(No Model.) 2 Sheets—Sheet 1.

J. A. SULLIVAN.

ELECTRICAL COMMUNICATION.

No. 567,112. Patented Sept. 1, 1896.

Fig. 1.

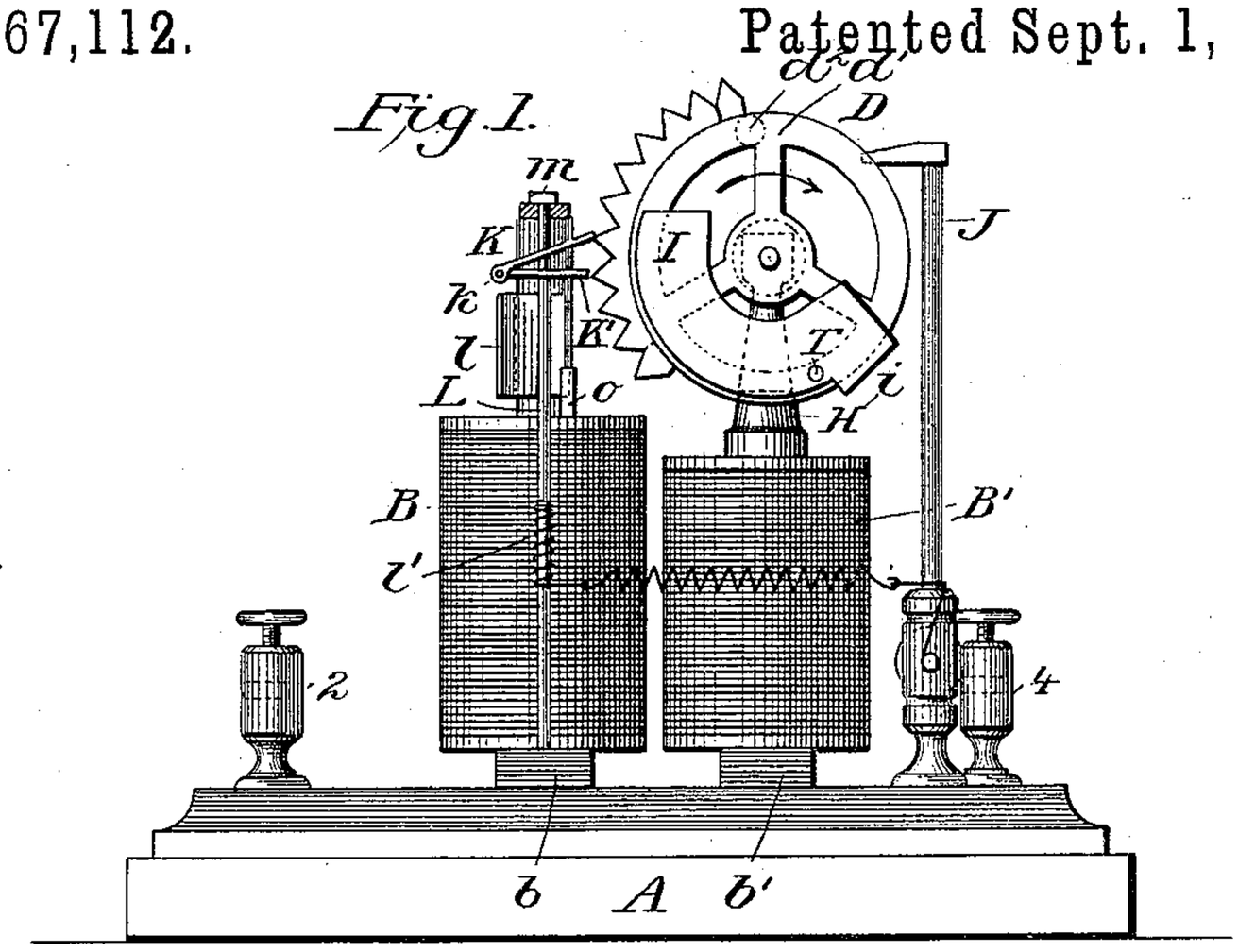


Fig. 2.

