

(No Model.)

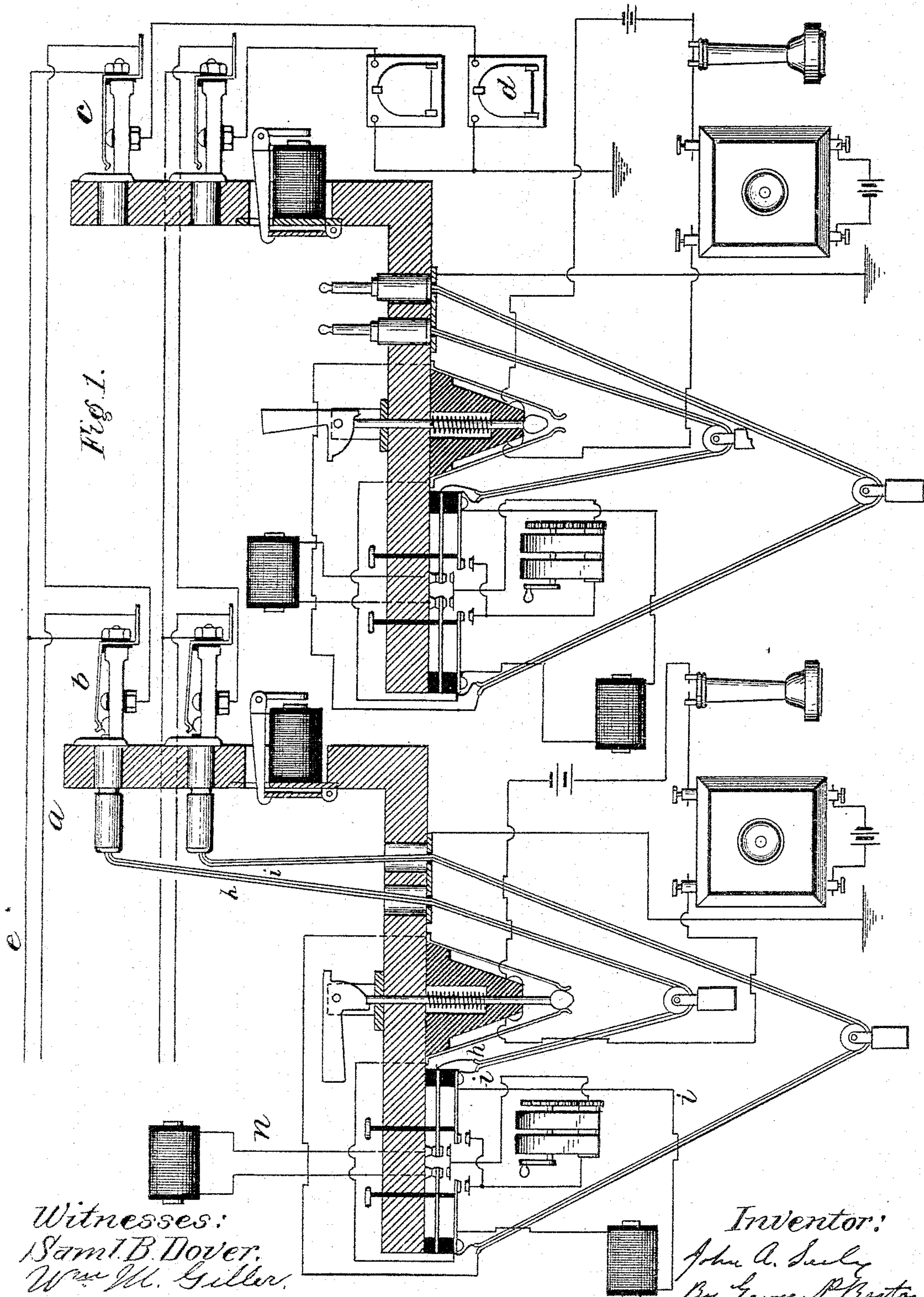
2 Sheets—Sheet 1.

