

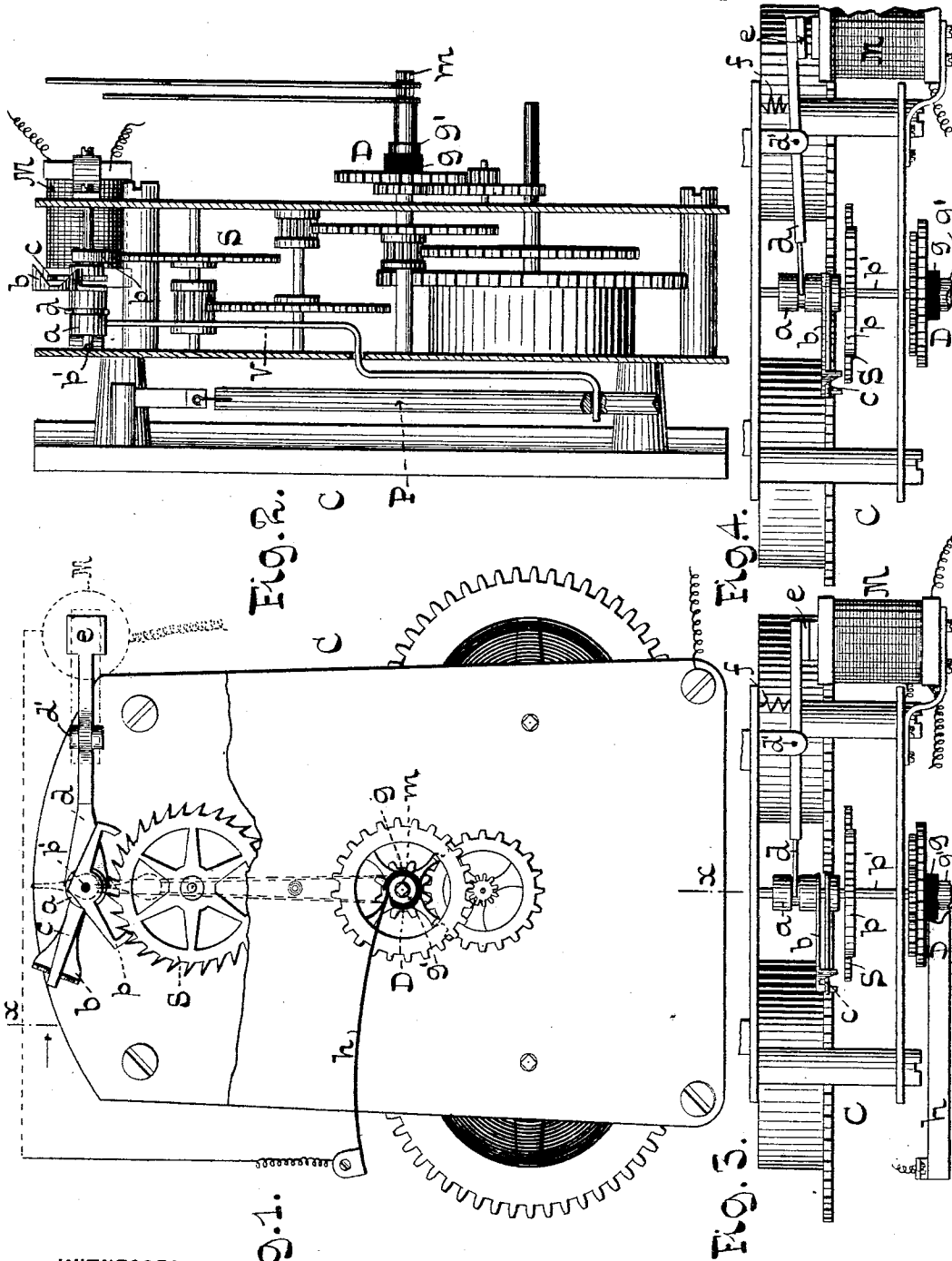
(No Model.)

2 Sheets—Sheet 1.

H. S. PRENTISS.
ELECTRIC SYNCHRONIZER FOR CLOCKS.

No. 496,135.

Patented Apr. 25, 1893.



