

(No Model.)

2 Sheets—Sheet 1.

H. S. PRENTISS.
ELECTRIC SYNCHRONIZER FOR CLOCKS.

No. 517,480.

Patented Apr. 3, 1894.

Fig. 2.

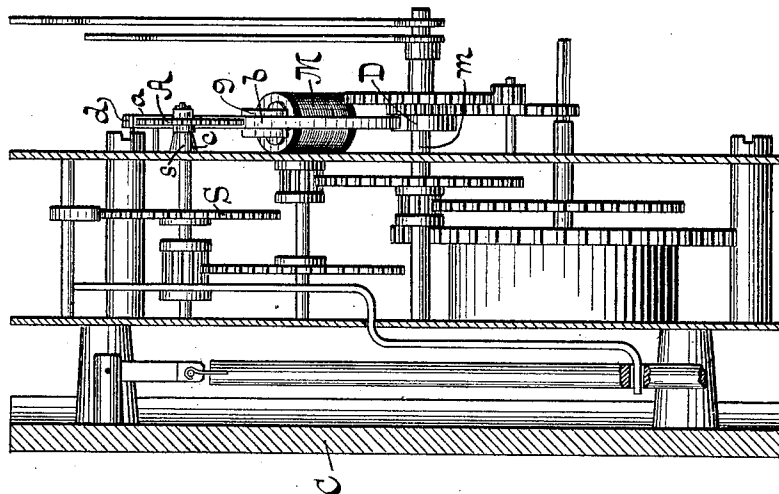
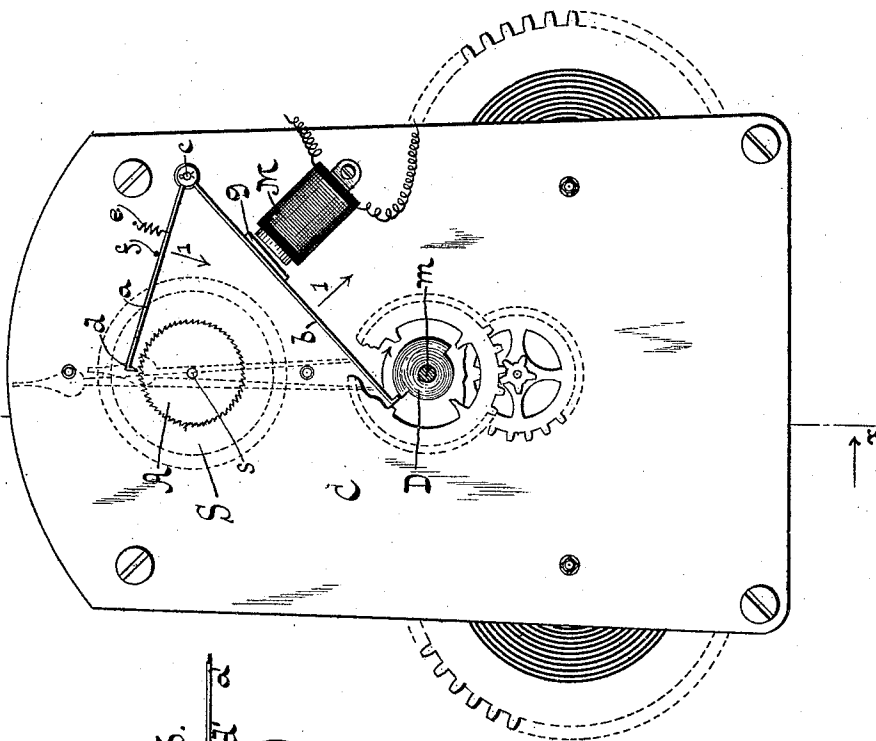


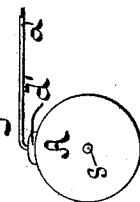
Fig. 1.



WITNESSES:

Klas N. Pernstelt
J. J. Wall.

Fig. 3.



INVENTOR:

Henry S. Prentiss

BY *Ataher duRoi* ATT'Y.

(No Model.)

