

No. 834,208.

PATENTED OCT. 23, 1906.  
C. KENNEY & R. H. LEATHER.  
TELEPHONE SYSTEM.  
APPLICATION FILED APR. 25, 1904.

2 SHEETS—SHEET 1.

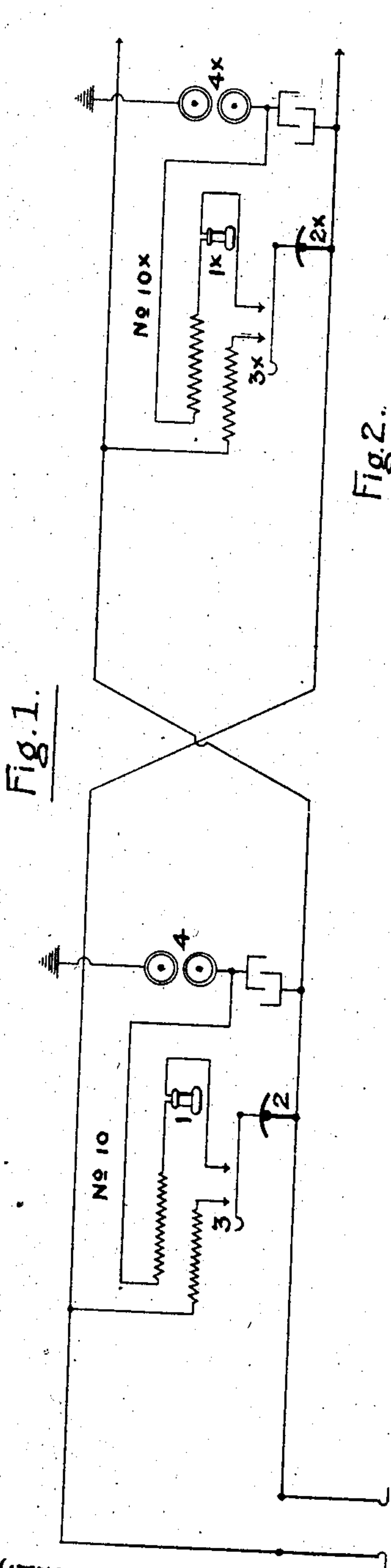


Fig. 1.

