(No Model.) 2 Sheets—Sheet 1.

J. W. DUNLAP, Sr.

MAGNETO ELECTRIC INDIVIDUAL SWITCHING APPARATUS.

No. 408,468. Patented Aug. 6, 1889.

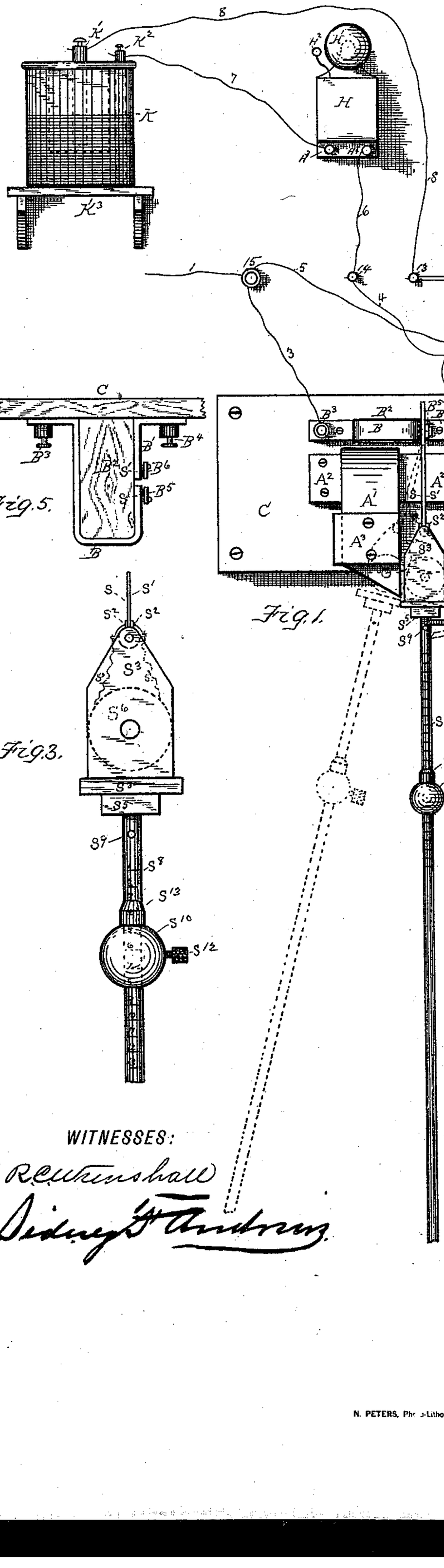

Fig. 1.

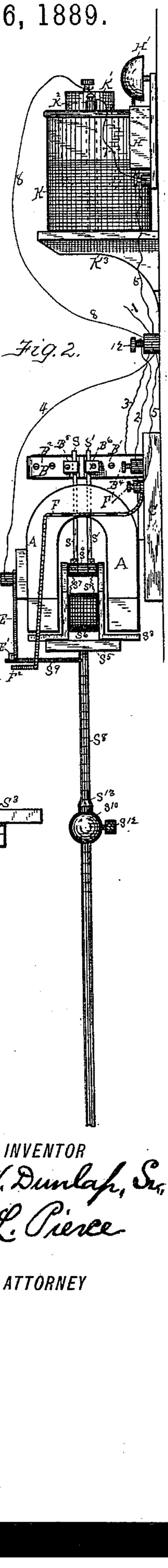

Fig. 2.

Fig. 5.

Fig. 3.

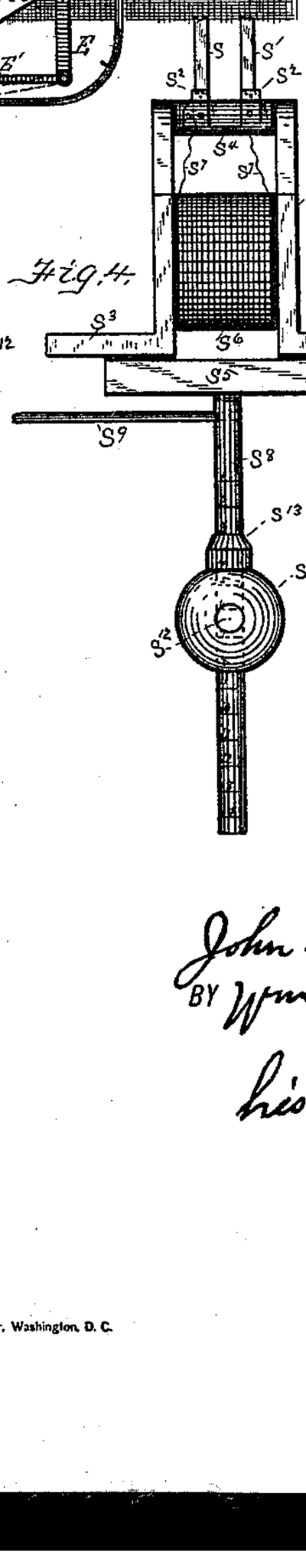

Fig. 4.

