

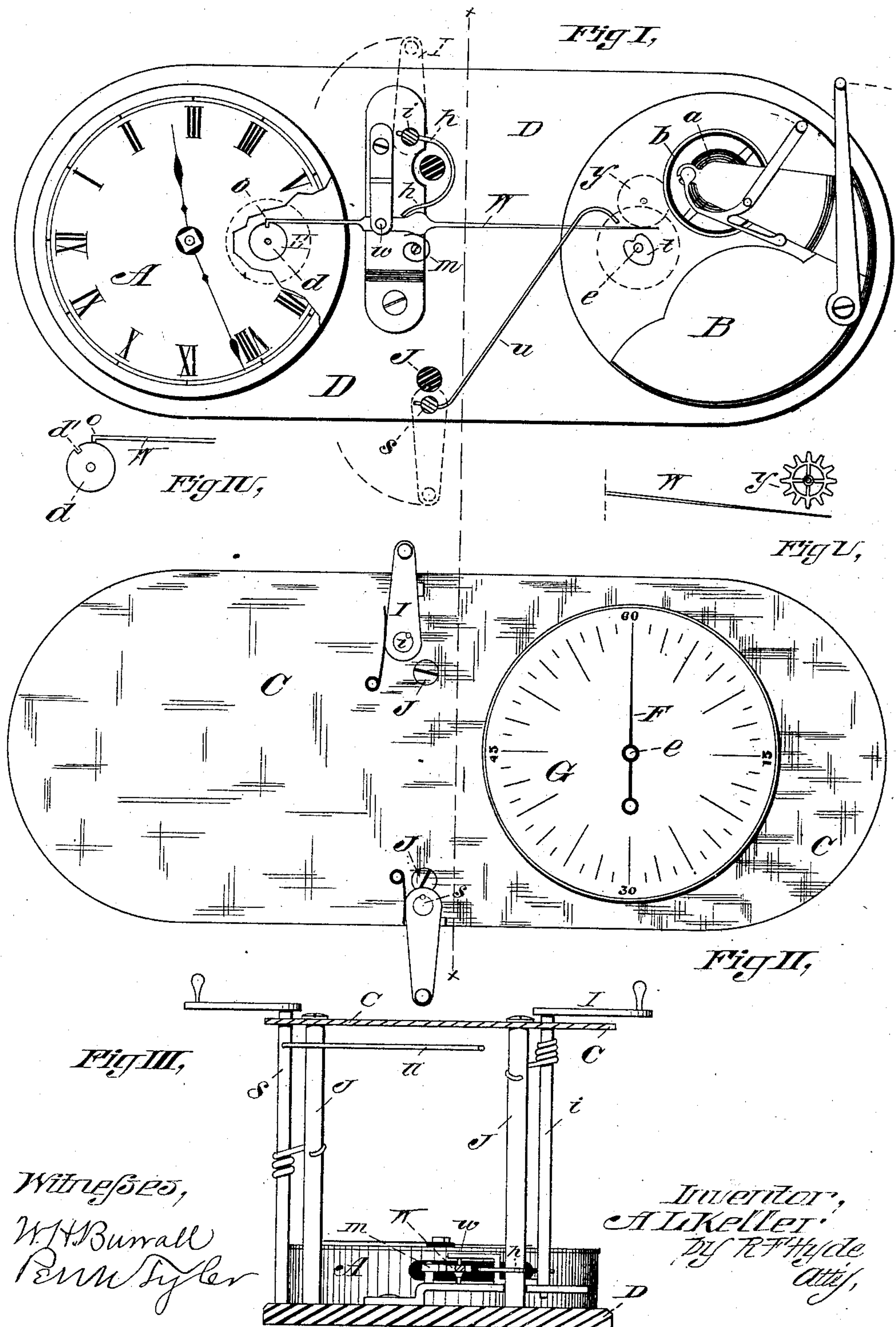
(No Model.)

A. L. KELLER.

DEVICE FOR TESTING WATCH BALANCES AND HAIR SPRINGS.

No. 353,418.

Patented Nov. 30, 1886.



UNITED STATES PATENT OFFICE.

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DEVICE FOR TESTING WATCH-BALANCES AND HAIR-SPRINGS.

SPECIFICATION forming part of Letters Patent No. 353,418, dated November 30, 1886.

Application filed August 11, 1886. Serial No. 210,603. (No model.)

To all whom it may concern:

Be it known that I, A. LINCOLN KELLER, a citizen of the United States, residing at Springfield, county of Hampden, and State of Massachusetts, have invented a new and useful Machine for Determining the Strength of Hair-Springs and Momentum of Balance-Wheels of Watches, of which the following is a specification.

10 The object of my invention is, more particularly in the manufacture of watches, to test the hair-spring and balance-wheel to enable the deviation of either from the true time, when either is combined with a standard balance-wheel or hair-spring, to be indicated, so that a plus or minus degree of speed in the one may be compensated for by its combination with the other having the exact opposite degree of deviation—as, for instance, a hair-spring being vibrated with a balance-wheel adopted as a standard, and showing a retardation of five seconds, will, upon being combined with a balance-wheel which showed, upon being tested with a standard spring, an acceleration of five seconds, form a regulator which will, when combined with the rest of the movement of a watch, form a true time-piece; and the invention consists in the combination and construction, as hereinafter described, and more particularly pointed out in the claims.

