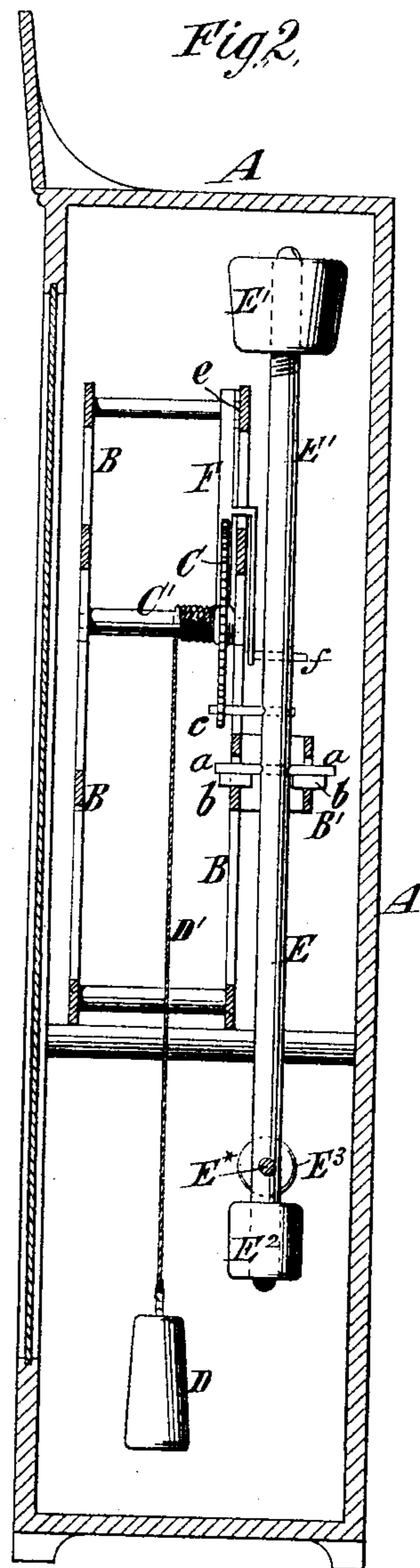
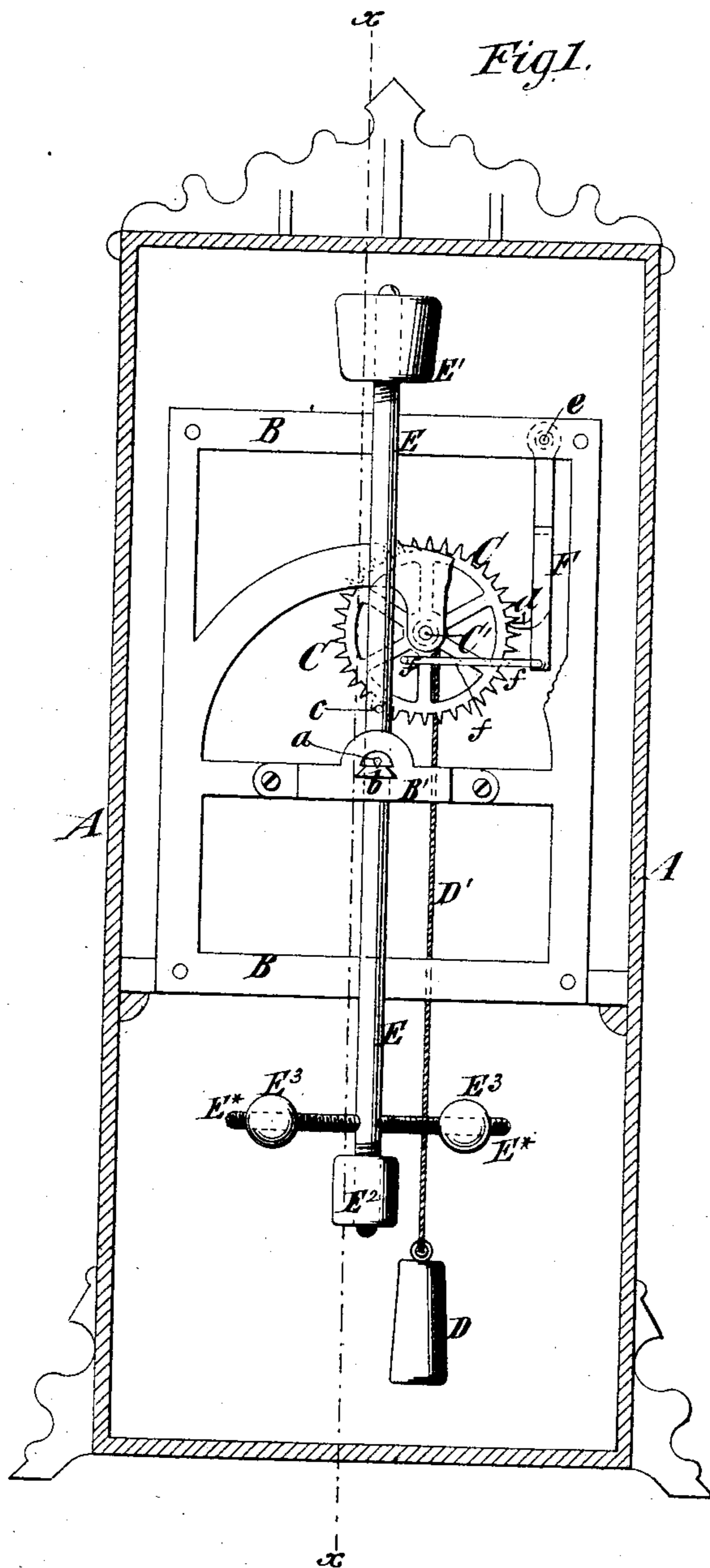


