

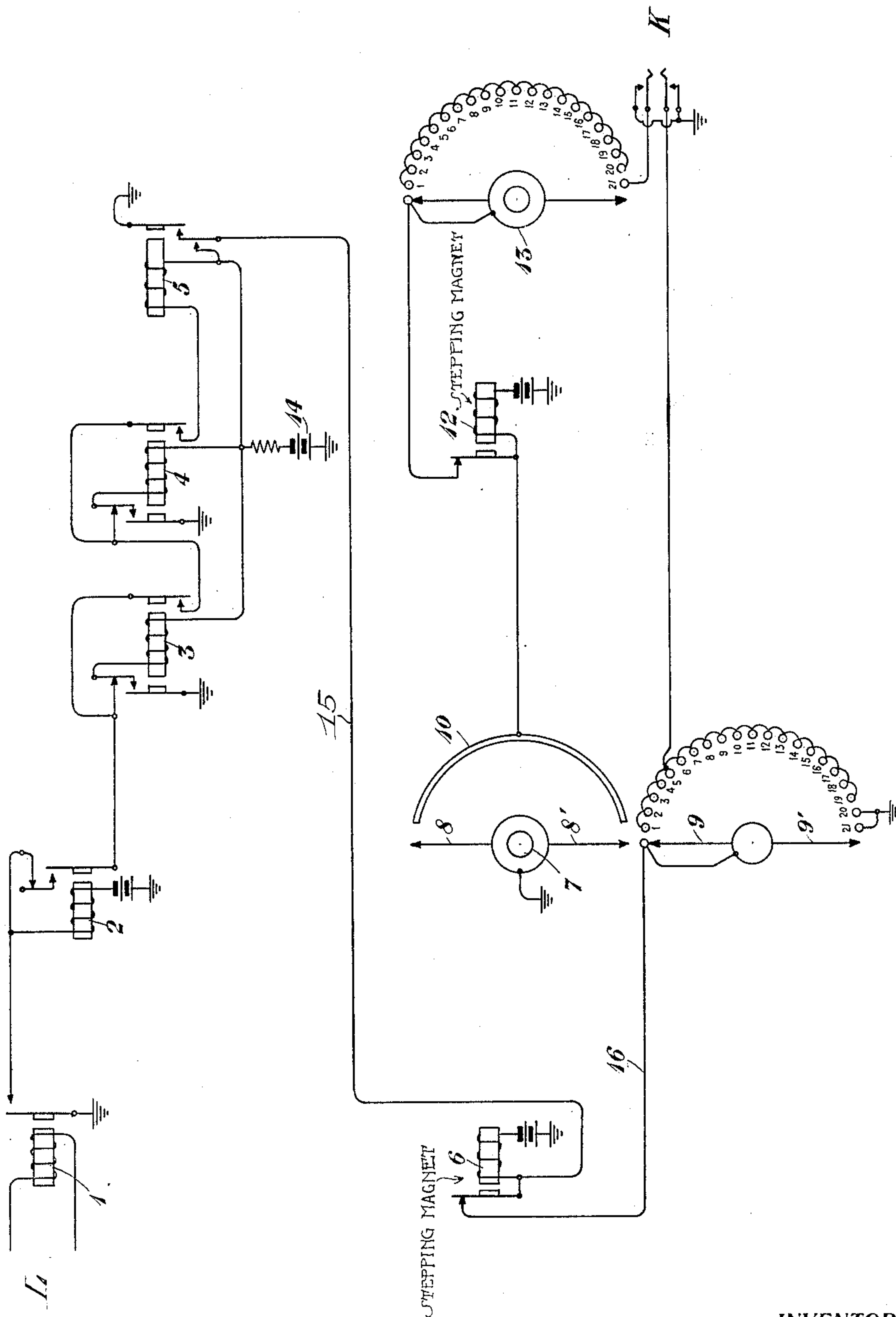
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IMPULSE REGISTERING DEVICE

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IMPULSE-REGISTERING DEVICE.

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This invention relates to improvements in impulse registering devices. Among the purposes for which the arrangements of the invention may be particularly useful may be enumerated that of ascertaining the frequency of current pulses transmitted over an electrical circuit, or for checking or measuring interrupter or ringing machine speeds, or other purposes in which it is desirable to ascertain the duration and number of impulses transmitted over a circuit. The arrangements of the invention have the following advantages: That one final reading can be obtained indicative of the total number of impulses received, that the incoming impulses need not occur regularly, and that a direct indication can be made of the impulses per second. Other features and purposes of the invention will appear more fully from the detailed description hereinafter given.

The invention may be more fully understood from the following description together with the accompanying drawing, in the figure of which is illustrated a circuit diagram of a preferred form of the invention. In the drawing is shown a circuit over which are transmitted electrical impulses. These impulses, through the operation of the relay 1, will operate an impulse translating relay 2, which in operating will cause the first of a train of three relays, 3, 4 and 5 to pull up. This latter relay, in operating, locks up in operated condition and transfers connections so that the next incoming pulse causes the second of the train of relays to pull up. This relay in turn locks up, thereby causing the third incoming pulse to operate the third and last relay in the train of three. This relay, in operating, will cause the operation of a stepping magnet 6. The stepping magnet 6 controls the operation of a selector switch 7 having two sets of arms 8 and 8' and 9 and 9'. The operation of the last relay of the train of three in operating the stepping magnet will cause the selector switch 7 to move its arms one step, and in addition will trip off the chain of three relays so that they are ready to receive the next impulse. When the first selector has advanced 20 steps it automatically advances itself to the zero position in readiness for the next set of three pulses, and at the same time will advance a second selector 13 one step through the operation of a stepping magnet 12. Because of the multiples of three in the relay train and 20 in the first selector respectively it is seen that if impulses are applied for one minute the second selector indicates directly in impulses per second. A restoring key K is provided, associated with the selectors, whereby they may be restored to normal.