WITNESSES:

R. C. Curtis Shaw

Sidney F. Andrews

INVENTOR

John W. Dunlap, Sr.

BY Wm L. Pierce

his ATTORNEY

(No Model.) 2 Sheets—Sheet 2.

J. W. DUNLAP, Sr.

MAGNETO ELECTRIC INDIVIDUAL SWITCHING APPARATUS.

No. 408,468. Patented Aug. 6, 1889.

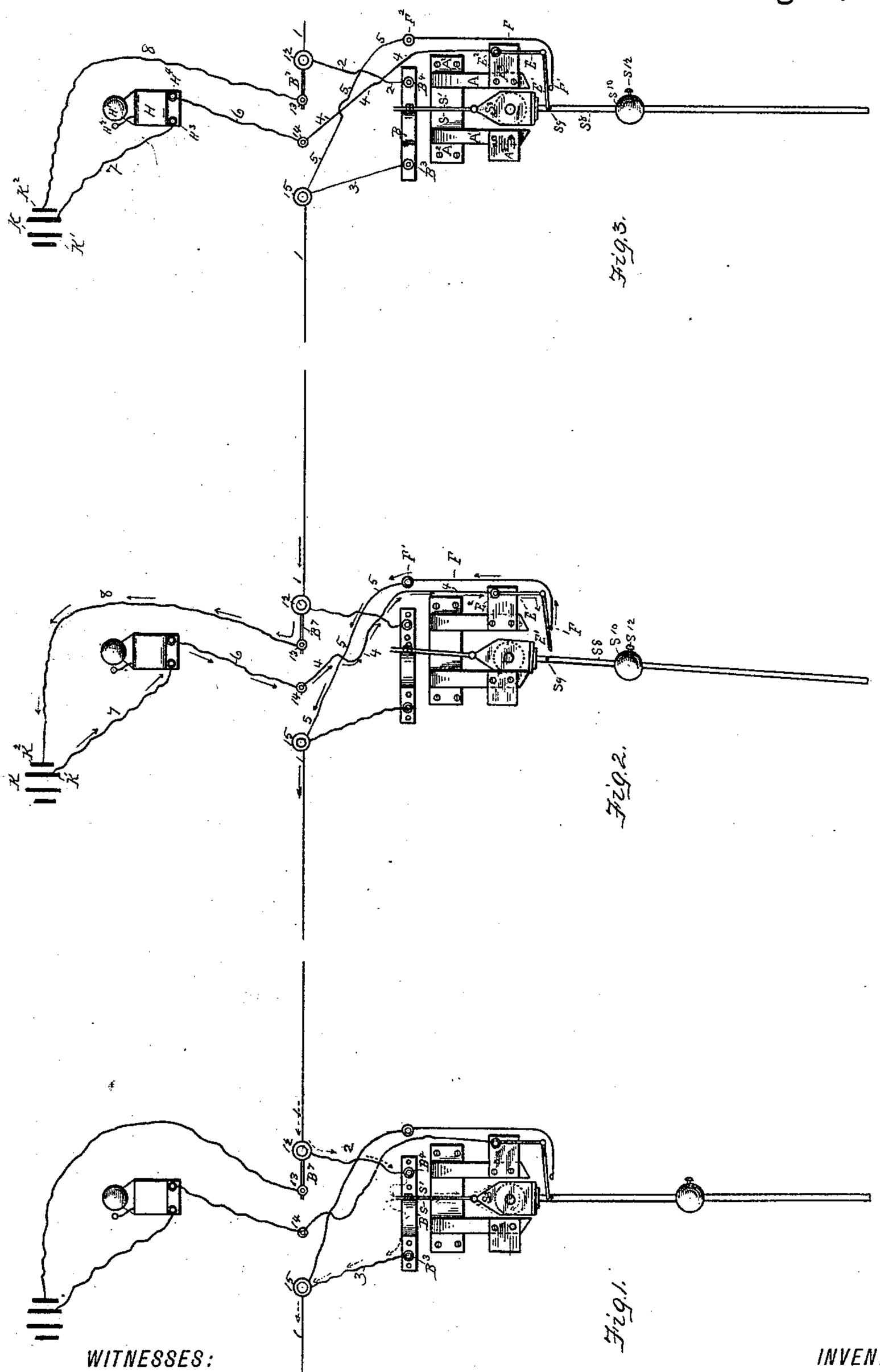

Fig. 3.

