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INDIVIDUAL CALL.

No. 332,567. Patented Dec. 15, 1885.

Fig. 2.

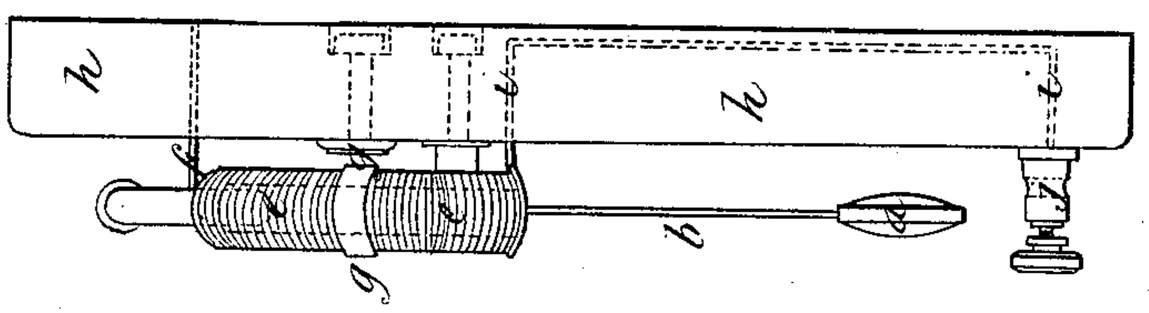

Fig. 1.

