(No Model.) 3 Sheets—Sheet 1.

A. RAMEL & W. W. DEAN.

CLOCK SYNCHRONIZING DEVICE.

No. 346,862. Patented Aug. 3, 1886.

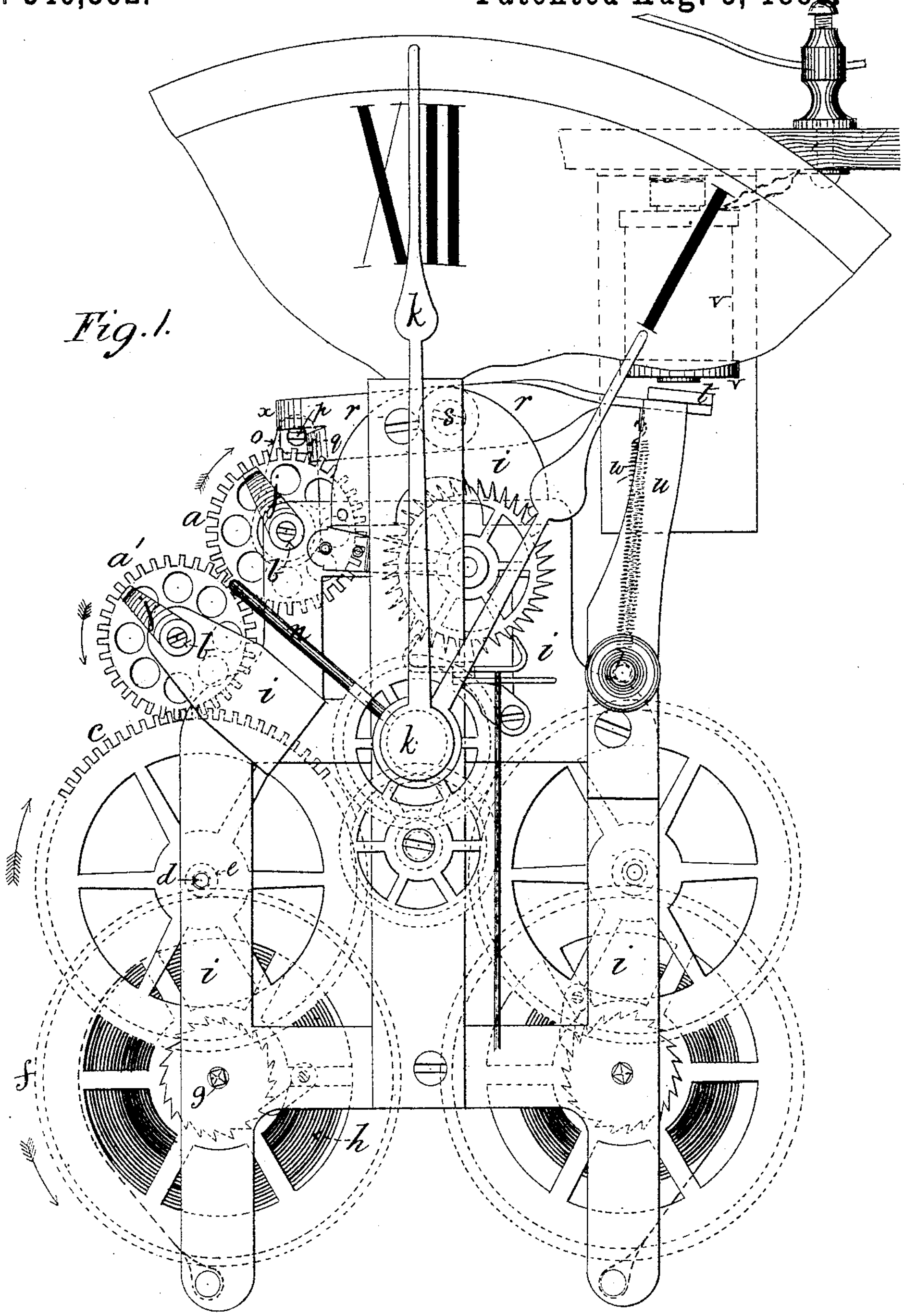

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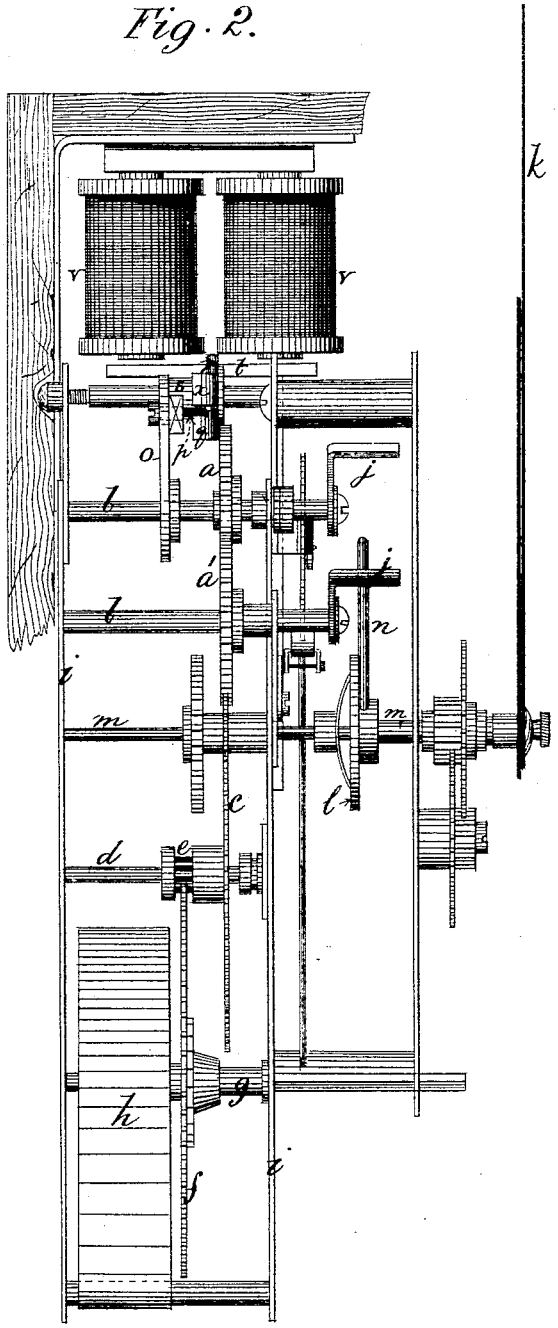