J. A. SEELY.

METALLIC CIRCUIT FOR MULTIPLE SWITCHBOARD SYSTEMS.

No. 491,252.

Patented Feb. 7, 1893.



Witnesses:  
Saml. B. Dover.  
Wm. M. Giller.

Inventor:  
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By George P. Barton  
Att'y

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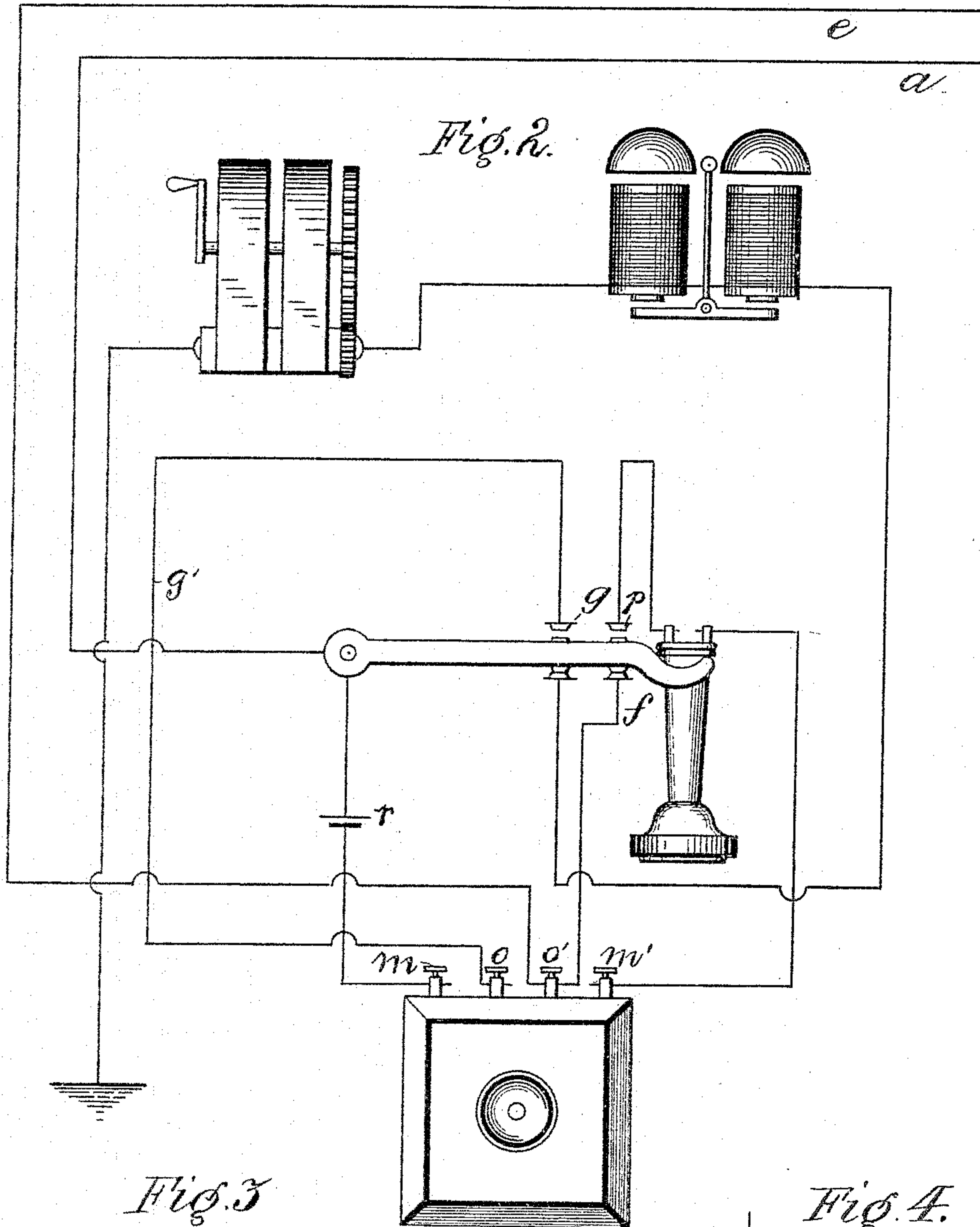