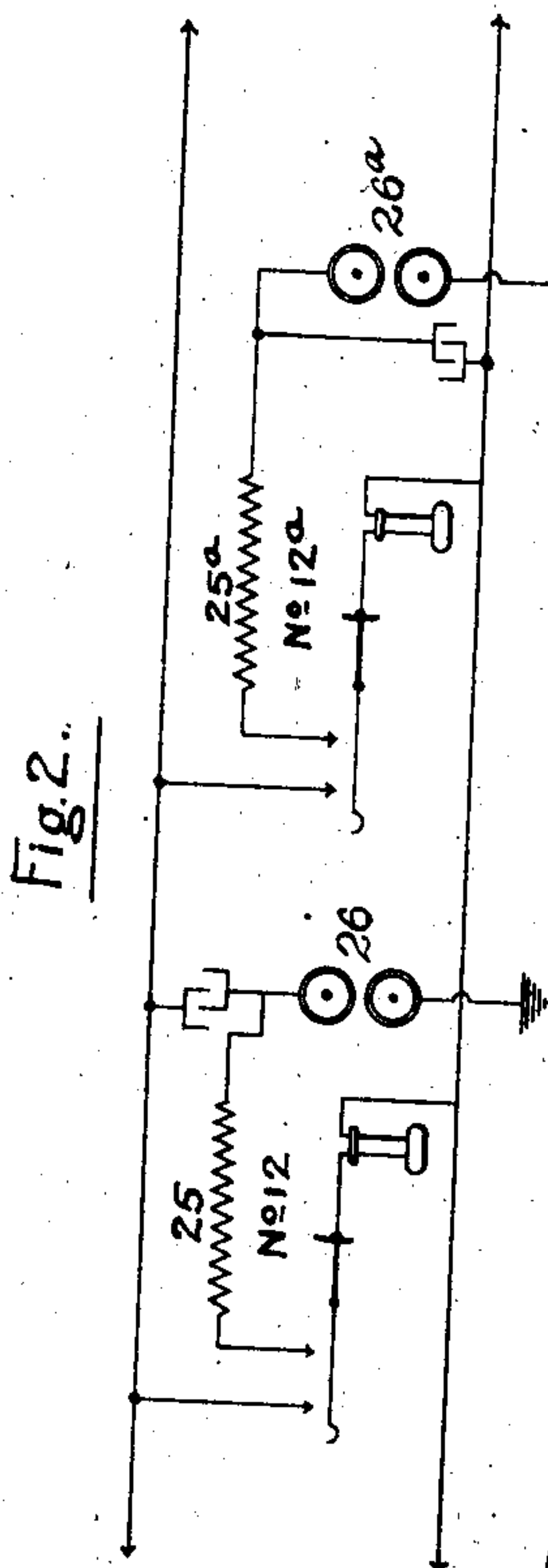


Fig. 2.

