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 SYNCHRONIZING ATTACHMENT FOR CLOCKS.  
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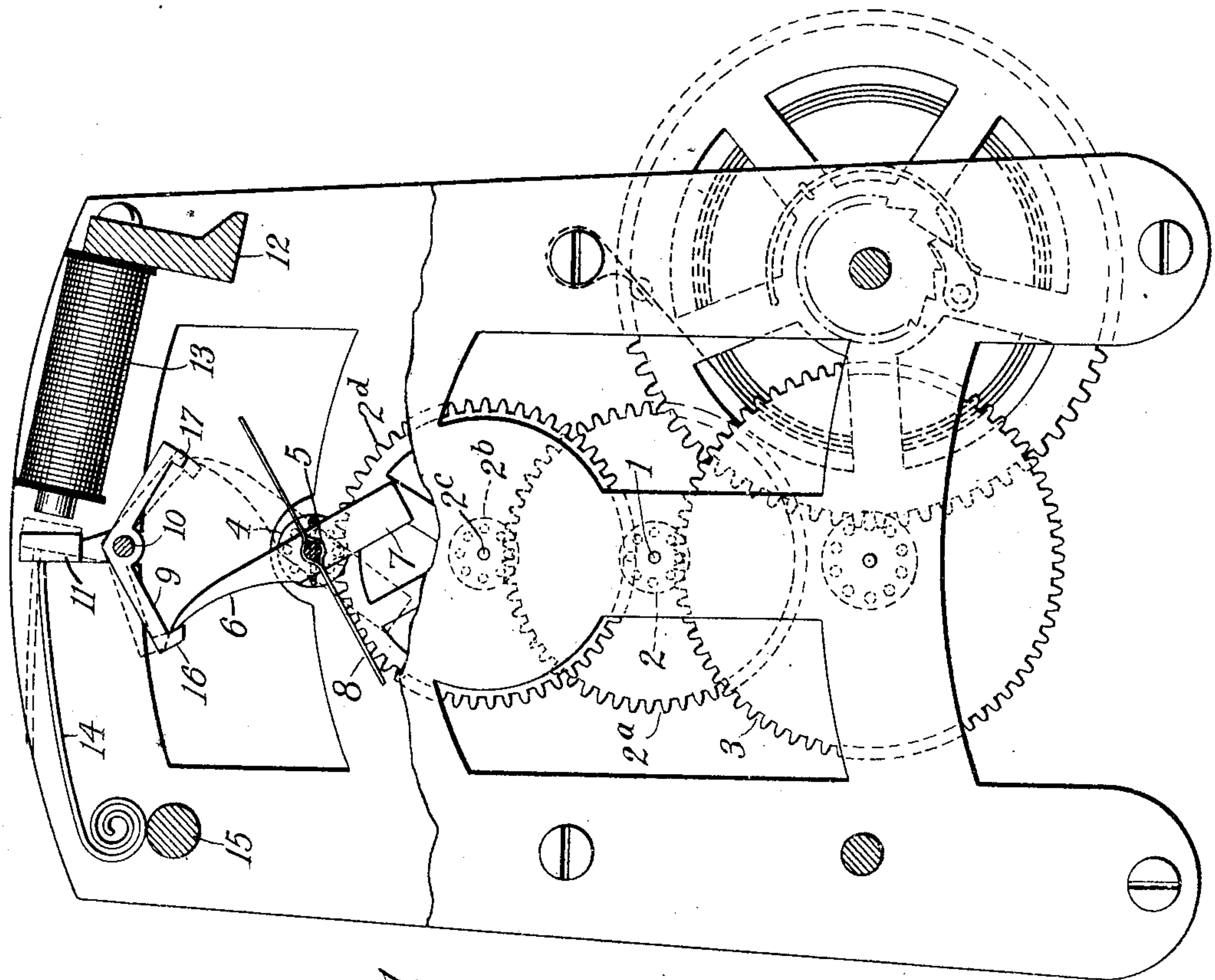
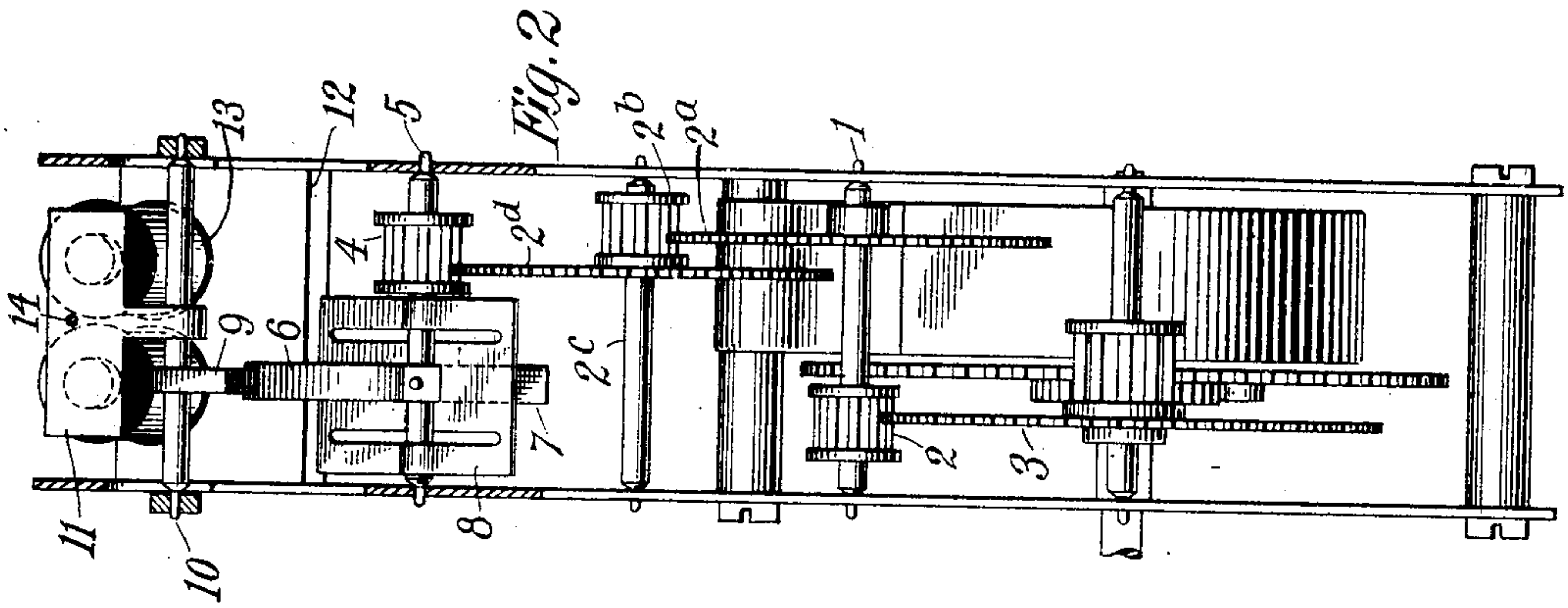


