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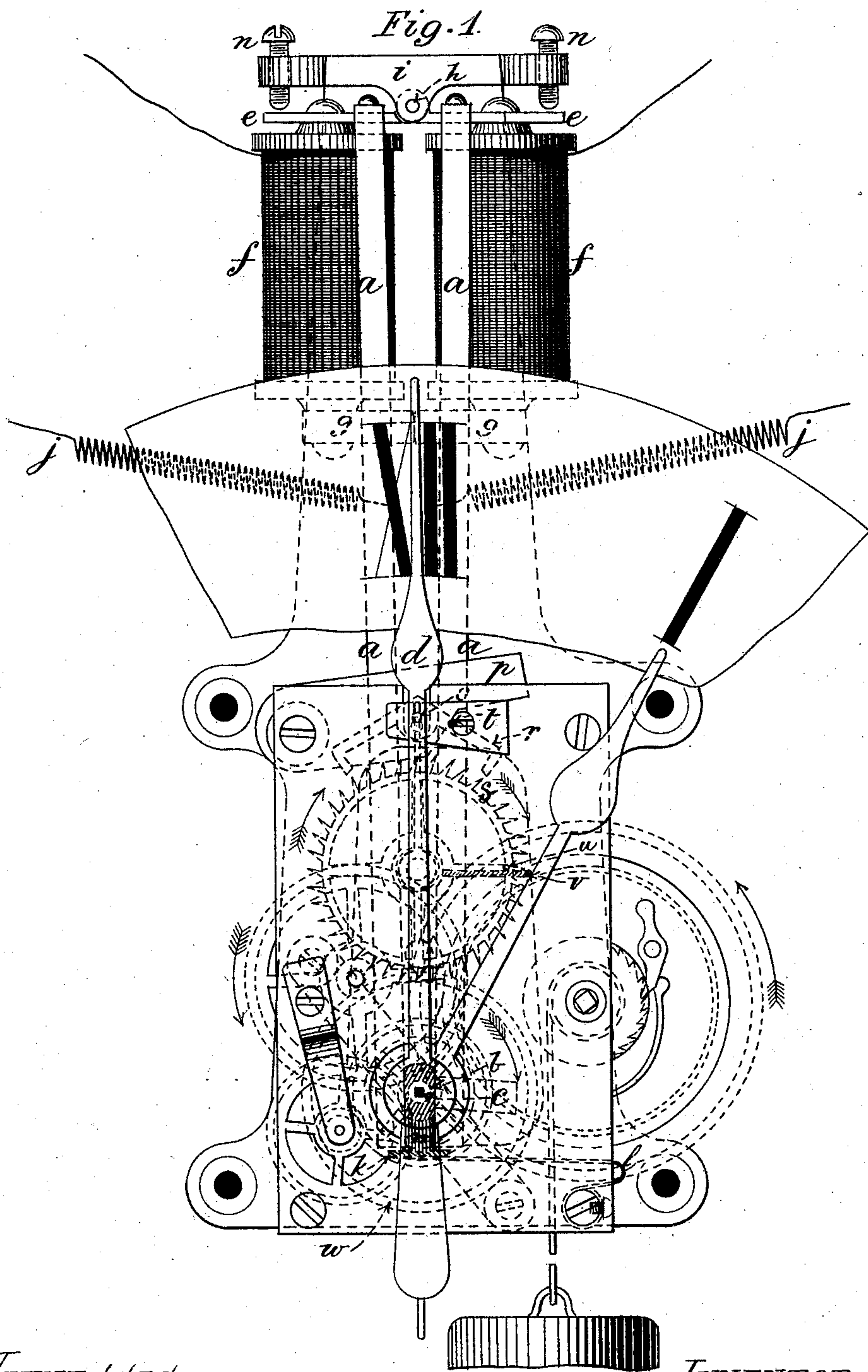
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A. RAMEL & W. W. DEAN.

ELECTRIC SYNCHRONIZING APPARATUS FOR CLOCKS.