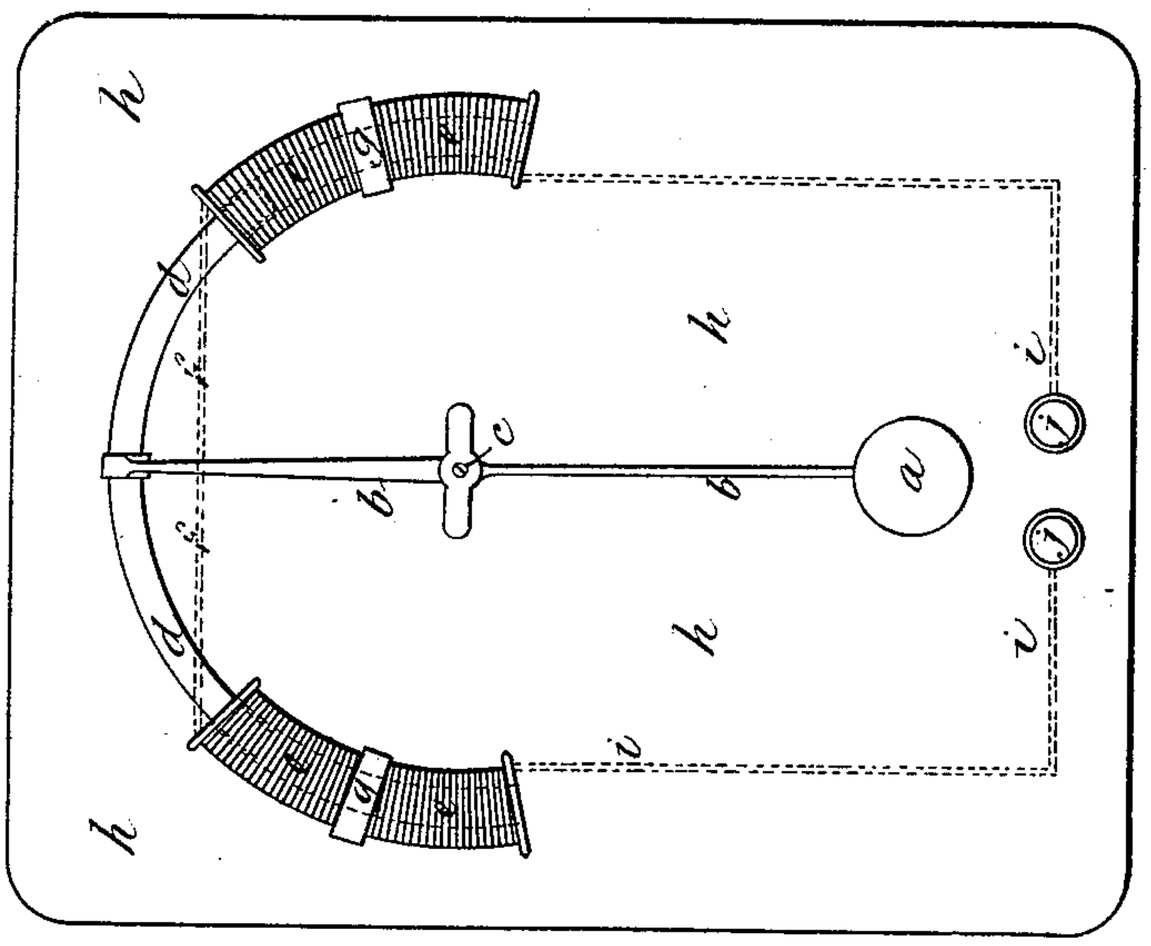

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Fig. 1.

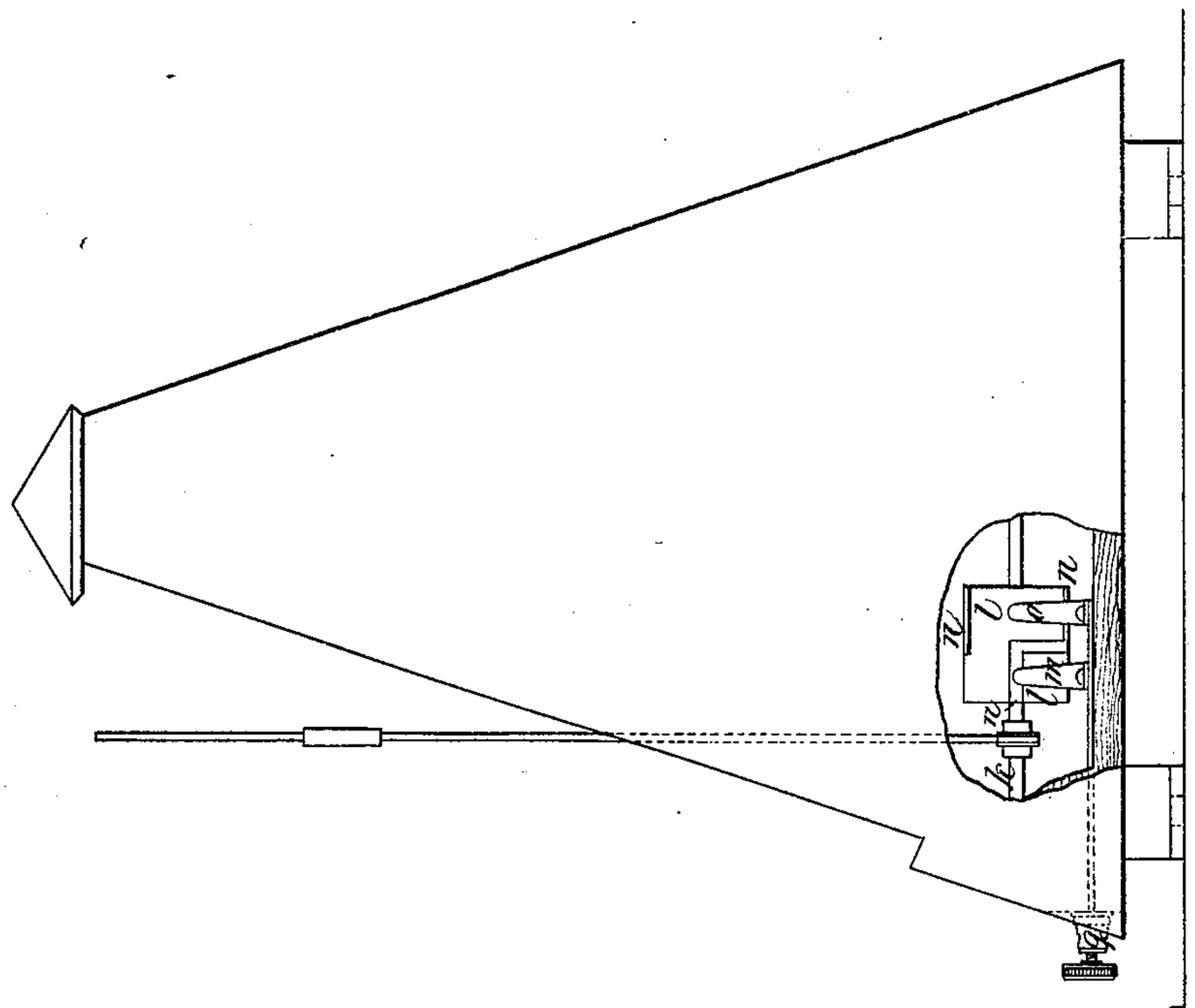

Fig. 3.