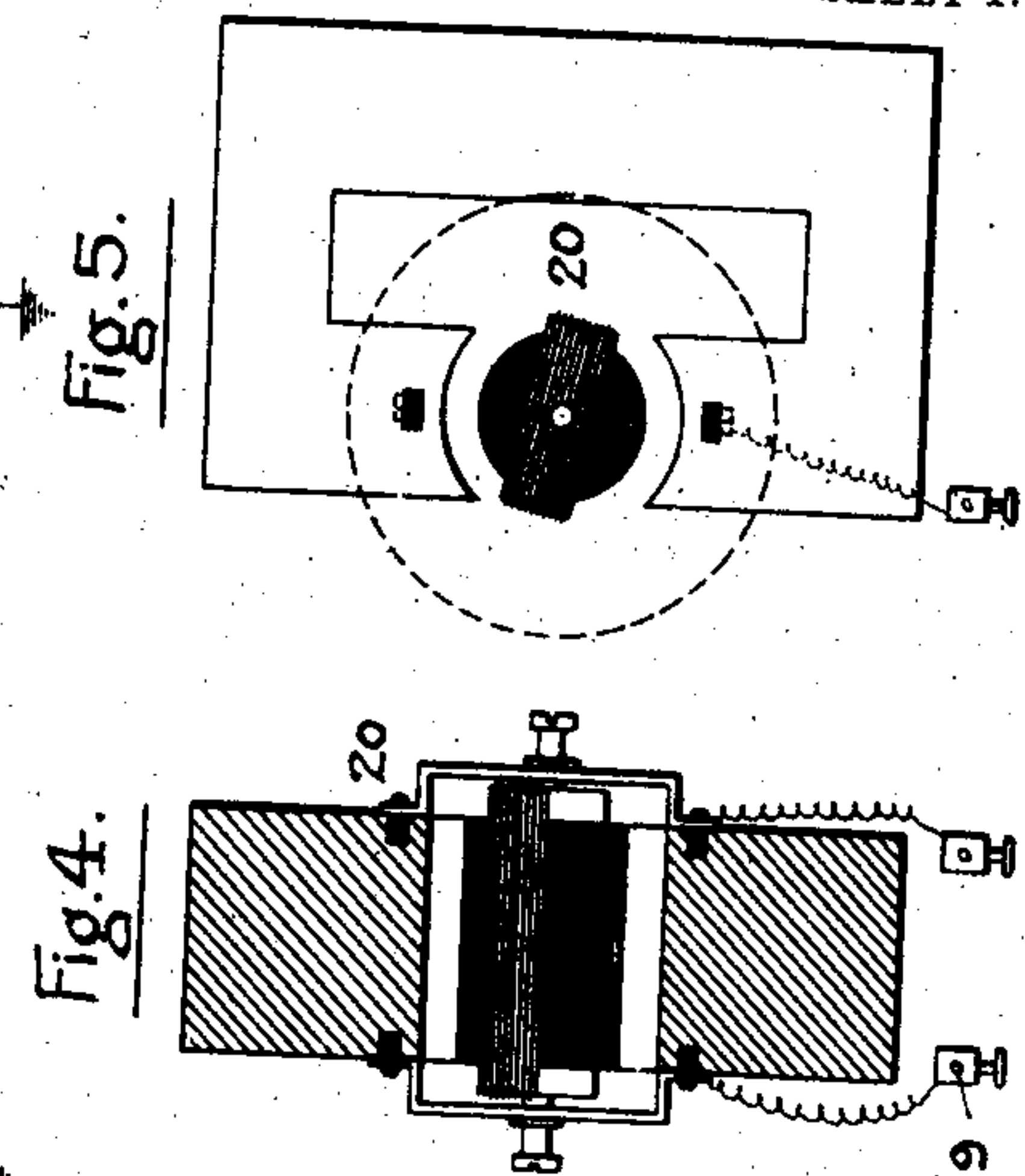
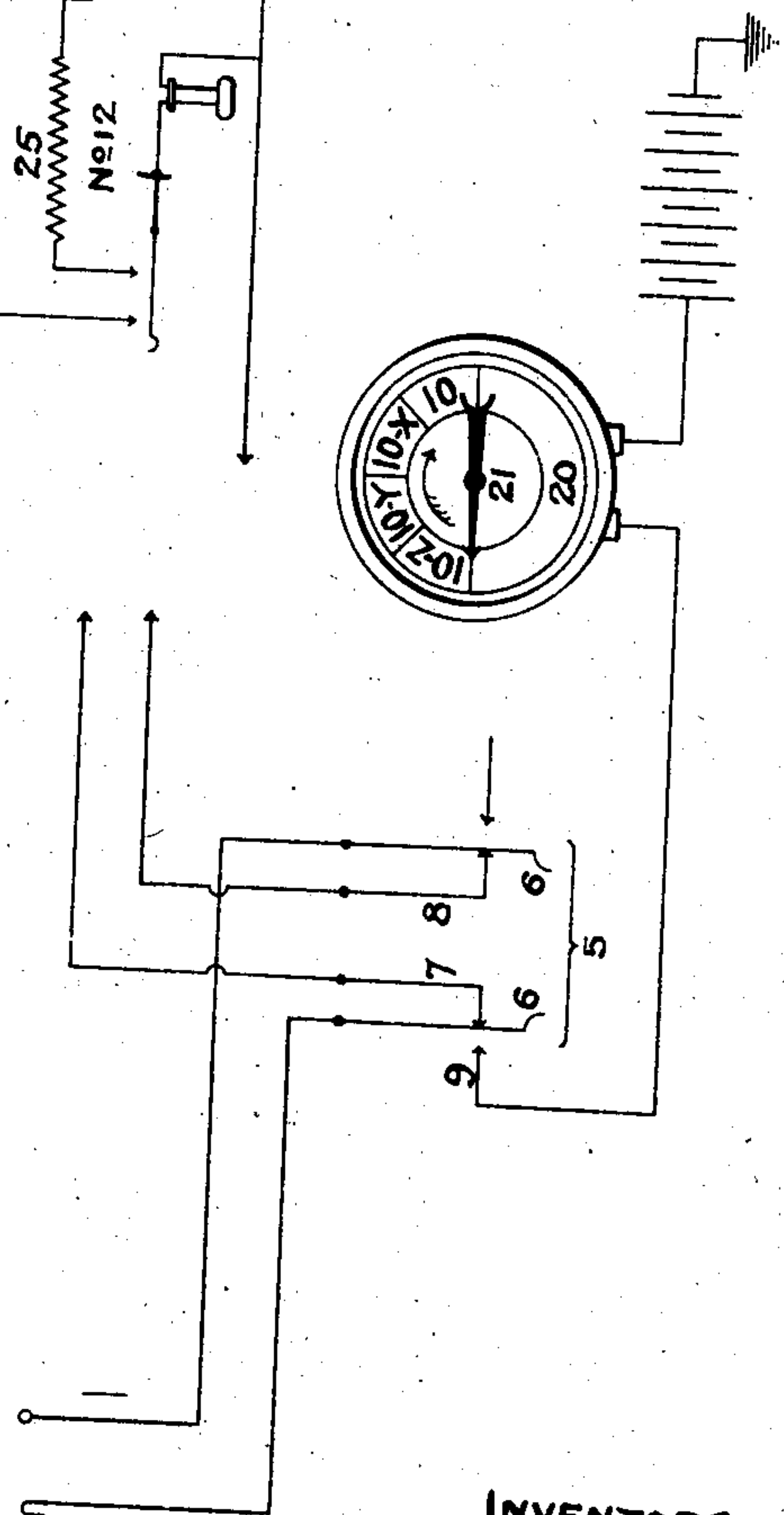


Fig. 5.

