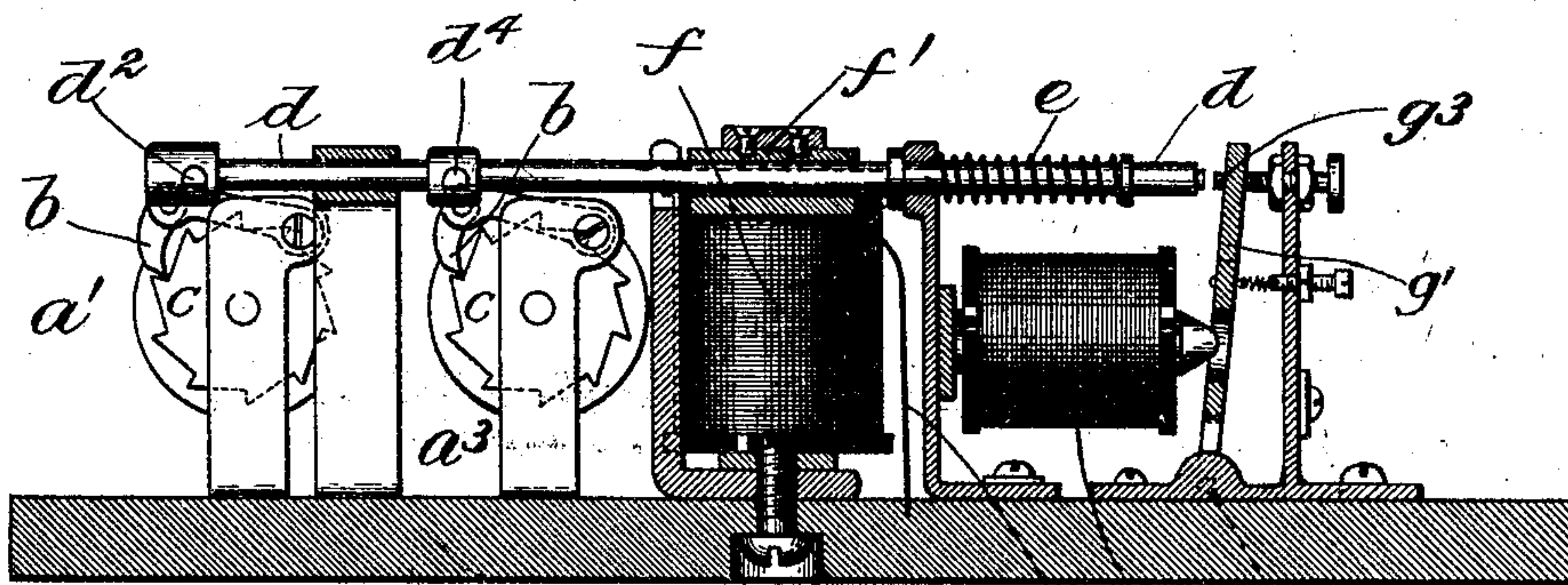


Fig. 2. f²g g²

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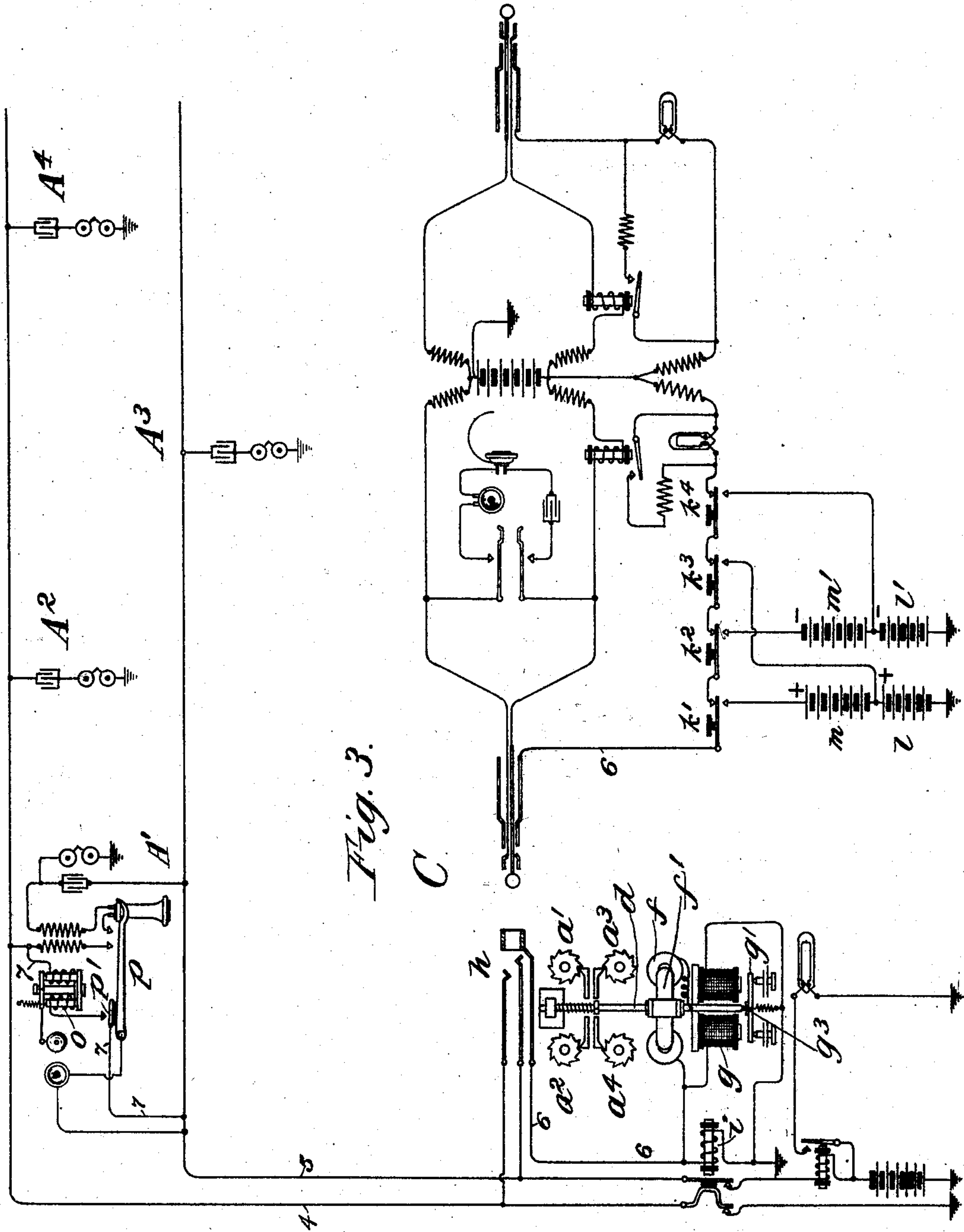
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

JAMES L. McQUARRIE, OF CHICAGO, ILLINOIS, ASSIGNOR TO WESTERN ELECTRIC COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

SERVICE-METER FOR PARTY TELEPHONE-LINES.

SPECIFICATION forming part of Letters Patent No. 794,112, dated July 4, 1905.

Application filed January 29, 1903. Serial No. 140,969.

To all whom it may concern:

Be it known that I, JAMES L. McQUARRIE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Service-Meters for Party Telephone-Lines, of which the following is a full, clear, concise, and exact description.

My invention relates to a service-meter for party telephone-lines, and has for its object to provide a device which may be associated with a party-line and selectively operated to independently register the calls from each of the several stations.

Preferably a number of counting-trains are provided—say four for a four-party line—with electromagnetic mechanism associated therewith in a local switchboard-circuit closed when connection is made with the line. The operator may be provided with keys corresponding in number to the counting-trains, each key being arranged when actuated to throw on the circuit a specialized current, which will operate the mechanism of the multiple register in such a way as to effect a registration on the corresponding counting-train without necessarily affecting the others.

I will describe my invention particularly by reference to the accompanying drawings, and the features or combinations which I regard as novel will be pointed out in the appended claims.

Figure 1 is a plan view of a four-party line service-meter constructed in accordance with my invention. Fig. 2 is a sectional elevation thereof; and Fig. 3 is a diagram illustrating a party telephone-line extending from four substations to a central office, the system being equipped for independent registration of the calls from each of the substations according to my plan.

The same characters of reference are used to designate the same parts wherever they are shown.