WITNESSES:

Klas H. Prentiss
J. H. Wall

INVENTOR:

Henry S. Prentiss,
BY Arthur du Sauray,
ATTORNEY,

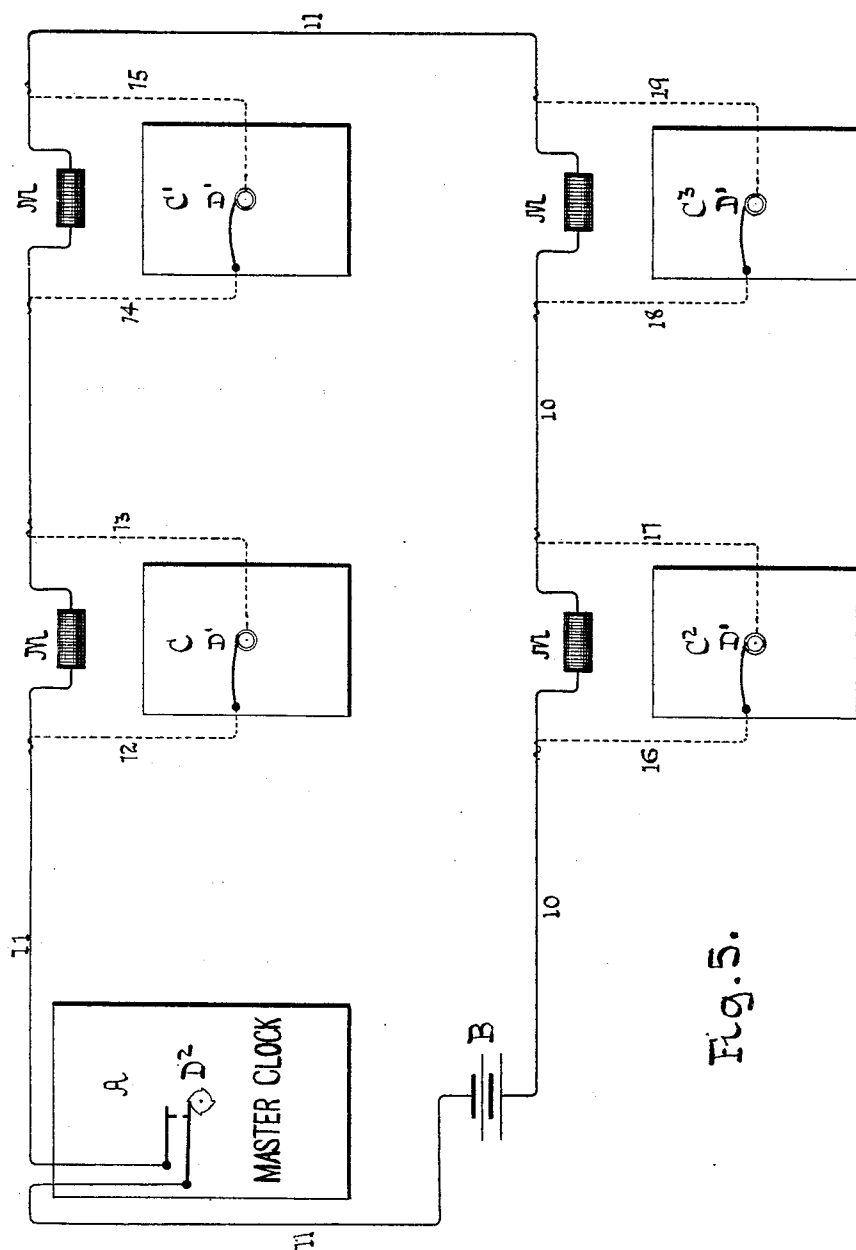
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UNITED STATES PATENT OFFICE.

HENRY S. PRENTISS, OF ELIZABETH, NEW JERSEY.

ELECTRIC SYNCHRONIZER FOR CLOCKS.

SPECIFICATION forming part of Letters Patent No. 496,135, dated April 25, 1893.

Application filed June 22, 1892. Serial No. 437,636. (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 of a system to run slightly fast, and providing each of the same with a device adapted to normally connect the pallet lever with the pendulum, but which device is automatically shifted at the hour as indicated by the respective secondary clock to break such connection,—combined with means operated from the master clock for restoring the connection at the exact hour; all of which, together with certain novel features in the arrangement of the system, is more fully pointed out in the following specification and claims and illustrated in the accompanying drawings, in which:

Figure 1 represents a face view of a secondary clock constructed according to my invention, showing the time piece stopped. Fig. 2 is a vertical section in the plane *xx* of Fig. 1. Fig. 3 is a plan or top view of Fig. 1. Fig. 4 is a similar view showing the clock running. Fig. 5 is a diagram illustrating the clocks arranged in a system.

Similar letters and numerals indicate corresponding parts throughout the several views.