Fig. 2.



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CLOCK SYNCHRONIZING DEVICE.

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Fig. 3.

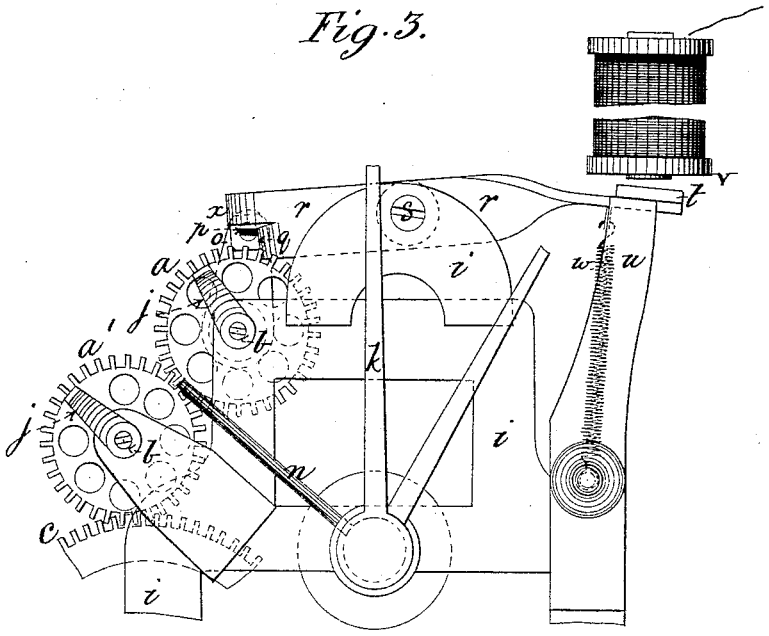
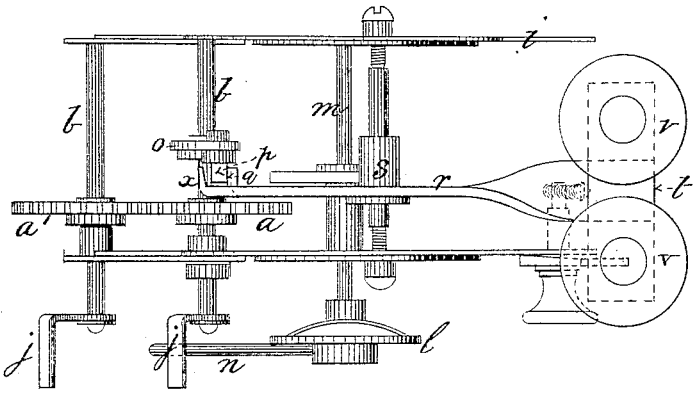