Fig. 4.



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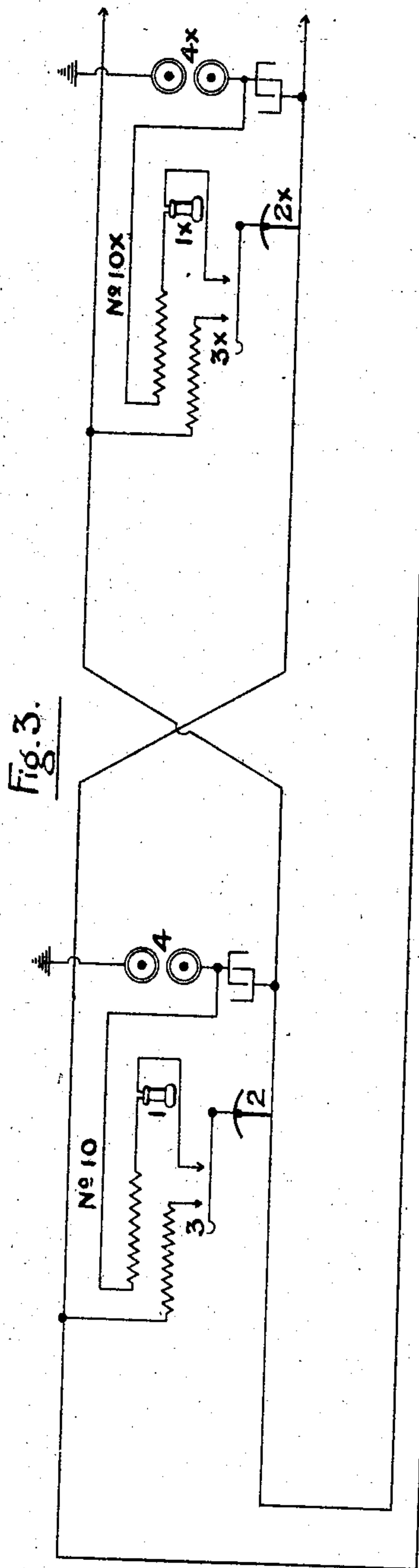
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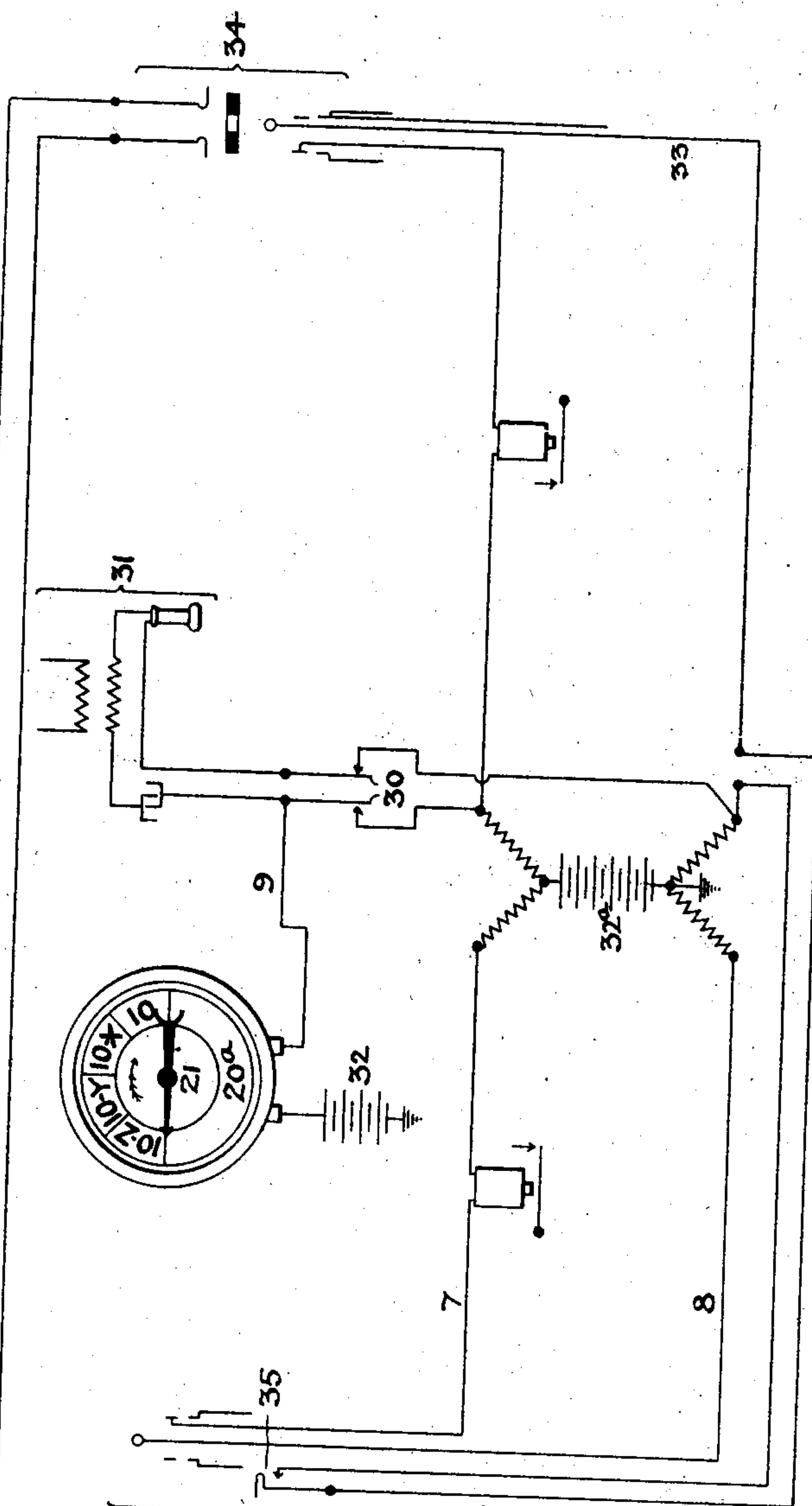
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2 SHEETS—SHEET 2.



