(No Model.)

# D. SHIVE.

## GRAVITY ESCAPEMENT FOR CLOCKS.

No. 287,181. Patented Oct. 23, 1883.

Fig. 1.

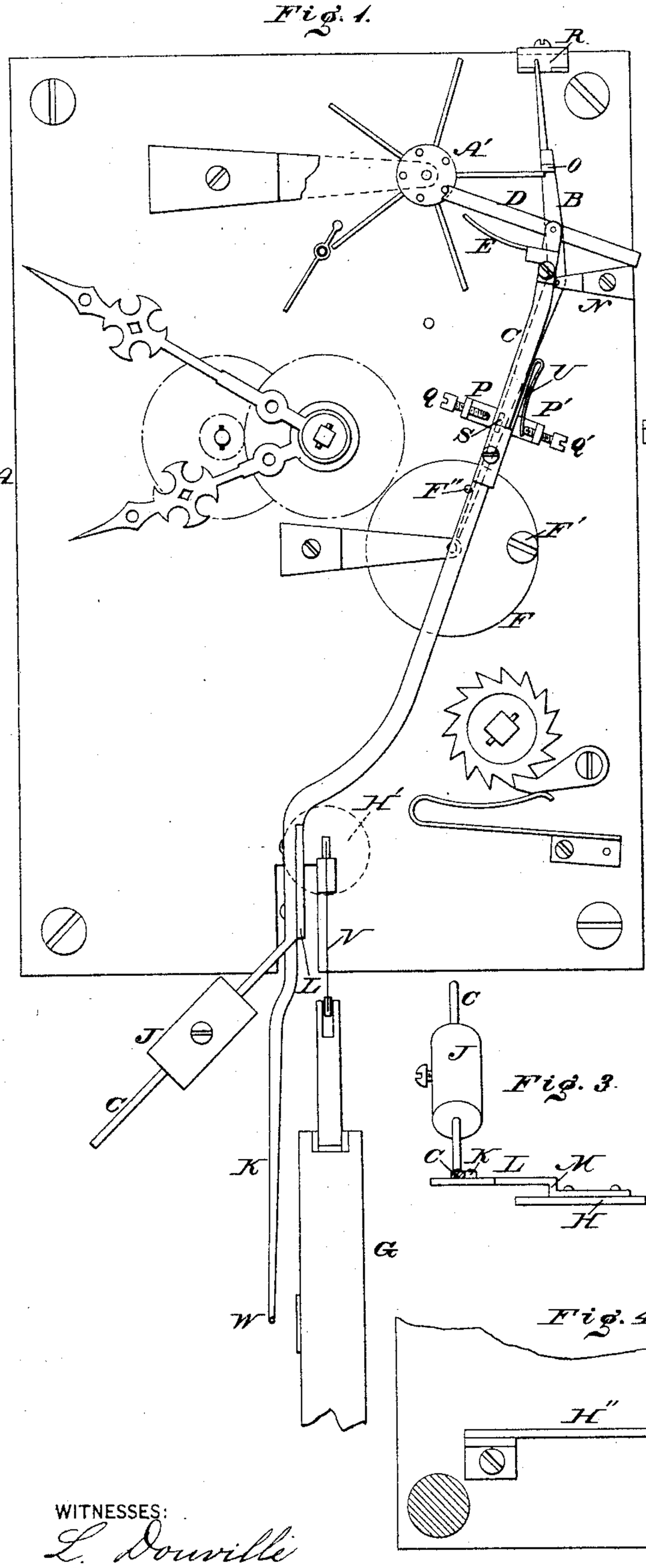


Fig. 2.