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Fig. 6.

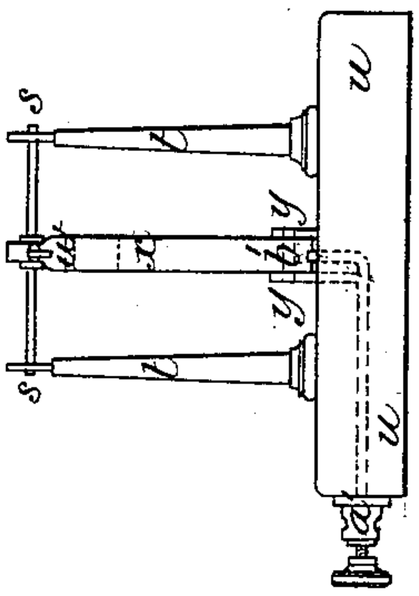

Fig. 5.

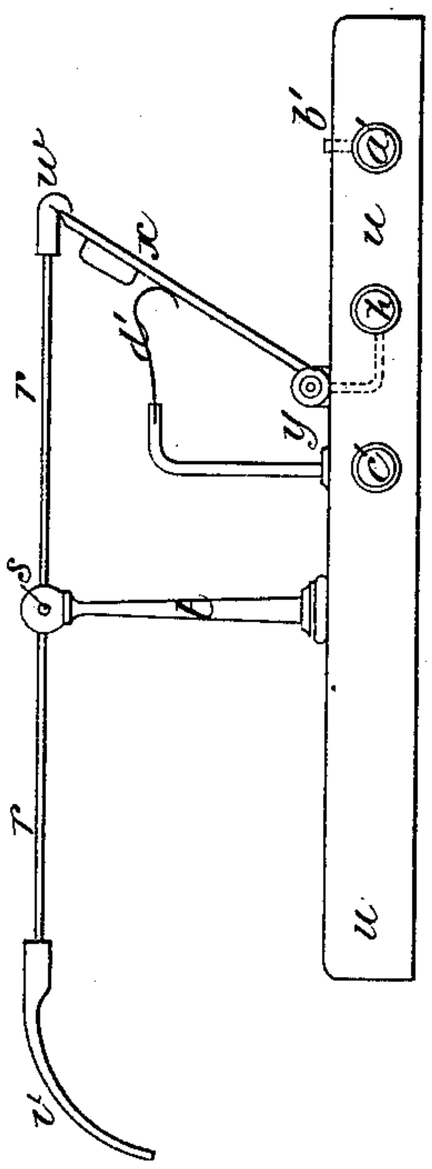

Fig. 7.