In the drawings the letter *C* designates one of the secondary clocks, which may embody any suitable movement in which *m* is the arbor of the minute hand, *P* the pendulum, *V* the verge rod, *p* the pallet lever mounted on an arbor *p'*, and *S* is the scape-wheel. The upper end of the verge rod, instead of being secured directly to the pallet *p*, or to the arbor of the same, is secured to a hub *a* mounted loosely on said spindle, so as to turn independent of the same, and from said hub projects a forked arm *b* arranged opposite to and adapted to straddle the end of a finger *c* made fast to the pallet *p*, or to the arbor *p'* thereof. The hub *a* can slide on the arbor *p'*, and is engaged by a forked lever *d*, pivoted at *d'* and having its opposite end secured

to the armature *e* of an electro-magnet *M*. Normally a spring *f* holds the forked arm *b*, which I shall hereinafter term the connecting arm, in a position to embrace and engage with the finger *c*, thereby imparting to the latter, and consequently to the pallet lever, the necessary oscillation to permit the rotation of the scape-wheel. Should however, the electro-magnet be vitalized, the connecting arm is withdrawn laterally, and the verge rod practically disconnected from the pallet lever, the latter ceases to oscillate and consequently the scape-wheel is practically locked and ceases to rotate, while the pendulum continues to oscillate.

D is a circuit closer of any suitable construction operated, by the train of the clock to close the circuit, of the electro-magnet *M*, when said clock is at the hour of synchronization. In this example the circuit closer is operated from the arbor of the hour hand of the clock and its parts *g g'* and *h* are arranged to close the circuit once twelve hours.

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 one second or more per hour, or for the synchronizing period. The circuit is closed at the master clock at such a time before the hour as would include the fastest running secondary clock, but in view of the fact that the circuits are not closed at the respective secondary clocks until the hour as indicated by said clocks, the latter are not affected thereby. As the hands of the individual secondary clocks reach the hour, the circuit through the respective electro-magnet *M* is closed; the connecting arm *b* is withdrawn from connection with the pallet lever, and the hands of the clock cease to move. At the exact hour as indicated by the master clock, the circuit is broken at the master clock, and the secondary clocks are again set in motion by the connecting arm engaging with the finger *c* of the pallet lever. Of course it must be understood that the secondary clocks should not be regulated to run so fast that they remain idle for a sufficient length of time to permit their pendulums to come to rest.

Referring to Fig. 5, in which I have illustrated the clocks arranged in a system, A rep-

represents the master clock, C C' C², &c., the several secondary clocks, B the battery, and 10 and 11 the line wires. In this example I have shown the circuit closer D² of the master clock constructed to make and break the circuit four times an hour, and have arranged the circuit closers D' of the secondary clocks in shunt circuits 12, 13, 14, 15, &c., while the electro magnets M are in the main line. In this case these circuit closers instead of closing the circuit once an hour, are arranged to keep the circuit closed during the hour and to break the same when the respective secondary clocks are at the time at which they are to be synchronized. For instance the circuit closer of clock C breaks the circuit at the hour, circuit closer of clock C' at a quarter of an hour after, circuit closer of clock C² at half past, &c. When the circuit is closed at the master clock it passes through the electro-magnets of those clocks only, in which the circuit is broken at the circuit closers, while in the remaining clocks the current passes through the shunt wires, and the circuit closers, so that a comparatively weak battery may be employed.

It is evident that according to the system herein described, slow running clocks would not be synchronized, and consequently in an extensive system of clocks, where it may be difficult to keep all the clocks continually running fast, the clocks may be regulated as usual, and devices such as shown embodied, which would act, in case the respective secondary clocks run fast, to set the same to the correct time; and with the same other devices embodied, which would act in case the secondary clocks run slow,—therefore I do not wish to restrict myself to purposely regulating the clocks to run fast.

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

1. A time piece having its governing member arranged and constructed to have its operative parts disconnected, and a device for breaking the connection at the hour as indicated by said time piece, substantially as described.

2. A time piece provided with a connection between its pendulum and pallet lever, a device electrically actuated to break the said connection at the hour as indicated by said time piece, substantially as described.

3. A secondary clock regulated to run fast and provided with a connection between its verge rod and pallet lever, a lever engaging said connection, an electro-magnet adapted to actuate said lever, a circuit closer adapted to close the circuit at the hour as indicated by said secondary clock, and connections for breaking the circuit of the electro-magnet at the exact hour.

4. In an electric clock system, a master clock provided with a circuit closer constructed to make and break the circuit at determined intervals as described, and a series of secondary clocks having their synchronizing magnets arranged in the main line, and their circuit closers constructed to break the circuit at the hour as indicated by said clocks, and arranged in shunt circuits, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 20th day of June, 1892.

HENRY S. PRENTISS.

Witnesses:

KLAS H. TERUSTEDT,
J. J. MALLE.