Fig. 4.



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UNITED STATES PATENT OFFICE.

ALFRED RAMEL AND WILLIAM W. DEAN, OF ST. LOUIS, MISSOURI, ASSIGNORS OF ONE-HALF TO PAUL BAKEWELL, OF SAME PLACE.

CLOCK-SYNCHRONIZING DEVICE.

SPECIFICATION forming part of Letters Patent No. 346,862, dated August 3, 1886.

Application filed February 19, 1886. Serial No. 192,505. (No model.)

To all whom it may concern:

Be it known that we, ALFRED RAMEL and WILLIAM W. DEAN, both of the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Clock-Synchronizers, of which the following is a full, clear, and exact description.

Our invention relates to improvements upon Letters Patent granted to us, bearing date November 24, 1885, No. 330,923, for clock-synchronizers, wherein is described apparatus arranged separately from but combined with the clock mechanism, whereby an electric current is caused to automatically regulate a clock every hour by drawing the minute-hand exactly to the front of twelve on the dial. The apparatus set forth in said Letters Patent No. 330,923 consists, essentially, of two cog-wheels of equal diameter, gearing into each other and rotated in opposite directions when required by a train of toothed wheels and pinions operated by a spring. On the axes of the cog-wheels are fixed two regulating-arms, which are adjacent to and in combination with the minute-hand of the clock when at or near the front of twelve. One of the cog-wheels is provided with studs or stops, with which engages a specially-constructed pawl carried at the end of a pivoted arm or lever, on the other end of which is an armature in proximity to electro-magnets, the whole operating in such a manner that on an electric current being transmitted through the magnets the armature is attracted toward the magnets, and its pivoted arm or lever thereby moved over on its pivot, so as to raise the pawl from its engagement with the stops on the cog-wheel, when the cog-wheels, with the regulating-arms, being free, are rotated by their operating-spring to the extent of one revolution only in opposite directions, and in so doing the ends of the regulating-arms, in approaching each other, catch and draw the minute-hand of the clock between them to the point of twelve.

Our present invention consists in mounting the moving mechanism of the synchronizer within the ordinary frame-work of the clock, so as to economize space and cost of construction, and in the use of simpler and more effective means of insuring a positive action of the cog-wheels and regulating-arms than with the devices described in our said patent.

On the accompanying drawings, Figure 1 is a front elevation, partly broken away, representing a clock fitted with our invention; Fig. 2, a side elevation thereof; Fig. 3, a detached front view of the principal parts of our invention; and Fig. 4, a plan of Fig. 3, with the clock-hands omitted, like letters of reference denoting like parts in all the figures.

a a' represent cog-wheels gearing into each other and corresponding with the cog-wheels A A', described and illustrated in our said previous patent. The cog-wheels *a a'* are fixed, respectively, on axles *b b*, and rotated in opposite directions, when required, by the spur-wheel *c*, which is fixed on shaft *d*, whereon is pinion *e*, geared into spur-wheel *f*, which is fixed on shaft *g*, driven by the force of spring *h*.

The cog-wheels *a a'* and their axles *b b*, with the various wheels, shafts, and pinions throughout the train of gearing, as described, are mounted within the ordinary frame-work *i* of the clock, and are respectively rotated in the directions indicated by the arrows in Fig. 1.

On the ends of the axles *b b* of the cog-wheels *a a'* are fixed, respectively, the two regulating-arms *j j*, which are of equal length and correspond with the arms B B of our said patent. The arms *j j* rotate, as in the case of the cog-wheels *a a'*, in opposite directions—that is to say, from each other in an upward and then downward direction and in planes parallel with that of the minute-hand *k* of the clock.