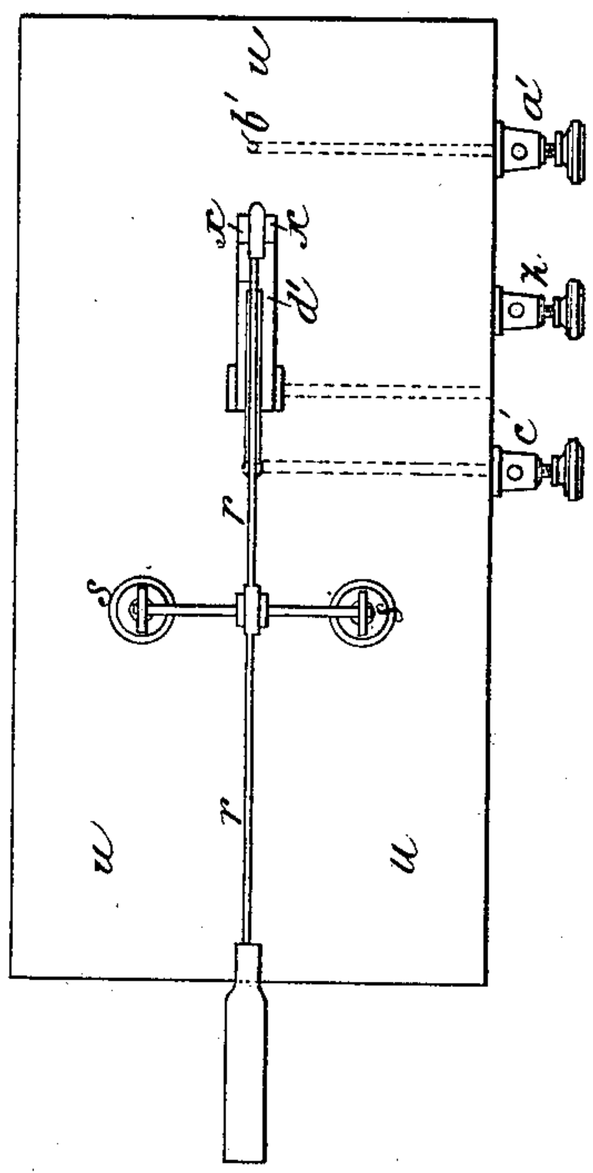

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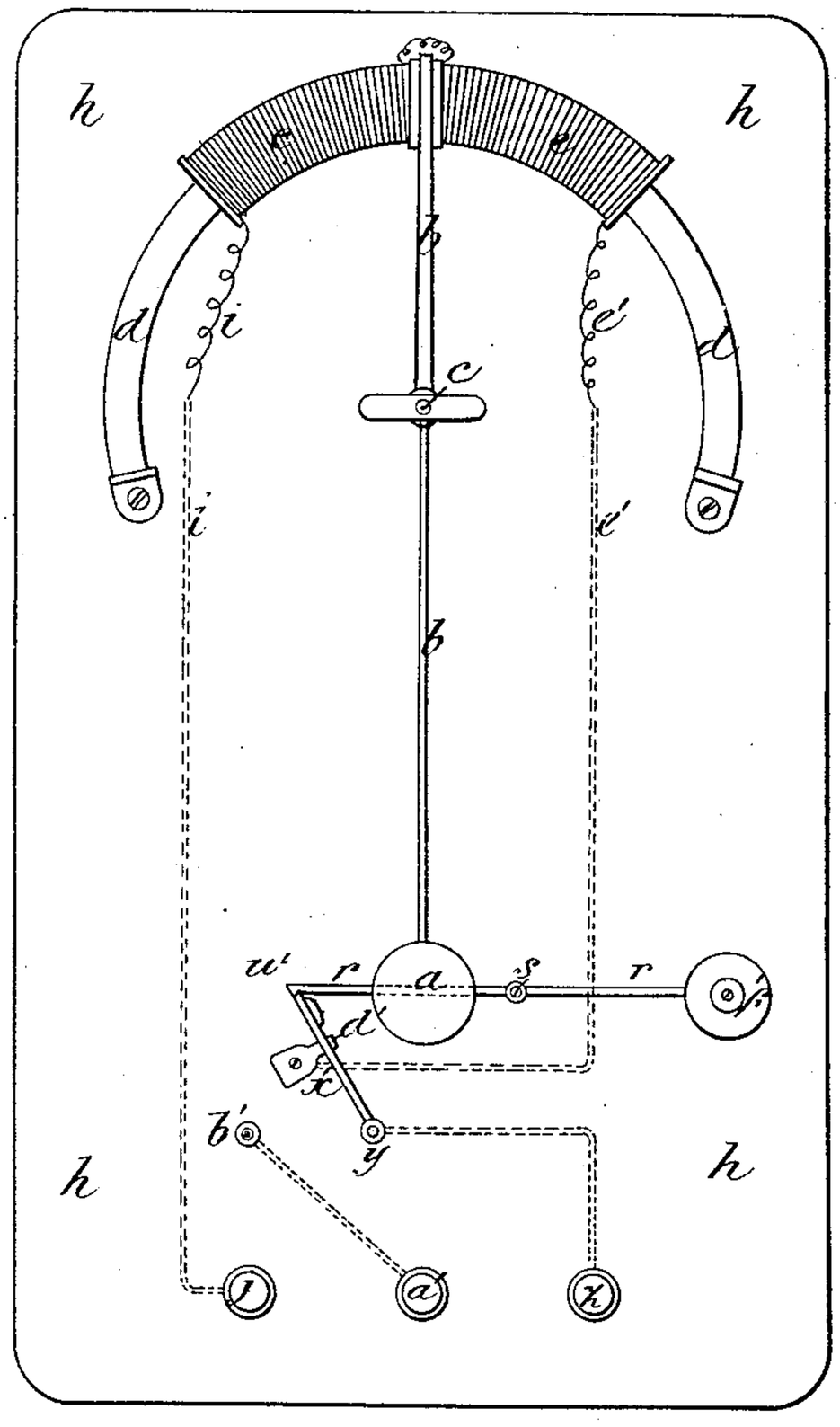
Fig. 8.