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# UNITED STATES PATENT OFFICE.

CHARLES KENNEY AND ROBERT H. LEATHER, OF PHILADELPHIA,  
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## TELEPHONE SYSTEM.

No. 834,208.

Specification of Letters Patent.

Patented Oct. 23, 1906.

Application filed April 25, 1904. Serial No. 204,862.

*To all whom it may concern:*

Be it known that we, CHARLES KENNEY, a citizen of the United States, and ROBERT H. LEATHER, a subject of the King of Great Britain and Ireland, residents of Philadelphia, Pennsylvania, have invented certain Improvements in Telephone Systems, of which the following is a specification.

Our invention relates to telephone systems, more particularly those in which a plurality of telephones are arranged or located upon the same line or circuit, which lines or circuits are usually termed "party lines or circuits."

The object of our invention is to provide automatic means that will indicate or register at the central station the number or other distinguishing-mark of any particular subscriber of any party line or circuit making a call without other action upon his part than the mere lifting of the receiver from its hook.

Our invention is fully shown in the accompanying drawings, in which—

Figure 1 is a view illustrating in diagram the connections and apparatus employed in carrying out our invention. Fig. 2 is a view in diagram of a modified form of part of the system. Fig. 3 is a diagram of a set of central-station connections forming a detail of our invention, and Figs. 4 and 5 are sectional views at right angles to each other of one form of station-indicator for use with our invention.