(No Model.)

C. M. RHODES.
CLOCK ESCAPEMENT.

No. 328,142.

Patented Oct. 13, 1885.



Witnesses:
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UNITED STATES PATENT OFFICE.

CHARLES M. RHODES, OF WALDEN, NEW YORK.

CLOCK-ESCAPEMENT.

SPECIFICATION forming part of Letters Patent No. 328,142, dated October 13, 1885.

Application filed April 21, 1885. Serial No. 162,899. (No model.)

To all whom it may concern:

Be it known that I, CHARLES M. RHODES, of Walden, in the county of Orange and State of New York, have invented a new and useful Improvement in Clock-Escapements, of which the following is a specification.

With the ordinary pendulum the pendulum-rod must be made very long in order to obtain a beat or reciprocation of the pendulum which is slow enough to indicate one or two seconds, and the necessary length of the pendulum precludes the making of a clock which will beat very much slower than this.

The object of my invention is to provide an escapement for a clock which is of such character that the clock will only require to be wound up at very long intervals, and which requires but comparatively small space, so that a clock containing it will not be large or cumbrous. By my invention a clock may be made which will not be of extraordinary size and will run for months without requiring to be wound up. My invention will be more fully hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 represents a sectional elevation of a clock-case and such parts of a movement as are necessary to illustrate my invention, and Fig. 2 represents a sectional elevation upon the plane of the dotted line $x x$, Fig. 1.

Similar letters of reference designate corresponding parts in both figures.

A designates portions of the case, which may, of course, be of any suitable design or construction, and B designates the frame of the movement, which is secured therein. Of this movement I have only shown the escape-wheel C and its arbor C', as only these are necessary to illustrate the operation of my invention. As here represented, the movement is to be driven by a weight, D, suspended by a cord, D', and wound around the arbor C' of the escape-wheel, as on a drum. The invention is, however, equally applicable to clock-movements in which the escape-wheel is driven by a spring.

The essential feature of my invention consists in a vertical balance-beam, E, which is provided with weights E' E² at top and bottom, and which is fulcrumed at a at about midway

of its length and very slightly above the center of weight in the beam. As here represented, the fulcrum a consists of a cross-pin inserted in the weight-rod of the beam E, and supported by bearings b , one of which is supported in one of the frame-plates of the clock, and the other of which is supported by a bridge, B', extending rearward from the frame, as best shown in Fig. 2. The fulcrum-bearings b may advantageously consist of pieces of glass, which are slightly indented or notched to receive the knife-edged fulcrum a . The beam or rod is thus supported so that it can swing or vibrate in a plane parallel with the wheel C.

In order to provide an adjustment whereby the beam or rod E may be properly balanced, I make the weight E² at the bottom thereof lighter than the weight E' at the top, and I provide supplemental weights E³, which are adjustable toward and from the rod E upon a screw-threaded cross-piece, E*, fixed in the rod E, near the lower end thereof. The beam or rod E being thus supported and very nearly balanced, the weights at its lower end very slightly preponderating, it will be obvious that a slight impulse will cause the oscillation of the rod or beam E upon its fulcrum a , and such oscillation of the beam or rod acts through suitable pawls to control the rotation of the escape-wheel C, under the impulse which it receives from the weight D, or from a spring employed as a substitute for the weight. As here represented, one of these pawls consists of a pin, c , projecting laterally from the rod E at a short distance above its fulcrum a , and adapted to engage with the teeth of the escape-wheel C. As here represented, the other pawl, d , is carried by a lever, F, which is fulcrumed at e to the frame of the movement, and has at its lower end an arm, f , which projects laterally within range of the beam or rod E as it swings on its fulcrum.