Referring first to Figs. 1 and 2, four counting-trains a' a^2 a^3 a^4 of ordinary construction are illustrated, each adapted to be advanced step by step by means of a pawl b engaging

a ratchet-wheel c . An actuating-shaft d is provided with four projecting lugs d' d^2 d^3 d^4 , which are arranged to strike the pawls b of the counting-trains to actuate the same when the shaft is rotated or rather rocked in its bearings. The shaft d is arranged to slide longitudinally as well as to rotate axially and is normally maintained in position so that the lugs d^3 d^4 are in operative relation to the actuating-pawls of counting-trains a^3 and a^4 , respectively, so that if the shaft is rocked axially in its bearings one of said counting-trains will be actuated, depending upon which way the shaft is rocked. This position is shown in Figs. 1 and 2, and it will be observed that the lugs d' and d^2 do not now register with the actuating-pawls b of counting-trains a' and a^2 , so that neither of these counting-trains will be actuated by a simple axial rocking movement of the shaft in either direction; but the shaft d is adapted to be moved longitudinally in its bearings against the tension of the spring e until the lugs d' d^2 are brought into operative relation to the actuating-pawls of counting-trains a' a^2 , in which position lugs d^3 d^4 are moved out of operative relation to the actuating-pawls of counting-trains a^3 a^4 . Now if the shaft d is axially rotated the counting-trains a^3 a^4 will be unaffected; but instead one or the other of the counting-trains a' a^2 will be actuated, depending upon which way the shaft is rocked.

The shaft d is arranged to be moved by either or both of two magnets f g , one of which controls its axial rotation, while the other controls the longitudinal movement. Thus the actuating-magnet f , which is polarized, is provided with an armature-lever f' , splined to rotate with the shaft, (which is free to slide longitudinally therein,) so that the shaft may be rocked to one side or the other by passing a current of one polarity or the other through the coils of the polarized magnet. The armature-lever f' is held normally in a central position by a centralizing-spring f^2 . The armature g' of the selecting-magnet g is pivoted at g^2 in position, so that when attracted it will strike the end of the shaft d

and make electrical contact therewith. Ordinarily this will not move the shaft, but when special strong current is applied to the magnet g the armature will be so strongly attracted as to overcome the tension of spring e and move the shaft longitudinally, so that counting-trains $a^3 a^4$ are put out of gear, so to speak, and counting-trains $a' a^2$ brought into gear. It is thus apparent that either of counting-trains $a^3 a^4$ may be actuated by simply applying suitably-directed current to magnet f , and that either of counting-trains $a' a^2$ may be actuated by first applying strong current to magnet g to shift the shaft d , and then applying suitably-directed current to the polarized magnet f to rock the shaft axially in its bearings.

Turning now to Fig. 3, the manner of associating the multiple service-meter with a party telephone-line entering an exchange-switchboard will be apparent. The party-line is shown extending in two limbs 4 5 from the four substations $A' A^2 A^3 A^4$ to a spring-jack terminal h at a central switchboard C. The system shown is equipped in accordance with the usual plan shown as the central-battery-relay switchboard system, which is so well known in the art that a detailed description is unnecessary. As applied to such a system I prefer to connect the service-meter in parallel with the cut-off relay i and to provide keys $k' k^2 k^3 k^4$, associated with the operator's answering-plug, by which the specialized currents may be applied in the local circuit 6 to bring about the actuation of the corresponding counting-trains. Said cut-off relay-circuit 6 is established, as usual, in registering contacts of the answering-plug and the spring-jack h of the line. The magnets of the service-meter are adjusted not to correspond to the ordinary current in the circuit through the usual resistance and supervisory signal-lamp. When either of keys $k^3 k^4$ is depressed, positive or negative current, respectively, is applied directly to the circuit 6 from batteries l or l' , so that magnet g , permanently included in parallel with the cut-off relay, is excited and in attracting its armature closes the relay-contact g^3 , which switches the polarized magnet f into circuit, this magnet being then excited to rock the shaft d to one side or the other, according to the direction of the current, and so to actuate one or the other of the counting-trains $a^3 a^4$. Keys $k' k^2$ are adapted to apply stronger current from the double batteries $l m$ and $l' m'$, respectively, so that the armature of magnet g , striking the end of shaft d , will not only close the parallel circuit containing magnet f , but will shift the shaft longitudinally, bringing the counting-trains $a' a^2$ into gear, so that one or the other will be actuated when the polarized magnet rocks the shaft, the trains $a^3 a^4$ being out of gear. Thus the key k' , applying positive strong current, brings about the actua-

tion of counting-train a' , the key k^2 , applying negative strong current, actuates train a^2 , and keys k^3 and k^4 , applying positive and negative weak currents, actuate trains $a^3 a^4$, respectively.