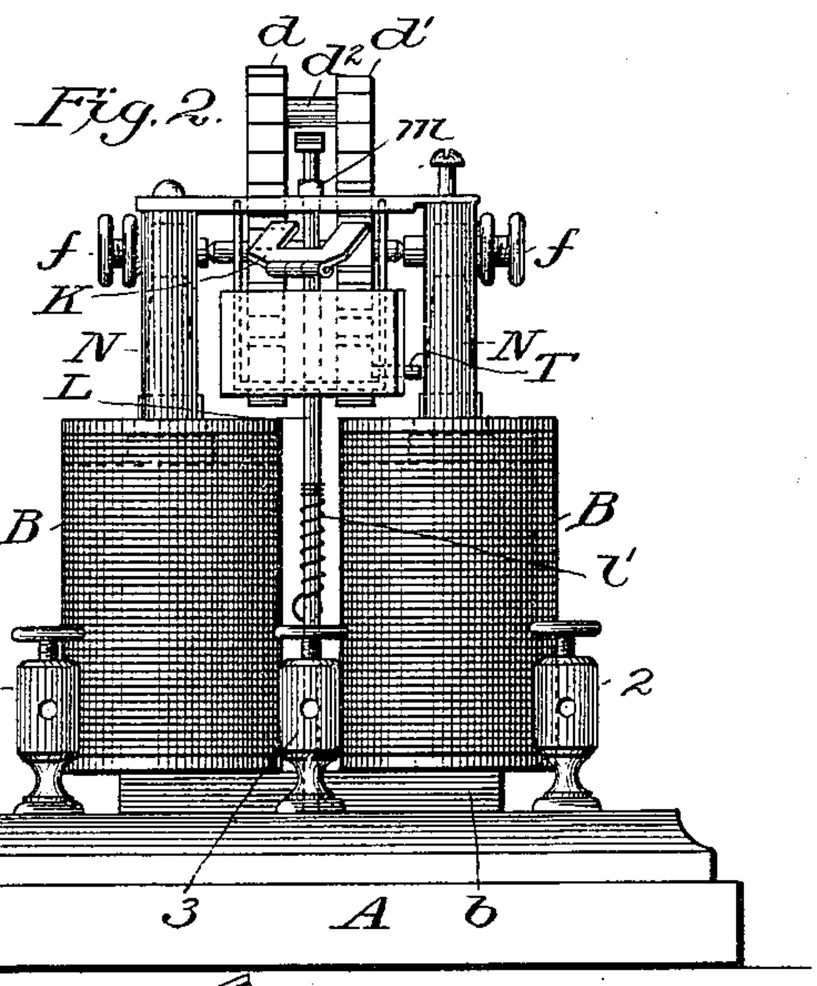


Fig. 4.

Fig. 6.