In the use of telephone party circuits or lines at the present day the central office must depend upon the word of the subscriber calling for knowledge of such subscriber's number in order to make a charge for the special toll for the call. In other words, each call is charged by the central office, and in order to be able to make this charge against the proper subscriber the operator in making the connection is obliged to ask the party calling to give his number or other distinguishing-mark, so that the individual accounts may be kept in proper shape. Inasmuch, however, as any subscriber upon a party line or circuit as at present arranged can hear every message and also from the fact that the removal of the receiver from any telephone on the line will only indicate to the central operator the line from which the call comes and not the particular subscriber, it has become a notorious practice for subscribers on party-

lines to give a wrong number or distinguishing-mark to the operator. For instance, the ordinary method with a four-party circuit or line is to number the instruments in the following manner—i. e., "10," "10 X," "10 Y," and "10 Z." Should the receiver of any one of these different instruments be lifted by a subscriber for the purpose of calling any other subscriber on any line, it will simply indicate to the operator the fact that No. 10 line or circuit is calling, and the person calling, if dishonest, may give one of the other numbers or distinguishing-marks upon the same circuit, and thereby escape payment of the charge for his call. For instance, if the instrument in use is numbered "10 Y" the subscriber can tell the operator that it is "10," "10 X," or "10 Z," and the operator only knowing that it is on the No. 10 line or circuit will be unable to check the statement of said subscriber and a wrong charge will result. We propose to overcome this difficulty and remove entirely from the subscriber the necessity of indicating his number or distinguishing-mark to the central operator.

Broadly speaking, our invention consists in providing bell or other coils which shall be of different resistance for each telephone of a party line or circuit and in using therewith a manually-operated test-key or other means which may be operated for the purpose of placing a suitable indicator in circuit with the line calling, and thereby securing a positive action, which, depending upon the amount of resistance in the circuit, shall infallibly designate the particular instrument in use. The bell-coils, if so employed, also perform their usual function of ringing the bell when the subscriber is called.

In Fig. 1 of the accompanying drawings we have shown two telephones of a party line or circuit in connection with the central-station indicator. At instrument No. 10, 1 represents the receiver; 2, the transmitter; 3, the hook upon which the receiver is hung until it is desired for use and while the calling-circuit is closed, and 4 the bell-coils. Upon removing the receiver, however, the hook rises and closes the talking-circuit, at the same time actuating a suitable signal at the operator's desk. At this desk will be a test-key 5, having a suitable part arranged to engage spring members 6, which are nor-



mally in contact with wires 7 and 8 of the cord-circuit connected with the usual listening set, which has been omitted for the sake of clearness, and this test-key will cause the spring members 5 to be brought into engagement with the contact 9, which is connected to the indicator 20 at the central station. The circuit thus established, including the bell-coils 4 at instrument No. 10, permits an amount of current to flow through said circuit which is dependent upon the resistance of the particular bell-coils included in the same, and by this means the indicating-needle will be deflected to an extent depending upon the amount of current diverted. For instance, the bell-coils of instrument No. 10 may have less resistance than the coils of any of the other instruments on the same line, thereby permitting the passage of the strongest current to operate the indicator, and as a result the needle 21 will be moved in the direction shown by the arrow through its full arc of motion to the point marked "10," and will thereby indicate to the operator that instrument No. 10 is calling. Instrument No. 10 X with its receiver 1<sup>x</sup>, transmitter 2<sup>x</sup>, and hook 3<sup>x</sup> may have bell-coils 4<sup>x</sup> with a slightly-greater resistance than instrument No. 10, in which case the indicating-needle will be moved through a less arc or to the point marked "10 X" to indicate that instrument No. 10 X is calling, and this same scheme will be carried out for all of the instruments of said line or circuit.

The bell-coils have their resistance based upon the unit system, the resistance in each instance being known and increased from instrument to instrument in proper ratio, so that the needle or pointer of the station-indicator may be correspondingly operated.