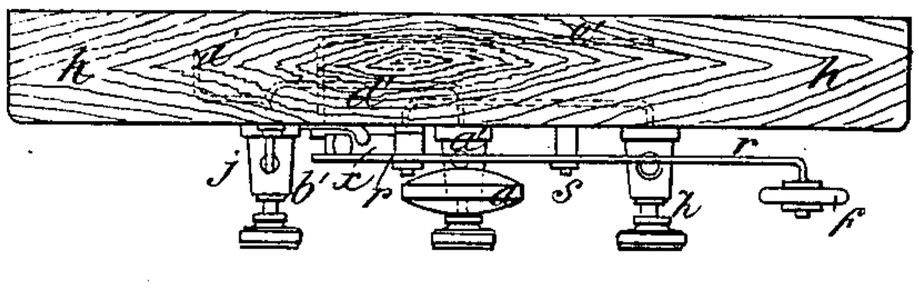


Fig. 9.

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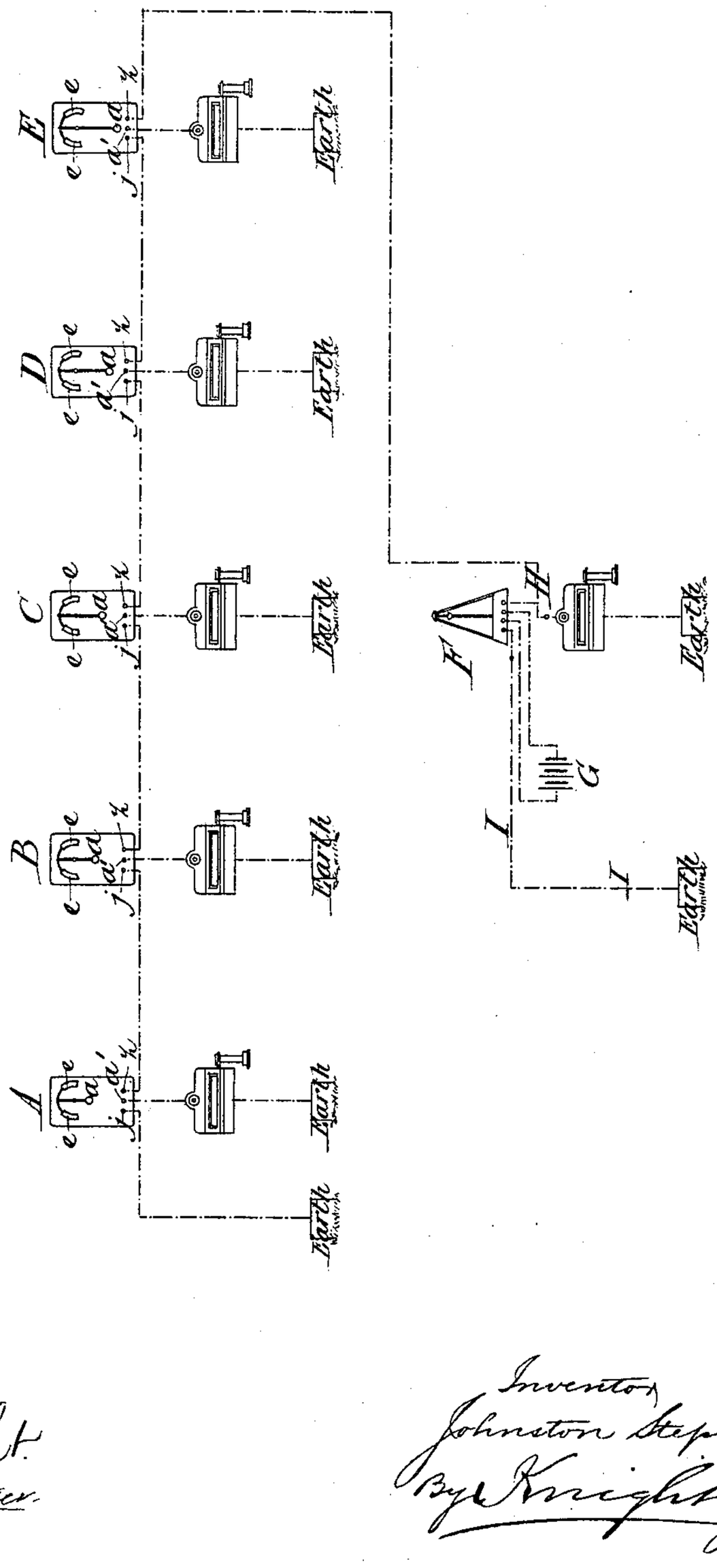
No. 332,567. Patented Dec. 15, 1885.