Fig. 3

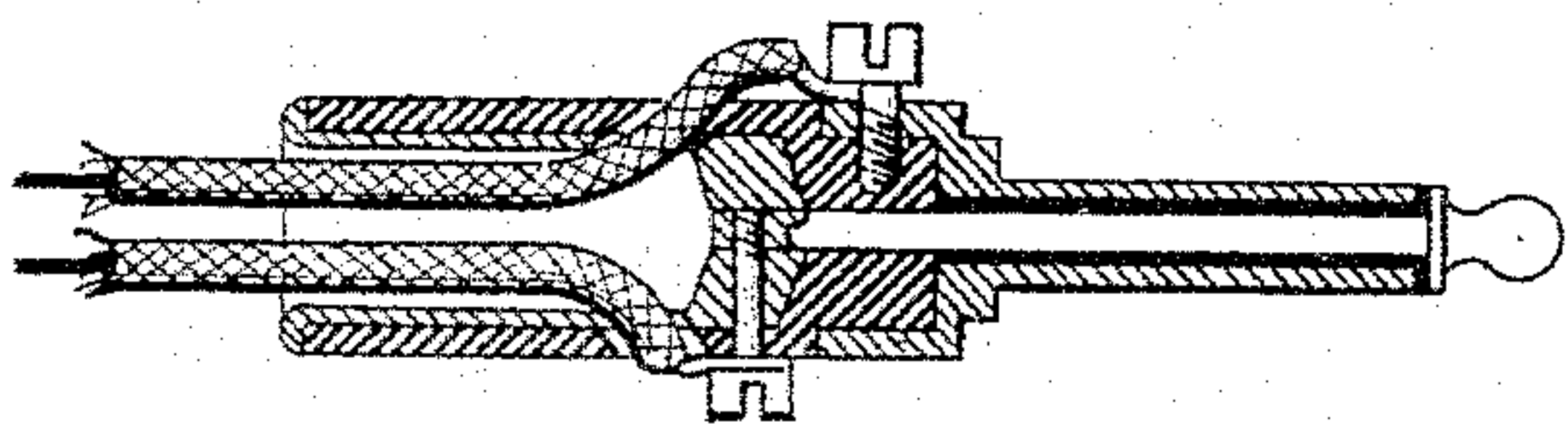
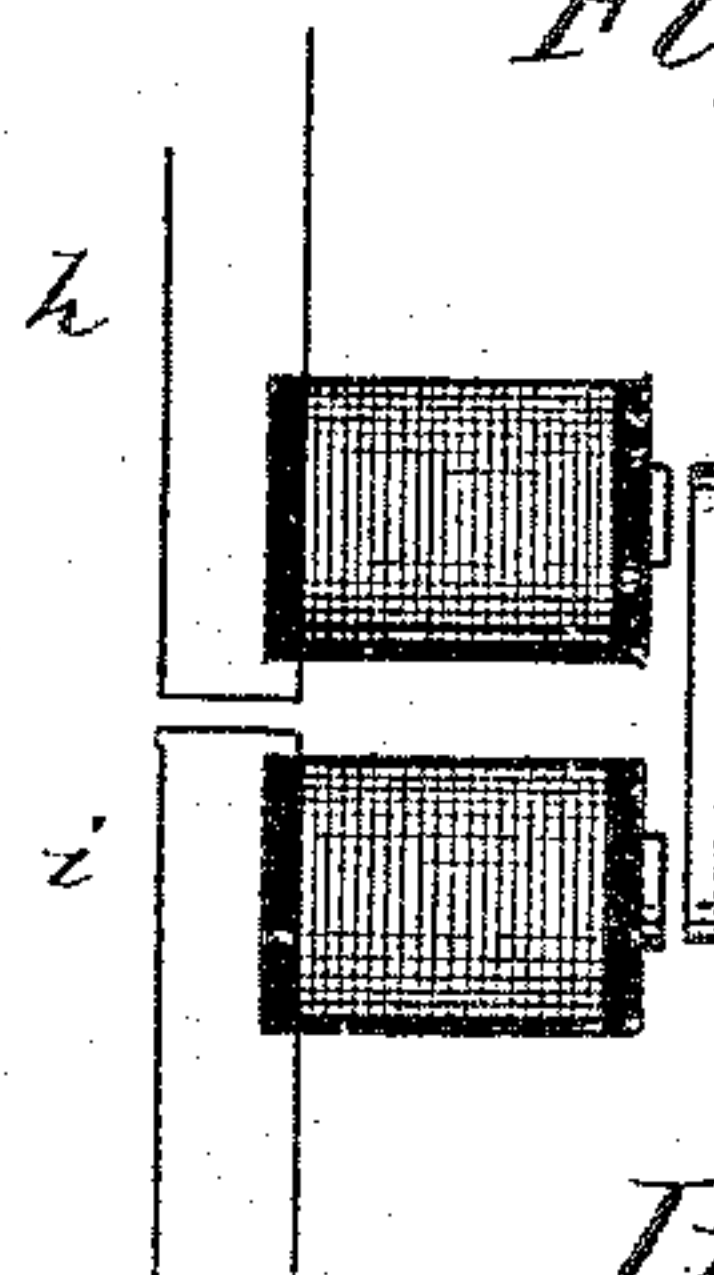