Fig. 1

Witnesses:  
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B. F. Merritt, Inventor  
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# UNITED STATES PATENT OFFICE.

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## SYNCHRONIZING ATTACHMENT FOR CLOCKS.

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Specification of Letters Patent.

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*To all whom it may concern:*

Be it known that I, BENJAMIN F. MERRITT, a citizen of the United States, residing at Canton, in the county of Norfolk, Massachusetts, have invented certain new and useful Improvements in Synchronizing Attachments for Clocks, of which the following is a specification, reference being had to the drawing accompanying and forming part of the same.

Where several clocks are employed in an establishment it is of course desirable that all the clocks show the same time. This is especially desirable, in fact it is practically imperative, where several time-recorders are used for recording the time of arrival and departure of employees. It is, however, difficult to keep two or more clocks going at precisely the same rate for any length of time except at the expense of considerable time and trouble in inspecting and regulating the clocks at frequent intervals.

I have therefore been led to devise my present invention, which has for its chief object to provide means whereby a clock can be controlled electrically from a "master" clock and therefore be made to keep time with complete accuracy with respect to such master clock.

A further object is to provide means, for the purpose stated, which shall be simple and cheap in construction without sacrifice of accuracy or reliability of operation.

In carrying out my invention in the preferred manner I dispense with the usual pendulum and scape wheel in the controlled or subsidiary clock or clocks, and substitute a scape "wheel" having preferably a single tooth, omitting the pendulum altogether. This scape wheel, which may be conveniently termed a scape "arm", is connected with the escapement arbor of the clock, so that the release of the arm at regular intervals will produce the desired regularity in the motion of the clock-train.

In applying the invention to time-recorders I prefer to have the pinion on the escapement arbor, and the gears connecting the same with the minute arbor, so proportioned that a complete revolution of the scape arm will permit the minute arbor or spindle to advance a space equivalent to one minute of time, (for the reason that workmen's time-recorders do not, as a rule, take account of intervals of less than a

minute), and also to construct the anchor so that it will at each vibration permit such complete revolution of the scape arm. The anchor itself is provided with an armature, preferably located near the anchor shaft, and in position to attract the armature is an electro-magnet in circuit with a source of current and with suitable circuit-closing and opening devices controlled or actuated by the master clock. Such make-and-break devices, which form no severable part of my present invention, may, as just stated, be of any suitable kind; but they should be constructed and arranged so as to be actuated once every minute, thereby causing the escapement devices of all the subsidiary clocks in the same circuit to be actuated simultaneously and hence causing each clock-train to advance one minute. The subsidiary clocks are thus kept in accurate synchronism with the master clock wherever they may be located.