Projecting radially from the hub *l* (or other part) of the spindle *m* of the minute-hand *k* is an arm, *n*, the direction of which when the minute-hand *k* is at the point of twelve on the dial will be exactly midway between the centers of the cog-wheels *a a'*, and will be between and in contact with the ends of the arms *j j* when these are nearest to and in line with each other.

On the axle *b* of the cog-wheel *a* is an arm, *o*, from one side of which, at its outer end, projects a bolt or stud, *p*, which, when the apparatus is not in action, normally bears against the rabbeted hooked (or broadened) portion *q*

of one end of an arm or lever, *r*, which is pivoted at *s* within the frame-work *i* of the clock and terminates at its other end in an armature, *t*, which, with lever *r*, is normally retained against the upper end of the fixed upright bar *u* (or equivalent stop) at a suitable distance from the electro-magnets *v*, as shown in Figs. 1 and 3, by a light spring, *w*, (or its equivalent—a weight.) Above its rabbeted hooked portion *q* the arm or lever *r* extends over and terminates beyond the bolt or catch *p* (when the latter is in its normal position, as shown) in a hooked (or broadened) end, *x*.

The operation of our improved synchronizer is as follows: The spring *h* being wound up and the lever *r* in its normal position, as shown, the cog-wheels *a a'* will be prevented from rotating by the bolt or stud *p* of the arm *o* bearing against the rabbeted hooked portion *q* of the lever *r*; but on a current of electricity being transmitted (once every hour) through the electro-magnets *v*, the armature *t* is attracted to the magnets *v*, and, overcoming the tension of the spring *w*, the lever *r* moves over on its pivot *s*, so as to lower the rabbeted hooked portion *q* of its end out of contact with and clear of the bolt or stud *p*, which with the arm *o* being then free the cog-wheels *a a'* are rotated by the action of the spring *h*, but are prevented from performing more than one revolution by the bolt or stud *p*, which, in returning to its normal position, if the armature *t* is still in contact with the magnets *v*, comes in contact with and bears against the outer hooked end, *x*, of the lever *r*; or if the armature *t* and lever *r* have been released from the magnets *v* and returned by the spring *w* to their normal position, as shown, the bolt or stud *p* is stopped by the rabbeted hooked portion *q* of the end of lever *r*, as before. As the cog-wheels *a a'* revolve, the regulating-arms *j j* also rotate, and, approaching each other, catch radial arm *n*, (if this is within their circuits,) and, constraining it to a central position between their meeting ends, thereby draw the minute-hand *k* to the point of twelve on the clock-dial.

We claim—

1. In a clock-synchronizing apparatus, the cog-wheels *a a'*, mounted on axles *b b*, regulating-arms *j j*, arm *o* on one of said axles *b*, and projecting bolt or stud *p*, all rotated substantially as described, in combination with the double-hooked end *q x* of arm or lever *r*, having armature *t*, and with electro-magnets *v*, spring *w*, and upright bar or equivalent stop *u*, substantially as and for the purpose hereinbefore described and shown.

2. In a clock-synchronizing apparatus, the cog-wheels *a a'*, mounted on axles *b b*, regulating-arms *j j*, arm *o* on axle *b*, and projecting bolt or stud *p*, all rotated substantially as described, in combination with arm *n* of minute-hand *k*, and with the double-hooked end *q x* of arm or lever *r*, having armature *t*, electro-magnets *v*, spring *w*, and upright bar or equivalent stop *u*, substantially as shown, and for the purpose described.

3. In a clock-synchronizing apparatus, cog-wheels *a a'*, mounted on axles *b b*, regulating-arms *j j*, arm *o* on axle *b*, and projecting bolt or stud *p*, all rotating substantially as decribed, in combination with double-hooked end *q x* of arm or lever *r*, armature *t*, spring *w*, and upright bar or equivalent stop *u*, the whole being mounted within the clock frame-work, substantially as shown, and for the purpose described.

In testimony whereof we have affixed our signatures, in presence of two witnesses, this 15th day of February, 1886.

ALFRED RAMEL.
WILLIAM W. DEAN.

Witnesses:
PAUL BAKEWELL,
JOS. W. CROOKES.