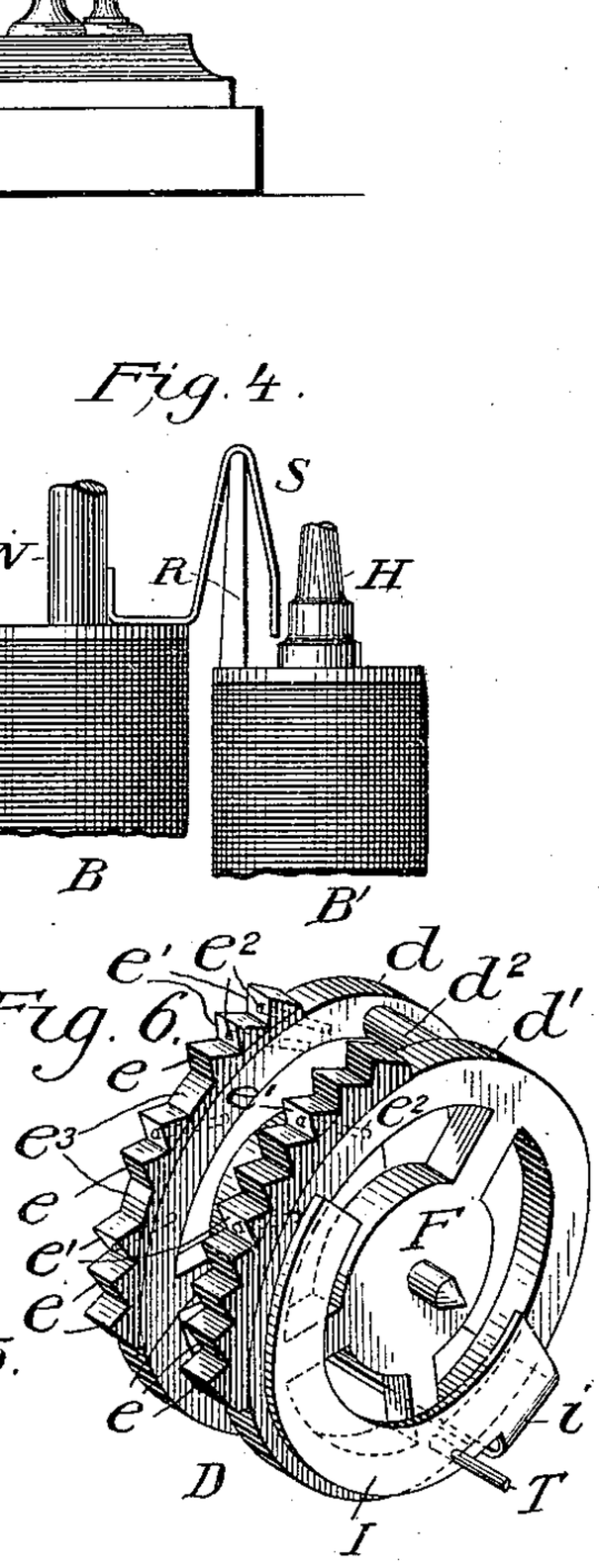


Fig. 7.

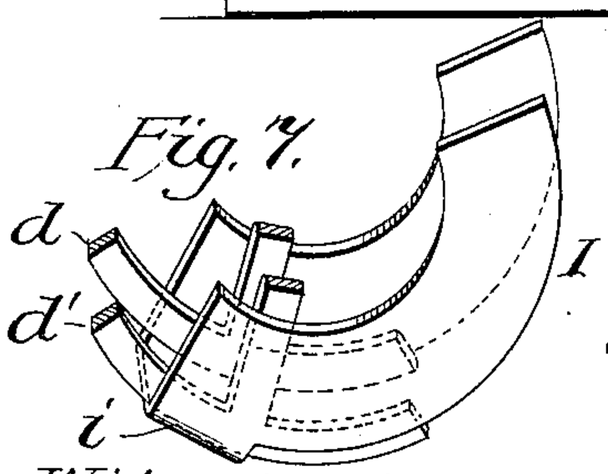
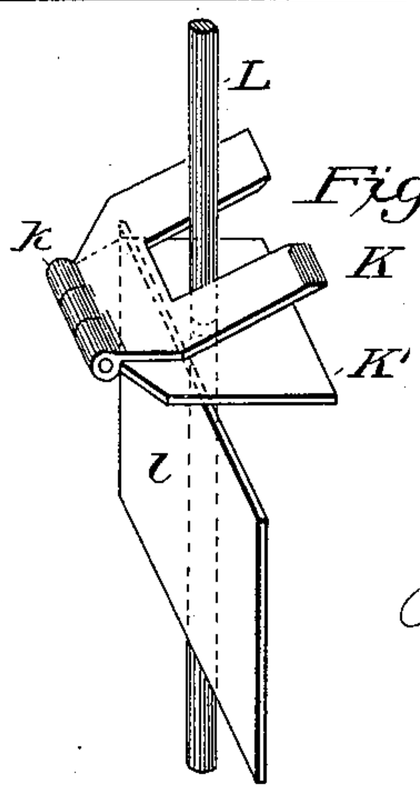


Fig. 5.