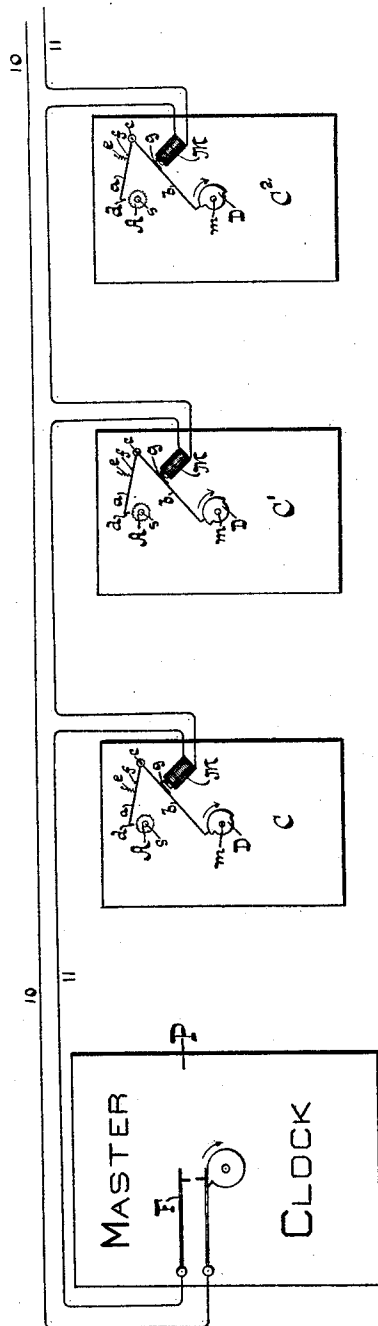
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Fig. 4.



WITNESSES:

Klas A. Fernstedt
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INVENTOR:

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UNITED STATES PATENT OFFICE.

HENRY S. PRENTISS, OF ELIZABETH, NEW JERSEY, ASSIGNOR TO THE
PRENTISS CLOCK IMPROVEMENT COMPANY, OF NEW YORK, N. Y.,
AND JERSEY CITY, NEW JERSEY.

ELECTRIC SYNCHRONIZER FOR CLOCKS.

SPECIFICATION forming part of Letters Patent No. 517,480, dated April 3, 1894.

Application filed November 3, 1892. Serial No. 450,894. (No model.)

To all whom it may concern:

Be it known that I, HENRY S. PRENTISS, a citizen of the United States, and a resident of Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Synchronizers for Clocks, of which the following is a specification.

My invention has reference to improvements in apparatus for synchronizing time pieces, and it consists essentially in regulating the several secondary clocks to run slightly fast, and providing each of the same with a detent adapted to engage with a moving member of the train to arrest the motion of the latter, an electro-magnet adapted to throw the detent into engagement with said member, and means actuated by the train for holding said detent out of engagement with the said member until the hour as indicated by the respective secondary clock, combined with a circuit closer at the primary or master clock adapted to close the circuit through the electro-magnets of the secondary clocks at a predetermined period before the hour as indicated by said master clock and to break it at the hour, all of which is hereinafter more fully pointed out in the following specification and claims and illustrated in the accompanying drawings, in which—

Figure 1 represents an elevation of a secondary clock constructed according to my invention. Fig. 2 is a vertical section in the plane x, x , Fig. 1. Fig. 3 is a detail view of a modified form of the detent. Fig. 4 is a diagram illustrating the clocks arranged in a system.

Similar letters of reference indicate corresponding parts throughout the several views of the drawings.

In the drawings the letter C designates one of the secondary clocks which may embody any suitable well known movement, such for instance as a pendulum or lever movement.

In the drawings I have shown a pendulum movement in which m is the arbor of the minute hand, S the scape-wheel and s its arbor, all as usual.

Upon the arbor of the scape wheel is rigidly mounted a notched disk A.

$a b$ is a detent made in the form of a lever, pivoted at c to the frame of the movement. One end of the lever is provided with a tooth d arranged in a position to engage with the disk A when the lever is turned about its pivot in the direction of the arrows 1 shown in Fig. 1. Normally the detent lever is held out of engagement with the wheel A by a spring e , which holds the arm a of the detent lever against a stop f .