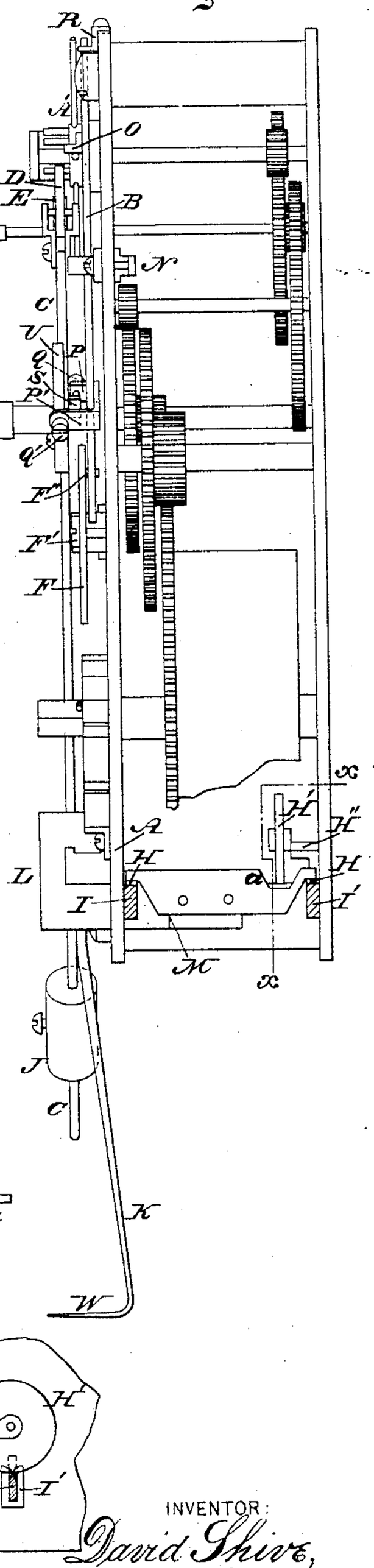


Fig. 3.




Fig. 4.




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## GRAVITY-ESCAPEMENT FOR CLOCKS.

SPECIFICATION forming part of Letters Patent No. 287,181, dated October 23, 1883.

Application filed December 15, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, DAVID SHIVE, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Clocks, which improvement is fully set forth in the following specification and accompanying drawings, in which—

Figure 1 is a front view of the portion of a clock embodying my invention, the dial being removed. Fig. 2 is a side elevation thereof. Fig. 3 is a top view of a detached portion. Fig. 4 is a vertical section in line *x x*, Fig. 2.

Similar letters of reference indicate corresponding parts in the several figures.

The object of my invention is to detach the pendulum of a clock from the train thereof, so that inequalities and imperfections in the train, inequalities in the tension upon the train and the change of oil on the clock and escapement will not affect the rate of time of the clock.

Another object of the invention is to make an ordinary low-priced movement keep time equal to the finest and most expensive movement.

The features of the invention will be hereinafter fully set forth.

Referring to the drawings, A represents the front plate of the clock-movement, and A′ the locking and escapement wheel properly mounted on said plate A, said wheel having pins and points which project from the hub of the wheel at a right angle to each other.

B represents the detent-lever, C the impulse-lever, D the drop-lever, and E the guide upon which said lever D drops, said lever D being pivoted to the lever C and the guide E rigidly secured to said lever and projecting beneath the drop-lever. The detent-lever has its bearings at N, and is located behind the impulse-lever C, and has connected with it, above its fulcrum N, a detent, O, upon which the points of the wheel A′ are adapted successively to lock. To the lower portion of the said detent-lever are attached projections P P′, which project toward each other and are provided with screws Q Q′, against the screw Q of which strikes a projection, S, on the rear of the impulse-lever C, and against the other impinges a bent spring, U, which is secured to the side of said lever C. Near the top of the plate A is fastened a plate, R, having a vertical notch or groove, within which plays the upper end of the detent-lever B, and by the walls of which the motion of said lever is limited.

F represents a disk, which is pivoted to the plate A, and provided with a screw-head or other piece, F′, serving as a make-weight to bear down the side of the disk with which said head is connected.

F″ represents a pin, which projects rearward from the disk F, and is adapted to bear against the lower end of the lever B, it being held in contact with said lever by the action of the weighted side of the disk.

G represents the pendulum-rod, which is suspended from the spring V, which is attached to the plate A, and has only a portion of its length shown in Fig. 1.

H represents the fulcrum of the impulse-lever C, the same consisting of a knife-edged steel plate, which rests in the notches of two pieces, I I′, respectively, attached to the front and back plates. The lower end of the impulse-lever is riveted to a brass plate, L, to which the knife-edge or fulcrum H is riveted, and to said plate is also riveted the foot K of the impulse-lever C, it now being noticed that the plate L is bent at M, and the bearings of the knife-edges are in line with and in the rear of the point of suspension of the pendulum-spring V. To retain the fulcrum-plate H in position a notch, *a*, is cut from its upper side, forming a knife-edge, (the third knife-edge,) upon which bears a roller, H′, which is mounted upon the end of a spring, H″, the other end of which is attached in the present case to the rear plate of the clock-movement. The lower portion of the lever C is bent laterally, and carries a ball, J, which by gravity gives impulse to the pendulum, the foot of the impulse-lever being adapted to be struck by the pendulum-rod—say at the part W—it being seen that said lever and rod are unattached.