Witnesses.

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H. S. Whittaker

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(No Model.) 2 Sheets—Sheet 2.

J. A. SULLIVAN.

ELECTRICAL COMMUNICATION.

No. 567,112. Patented Sept. 1, 1896.

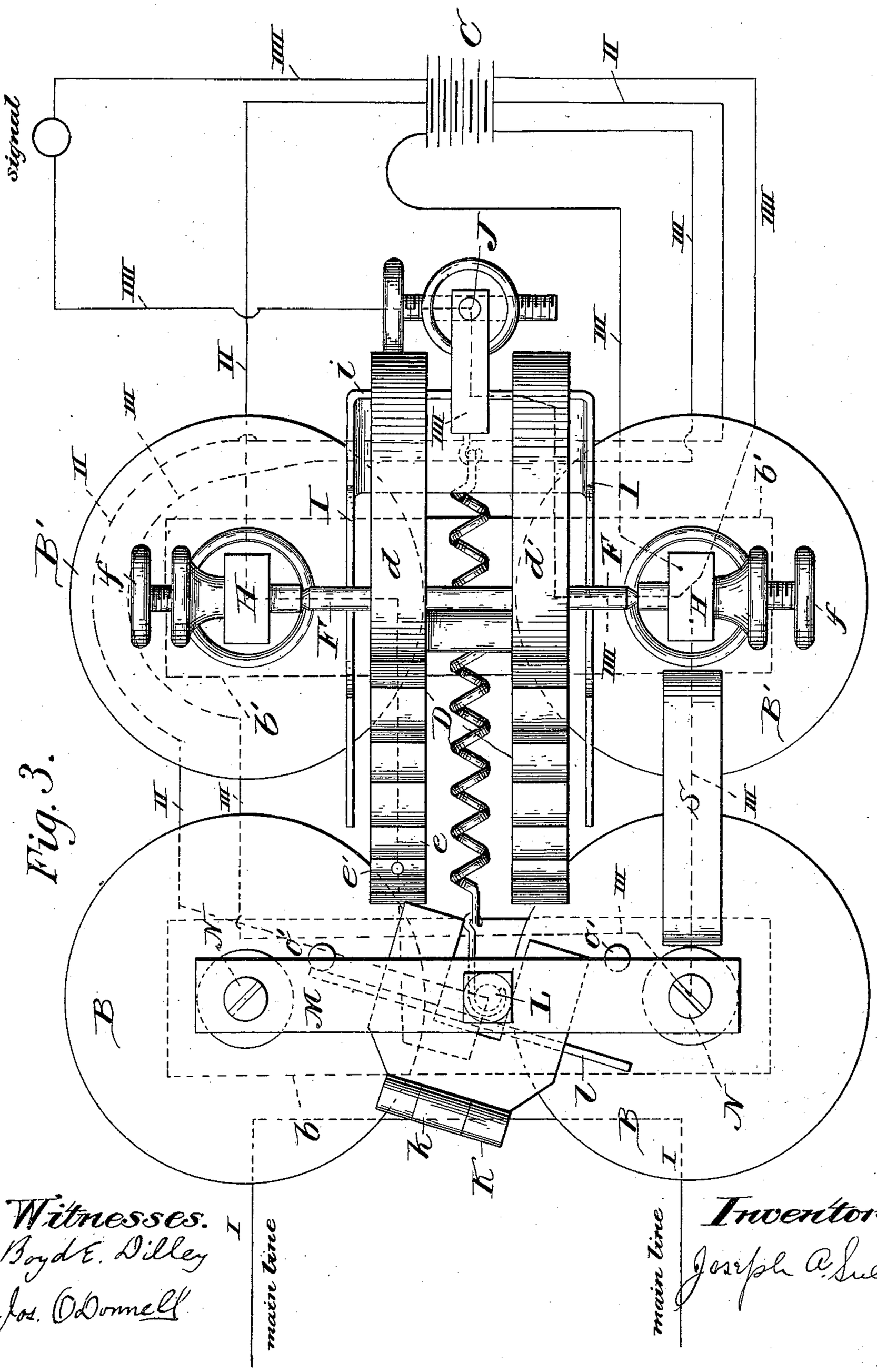

Fig. 3.

Witnesses.
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UNITED STATES PATENT OFFICE.

JOSEPH A. SULLIVAN, OF CINCINNATI, OHIO.

ELECTRICAL COMMUNICATION.

SPECIFICATION forming part of Letters Patent No. 567,112, dated September 1, 1896.

Application filed July 15, 1893. Serial No. 480,627. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH A. SULLIVAN, a citizen of the United States, residing at Cincinnati, in the county of Hamilton, in the State of Ohio, have invented a new and useful Improvement in Electrical Communication, of which the following is a specification.

My invention relates to the art of electrical communication by means of a series of signals or other devices connected with and operated from a central station; and its object is to provide mechanism whereby each of a series of visual, palpable, or audible signals at various points on a main circuit may be called into action or other work performed from a central station without operating or calling into action the signals or performing work at other points or stations on the same circuit. This I accomplish by means of a regulating instrument or multiple relay at the local or relay station, which may be actuated from a central station by making and breaking the main circuit, so constructed, arranged, and operated that the signal or machine to be operated at that station will respond to or be actuated by the "call" for that station and will not respond to or be operated by other calls.

My invention consists in a peculiar device hereinafter described and claimed and the method of applying the same in connection with circuits and signals, as hereinafter more fully described and claimed.

Referring to the drawings, Figure 1 is a side elevation of one of the instruments. Fig. 2 is a front elevation. Fig. 3 is a plan view showing the circuits. Fig. 4 is a detail of the auxiliary armature. Fig. 5 is a detail of the escapement. Fig. 6 is a detail of the wheel. Fig. 7 is a detail of the wheel-rotating armature.