Fig. 4.



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# UNITED STATES PATENT OFFICE.

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## METALLIC CIRCUIT FOR MULTIPLE-SWITCHBOARD SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 491,252, dated February 7, 1893.

Application filed November 15, 1886. Serial No. 218,947. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN A. SEELY, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Metallic Circuits for Multiple-Switchboard Systems, (Case No. 2,) of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to telephone exchange systems in which metallic circuits are used in connection with multiple switch boards, and consists in providing a ground connection for both branches of the metallic circuit at the subscriber's station, so that the ordinary calls may be made over one branch or limb of the circuit, while the other branch or limb connected with the insulated frames of the different switches of the line may be used as a test wire. When the subscriber takes his telephone from the switch, this ground connection is broken at the subscriber's station and the two branches or limbs are united to form a metallic circuit which is completed at the central office through a pair of loop plugs and cords, as hereinafter described.

My invention consists in placing the different magnets of each of the clearing out drops in different strands of the cords, so that the resistance in the two sides or different limbs of the metallic circuit may be balanced.

My invention will be readily understood by reference to the accompanying drawings in which

Figure 1 is a diagram of two metallic circuits connected with their switches respectively on two multiple switch boards, and the different magnets of the clearing out shutters included in different strands of the pairs of cords. Fig. 2 is a diagram illustrative of the circuits at a subscriber's station when the subscriber's telephone is hung upon the switch lever. Fig. 3 is a sectional view showing the loop plug in detail. Fig. 4 shows the two magnets of the clearing out drop in connection with their common armature.

Like parts are indicated by similar letters of reference throughout the different figures.

Referring to Fig. 1, it will be seen that branch *a* of the first telephone line is connected with the levers of the spring jacks *b c* on the different boards and from the spring jack *c* through the subscriber's individual drop *d* to ground. The other branch *e* of the first telephone line is connected with the insulated frames of said spring jacks *b c*, and when no plug is inserted, said branch *e* will be open at the switch board.

Referring now to Fig. 2, it will be seen that branch *a* is permanently connected with the telephone switch lever, and when the telephone is hung upon the switch lever, as shown, the circuit of line *a* is closed through the bell and generator to ground.