Fig. 10.



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N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

JOHNSTON STEPHEN, OF EDINBURGH, COUNTY OF MID-LOTHIAN, SCOTLAND.

INDIVIDUAL CALL.

SPECIFICATION forming part of Letters Patent No. 332,567, dated December 15, 1885.

Application filed July 10, 1885. Serial No. 171,220. (No model.) Patented in England February 21, 1884, No. 3,668.

To all whom it may concern:

Be it known that I, JOHNSTON STEPHEN, of Edinburgh, in the county of Mid-Lothian, North Britain, journalist, have invented a Device for Giving an Individual Call to Any One of a Group of Subscribers Connected to a Telephone-Exchange by One Wire, (which has been patented to me in Great Britain by Letters Patent No. 3,668, dated February 21, 1884,) of which the following is a specification.

The object of my present invention is to give a call to one of a number of subscribers or parties on the wire, so that only the person wanted shall receive the call. Each individual subscriber of the group or party placed on one wire has in his house, shop, or office, or other premises connected in the series, a pendulum of a length and therefore period of oscillation proper to himself. This pendulum is hung in such a manner as to be capable of oscillating very freely. The pendulum-rod is prolonged upward above the point of suspension, and carries at its upper end a curved magnet, whose curve is an arc of that circle of which the pendulum-rod from its point of suspension to the curved magnet is a radius. A pair of solenoids wound similarly and connected are arranged in such a fashion that the curved magnet can pass from out of one into the other solenoid. These solenoids in the circuit are connected and are in electrical circuit.

At the central or calling station is a metronome, whose axle carries a commutator, and is arranged in such a way that for each extreme of the oscillation of the metronome-rod a positive or negative current is sent along the wire, and consequently round all the solenoids in the circuit. For each positive current so sent, all the magnets are sucked into one of its pair of solenoids and expelled from the other. For a negative current so sent, the reverse effect is produced. This is in accordance with the well-known law of Ampère. Now, if the metronome at the central or calling station be so set as to beat in period unisonant with any one of the pendulum's periods, it will happen that only that particular pendulum will take up periodic oscillation. This is in accordance with well-known laws of harmonic motion. It will be thus seen that by setting the metronome at the central or calling station to beat in unison with the pendulum period of any one of the subscriber's pendulums that pendulum only will respond and take up swaying. When the pendulum shall have attained sufficient amplitude, it will strike a latch or other arrangement, which by falling will close a circuit, ring a bell, or otherwise call attention. The pendulum may be so constructed as to switch into circuit the telephone and transmitter in any of the well-known ways.

The object of my present invention is to give a call to any one of a number of subscribers in the circuit; so I do not bind myself to use pendulums of any particular kind or pattern, as I may employ springs or other means for obtaining simple harmonic motion, and I do not bind myself to use magnets passing into solenoids, as I may use any solenoids passing over magnets.

In the drawings, Figures 1 and 2 are respectively front and side elevations of one form of pendulum apparatus constructed according to my present invention. Fig. 3 is a front elevation of a metronome constructed according to my present invention. Fig. 4 is a part side elevation and part transverse section of the same. Figs. 5, 6, and 7 are respectively a side, an end elevation, and a plan of a latch or switch used in combination with the pendulum apparatus represented at Figs. 1 and 2. Figs. 8 and 9 are respectively a front elevation and a horizontal section of another form of pendulum apparatus provided with a latch or switch and constructed according to my present invention. Fig. 10 is a diagrammatic view showing an installation formed and connected together according to my present invention.