35 My invention is fully illustrated in the accompanying drawings, in which Figure I is a plan view of my machine with the top portion removed. Fig. II is a plan view of the top part. Fig. III is an elevation in section on the dotted line *xx* of Figs. I and II; and Figs. IV and V are detail views of parts of the mechanism.

40 D is the base, upon which is secured at an interval of space two watch-movements, A B.

A is a standard already regulated to move without variation.

45 B is a movement, a counterpart of the one A, except that the regulating hair-spring *a* and balance-wheel *b* are adapted to be readily removed, to be as easily replaced.

50 *d* is a cam on the axis of the fourth wheel, H, of the movement A, said fourth wheel being indicated in dotted lines, Fig. I. The cam *d* is in the form of a circular disk having a notch, *d'*, upon its periphery, and is fast con-

centrically to the axis of the fourth wheel, so as to rotate with it.

W is a lever hinged between the two movements A B at *w* and adapted to vibrate in the plane of the base D, to have its free ends project within the movements A B and engage with the mechanism of each.

65 *h* is an arm attached to a rock-shaft, *i*, and adapted to, upon the rocking of the shaft *i* by means of its handle I, vibrate the lever W, and *m* is a spring bearing continuously upon the lever W and operating to bear it in the opposite direction from the intermittent movement of arm *h*. The end of lever W entering movement A is provided with a detent, *o*, adapted to fit into the notch *d'* of cam *d*, and the end of lever W passing into movement B is adapted to engage with one of the wheels thereof to instantly stop the movement. In the drawings it is shown bearing upon the periphery of the escape-wheel, as I have found in practice that the slightest pressure upon said wheel instantly stops the movement.

75 As shown in Fig. I, both movements A and B being wound, a swing of the handle I in the direction indicated in dotted lines swings lever W to simultaneously permit both movements A B to start—the one A by the withdrawal of detent *o* from the notch of cam *d*, and the one B by the relief of contact of the end of the lever from escape-wheel *y*. The cam *d* having started to rotate with the fourth wheel, H, the position of notch *d'* has changed, so that the detent *o* rests upon the periphery of the rotating cam when the lever W is released by handle I, and the other end of the lever is held removed from escape-wheel *y*. As notch *d'* comes under detent *o* spring *m* forces the detent therein and brings the other end of the lever W against the escape-wheel *y* to synchronously stop both movements. As the fourth wheel, H, and consequently the cam *d*, makes a complete rotation in sixty seconds, it will be seen that any deviation in the movement B from the standard A during that time would be indicated by a hand moving with the spindle of the fourth wheel of movement B and stopping with it, and I arrange upon the spindle *e* of the fourth wheel of movement B a rod (not shown in elevation) to extend up 100 above the top C of the device and carry a

hand, F, over a dial, G, secured to the top and in convenient view. The top C rests upon and is secured to posts J from the base D, and, with sides connecting it with the base D, not only excludes all dust from the delicate mechanism thus inclosed, but serves as a rest for dial G and journal-bearings for the rock-shaft *i* and for rock-shaft *s*. The hand-carrying rod from spindle *e* is sleeved to pass over said spindle end, to form a friction-joint therewith, and said rod is provided with a heart-cam, *t*, operating in connection with arm *u* of rock-shaft *s*, by means of which—as is common in stop-watches—the hand F is brought to the same starting-point on the dial G. Both shafts *i* and *s* are preferably provided with stops and returning-springs, as shown in Figs. II and III.

Accessible for easy removal in the movement B is the hair-spring *a* and balance-wheel *b*, and in factories where balance-wheels and hair-springs are to be combined to complete otherwise standard movements a balance-wheel adopted as a standard is combined with an untested hair-spring, and together placed, as shown in Fig. I, to make part of movement B. The two mechanisms A B are then started, and the deviation of the two at the end of sixty seconds, and due to the hair-spring, is, as indicated by hand F on dial G, recorded upon that spring, whether so many seconds or fractions of seconds, fast or slow. Any number of hair-springs may be so tested and marked. The hair-springs being so marked or sorted, a hair-spring adopted as a standard is combined with an unknown balance-wheel, and successively with any number of balance-wheels to obtain a record of their deviation individually.

To combine the two to complete a watch-

movement, either of the two minus a certain number is combined with the other plus exactly the same.

In practice I divide the dial G into a scale showing the tenth or twentieth part of a second, and by the device I obtain almost perfect accuracy in the adjustment of the two parts of the vibrating mechanism of a watch to regulate the whole movement to a standard of comparison. In Fig. IV a portion of lever W is shown, with its detent resting upon the edge of cam *d* and removed from notch *d'*, and in Fig. V the opposite end of said lever is shown removed from contact with escape-wheel *y*.

The construction of the mechanism of watches being so well known, it is not deemed necessary to more fully illustrate the parts only generally indicated in the drawings.

Now, having described my invention, what I claim is—

The within-described mechanism for determining the strength of hair-springs and momentum of balance-wheels of watches, consisting of two watch-movements, A B, fixed at an interval apart; intermediate mechanism, substantially as shown, operatively connected with the fourth wheel of movement A and the mechanism of movement B, and adapted to start and automatically stop the two movements synchronously, and a hand upon the prolonged spindle of the fourth wheel of movement B and adapted to rotate with it, whereby a difference in the rate of speed of the fourth wheels of the two movements is indicated, as and for the purpose set forth.

A. LINCOLN KELLER.

Witnesses:

R. F. HYDE,
PENN TYLER.