C. B. THWING.

RECORDING DEVICE.

APPLICATION FILED NOV. 30, 1918.

1,358,896. **Patented Nov. 16, 1920.**

Fig. 1.

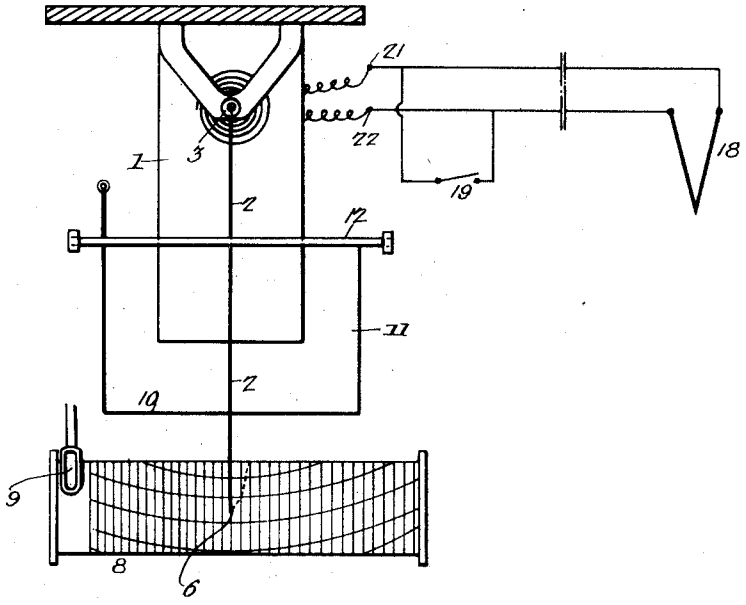
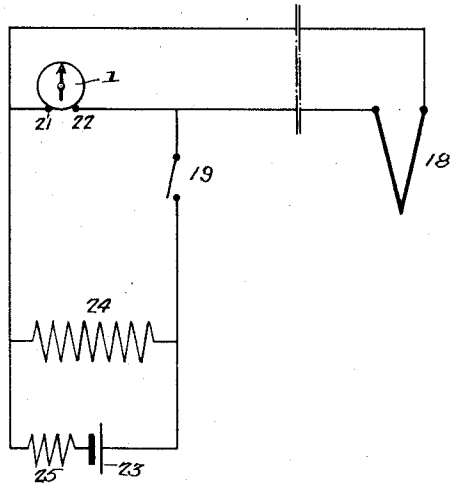


Fig. 2.



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UNITED STATES PATENT OFFICE.

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RECORDING DEVICE.

1,358,896. Specification of Letters Patent. Patented Nov. 16, 1920.

Application filed November 30, 1918. Serial No. 264,875.

To all whom it may concern:

Be it known that I, CHARLES B. THWING, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented Recording Devices, of which the following is a specification.

One object of this invention is to provide simple and reliable means for insuring movement of the needle of a recording galvanometer to a predetermined zero position after its displacement therefrom, for the purpose of inking its point without breaking the galvanometer circuit with a view to effectually avoiding possible errors in the galvanometer indication by reason of imperfect contacts.

These objects and other advantageous ends I attain as hereinafter set forth, reference being had to the accompanying drawings, in which,

Figure 1 is a plan to some extent diagrammatic, illustrating an apparatus arranged in accordance with my invention; and

Fig. 2 is a diagram showing a special form of my invention.

In the above drawings, 1 represents a galvanometer whose movable element includes a needle 2 fixed to a pivot 3 mounted in suitable bearings. This needle carries at its outer or free end a pen 6 or marking point and is movable in a circular arc over a record sheet supported on a drum or roller 8. Over one end of the latter is mounted an ink reservoir or pad 9 and there is provided a depressor bar 10 carried on arms 11 pivotally mounted on a fulcrum bar 12 and of such weight that when unsupported it will engage the needle 2, springing it down out of its normal position so that its pen 6 will engage the record sheet or will enter the ink reservoir 9, depending on its position. The depressor bar 10 is raised by any suitable means forming no part of the present invention so that the needle 2 may return to its normal elevated position, thereby causing the pen 6 to disengage the record sheet or to move away from the ink reservoir 9, as the case may be.

From the above description it will be appreciated that it is essential that the pen 6 shall be periodically in such a position as to be moved into the ink reservoir 9, by the action of the depressor bar, and if in order to accomplish this end, the current be cut off from the galvanometer by opening the circuit thereof, there is a possibility that a bad contact may occur when said circuit is again closed, thus introducing an error into the reading of the instrument.

If the galvanometer 1 be connected in circuit with a thermo-couple 18 or other current source whose electromotive force is to be measured and recorded or indicated, said galvanometer may be caused to return its needle to its inking position without opening its circuit by connecting a short circuiting switch 19 in shunt with the galvanometer terminals 21 and 22. This switch is operated automatically after one or any desired number of depressions of the pen 6 upon the record sheet, and in each case it not only results in the galvanometer needle swinging to its full off position with the pen over the ink pad or reservoir, thus insuring a supply of ink to said pen upon the succeeding downward movement of the depressor bar, but in addition it obviates any errors in the galvanometer indication which might otherwise occur due to imperfect contact of the circuit breaking switch otherwise employed.

Instead of merely short circuiting the galvanometer, I may include in the shunt circuit with the switch 19 a source of current 23 with a resistance 25 and a body of high resistance 24 in shunt to said first resistance and said current source;—the latter being so connected as to oppose the electromotive force of the thermo-couple or other current generator connected to the galvanometer, although in some cases it may act in a positive direction in which case the ink pad would be placed at the opposite side of the scale. This arrangement, as in the first case referred to, accomplishes the desirable results;—the current flow from the source 23 tending in the arrangement shown in Fig. 2, to swing the needle of the galvanometer in a direction opposite that in which it is ordinarily moved by current from the source 18. By employing the high resistance 24 it is possible to use the battery as shown and thus obtain a single resultant electromotive force in the circuit.

I claim:

1. The combination of a recording galvanometer; a source of current connected to said galvanometer; with means for insuring

the movement of the galvanometer needle to an inking position consisting of a circuit in shunt to the galvanometer and including a switch; a source of current arranged to oppose the current from the first current source; and a body of high resistance in circuit with said second current source.

2. The combination of a galvanometer; a record sheet supporting device; a needle therefor; an inking device for said needle mounted adjacent said sheet supporting device; and means for causing the needle to move to an ink receiving position relative to said device without opening the galvanometer circuit consisting of a circuit in shunt to the galvanometer, and means for controlling said circuit.

3. The combination of a galvanometer; a current source whose E. M. F. is to be measured; and means for causing the galvanometer indicating element to move to a predetermined position while the current source is in circuit with said galvanometer, consisting of a switch; a body of resistance in series therewith, connected across the terminals of the galvanometer, and a source of opposing E. M. F. in shunt to said resistance.

In witness whereof I affix my signature.

CHARLES B. THWING.