I introduce into a circuit at various points where a signal is desired one of my regulating-machines and a local battery of the usual construction. The main line is connected at each local station with posts 1 and 2.

A is a base upon which the instrument is mounted.

B is the magnet operating the escapement, B′ a resetting-magnet, and C the local battery.

D is a permutation-wheel, which consists of two or more parts *d d′*, rigidly fastened together on a common axle F. Each part is provided with a series of teeth on the arc of its circumference. A part of these teeth *e* are insulated from the spindle F. A part of these teeth *e′* are insulated from the wheel D and its spindle F, and part of these teeth *e′* are electrically connected to the periphery of the metal wheel D, by means of metal pins or bands e^2, and through the wheel to the spindle F, on which the wheel is mounted. The spindle is supported in set-screws *f f*, taking through the supporting-posts H H, which form cores in the magnetic field of magnet B′.

I is a wheel-rotating armature attached to each of the parts of the permutation-wheel and connected by the cross-piece *i*. The parts I and *i* are formed of one piece and constitute a magnetic arch. This arch is wider at the point *i* than at the opposite end. When a current of electricity is passed through the magnet B′, a magnetic field is made by the cores of magnet B′, which are also cores of the supporting-posts H H, and the unequal attraction on the armature causes it to rotate, and being fastened to the permutation-wheel rotates the wheel in the direction shown by the arrow until a pin T on the wheel-rotating armature I strikes the spring-plate S and forces it out of engagement with the core or post H, thereby breaking the resetting-circuit hereinafter described. The wheel is rotated by gravity in the opposite direction to that shown by the arrow until the cross-piece *i* strikes the rod J, the wheel being weighted by the block d^2 and the teeth on the periphery of the wheel.