At the house, office, shop, or other premises of each subscriber of the group placed on one wire I provide a pendulum of oscillation proper to himself. This pendulum, as shown at *a*, Figs. 1 and 2, is hung in such a manner as to be capable of oscillating very freely. The pendulum-rod *b* is prolonged upward above the point *c* of suspension, and carries at its upper end the curved magnet *d*, whose curve is an arc of the circle of which the pendulum-rod *b* from its point, *c*, of suspension to the curved magnet *d* is a radius. A pair of solenoids, *e*, wound similarly and electrically

connected through the wire *f*, are arranged in such a fashion that the curved magnet *d* can pass from out of one into the other solenoid *e*. These solenoids are supported in the brackets *g*, secured to the base-board *h*, and their terminals are electrically connected through the wires *i* to the binding-screws *j*.

At the central or calling station there is provided a metronome, such as is represented at Figs. 3 and 4. The axle *k* of this metronome carries a commutator, whose two metallic portions, *l*, are so arranged relatively to the bearing-springs *m*, which constitute the two terminals of a battery or other source of electricity, that when in a normal position the insulating material *n* of the commutator is in contact with the said springs *m*.

The bearing-springs *o* constitute the terminals of the line in which the metronome is placed in circuit, and bear continuously upon the metallic portions *l* of the commutator, these portions being so arranged that their circumferential points of insulation at one part of their length lie horizontally across the axis *k*, while at the opposite part they lie vertically across the said axis.

The springs *m* and *o* are in metallic connection with the binding-screws marked, respectively, *p* and *q*. When the springs *m* are connected through the binding-screws *p* with a battery or other source of electricity, and the springs *o* are placed in the circuit, no current passes into the commutator when in its normal position; but upon the commutator being rotated in one direction a positive current of electricity is sent along the wire, while on being rotated in the opposite direction a negative current of electricity is sent along the wire. These currents of electricity are passed round all the solenoids *e* which are placed in the circuit. For each positive current so sent all the curved magnets *d* are drawn into one of its pair of solenoids *e* and expelled from the other. For a negative current so sent, the reverse effect is produced. This is in accordance with the well-known laws of Ampère.

In the vicinity of the pendulum *a*, I provide a latch or switch device, which, by being struck by the said pendulum after it has attained sufficient amplitude, closes a circuit. Such a device I have represented at Figs. 5, 6, and 7. In this switch device there is provided the lever *r*, pivoted at *s* in the standards *t*, which are secured to the base or stand *u*. At one end of the lever *r* the curved plate *v* is secured, while at the opposite end the catch or hook *w* is secured. The plate *x* is hinged at *y* to the base *u*, a metallic connection being formed between the hinge *y* and the binding-screw *z*. The binding-screw *a'* is metallically connected to the contact-piece *b'*, and the binding-screw *c'* is in metallic connection with the spring *d'*. This spring *d'* is supported in a bracket, as shown, or by its equivalent, and when the hinged plate *x* is in the position represented on the accompanying drawings—that is to say, in its normal position—the said spring *d'* bears upon and makes electrical contact with the said plate *x*, so that currents of electricity may pass direct in through the binding-screw *z* and out through the binding-screw *c'*, or vice versa. The plate *x* is supported in its normal position by the catch or hook *w*, which, on being raised by the depression of the opposite end of the lever *r*, allows the said plate *x* to fall onto the contact-piece *b'* and so break the circuit between the binding-screws *z* and *c'*, and complete the circuit between the binding-screws *z* and *a'*.

In place of forming the pendulum with the magnet *d* to pass into the solenoids *e*, I may arrange the solenoids to pass over the magnets.

At Figs. 8 and 9 I have shown such a construction of pendulum in combination with a latch or switch device essentially the same as that hereinbefore described with reference to Figs. 5, 6, and 7 of the annexed drawings.