The operation is as follows: The pendulum is started and its rod touches the foot of the impulse-lever, thus causing the upper end of said lever to move to the right, carrying the drop-lever D from the engaged pin of the wheel A′, said

drop-lever now resting on the guide E and being in direct line with the next pin. The drop-lever, as now released, and the lever C are free to move to the left, which they do by the force of gravity of the ball J as soon as the pendulum commences its motion to the right. The pendulum moves to the right, the impulse-lever resting against the pendulum-rod and the ball J imparting the impulse. The upper part of the impulse-lever moves to the left, carrying the drop-lever toward the next pin of the wheel A′. Just before said pin is reached the projection S on the rear side of the impulse-lever strikes the screw Q of the detent-lever, thus unlocking the detent O and allowing the wheel A′ to move forward, the next pin of said wheel striking the end of the drop-lever D, carrying it back and up until the next long point of the wheel A′ reaches the detent O, when the movement is arrested until the return of the pendulum. The motion of the wheel A′ has been a motion of the entire train, which has elevated the gravity-ball J and imparted power sufficient to give two vibrations to the pendulum. The arrested movement now awaits the return of the pendulum, when the operations described are repeated and continued indefinitely.

The spring U is an important member. The motion of the wheel A′ is quick, and were it untrammeled it would not allow the end of the drop-lever D to rest against either of the pins of the wheel A′, but would throw it off by momentum, and the clock would run down in a short time. So, also, the detent O, when struck by one of the arms or points of the wheel A′ without check, would vibrate, and, instead of locking the wheel, would allow it continuously to trip. The spring U securely locks and guards both of these points. As the wheel A′ pushes back the drop-lever D and impulse-lever C, it is compelled to bend said spring U, by which its momentum is modified, said spring also holding the drop-lever against the pin of the wheel A′, and by its pressure against the screw Q′ locks the detent O against tripping. If the impulse upon the pendulum is not at all times absolutely uniform, the rate of the clock's time must vary accordingly. If the parts giving impulse have any friction to overcome, or have any of the parts oiled, the impulse cannot be uniform, as oil and friction are continually changing. The impulse-lever, during the time that impulse is given to the pendulum, has three points of contact, neither of which has friction or oil; neither has the gravity-ball any other work than to give impulse during the time of impulse; but the gravity-ball unlocks the detent O, wherein there is a very small friction, and to securely detach the pendulum from the impulse-lever before the unlocking of the detent takes place, the disk F is introduced as a drag or check upon the impulse-lever, securing an instant separation between the impulse-lever and the pendulum.

As has been stated, the disk F has a pin resting against the detent-lever B, the pin being held there by the weighted side of the disk; hence the disk F and the lever B being at rest must both be put in motion before the detent O can be acted upon, and before the inertia is overcome the separation at the point W is complete.

In clocks as usually constructed the train is attached to the pendulum, and in a direct manner gives impulse to the pendulum, and to a great extent controls it. In consequence of the imperfections of the train the inequalities in the tension upon the train and escapement each becomes a factor in the rate of time of the clock. In my arrangement when the train is in motion the pendulum moves in the opposite direction, each entirely independent of the other. When the clock has performed its motion, it stops and awaits the return of the pendulum. In this manner the pendulum alone controls the rate of time.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A clock having a lock and escapement wheel, an impulse-lever, a drop-lever pivoted to said impulse-lever, and a pendulum forming a gravity-escapement giving impulse only on one side of the pendulum, substantially as and for the purpose set forth.

2. The impulse-lever, in combination with the detent-lever provided with screws Q Q′ and spring U, substantially as and for the purpose set forth.

3. The impulse-lever connected with the plate L, which is formed with knife-edges in front and rear, substantially as and for the purpose set forth.

4. The fulcrum-plate L, having a knife-edge on top, in combination with a roller bearing thereon, substantially as and for the purpose set forth.

5. The lock and escapement wheel, the detent-lever, the drop-lever, the impulse-lever, and connected spring, the make-weight device, the weight and foot of the impulse-lever and the pendulum-rod combined, and operating as described, and forming an improvement in gravity-escapements, substantially as set forth.

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Witnesses:
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