Fig. 2.

Fig. 1.

WITNESSES:

R. F. Whitehurst

Sidney F. Anthony

INVENTOR

John W. Dunlap, Sr.,

BY Wm. L. Pierce

his ATTORNEY

UNITED STATES PATENT OFFICE.

JOHN W. DUNLAP, SR., OF PITTSBURG, PENNSYLVANIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF PART TO ROBERT J. SHAW, CHARLES R. MAIR, AND WILLIS H. ROWE, ALL OF SAME PLACE.

MAGNETO-ELECTRIC INDIVIDUAL SWITCHING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 408,468, dated August 6, 1889.

Application filed August 1, 1888. Serial No. 281,673. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. DUNLAP, Sr., residing at Pittsburg, in the county of Allegheny and State of Pennsylvania, a citizen of the United States, have invented or discovered a certain new and useful Improvement in Magneto-Electric Individual Switching Apparatus, of which improvement the following is a specification.

The purpose of my invention is to devise certain mechanical magneto-electrical switching apparatus, in which one set of instruments is adapted both to receive and to transmit.

It is known that a pendulum or reed susceptible of a certain rapidity of vibration will create when so vibrated and subject to magnetic influence a specific and peculiar wave in an electric circuit of which it forms a part. It is also known that such waves to be effective must be received by a sympathetic reed or pendulum—*i. e.*, one adapted to vibrate isochronously with the first. These principles can be utilized in a number of highly-important ways—as, for instance, in singling out and calling any particular subscriber on a single-circuit telephone system without the assistance of a central exchange; second, in throwing into a circuit any particular dynamo or electric lamp on a single circuit, or in actuating any required signal or call upon a given circuit in the railroad service, or in the use of annunciators upon a common circuit. The system is susceptible of other applications not here enumerated.

To put this system into practical working apparatus, I have contrived the following mechanical arrangement, which is shown in the particular drawings as applied to the call-bells of the telephone service, but might be as readily attached to the various other systems above suggested.

In the accompanying drawings, which make part of this invention, Figure 1, Sheet I, is a front elevation of my pendulum, magnets, battery call-bell, and subordinate devices. Fig. 2 is an end view of the same. Fig. 3 is a front elevation of the pendulum when in position; Fig. 4, a side elevation of the pendulum. Fig. 5 is a plan view of the support for the pendulum-springs. Sheet II shows a general view of the circuit, Figs. 1 and 3 showing the bell cut out of the circuit, and Fig. 2 showing the bell cut in the circuit.

In the practice of my invention I take a pair of equal horseshoe-magnets A A, each having equal poles. These magnets are screwed to a connecting iron base A^2, which in turn is suitably secured to the wooden back C C. To the same back C C, as shown clearly in Fig. 5, is also fastened a brass double elbow B, having binding-post B^3, also the brass elbow B, having binding-post B^4. These elbows are slightly separated and insulated by ebonite B^2 or like insulation.

Each elbow is provided with a clamping-nut B^5 B^6, working on a screw. From these clamps hangs a pendulum S^8, constructed, preferably, as follows, as shown at Fig. 4: The upper part consists of two parallel flat steel springs S S′, both gripped in their respective clamps B^5 B^6. The springs S S′ are clamped upon a hard-rubber insulator S^4, which is screwed at either end to right-angled irons or cheeks S^3 S^3. Between these cheeks is an insulated wire-wound bobbin S^6. One end S^7 of the bobbin-wire is attached to the spring S and the other end S^7 to the spring S′.

S^5 is a piece of ebonite or suitable insulating material, which is attached to the cheeks S^3 S^3 and supports the lower part of the pendulum, which is graded or scaled at regular intervals. On the graded portion of the pendulum slides an adjustable weight S^{10}, provided with a marker S^{13} and adjusting-screw S^{12}. Projecting from the pendulum at right angles with the path of its oscillation is the needle S^9. The pendulum is hung at an equal distance from each of the pair of magnets, and so that it will swing in a path which will be equally distant from the poles of each magnet, as shown in Fig. 1. Upon the face of each of the magnets A A′, I fasten an insulating-support A^3 A^3. From the insulator A^3 on magnet A hangs a brass arm E, with another pivoted brass arm E′, the extreme point of which by fine adjustment rests normally upon the point of the needle S^9. When the pendulum S^8 attains a certain rate of vibration, the brass arm E′ will be shaken from the point of the needle S^9 and drops upon the

contact-point F^2 of a brass rod F, also secured to the common back C C.

