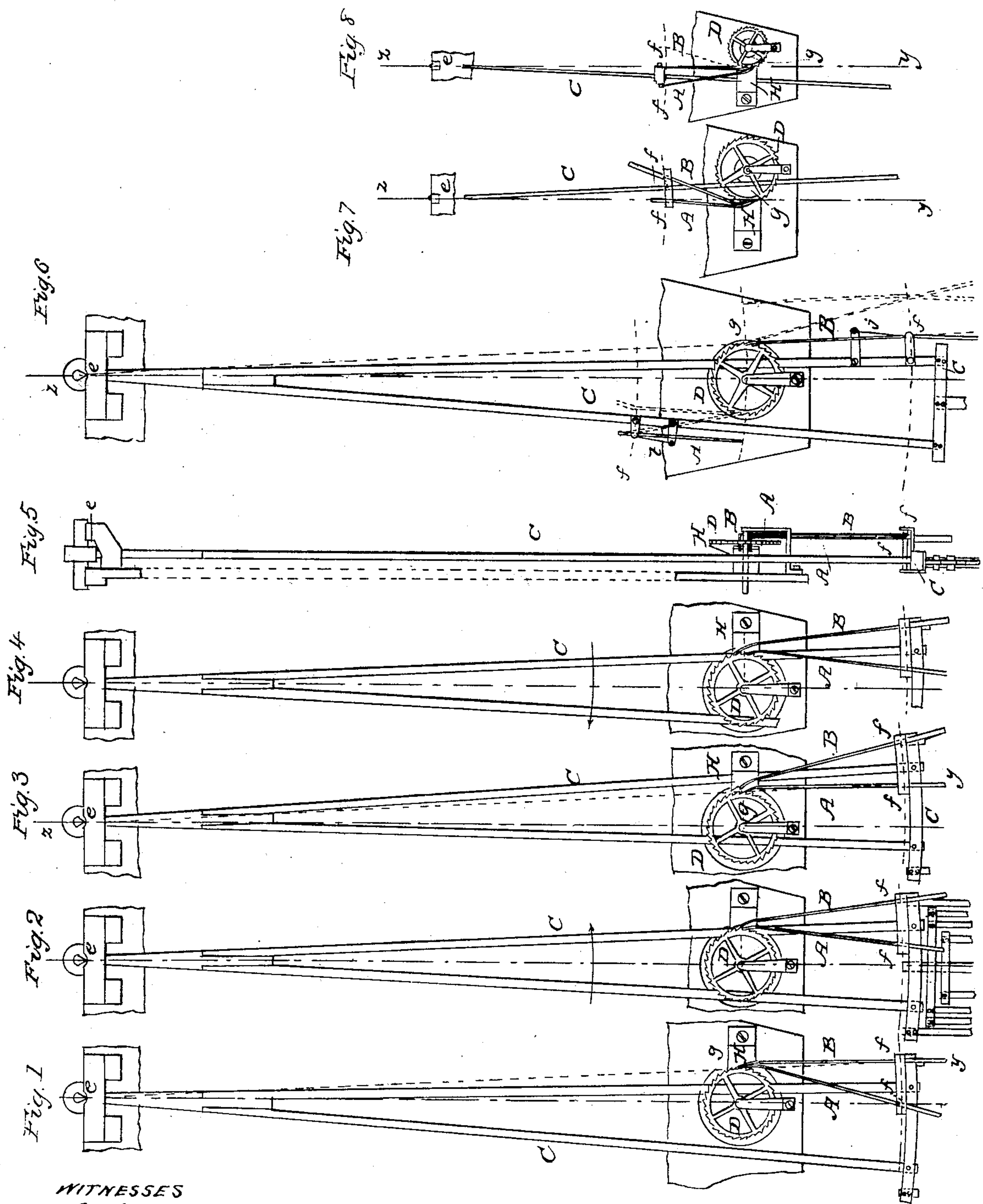


G. M. PHELPS.
Clock Escapement.

No. 29,097.

Patented July 10, 1860.



WITNESSES

Geo. Macaroll
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GEORGE M. PHELPS, OF TROY, NEW YORK.

PENDULUM-CLOCK.

Specification of Letters Patent No. 29,097, dated July 10, 1860.

To all whom it may concern:

Be it known that I, GEORGE M. PHELPS, of the city of Troy, in the county of Rensselaer and State of New York, have invented a new and useful Improvement in Escapements for Timekeepers; and I do hereby declare that the following contains a full and exact description of my invention, reference being had to the annexed drawings, which make a part of this specification, and in which—

Figures 1, 2, 3 and 4 are front elevations and Fig. 5 a side view of one form of my improved escapement, and Figs. 6, 7 and 8 front elevations of three other forms thereof.

The same letters refer to like parts in all the figures.