Line *e* is shown connected with a contact point *f*, against which the switch lever rests when the telephone is hung thereon; hence the line *e* is also grounded at the subscriber's station as long as the switch rests upon point *f*. Calls may therefore be sent over branch *a* in the usual manner between the subscriber and the central office. Line *e* being normally open at the central office and closed at the subscriber's station, it is evident that when a test is made by connecting a telephone in circuit with a battery with the insulated frame of either of the switches *b c*, circuit will be closed through said wire *e* to ground at the subscriber's station. The click resulting in the telephone will indicate that the line is free.

When the subscriber takes down his telephone, the lever is separated from point *f* and the ground contact of the bell and generator, and closed with the upper contact points, thus closing the local circuit in the ordinary way and uniting the two lines *a e* in a metallic circuit through the telephones. The metallic circuit thus formed may be traced by line *a* to the switch lever, thence to point *g* thence through line *g'* to binding post *o* through the secondary of the induction coil to post *o'* then to line *e*. Thus when the telephone is on the switch lever, the contact point *f* is closed to said switch lever and the branch containing the bell and generator is closed to ground. On removing the telephone, the lever is disconnected from point *f* and the ground con-



nection, and closed to point *g*, the local circuit being also closed at the same time.

The local circuit may be traced from the battery *r* to the switch lever, thence to contact *p*, through the receiver to post *m'*, through the primary of the induction coil to post *m*, thence to battery.

Referring now to the connections upon the switch board of branches *a* and *e*, it will be seen that when a plug is inserted as shown in switch *b*, branch *e* will be connected from the insulated frame of the spring jack to the insulated sleeve upon the plug and thence to a strand of the conducting cord; we will say strand *h*. Branch *a* being connected with the lever of the switch will be disconnected from the ground contact of the switch and closed to the tip of the plug and thence connection will be made with the other strand of the cord; we will say strand *i*. The connection with the other line is made with the other plug of the pair and the second subscriber is summoned by looping in the generator. When two lines are thus connected together and a test is made at any spring jack of either of the lines upon any of the boards, no circuit will be found since the wires are disconnected at the subscriber's stations and connected together to form a single metallic circuit. Therefore if a line wanted is busy when a test is made at one of the test pieces or rings, current will be sent through the telephone and hence no click will be heard. If, therefore, the operator when testing hears no click in the telephone, he will know that the line is in use.

Having thus described my invention I claim as new and desire to secure by Letters Patent—

1. In a multiple system of telephone exchange, the combination with a spring jack switch on each of two or more boards, of a metallic circuit provided with a branch cir-

cuit to ground at the subscriber's station, one of the branches of said circuit being normally connected through said spring jacks and an annunciator to ground, and the other branch being connected with the insulated frames or test pieces of said switches and normally open, and switching apparatus at the subscriber's station, whereby said ground at the subscriber's station may be taken off and the two branches connected together through the subscriber's telephone to form a metallic circuit substantially as shown and described.

2. In combination with spring jacks one on each of two or more multiple switch boards, of a metallic circuit consisting of two branches, one branch being normally connected through the spring jack switches to ground, the other branch being connected to the insulated frames or test pieces of said switches and normally open, and switching apparatus at the subscriber's station and at the central office, whereby said branches may be united to form a metallic circuit substantially as described.

3. In a multiple switch board exchange system the spring jacks of a telephone line, one on each board, said spring jacks being each provided with an insulated frame or test piece to which one branch of the metallic circuit is connected, the other branch being connected through said spring jack switches, testing apparatus at the central office and switching apparatus at the subscriber's station for connecting said lines to ground or with each other in metallic circuit, whereby one branch of said circuit may be used as a test wire or united with the other branch in a metallic circuit substantially as described.

In witness whereof I hereunto subscribe my name this 6th day of November, A. D. 1886.

JOHN A. SEELY.

Witnesses:

H. B. THAYER,  
A. L. SALT.