In systems where no induction-coils are used we may employ indicator-coils of different resistance in each instrument, as indicated at Fig. 2, the connections being carried to the test-key and indicator at the central office in the same manner as in the case of the system shown in Fig. 1. For instance, in Fig. 2 instrument No. 12 will have an indicator-coil 25 of a resistance different from the indicator-coil 25<sup>a</sup> of the instrument No. 12<sup>a</sup>, while the bell-coils 26 and 26<sup>a</sup> will have the same resistance. The operation of the system with this arrangement of parts is substantially the same as with the arrangements previously described.

In the system shown in Fig. 1 the test-key (indicated at 5) is an additional key, which the operator must employ in registering the subscriber's number or distinguishing-mark after such subscriber has called, the wires 7 and 8 being connected to the central-operator's listening set in the usual manner, the connections for which are omitted for the sake of clearness. For the purpose of relieving the operator of this additional work

we may employ the system of central-station connections illustrated in Fig. 3, in which the cord-circuit is more fully illustrated. In this system the instruments on the external lines or circuits and their connections may be similar to those illustrated in Fig. 1 or 2, and we have therefore employed the same reference-numerals in the similar portions of Fig. 3. The portion of the system controlled by the operator, however, is preferably arranged as illustrated in this latter figure, in which the indicator 20<sup>a</sup> has its terminal 9 connected to one of the wires connecting the central-operator's listening-key 30 with the usual listening set 31. The other terminal of the indicator is connected to ground through a suitable battery 32, preferably of the same voltage as the battery or generator 32<sup>a</sup> employed with the listening set.

In the wire 33, connecting the answering-jack 34 with its battery and the listening set, is interposed a switch 35, which is carried upon the calling-plug 36 and so constructed as to be maintained open as long as said plug is in its normal position and out of use. When, however, the plug is moved from such normal position and inserted in a socket to make any desired connection, said switch is permitted to close.

With such an arrangement of apparatus the following actions occur in answering a call and in making a connection to any desired subscriber, viz: Upon the customary visual signal being displayed the central operator inserts the answering-jack 34 in the proper socket and operates the listening-key 30. This not only places the listening set in operative communication with the subscriber calling, but, owing to the fact that the auxiliary switch 35 on the calling-plug is open, permits current to flow from the battery 32 through the indicator 20<sup>a</sup>. The amount of current so flowing depends upon the resistance of the coils of the instrument calling, which coils may be the bell-coils or special indicator-coils, as hereinbefore described. Upon moving the calling-plug and inserting it in the socket connected to the instrument called for the switch 35 is permitted to close, thereby completing the talking-circuit between the two subscribers. It will be noted with this arrangement of parts that the indicator 20<sup>a</sup> is thrown into and out of use without requiring any apparatus other than that customarily employed and actuated by the central-station operator.

The indicator, which is illustrated in Figs. 4 and 5, may be of any suitable galvanometric form, and hence requires no special description.

Having thus described our invention, we claim and desire to secure by Letters Patent—

1. The combination in a telephone system, of an indicator, a line including a series of



telephone instruments, and means for placing any one of said instruments in circuit with the indicator, said instruments including bell-coils of different resistances.

5 2. The combination in a telephone system, of an indicator, a line including a series of telephone instruments, and a key for placing any one of said instruments in circuit with the indicator, said instrument including  
10 bell-coils of different resistances.

3. The combination in a telephone system, of an indicator, a line including a series of telephone instruments, bell-coils of different resistances in circuit with said instruments,  
15 and a key for placing any one of said instruments and its bell-coils in circuit with the indicator.

4. The combination in a telephone system, of an indicator, a line including a series of  
20 telephone instruments, a bell-coil on each instrument, and a key for placing any instrument in circuit with said indicator, the bell-coils of said instruments being of different resistances.

5. In a telephone system, the combination of a line having a series of telephone instruments, an indicator, and a test-key at a central station, each of said instruments including bell-coils of different resistances.

30 6. The combination in a telephone system, of an indicator responsive to variations in current-flow, a line having a series of telephone instruments including coils of different resistances, an instrument at a central  
35 station, and means for placing either the indicator or the central-station instrument in circuit with said line.

7. The combination in a telephone system, of an indicator, a line having a series of telephone instruments including coils of different resistances, an instrument at a central station, and a key having means for placing  
40 either the indicator or the central station instrument in circuit with said line, the connections of the system being such that each of the line instruments causes a different current to flow through the indicator.