My invention consists in so mounting two separately-vibratile pallets (A, B,) upon the pendulum (C) of any time-keeper, that when the pendulum is at the end of each vibration, the pallet or detent (A in Figs. 3 and 7, and B in Figs. 1, 6 and 8,) which then sustains the pressure of the swing-wheel, (D,) will then have its axis or center of vibration (*f*) in or nearly in a straight line (*z y*), drawn through the center or axis of oscillation (*e*) of the pendulum and the points, (*g*), where the swing-wheel then bears on the pallet; or, in other words, in so mounting the vibratile pallets upon the pendulum that at every time when the pressure of the swing-wheel is being transferred from one pallet to the other, the center of vibration of the pallet which is just receiving the pressure of the swing-wheel, will then be in line or nearly so with the center of oscillation of the pendulum and the point where the swing-wheel then bears on the pallet; so that while there is no more recoil to the swing-wheel, and no more frictional resistance to the pendulum, the motive power of the swing-wheel is more directly communicated to the pendulum, and with less loss from friction, and by means of far less complicated and less expensive devices, than in the escapement heretofore made with a verge mounted apart from and connected to the pendulum by a spring, rod, or link, and provided with movable detents so constructed that in the vibrations of the pendulum each pallet or detent is carried on, nearly on, or past its dead center, as described in No. 20,201 of United States pat-

ents, and upon which escapement my invention is an improvement.

The detents or pallets, A, B, may be variously mounted and operated on the pendulum. For instance, in Figs. 1, 2, 3, 4 and 5, both of the detents are placed below, and in Figs. 7 and 8, above the swing-wheel. In Figs. 1, 2, 3, 4, 5 and 7, the detents are so balanced, and in Fig. 8 have such a tendency to spring away from the swing-wheel, that as the pendulum gets nearly to the end of each vibration and transfers the pressure of the swing-wheel from one detent to the other, the just-liberated detent,—A in Figs. 1 and 8, and B in Figs. 3 and 7,—will move out of the way of the swing-wheel, and bear lightly against a stationary guide, H; and, as the pendulum swings backward, will slide along the guide H and engage with the next advancing tooth of the swing-wheel so as to liberate the other detent as the pendulum gets nearly to the end of its backward oscillation, and so on.

In Figs. 1 and 8 the pendulum is shown at, or nearly at, the end of a vibration toward the left hand side, and in Figs. 3 and 7, at or near the end of an oscillation toward the right hand side. In Fig. 2 the pendulum is represented at the middle of a vibration toward the right hand side, with the detent B sustaining the pressure of the swing-wheel and letting it turn forward to meet the detent A which is then sliding lightly upward along the guide H, past the tooth from which it was last liberated, to engage with the next advancing tooth of the swing-wheel; and in Fig. 4 the pendulum is at the middle of an oscillation toward the left hand side, with the detent A sustaining the pressure of the then-moving swing-wheel, and the detent B sliding freely along the guide H to meet the next advancing tooth to that which it has just passed, and from which it was last disengaged or released.

In Fig. 6 one detent, A, is mounted above, and the other one, B, below the swing-wheel; and each detent is so counter-balanced that when the pendulum nearly reaches the end of each oscillation, and transfers the pressure of the swing-wheel from one detent to the other, the detent (A, in Fig. 6,) which is just liberated from the swing-wheel, will then gravitate or swing away from the latter into such a position

that the said detent will engage with the next advancing tooth of the swing-wheel and liberate the other detent when the pendulum gets near to the end of its next oscillation. Very delicate spring-stops, *i*, *j*, may be so attached to the pendulum as to make the detents assume the proper positions more quickly upon being liberated from the swing-wheel. Some of the various positions which the pallets A, B, occupy, when the pendulum is in different parts of its vibrations, are indicated by dotted lines in Fig. 6.

It is obvious that other forms and modifications of construction than those shown in the annexed drawings may be adopted, and the escapement still have the distinguishing feature of my improvement, which is the so mounting of the vibrating pallets or detents upon the pendulum itself that in the vibrations of the pendulum the axis or center of vibration of each pallet will be carried to, or nearly to, or past a line drawn from the center or axis of oscillation of the pendulum through the point where the swing-wheel bears on the pallet:—the pallets of time-keepers having been heretofore mounted on the pendulum in various other and inferior

ways; and so arranged upon a verge, not mounted on the pendulum, that in the oscillations of the latter the axis of vibration of each pallet is carried into line or nearly so with the axis of the verge and the point where the swing-wheel bears on the pallet;—which arrangement, shown in Henry C. Fay's patent of May 11, 1858, makes the escapement more complicated and expensive, and less accurate, than my improved one herein described.

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

So mounting two vibrative pallets upon the pendulum of a time-keeper, that in the oscillations of the pendulum the axis or center of vibration of each pallet will be carried to, nearly to, or past a line drawn from the axis or center of oscillation of the pendulum, through the point where the swing-wheel bears on the pallet, substantially as herein set forth.

GEO. M. PHELPS.

Witnesses:

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