An escapement K, pivoted at *k* to allow it an upward movement and provided with the stop-plate *k′*, is fixed on an oscillating spindle L. This spindle is mounted in yoke *b* of magnet B and a set-screw *m*, taking through the plate M on supporting-posts N N, which form also the cores of magnet B B. On the oscilating spindle L is fixed the armature *l*. The guides *o o* are fixed to the magnet B B. A thread wound around the spindle L at *l′* and connected by a spring to the post J tends to rotate the oscilating spindle until the armature I strikes the guide *o*, which is the normal position of the armature. When a current of electricity is passed through magnet B, the position of the armature *l* is reversed

by magnetic attraction until it strikes the guide *o'*, and by making and breaking the main circuit the rod L is oscillated and in turn oscillates the escapement K, fixed on the rod L, thereby releasing the teeth on the wheel moved by gravity and catching the teeth on the other part of the wheel with the corresponding fork of the escapement. When a fork of the escapement impinges an electrically-connected tooth, the wheel is reset, as hereinafter described, but when it impinges a non-electrically connected tooth no resetting of the wheel takes place, but the wheel continues in the same direction when the tooth is released by the fork.

The calls for the several instruments on a circuit are made by arranging the conducting and non-conducting teeth, and by leaving spaces between them, as shown in Fig. 7. Any number of combinations can be made, so that a large number of instruments may be placed on a single line and no two instruments have the same call.

R is a post fixed in the magnet B', and having a spring-plate S thereon, which acts as an auxiliary armature when a current of electricity is passed through the coil of magnet B'. The spring-plate S is then attracted to and forms a contact with the core of the magnet B', thereby continuing the resetting-circuit, formed by the escapement and a conducting-tooth, and holding it until the wheel has completed its operation of returning to the starting-point of the combination. A non-conducting pin T on the permutation-wheel, and insulated therefrom, is adapted to engage the spring-plate S and force it out of engagement with the core as the wheel rotates. This breaks the resetting-circuit, as will be explained hereinafter.

The following-described circuits are formed in the operation of the device in a circuit with several instruments: The wires from the main line or relay, if such relay is desired to be used, are connected with magnet B, and when the circuit is closed by the backstop of the relay the oscillating rod and the escapement are operated, releasing one of the non-conducting teeth. If a dot is made, the escapement will rebound by means of the thread and spring in time to impinge the next non-conducting-tooth without having touched a conducting-tooth with the opposite fork of the escapement. If a longer contact than a dot is made, for instance a dash is made, then the opposite fork will impinge a conducting-tooth and the resetting-circuit will be formed and the wheel returned. For a dash in the call of the instrument a tooth is cut away at e^3. The tooth just opposite to this break, on the opposite flange of the wheel, is a conducting-tooth, so that when the dash is made in the proper place and the one fork of the escapement passes the cut-out tooth it allows the opposite fork of the escapement to escape a conducting-tooth. If a dash is made where a dot should be made, one point of the escapement will catch a conducting-tooth and the wheel will return to the beginning of the combination, and the same thing occurs when a dot is made where a dash should be made. In case such mistake occurs in sending a signal or call the escapement catches a conducting-tooth and circuit I I is formed through tooth *e'*, wheel D, spindle F, core H, battery C, magnet B', yoke *b*, spindle L, escapement K, and tooth *e'*. This circuit begins to rotate the wheel by means of the wheel-rotating armature, but as soon as the wheel begins to rotate the connection is broken at the tooth *e'* and escapement K. A continuing circuit I I I is formed immediately by means of the auxiliary spring-plate, armature S being forced by magnetic attraction into contact with the core H. This circuit I I I passes through core H, yoke *b'*, battery C, magnet B', yoke *b*, end of core N, spring-plate S, and core H. While circuits I I and I I I are operating, the wheel D is rotated in the direction shown by the arrow until the pin T strikes the spring-plate S and forces it out of engagement with the post or core H, which breaks the resetting-circuit, and the wheel is ready for a new signal or call. This rotary movement of the wheel in resetting itself is accomplished by the attraction of the energized cores H H on the wheel-rotating armature I, the segment-shaped side pieces of which being elongated are always within the magnetic field. The attraction from the cores would ordinarily tend to operate in a lateral direction, but as the side pieces are rigidly fixed to the wheel and the wheel has no lateral motion they move forward, revolving the wheel as they go; but just before the cross-piece *i* of the armature comes to rest between the cores the insulated pin T strikes the spring-plate S and breaks circuit I I I, whereby the wheel is reset, leaving the wheel free to begin again its forward movement by gravity when released by the escapement. If, however, the proper signal is made the escapement will pass over each of the conduction-teeth of the wheel and no circuit I I or I I I will be formed at all, but the wheel will be rotated by gravity until the cross-piece *i* strikes the upright rod J and a new circuit I I I I will be formed through the upright rod J, signal to be operated, battery C, core H, spindle F, wheel D, wheel-rotating armature I, cross-piece *i*, and post or rod J. This is the circuit that operates the signal connected with the instrument for which the call has been sent. In this manner by making the proper call any predetermined instrument may be operated from the central station. At the same time all the other instruments on the line will have been partially operated, but none of them will have made a complete operation so as to operate the signal connected with those instruments, because each instrument will have been reset each time an electrically-connected tooth *e'* has made contact with the escapement K.