The preferred embodiment of the invention is illustrated in the annexed drawing, in which—

Figure 1 is a front view of a clock mechanism, with the upper portion of the front frame plate broken away to show the synchronizing attachment. Fig. 2 is a side view of the same, the upper portions of the frame plates being in cross section.

The minute spindle of the clock is designated by 1, and is provided with a lantern-pinion 2 engaging the power-driven gear 3, and a gear 2<sup>a</sup> in mesh with a lantern gear 2<sup>b</sup> on a countershaft 2<sup>c</sup>. The latter has also a gear 2<sup>d</sup>, in mesh with a lantern pinion 4 on the escapement shaft or arbor 5. Rigidly secured on the escapement shaft is the scape arm 6, which may be provided with an extension 7 on the opposite side of the shaft to serve as a counterbalance. Said shaft may also be provided with a suitable steadying vane 8 if desired.

The anchor or scape lever 9 is rigidly mounted on the shaft 10 above the scape arm, and extending upwardly from said shaft is an armature 11 fastened thereto. Mounted on a suitable support 12 is an electro-magnet 13, arranged with its poles in position to attract the armature 11 and so oscillate the anchor 9. In order to hold the armature normally away from the magnet the former is provided with an arm 14 extending rearwardly with respect to the



magnet, so that the weight of said arm will serve to hold the armature in the desired normal position, as shown in full lines in Fig. 1. This arm may be simply a piece of wire fixed to the armature, and in order to have sufficient weight for the purpose intended it may be of some length, the portion which might otherwise project beyond the clock frame being coiled as shown. This arrangement also serves as a convenient means for regulating the separation of the armature from the magnet cores. For this purpose the coiled portion is arranged to rest on the cross rod 15 of the clock frame, and it will be seen that the normal distance between the magnet cores and the armature can be varied as desired merely by suitably expanding or contracting the coiled portion of the gravity arm 14.

It will be understood, of course, that the magnet 13 is in a circuit which is provided with suitable make-and-break devices actuated at uniform intervals by a master clock, not shown. The present embodiment is designed for a normally open circuit, and hence the position of the parts which is shown in Fig. 1, with the armature retracted from the magnet, is the normal position. In this position the scape arm 6 rests against the holding pallet 16, the other or right hand pallet 17 being raised.

From the foregoing description the operation of the device will be readily understood. At each closing of the magnet circuit by the master clock the armature 11 is drawn over toward the magnet, thereby lifting the holding pallet and releasing the scape arm 6, which immediately flies around to the position shown in dotted lines in Fig. 1, where it strikes the right hand pallet 17 which has been lowered by the actuation of the anchor. Immediately, however, after the closing of the circuit the circuit is broken again, by the master clock, whereupon the armature and the anchor return to their normal positions, releasing the scape arm from the right hand pallet and permitting the said arm to continue its movement until it brings up against the holding pallet

16. It will therefore be seen that at each make-and-break of the synchronizing circuit the scape arm makes a complete revolution, permitting the clock train to advance to a corresponding extent, which of course should be in exact correspondence with the time-interval between each make-and-break and the succeeding make-and-break. This time-interval may be one second, ten seconds, one minute, or any other interval desired; but as previously stated, I prefer to have it one minute, since that is the smallest division of time which time-recorders as ordinarily constructed take account of. In such case the reduction from the escapement shaft 4 to the minute spindle 1 should of course be in the ratio of 60 to 1, so that at each revolution of the escapement shaft the minute spindle will be advanced one-sixtieth of a revolution, or one minute.

It is to be understood that the construction herein specifically described is merely the preferred embodiment of the invention, which may be embodied in various forms without departure from its proper scope as defined by the following claims.

What I claim is:

The combination of an escapement arbor having a scape-arm, an anchor arranged to oscillate in the path of the scape-arm, an armature connected with the anchor, an electromagnet arranged to attract the armature and thereby swing the anchor in one direction, a weight-arm associated with the armature to retract the same when the magnet is deenergized, and a stop in the path of the weight-arm to limit the retraction of the armature, said weight-arm comprising a strip of pliable material having the portion engaging the said stop arranged in expandible and contractible convolutions whereby the extent of retraction of the armature may be varied without substantial variation in the retracting force of said arm, as set forth.

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Witnesses:

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