As represented in Fig. 1, the beam or rod E is in mid-position, and the escape-wheel is prevented from turning by the pawl or detent d . Supposing, now, that a slight impulse be given the beam in a direction to move its upper end toward the right of Fig. 1, it will be seen that said beam or rod will strike the laterally-projecting rod or arm f , and will

move the pawl or detent *d* out of engagement with the teeth of the escape-wheel C. The wheel will thereupon turn sufficiently to bring a tooth in engagement with the pawl *c*, which is carried by the beam or rod E, and such pawl will block the further turning of the wheel, and at the same time the weight, acting through the wheel, will cause the tooth to press against the pawl with sufficient force to swing the rod or beam in a reverse direction, or so that its upper end will move toward the left of Fig. 1. As the upper end so moves toward the left the rod or beam will gradually retreat from the arm *f*, and before its pawl *c* has passed beyond the range of the teeth of the wheel C the detent or pawl *d* will be allowed to come into engagement with the next tooth of the wheel C, and will thereby block the turning of the wheel. Therefore it will be seen that the teeth of the wheel C in succession impart to the rod or beam a movement which carries the upper end thereof toward the left of Fig. 1, the pawl *c* at the same time blocking the further turning of the wheel C, and the return movement of the beam or rod, which is produced by the slight excess in weight at its lower end, will move the pawl or detent *d* out of engagement with the wheel C, and permit another tooth of the wheel to come against the pawl *c* and impart a second movement to the rod or beam E.

It will be seen that by moving the pawl *c* nearer to or farther from the fulcrum *a* the force which the wheel C exerts to swing the rod or beam may be decreased or increased as desired. It will also be seen that the expansion or contraction of the rod or beam E, by reason of variations in temperature, will affect the operation of the escapement only in so far as such changes in length affect the short length of rod which is between the fulcrum *a* and the pawl *c*, and this change will be so infinitesimal that it need not be taken into consideration.

It is found that by the use of the balance beam or rod E in the escapement the escapement may be made to beat very slowly with a rod of comparatively short length. For example, it is found that a rod or beam of a little more than one foot in length, with weights properly adjusted, will require about fourteen seconds for its complete reciprocation or double movement, and hence such a movement would require a very long time to run down, and a lesser number of wheels would be required in the time-train than are now necessary. By making the rod or beam E of about thirty-seven inches in length—which is not an unusual length for a clock-pendulum—nearly a minute would be required for a complete reciprocation or double movement of the rod or beam, and hence the speed would have to be but very little reduced between the arbor of the escape-wheel and the arbor or sleeve of the movement which carries the minute-hand.

By my invention I provide an escapement

which will enable a clock-movement to run for a very long time between the intervals of winding, and I greatly reduce the number of wheels in the clock-movement, and thereby lessen the cost of such movement and the friction therein.

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

1. The combination, with the escape-wheel C, of the vertical balance beam or rod E, weighted at both ends, and fulcrumed near the center of weight and arranged to vibrate in a plane parallel with and behind the escape-wheel, and pawls or detents controlled by the swinging movement of the beam or rod, and engaging with the teeth of said wheel, one of said pawls being acted upon by the teeth of said wheel to vibrate the beam or rod, and the other pawl being acted upon by the beam or rod to withdraw it from engagement with the teeth of said wheel, substantially as herein described.

2. The combination, with the escape-wheel C, of the vertical balance beam or rod E, weighted at both ends and fulcrumed at *a* at or near the center of weight, the fulcrum *a* being parallel with the axis of the said wheel, the pawl *c* projecting laterally from the beam or rod near its fulcrum, and in a direction parallel with the axis of the escape-wheel, whereby the action of the teeth of the wheel upon the said pawl will vibrate the beam or rod in a plane parallel with and behind the escape-wheel, and a stop pawl or detent, *d*, actuated by the vibrating beam or rod to control the rotation of the escape-wheel, substantially as herein described.

3. The combination, with an escape-wheel of a clock-movement, of a vertical balance beam or rod having weights at both ends, and having near its lower end laterally-projecting arms, to which are adjustably fitted supplemental weights, and pawls or detents controlled by the swinging movement of said beam or rod, and serving to regulate the rotation of the escape-wheel, substantially as and for the purpose herein described.

4. The combination, with the escape-wheel C of a clock-movement, of a balance beam or rod fulcrumed at about the center of weight, and having projecting from it near its fulcrum a pawl, *c*, which engages the teeth of the escape-wheel, and through which said wheel acts to swing said beam or rod, a swinging arm, F, carrying a pawl or detent, *d*, engaging with the escape-wheel, and which is acted upon by the swinging beam or rod to remove the pawl or detent *d* from the escape-wheel as the pawl *c* comes into engagement therewith, substantially as and for the purpose herein described.

CHARLES M. RHODES.

Witnesses:

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