M is an electro-magnet secured to the frame of the movement, its armature g being carried by the arm b of the detent lever. When the electro-magnet is vitalized it tends to throw the detent into engagement with the notched disk to arrest the train of the secondary clock. The end of the arm b of the detent lever is engaged by a cam D mounted on the arbor m of the minute hand, which cam is so constructed that it permits the detent lever a to be thrown into engagement with the notched disk A only at the hour as indicated by the secondary clock, and for a determined period thereafter, so that said clock can be stopped only during that time.

In the operation of the system according to my invention, all the secondary clocks are regulated to run a trifle fast, say from one tenth to three seconds per hour, or for the synchronizing period. The circuit is closed at the master clock at a predetermined period, say ten seconds, before the hour as indicated by the same to vitalize the magnets of the several secondary clocks, and is broken at the hour. Assuming the clock shown in Fig. 1 to be five seconds fast, its cam D will not have released the detent lever D when the master clock closes the circuit at ten seconds of the exact hour, and consequently, although the electro-magnet M is vitalized, it cannot turn the detent lever to bring its tooth into engagement with the notched disk A. Consequently the clock continues to run. At the hour, however, the detent is free to turn, and engages with the notched disk to arrest the motion of the train for five seconds, which brings the clock to the correct time, whereupon the train is released by the breaking of the circuit at the master clock and the retraction of the detent lever D by the spring e .

Referring to Fig. 4, in which I have shown the clocks arranged in a system, P designates the primary or master clock and C C', &c., the several secondary clocks; F is the circuit closer of any suitable construction for closing the circuit at a predetermined period before the hour, and 10 and 11, are the wires leading to the electro-magnets of the respective secondary clocks.

One of the important features of my present invention consists in the fact that clocks whose error is greater than the actual time during which synchronization takes place (time during which the circuit is closed at the master clock) have this error reduced by increments and are finally brought to the correct time. Thus as an example, assuming that the secondary clock is ten minutes fast, it will be seen that at the first period of synchronization approximately ten seconds of this error will be removed, at the second, ten more, and so on until the clock is ultimately brought to the correct time.

In practice I prefer to construct the cam D to permit the detent lever *ab* to be turned by the electro-magnet M during a period of half an hour, so that the secondary clocks, if half an hour fast or slow, must always be brought to the correct time. It will also be noticed that changes in time at the master clock will not affect the individual secondary clocks and the necessity of setting the same by hand in case of such changes is avoided. Furthermore, should any of the secondary clocks stop, they can be set without taking special care to setting them to the exact time, since they are regulated to run fast and will therefore be ultimately brought to the correct time whether set ahead or behind the correct time.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a clock system, a master clock provided with a circuit closer adapted to close the circuit at a predetermined period before the hour and to break it at the hour, and a

secondary clock (or clocks) provided with a detent adapted to arrest the motion of the train, an electro-magnet in connection with the circuit closer of the master clock and arranged to act on said detent, and a device actuated by the train of the secondary clock, and placed in connection with the detent to permit motion of the latter under the influence of the electro-magnet at the hour as indicated by the secondary clock and for a predetermined period thereafter, substantially as and for the purpose set forth.

2. A time piece provided with a detent composed of a member actuated by the train of the movement, and a second member consisting of a lever actuated by an electro-magnet, the two cooperating to arrest the motion of the train, and a cam, or its equivalent, mounted on one of the arbors of the train and engaging the lever to permit of its being actuated to engage with the first member only at the hour as indicated by said time piece, and for a predetermined period thereafter, substantially as described.

3. A time piece provided with a disk mounted on the arbor of the scape wheel, a detent lever arranged to engage with the same for arresting the motion of the train, an electro-magnet arranged to act on said lever to draw it into contact with the disk, and a cam mounted on the arbor of the minute hand and engaging with the lever; said cam having a recessed portion permitting the lever to turn about its pivot under the influence of the electromagnet at the hour as indicated by the time-piece and for a predetermined period thereafter, substantially as and for the purpose set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 28th day of October, 1892.

HENRY S. PRENTISS.

Witnesses:

KLAS H. TERNSTEDT,
J. J. MALLE.