No. 365,023.

Patented June 14, 1887.



WITNESSES  
*S. P. Schrader*  
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INVENTOR  
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*William W. Dean by*  
*Paul Bakewell,*  
*their attorney*

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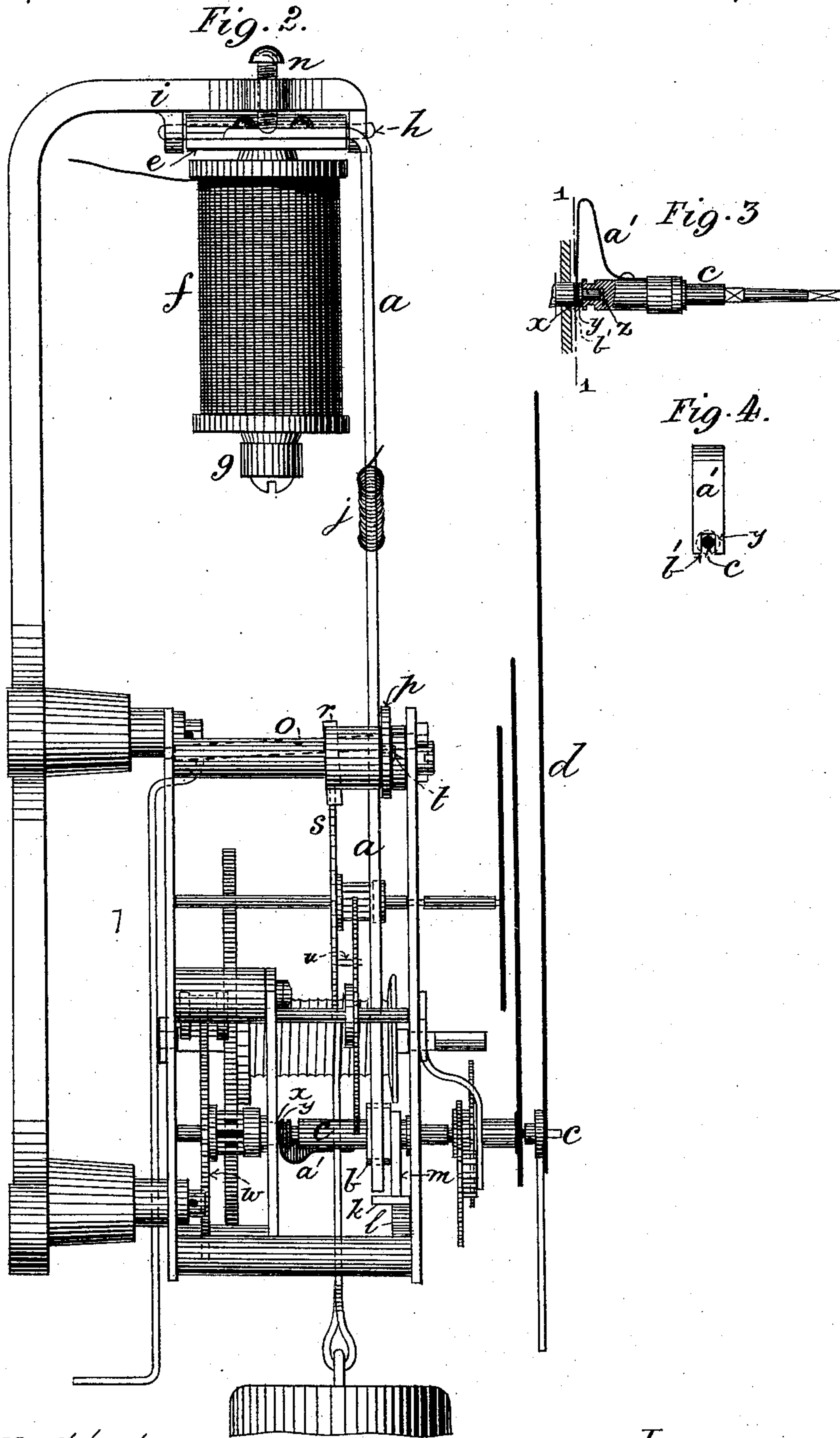
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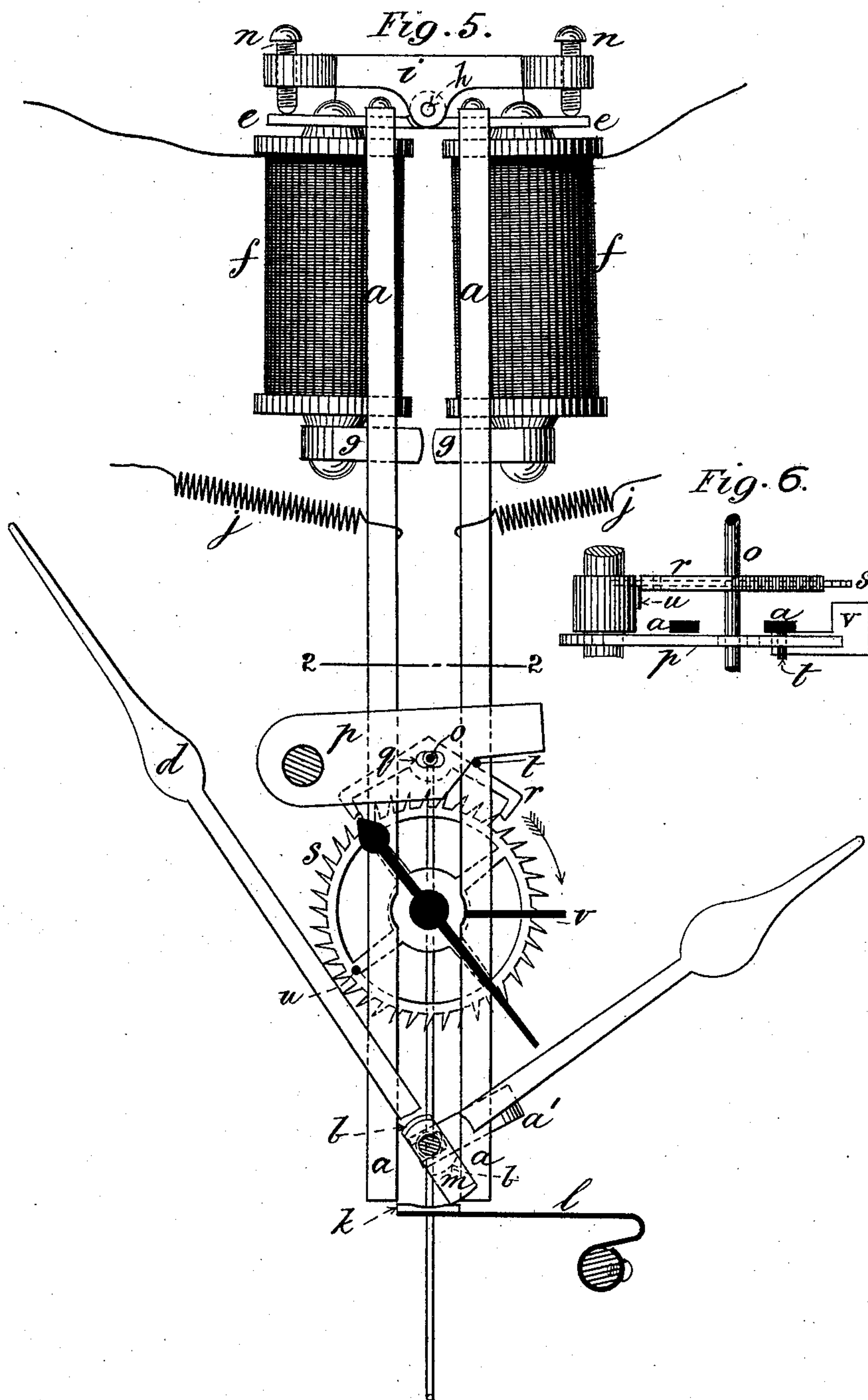
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# UNITED STATES PATENT OFFICE.