It is obvious that by using my invention

any number of instruments may be placed on a single circuit, and any instrument on this circuit for which the proper call has been sent, and not any other instrument on the circuit, may be operated and controlled from a central office.

I claim—

1. The combination in an electrical instrument in a circuit of a permutation-wheel having an armature mounted thereon and attached thereto, the wheel being in such relation to a magnet that the attraction of the magnet causes the rotation of the wheel, a magnet and a battery substantially as and for the purpose described.

2. The combination in an electrical instrument in a circuit of a relay magnet, an escapement actuated thereby, a permutation-wheel having thereon two or more series of teeth arranged with conducting and non-conducting teeth as described, to correspond to a predetermined signal or call for the instrument, an armature mounted on and attached to said wheel, the wheel being in such relation to a magnet that the attraction of the magnet causes the rotation of the wheel, a local magnet and a local battery substantially as and for the purpose described.

3. The combination in an electrical instrument in a circuit of a relay magnet, an escapement mounted on an oscillating spindle a permutation-wheel provided with two or more series of conducting and non-conducting teeth, an armature on said wheel, the wheel being in such relation to a magnet that the attraction of the magnet causes the rotation of the wheel, a local magnet and a local battery substantially as and for the purpose described.

4. The combination in an electrical instrument in a circuit, of a relay magnet, an escapement actuated thereby, a permutation-wheel having thereon two or more series of conducting and non-conducting teeth, a wheel-rotating armature, and an auxiliary-spring armature to continue the resetting local circuit, substantially as and for the purpose described.

5. The combination in an electrical instrument in a circuit, of a relay magnet, an escapement actuated thereby, a permutation-wheel having thereon two or more series of conducting and non-conducting teeth, a wheel-rotating armature, an auxiliary-spring armature to continue the resetting local circuit and a non-conducting pin on the permutation-wheel, whereby the resetting-circuit is broken, substantially as and for the purpose described.

6. The combination in a series of electrical instruments in one circuit each instrument provided with a wheel having thereon and attached thereto an armature for a magnet so arranged in a magnetic field that a local current passing through the magnet, rotates the wheel, an armature carried thereby, a permutation device whereby the local current is controlled by the main-line current, and a local battery, substantially as and for the purpose described.

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Witnesses:

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