The operation of the arrangement is as follows: An impulse coming in over the line L will operate the relay 1. This in turn will cause a circuit to be closed through the impulse translating relay 2. Upon the operation of relay 2 a circuit will momentarily be closed over both of the contacts and armature of relay 2 and the break contact of relay 3, to the battery 14 and ground, thereby operating relay 3, which will lock up over its armature and make contact. The second impulse coming in over the line L will, in like manner, cause relay 2 to be operated momentarily. A connection will now be established over the contacts and armature of relay 2 and over the right-hand armature and contact of relay 3 and the break contact of relay 4, through the winding of relay 4 to battery 14 and ground, thereby operating relay 4, which will lock up over its left-hand armature and make contact. The third incoming impulse from the line L will, in like manner, momentarily operate relay 2 and allow a circuit to be completed over the contacts and armature of relay 2, right-hand armature and contact of relay 3, right-hand armature and contact of relay 4, through the winding of relay 5, to battery 14 and ground. The relay 5, upon operating, will short circuit the battery 14 with respect to the relays 3, 4 and 5 and allow them to release. It will also apply ground to conductor 15 and thence through the winding of the stepping magnet 6 to battery and ground. This will cause the stepping magnet 6 to operate. The operation of magnet 6 will in a well-known manner release mechanism which will allow the arms of selector 7 to move ahead one step. The arm 8 of selector 7 will now rest on segment 10 and connect a ground to the conductor leading to the stepping magnet 12 and battery, thereby maintaining the stepping magnet 12 in operated position so that

the arms of the second selector 13 will not be operated under these conditions. The next three incoming impulses will in like manner operate the train of relays 3, 4 and 5 and cause the stepping magnet 6 to move the arms of selector 7 ahead another step. This operation will be repeated until the arm of the selector, such as 9, shall have reached the twentieth step. At this point a ground will be applied from the twentieth step to the arm of the selector and thence over conductor 16, contact and armature of the stepping magnet 6, through the winding of said magnet to battery and ground. This will cause the stepping magnet 6 to operate at this instant so that the arms of the selector will automatically be advanced a step to 21. The ground applied from 21 will now advance the arm to the zero position again. When the arm 8, upon this operation of being restored to zero position, leaves the segment 10, the circuit heretofore mentioned through the stepping magnet 12 will be broken and the stepping magnet 12 will release and advance the arm of the selector 13 one position. Accordingly, each set of three impulses coming in over the line L will operate the selector 7 one step. When the selector 7 has operated 20 steps the selector 13 will, as has been pointed out, be operated one step. Accordingly, because of the multiples of three in the relay chain 3, 4 and 5, and 20 in the selector 7, it is seen that an application of impulses to the line for one minute will give a direct reading on the steps of the selector 13 of the impulses per second. It should be noted that the contact arrangement of the impulse translating relay 2 acts in a way so as to translate the incoming pulses which may be of different length as not to cause false counting on the part of the relay chain. The restoring key K, which is provided, will, by applying ground to the contact steps of the selectors, cause the operation of the stepping magnets 6 and 12 to cause the selector switches to return to the zero position.

While the invention has been disclosed in certain specific forms which are deemed desirable, and though reference has been made to the multiples 3 and 20, it is to be understood that the invention is not so limited, but that it is capable of embodiment in many other widely varied arrangements without departing from the spirit of the invention as defined by the appended claims.

What is claimed is:

1. An indicating device comprising an im-

pulse translating relay, a train of relays operated successively by successive operations of said impulse translating relay, a plurality of selector switches, and means controlled by the operation of the last relay of said train of relays for controlling said selector switches.

2. An indicating device comprising an impulse translating relay, a train of relays operated successively by successive operations of said impulse translating relay, the operation of said relays in said train being dependent upon each other, a selector switch, means controlled by the operation of the last relay of said train of relays for releasing all of said train of relays and for moving said selector switch one step, a second selector switch, and means controlled by said first selector switch after it has moved a predetermined number of steps for operating said second selector switch.

3. An indicating device comprising an impulse translating relay, a train of relays operated successively by successive operations of said impulse translating relay, the operation of said relays in said train being dependent upon each other, a plurality of selector switches, means controlled by the operation of the last relay of said train of relays for releasing all of said train of relays and for moving one of said selector switches one step, and means controlled by said last mentioned selector switch after it has been moved a predetermined number of steps for restoring it to normal position and for operating other of said selector switches.

4. An indicating device comprising an impulse translating relay, a train of three relays operated successively by successive operations of said impulse translating relay, the operation of said relays in said train being dependent upon each other, a selector switch having twenty steps, means controlled by the operation of the last relay of said train of relays for moving said selector switch one step, a second selector switch, means controlled by said first selector switch after it has moved twenty steps for moving said second selector switch one step and for restoring itself to normal position, and a switching mechanism associated with both of said selector switches for restoring them to normal position.

In testimony whereof, we have signed our names to this specification this 8th day of July, 1924.

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