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

## ELECTRIC SYNCHRONIZING APPARATUS FOR CLOCKS.

SPECIFICATION forming part of Letters Patent No. 365,023, dated June 14, 1887.

Application filed March 1, 1887. Serial No. 229,283. (No model.)

*To all whom it may concern:*

Be it known that we, ALFRED RAMEL and WILLIAM W. DEAN, citizens of the United States, residing at the city of St. Louis, State of Missouri, have invented a certain new and useful Improvement in Clock-Synchronizing Apparatus, of which the following is a full, clear, and exact description.

Our invention relates to improvements in clock-synchronizing apparatus, whereby a current of electricity transmitted once every hour from any central clock which is presumably on correct time is caused to synchronize a clock (or clocks) with which the apparatus is directly combined by drawing its minute-hand at such times preferably to the point of twelve (but, if desired, to any other point) on the dial, and simultaneously causing the seconds-hand to be brought to the point indicating the sixtieth second on its dial.

On the accompanying drawings, Figure 1 is front elevation of a clock fitted with our improved synchronizing devices; Fig. 2, a side elevation thereof; Fig. 3, a detached view of parts of Figs. 1 and 2; Fig. 4, a section on line 1 1 in Fig. 3; Fig. 5, a detached front elevation of the synchronizing apparatus, with the immediately combined parts of the clock as shown in Figs. 1 and 2, and Fig. 6, a sectional plan taken on line 2 2 in Fig. 5, like letters of reference denoting like parts in all the figures.

Our invention consists in a combination of devices composed of bars or arms *a*, which are arranged vertically in the same plane and at a suitable distance apart within the frame-work of the clock to be synchronized, one on each side of a flat parallel-sided cross-bar, *b*, which is formed on or attached to the minute-hand shaft *c* at right angles thereto, and in the same direction as the minute-hand *d*.

Each bar or arm *a* is secured at its upper end to a plate, *e*, which carries an electro-magnet, *f*, having a pole-piece, *g*. The two plates *e* are hinged together at *h*, (or otherwise,) so that the outer ends of the pole-pieces *g* of the magnets *f* are immediately opposite to each other, the whole being carried by the overhead frame-work *i*, which may either be an extension of the clock frame-work, as shown, or

an independent fixture, according to circumstances.

Normally, or when unaffected by passing electric current, the magnets *f*, with their pole-pieces *g* and the bars or arms *a*, pivoted at *h*, are kept apart, as seen in Fig. 5, by spiral (or other) springs *j*, which are connected at one end to the bars or arms *a*, and at the other end to any fixed point—such as the outer casing of the clock—in which position of the bars or arms *a* the flat-sided cross-bar *b* on the minute-hand shaft *c* is free to rotate with the latter unobstructed. The bars or arms *a* are further retained apart by a block or distance-piece, *k*, which is caused to pass up between the bars or arms *a* at their lower ends by a spring, *l*, fulcrumed to the clock-frame, and is depressed clear of the bars or arms *a*, as hereinafter more particularly described, by a cam, *m*, which projects from the minute-hand shaft *c* in line with the flat-sided cross-bar *b*.

The limit of separation permitted to the bars or arms *a* is adjustable, as required, by set-screws *n*, which work through the upper frame-work, *i*, and form stops to the plates *e* when these are thrown upward by the separation of the magnets *f*.