8. The combination in a telephone system, of an indicator, a line having a series of telephone instruments including bell-coils of different resistances, an instrument at a central station, and means for placing either the indicator or the central-station instrument in circuit with said line.

55 9. The combination in a telephone system, of an indicator, a line having a series of telephone instruments including bell-coils of different resistances, an instrument at a central station, and a key having means for placing  
60 either the indicator or the central-station instrument in circuit with said line.

10. The combination in a telephone system, of an indicator connected in the listening-circuit at the central station, a line including a series of telephone instruments,  
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and means for placing any one of said instruments in circuit with the indicator, said instruments including coils of different resistances and which causes a different current-flow through the indicator.

11. The combination in a telephone system, of an indicator responsive to variations of current-flow connected in the listening-circuit at the central station, a line including a series of telephone instruments, coils of different resistance in circuit with said instruments, and means for placing any one of said instruments in circuit with the indicator.

12. The combination in a telephone system, of an indicator responsive to variations of current-flow connected in the listening-circuit at the central station, a line including a series of telephone instruments, coils of different resistances in circuit with said instruments, and means for placing any one of said instruments and its coil in circuit with the indicator.

13. The combination in a telephone system, of an indicator connected in the listening-circuit at the central station, a line including a series of telephone instruments, and means for placing any one of said instruments in circuit with the indicator, said instruments including bell-coils of different resistances.

14. The combination in a telephone system, of an indicator connected in the listening-circuit at the central station, a line including a series of telephone instruments, bell-coils of different resistances in circuit with said instrument, and means for placing any one of said instruments in circuit with the indicator.

15. The combination in a telephone system, of an indicator connected in the listening-circuit at the central station, a line including a series of telephone instruments, bell-coils of different resistances in circuit with said instruments, and means for placing any one of said instruments and its bell-coils in circuit with the indicator.

16. The combination in a telephone system, of an indicator connected in the listening-circuit at the central station, a line including a series of telephone instruments, a coil on each instrument, and means for placing any instrument in circuit with said indicator, the coils of said instruments being of different resistances, whereby each instrument is made to cause a different current to flow through said indicator.

17. The combination in a telephone system, of an indicator connected in the listening-circuit at the central station, a line including a series of telephone instruments, a bell-coil on each instrument, and means for placing any instrument in circuit with said indicator, the bell-coils of said instruments being of different resistances.

18. In a telephone system, the combina- 130



- tion of a line having a series of telephone instruments, an indicator connected in the listening-circuit at the central station, and means at said central station for placing any instrument in circuit with said indicator, each of said instruments including coils of different resistances, whereby each instrument is made to cause a different current to flow through said indicator.
19. In a telephone system, the combination of a line having a series of telephone instruments, an indicator connected in the listening-circuit at the central station, and means at said central station for placing any instrument in circuit with said indicator, each of said instruments including bell-coils of different resistances.
20. The combination in a telephone system, of an indicator responsive to variations in current-flow connected in the listening-circuit at the central station, a line having a series of telephone instruments including coils of different resistances, an instrument at a central station, and means for placing either the indicator or the central-station instrument in circuit with said line.
21. The combination in a telephone system, of an indicator responsive to variations in current-flow connected in the listening-circuit at the central station, a line having a

series of telephone instruments including coils of different resistances, an instrument at a central station, and a switch or key for placing either the indicator or the central-station instrument in circuit with said line.

22. The combination in a telephone system, of an indicator connected in the listening-circuit at the central station, a line having a series of telephone instruments including bell-coils of different resistances, an instrument at a central station and means for placing either the indicator or the central-station instrument in circuit with said line.

23. The combination in a telephone system, of an indicator connected in the listening-circuit at the central station, a line having a series of telephone instruments including bell-coils of different resistances, an instrument at a central station and a switch or key for placing either the indicator or the central-station instrument in circuit with said line.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

CHARLES KENNEY.  
ROBERT H. LEATHER.

Witnesses:

MURRAY C. BOYER,  
JOS. H. KLEIN.