In Fig. 8 I have represented diagrammatically the manner in which the solenoids *e* are electrically connected in the circuit, it being understood that in practice the terminals of the two solenoids *e* are arranged at or near the point *c* of suspension and insulated from each other at such point. It will be seen with reference to this figure that the currents entering at the binding-screw *z* pass through the hinged plate *x* and spring *d'*, and are conducted through the wire *e'* to and through the solenoids *e*, passing out therefrom through the binding-screw *j*, until such time as the pendulum *a* has attained sufficient amplitude, as hereinbefore set forth, when it strikes against the plate *v*, Figs. 5, 6, and 7, or the roller *f'*, and thereby breaks the circuit between the binding-screws *z* and *j*, and completes the circuit through the contact-piece *b'* between the binding-screws *z* and *a'*.

The method of joining the hereinbefore-described apparatus in series is represented in diagram at Fig. 10, where, at A, B, C, D, and E, are shown the telephonic stations of five subscribers connected with the central or calling station F. It is seen in this diagram that the metronome at the central or calling station F is connected with the battery G, and that the telephone at this station may be connected with the line H by a flexible or other switching device. This line is connected with the series of pendulums' solenoids *e*, and conducts the currents of electricity through the same by the binding-screws *z* and *j*. (See Fig. 8.) The line H, after the last solenoids of the series, is led to earth, the return I, connected to the metronome, being similarly led to earth. The telephone-posts at the several subscribers' stations are connected to the binding-screws *a'*. (Shown more particularly at Fig. 8.) The telephones at these stations are so arranged that upon electrical connection being made with any one of them the bell attached thereto rings, and continues to ring until the receiver is lifted from off its hook, when the circuit through the bell is broken and the telephonic connection made in any of the well-known

ways between the receivers and transmitters of the station so called and of the central or calling station. Each of the telephone-posts is connected to earth, and on the fall of the hinged plate *x*, Fig. 8, the connection onward through the line H is broken, and a new connection is formed with the telephone-post. The circuit is then complete through the line H and through the telephone-post to earth.

It is to be understood that in the carrying out of my present invention I do not bind myself to the precise construction of apparatus and mode of connecting the same in series hereinbefore set forth, for the same may be varied in many ways without departing from the essential features of my invention. For example, the simple harmonic motion obtained from the pendulums *a*, as hereinbefore described, may be also obtained from springs or other equivalent means. Neither do I bind myself to the use of magnets *d*, passing into solenoids *e*, or vice versa, for a like dynamic effect may be produced in many ways from the relations of a closed coil in a magnetic field.

I claim—

1. In combination with an electric circuit, a current-reversing device at a calling-station, and an electro-magnet or solenoid in said circuit, a magnet and a pendulum, all at a receiving-station, said magnet and solenoid being fixed, one to the pendulum and the other to a support stationary relatively to said pendulum, substantially as and for the purpose set forth.

2. In combination with an electric circuit and means of disturbing the current therein periodically, a pendulum and an electro-magnetic device for vibrating said pendulum, consisting of a solenoid in said electric circuit and a magnetized core, one of said members being fixed to the said pendulum, and the other rigid with the base or support, substantially as set forth.

3. In combination with an electric circuit and a current-reversing device, a pendulum, and an electro-magnetic device for vibrating said pendulum, consisting of a permanent magnet and an electro-magnet on each side of said pendulum, one member on each side being rigid and the other connected with the pendulum, and the whole being so arranged that the continuous reversal of the current will cause the pendulum to be drawn alternately in opposite directions, substantialiy as set forth.

4. In combination with an electric circuit and a current-reversing device therein at different stations on said circuit, a solenoid and magnet for each pendulum, one attached to said pendulum and the other rigid, the whole being so arranged that a continuous reversal of the current will cause an alternate attraction and repulsion between said solenoid and magnets, and a consequent vibration of the pendulum, substantially as set forth.

5. In combination with an electric circuit, a metronôme, a commutator on the shaft thereof, brushes bearing on said commutator, and respectively in circuit with the battery and the line, and a series of pendulums, each having solenoid and magnetized core, adapted to operate substantially as and for the purpose set forth.

6. In combination with a line-circuit and a device for periodically disturbing the current therein, an electro-magnet in said circuit, a pendulum adapted to be vibrated by said magnet, a local circuit including transmitting and receiving instruments, and a trip or switch adapted to be released by said pendulum, and to automatically break the line-circuit through said magnet and connect said circuit with the local circuit, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHNSTON STEPHEN.

Witnesses:
ROBERT ADAM GUNN,
HENRY HART,
Both of 115 *St. Vincent Street, Glasgow.*