Hinged at one end to the clock frame-work and extending across and beyond the faces (or backs) of the bars or arms *a* in a plane parallel with the latter and at right angles to the escapement-spindle *o* is a tumbler-lever, *p*, the lower edge of which at a certain distance from the fulcrum is rabbeted, the rabbeted portion sloping upward and forward from the fulcrum and thence straight and parallel, or thereabout, with the upper edge of the lever *p* to the outer or free end of the latter. Through a slotted hole, *q*, formed through the tumbler-lever *p*, the escapement-spindle *o* passes, the relative positions of these parts being such that when the bars or arms *a* are separated, as above described, and the escapement *r* is engaged with its wheel *s* during the ordinary working of the clock, the escapement-spindle *o* will be horizontal and the tumbler-lever *p* supported on a pin, *t*, which projects from the face of one of the bars or arms *a* and passes beneath the straight horizontal portion of the



rabbeted edge of the tumbler-lever *p*; or the tumbler-lever *p* may be supported by an adjacent portion of the clock-frame, the pin *t* being at the same time in contact with the edge of the lever *p*, as described.

The synchronizing of the clock is effected by means of the above-described apparatus in the following manner: During the working of the clock, so long as the electro-magnets *f* are not influenced by a passing current of electricity, the bars or arms *a* remain separated, as described. At some minutes before the hour the cam *m* on the minute-hand shaft *c* begins to depress the block or distance-piece *k*, as seen in Fig. 5, until the latter is clear of the ends of the bars or arms *a*, which will occur at about five minutes (more or less) before the hour, as indicated by the clock. At the exact hour as given by the central regulating-clock a current of electricity is passed through the electro-magnets *f*, and, attracting their pole-pieces *g* together, causes the magnets *f* and bars or arms *a* to converge on the hinge *h*. In so doing the inner opposite edges of the bars or arms *a* close upon the flatsides, respectively, of the cross-bar *b* on the minute-hand shaft *c*, and if the minute-hand *d* is on slow or fast time—or, in other words, to the left or right of the point of 12 on the dial—the flat-sided cross-bar *b* is constrained by this closing action of the bars or arms *a* to the vertical position, and with it the minute-hand *d* to the point of 12 on the dial. Simultaneously the projecting pin *t* on the bar or arm *a*, striking and pressing inwardly against the beveled portion of the rabbeted lower edge of the tumbler-lever *p*, raises the latter radially to its fulcrum, and tilting with it the escapement-spindle *o* (which has a slot formed above its bearing at one end to permit of the movement) lifts the escapement *r* out of engagement with its wheel *s*, which being thereby released is partially rotated by the clock-work until the seconds-hand points to the sixtieth second on its dial, when the escapement-wheel *s* is momentarily stopped during the continuance of the electric current by a pin, *u*, which projects from the face of the escapement-wheel *s* (see Figs. 2 and 5) and comes against a stop, *v*, projecting backward from one of the bars or arms *a*. On the cessation of the electric current the bars or arms *a* are again separated by the springs *j*, and in so doing release the flat-sided cross-bar *b* on the minute-hand shaft *c*, which is then free to rotate with the minute-hand *d* unobstructed, as before. Simultaneously the projecting pin *t* on the bar or arm *a* leaves the beveled portion of the rabbeted lower edge of the tumbler-lever *p*, which thereby falls and allows the escapement *r* to again engage with its wheel *s*. At the same instant also the stop *v* on the bar or arm *a* is removed from beneath the projecting pin *u* on the face of the escapement-wheel *s*, which is then free to rotate, subject to the action of the escapement *r*, as before. On the minute-hand *d* traversing

the space of about five minutes (more or less) on the dial after the hour, the cam *m* on the minute-hand shaft *c* becomes clear of the block or distance-piece *k*, which is then returned by the spring *l* to its normal position between the lower ends of the bars or arms *a*.

For enabling the bars or arms *a* to be passed downward between the front and back plates of the clock, so as to economize space and simplify the construction of the synchronizing apparatus, we divide the minute-hand shaft *c* into two parts, as seen in Figs. 2 and 3, one part, which carries the usual gearing, *w*, being mounted permanently between the back plate of the clock-frame and an inner bearing-plate, *x*, through which it projects, this projecting portion being of reduced diameter and formed near its shoulder at the bearing *x* with a flange, *y*. The other part of the minute-hand shaft *c* carries the flat-sided cross-bar *b*, cam *m*, minute-hand *d*, and hour-hand with its usual appendages, and passes through the front plate of the clock, from which it can be removed, if desired. Its inner end is bored out or formed with a cylindrical recess, *z*, which is passed onto the projecting reduced end of the permanent part of the shaft *c* until stopped by the flange *y* thereon.