A line-circuit is made, as shown by dotted arrow in Fig. 1, Sheet II, as follows: Starting with wire 1, which connects with similar magnet and pendulum at the right, thence to post 12, thence through wire 2 to post B^4, through brass strip B′, spring S′, clamp S^3, through wire bobbin S^6, through second clamp S^2, spring S, through strip B, post E^3, wire 3, post 15, and wire 1. In this circuit the pendulum is in the circuit waiting for call, and the bell is out. When the bell is in call the circuit will be as follows, as shown by solid arrow in Fig. 2, Sheet II: Commencing at Fig. 3, wire 1, post 12, brass strip B^7, post 13, wire 8, through battery K, wire 7, post h^3, through bell-coils, (under cover of H and not shown,) through post H^4, wire 6, post 14, wire 4, post E^2, brass arm E, trip-lever E′, contact-point F^2, rod F, post F′, wire 5, post 15, and line 1.

The battery K is the ordinary battery used in connection with the telephone service, with carbon K′ and zinc K^2, all mounted upon the stand K^3. The bell is the ordinary telephone call-bell with board H, gong H′, and hammer H^2.

Assuming that there are three sets of mechanical devices exactly duplicating the devices, as shown in Fig. 1, Sheet I, the operation of these devices as applied to telephony will be apparent from the three figures of Sheet II. In small towns, where the number of subscribers is too limited to support a central exchange, I would place all the telephones on a single common circuit and attach the line-wire to posts 12 and 15, the telephone-bell wires in series to posts 13 and 14, and each subscriber would be supplied with the apparatus shown in Fig. 1, Sheet I. Further, each subscriber would have a designated number and be supplied with a card of the numbers of all other subscribers. The sliding weight S^{10} on each subscriber's pendulum would be set normally at the gradation on his pendulum corresponding with his number—*i. e.*, No. 5 would keep his sliding weight set at mark 5, with the lever E′ resting on the point of the needle S^9. Assuming, now, that the three pendulums of Figs. 1, 2, and 3 of Sheet II are properly set and Fig. 3 desires to call Fig. 2, Fig. 2's sliding weight S^{10} will be set at a certain notch, which Fig. 3 can ascertain by examining his card of numbers. Fig. 3, having thus discovered the grade or position of Fig. 2's sliding weight, will move his sliding weight to the same notch on his pendulum and set his own pendulum in vibration. As heretofore asserted, this vibrating pendulum at Fig. 3 will create a certain magnetic wave in the line-circuit, which will be transmitted to the correspondingly weighted and adjusted pendulum in Fig. 2. This magnetic wave will slightly affect the pendulum of Fig. 1, but not to such an extent as to displace the lever-arm resting on the needle.

In accordance with the law I have already stated, the pendulum of Fig. 2 is now the sympathetic or co-mate pendulum of that in Fig. 3, and is adapted to vibrate in unison therewith, and does so vibrate. The vibration of the pendulum in Fig. 2 shakes the lever E′ off the point of the needle S^9. The lever E′ drops upon the contact-point F^2, throwing the bell of Fig. 2 into circuit, thus calling up the subscriber represented by Fig. 2. When Fig. 3 and Fig. 2 have ceased talking, Fig. 3 adjusts his weight or bob back to his own mark, and both Fig. 3 and Fig. 2 replace their respective levers E′ upon the point of the needle S^9.

It will be noted that each set of devices is both a receiver and transmitter.

It is apparent that varying vibrations of the pendulum may be secured by other mechanical devices than the sliding weight, while still employing the spirit of my invention.

Having fully described my invention, what I desire to secure by Letters Patent is—

1. The combination, in an electric circuit, of several call receiving and transmitting devices, each comprising a pendulum, with an adjustable bob normally at a fixed point, differing for each pendulum or station, a coil in the line-circuit, carried by the pendulum, magnets, near which said coil may vibrate, a circuit-controller operated by the pendulum on reaching a certain extent of motion to close a local alarm-circuit, whereby one station may call another by adjusting its pendulum-bob to a position corresponding to that of the station to be called, and vibrating a pendulum to generate a current on the line, as set forth.

2. A combined transmitter and receiver pendulum consisting, essentially, of a pair of springs, the lower ends connected with the respective end wires of a wire-wound bobbin provided with suitable cheeks supporting a graduated rod with needle and sliding weight, in combination with a pair of magnets with equal poles, and lever-contacts constructed to fall on the oscillation of the pendulum, all substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand.

JOHN W. DUNLAP, SR.

Witnesses:
WM. L. PIERCE,
CHARLES R. MAIR.