In order that the operator at the central office may know which of the stations $A' A^2 A^3 A^4$ has called, so that she may press the corresponding key, each station may be equipped with a special single-stroke bell o in a bridge 7 of the circuit controlled at a normally open special contact p' of the telephone-switch p . The bells at the different stations may have different tones, so that the operator can distinguish the station by the characteristic tone. She therefore listens in with her telephone while inserting the answering-plug, which applies current from the battery in the cord-circuit to the line, and so rings the bell at the station where the telephone has been taken from the hook to send a call. The distinctive sound of the bell is heard in the operator's telephone, so that she can press the proper key to register the call without necessarily depending on the subscriber to learn which of the party-line substations is calling. This feature constitutes no part of the present invention, but forms the subject-matter of my divisional application, Serial No. 236,268, filed December 10, 1904.

It is apparent that the ideas herein suggested may be embodied in apparatus differing considerably from that shown in the drawings and specifically described without departing from the essential features of the invention.

I therefore claim—

1. A service-meter comprising a plurality of counting-trains, an actuating-magnet, intermediate actuating mechanism, a selecting-magnet adapted to move said actuating mechanism into operative relation with any one of said counting-trains, and means for controlling said magnets jointly or independently.

2. A service-meter comprising two counting-trains, an actuating-arm therefor normally in position to operate one of the trains, a magnet adapted to move the arm into position to operate the other train, a second magnet for imparting another movement to the arm to actuate either counting-train dependent on the relative position of the arm, and means for applying current to said magnets to energize them.

3. The combination with pairs of counting-trains, of an actuating-shaft controlling the actuation of said counting-trains, said shaft being arranged to move to bring the same into operative relation to any given pair of counting-trains, the shaft being also adapted to rock axially to actuate one or the other of the counting-trains with which the shaft is brought into operative relation.

4. The combination with pairs of counting-trains, of an actuating-shaft controlling the

actuation of said counting-trains, said shaft being arranged to slide longitudinally to bring the same into operative relation to any given pair of counting-trains, the shaft being also
5 arranged to rock axially to actuate one or the other of the counting-trains of such pair, a circuit containing a polarized electromagnet responsive to weak current arranged to rock the shaft to one side or the other dependent
10 upon the direction of current, a neutral magnet in the same circuit responsive to strong current, adapted to shift the shaft longitudinally, and means for applying in the circuit strong or weak current of either polarity.

15 5. A service-meter comprising a number of counting-trains, actuating mechanism therefor, a shaft governing the operation of said actuating mechanism, said shaft being adapted to move longitudinally and to rotate axially,
20 one of said movements selecting the counter to be actuated and the other movement actuating the counter so selected, an electromagnet adapted to act on the shaft to move it longitudinally, another magnet adapted to act on
25 the shaft to rotate it axially, and means for applying current to said magnets to energize them.

30 6. In a service-meter the combination with a plurality of counting-trains, of an actuating-magnet, intermediate actuating mechanism, a selecting-magnet adapted to move said actuating mechanism into operative relation

with any one of said counting-trains, means for producing current in the windings of said magnets to energize the same, and blocking
35 mechanism controlled by the selecting-magnet adapted to prevent the actuation of the actuating-magnet, said blocking mechanism being made inoperative in the response of the
40 selecting-magnet, whereby the premature operation of the actuating-magnet is prevented.

7. In a service-meter, the combination with a plurality of counting-trains, of an actuating-magnet, an actuating-arm, said arm being normally in position to operate one of said
45 trains, a selecting-magnet for moving the arm into position to operate another of said trains, a circuit including the winding of said selecting-magnet, means for producing current in the circuit to energize said magnet, switch-
50 contacts of the selecting-magnet, and a circuit of the actuating-magnet controlled thereby, said switch-contacts being adapted to make the actuating-magnet operative in the
55 response of the selecting-magnet, whereby the premature operation of the actuating-magnet is prevented.

In witness whereof I hereunto subscribe my name this 22d day of January, A. D. 1903.

JAMES L. McQUARRIE.

Witnesses:

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E. H. SMYTHE