For obtaining the necessary friction between the divided ends of the minute-hand shaft *c*, a flat spring, *a'*, is attached at one end to the removable part of the shaft, and thence projecting outward is bent over and back to the shaft *c*, where its other end is formed with a fork, *b'*, (see Fig. 4,) which, when constrained to pass over the permanent part of the shaft *c*, between its flange *y* and the shoulder at the bearing *x*, is in a state of tension, and, pressing against the flange *y*, maintains the latter and the removable end of the shaft *c* in frictional contact at all times.

Although our improved synchronizing apparatus is here described as in combination with a specially-constructed minute-hand shaft, *c*, it is equally applicable to any ordinary minute-hand shaft.

We claim as our invention—

1. In a clock-synchronizing apparatus, the combination, with the minute-hand shaft *c*, (or the ordinary minute-hand shaft, when so used,) having flat-sided cross-bar *b*, of arms or bars *a*, plates *e*, hinged to frame-work *i*, and electro-magnets *f*, carried by said plates, and having pole-pieces *g*, substantially as shown, and for the purpose described.

2. In a clock-synchronizing apparatus, the combination, with the minute-hand shaft *c*, (or ordinary minute-hand shaft,) having flat-sided cross-bar *b*, of bars or arms *a*, plates *e*, hinged to frame-work *i*, electro-magnets *f*, carried by said plates and having pole-pieces *g*, set-screws *n*, and spiral (or other) springs *j*, substantially as shown, and for the purpose described.

3. In a clock-synchronizing apparatus, the combination, with the minute-hand shaft *c*, (or ordinary minute-hand shaft,) having flat-sided



cross-bar *b* and cam *m*, of bars or arms *a*, plates *e*, hinged to frame-work *i*, electro-magnets *f*, carried by said plates and having pole-pieces *g*, set-screws *n*, spiral (or other) springs *j*, block or distance-piece *k*, and spring *l*, fulcrumed to clock-frame, substantially as shown, and for the purpose described.

4. In a clock-synchronizing apparatus, the combination, with the minute-hand shaft *c*, (or ordinary minute-hand shaft,) having flat-sided cross-bar *b*, of bars or arms *a*, having projecting pin *t* and stop *v*, plates *e*, hinged to frame-work *i*, electro-magnets *f*, carried by said plates and having pole-pieces *g*, set-screws *n*, spiral (or other) springs *j*, tumbler-lever *p*, fulcrumed to clock-frame, escapement-spindle *o*, escapement *r*, and its wheel *s*, having projecting stop *u*, substantially as shown, and for the purpose described.

5. In a clock-synchronizing apparatus, the combination, with the minute-hand shaft *c*, (or ordinary minute-hand shaft,) having flat-sided cross-bar *b* and cam *m*, of bars or arms *a*, having projecting pin *t* and stop *v*, plates *e*, hinged

to frame-work *i*, electro-magnets *f*, carried by said plates and having pole-pieces *g*, set-screws *n*, spiral (or other) springs *j*, block or distance-piece *k*, spring *l*, fulcrumed to clock-frame, tumbler-lever *p*, escapement-spindle *o*, escapement *r*, and its wheel *s*, having projecting stop *u*, substantially as shown, and for the purpose described.

6. In a clock-synchronizing apparatus substantially as described, the combination of the minute-hand shaft *c*, divided into two parts and having flat-sided cross-bar *b*, flange *y*, recess *z*, and spring *a'*, formed with fork *b'*, substantially as shown, and for the purpose described.

In testimony whereof we affix our signatures in presence of two witnesses this 26th day of February, 1887.

ALFRED RAMEL.  
WILLIAM W. DEAN.

Witnesses:

S. L. SCHRADER,  
EDWIN SAUTER.