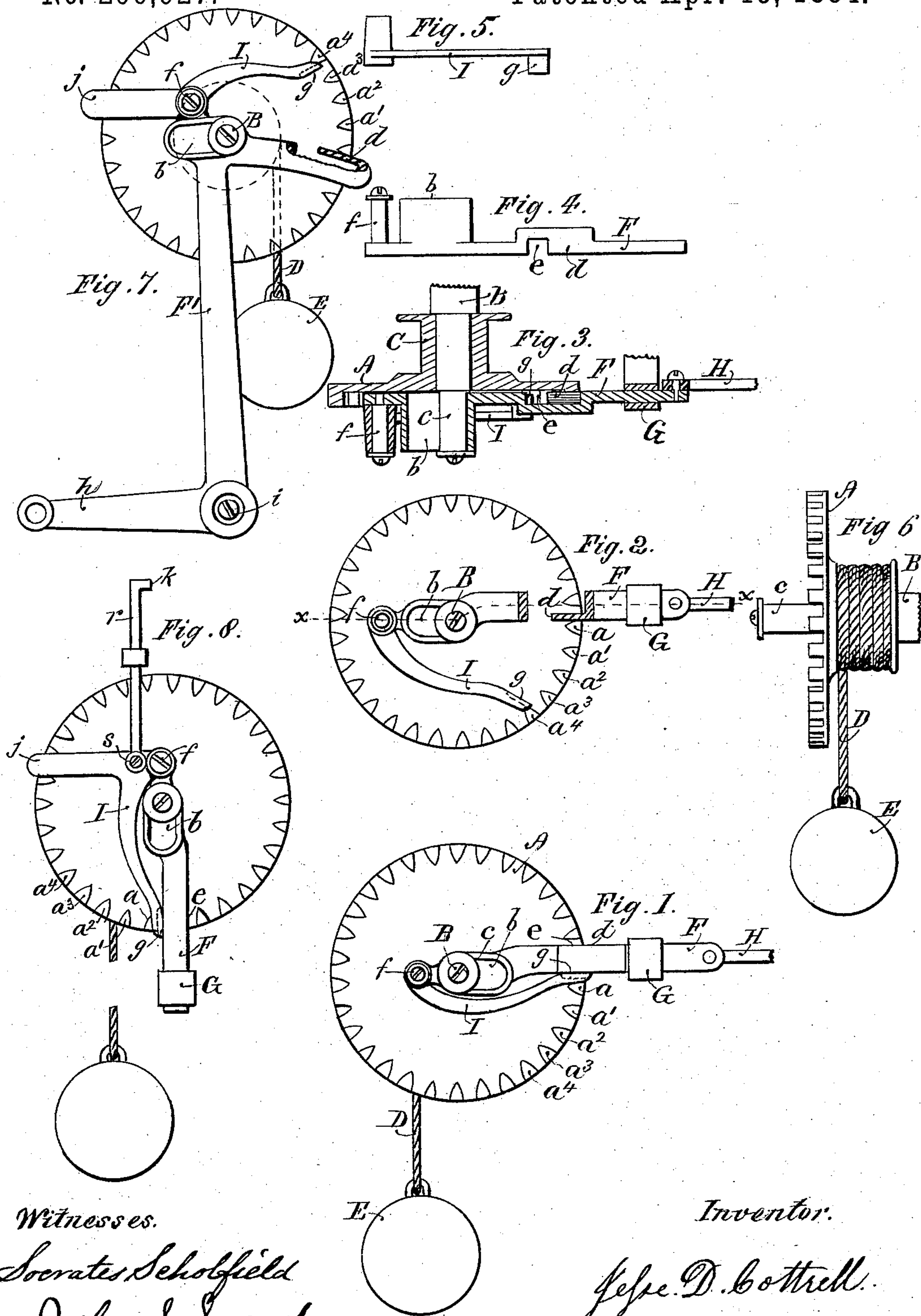


(No Model.)

J. D. COTTRELL.  
VARIABLE ESCAPEMENT.

No. 296,927.

Patented Apr. 15, 1884.



Witnesses.

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## VARIABLE ESCAPEMENT.

SPECIFICATION forming part of Letters Patent No. 296,927, dated April 15, 1884.

Application filed January 17, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, JESSE D. COTTRELL, of Central Falls, in the county of Providence and State of Rhode Island, have invented an Improvement in Variable Escapements, of which the following is a specification.

The nature of my invention consists in the combination of an escapement-wheel provided on its side with a circularly-arranged series of equidistant pins or teeth with a reciprocating pallet, and a pivoted pawl arranged for simultaneous movement near the face of the escapement-wheel, the pallet being adapted to pass between the teeth, and thus prevent the movement of the escapement-wheel, while the pawl on its backward movement with the pallet will move from under the tooth, and then pivotally to interior contact with one or more adjacent teeth, and to release the tooth and allow the escapement-wheel to revolve for the full limit of the pivotal movement of the pawl whenever the pawl and pallet are made to move in the opposite direction.

Figure 1 is a face elevation of my improved variable escapement, showing the pawl in its forward position under the tooth of the escapement-wheel. Fig. 2 represents a face elevation of the same with a portion of the sliding bar removed in order to show the pallet, and also showing the pawl in its extreme backward position. Fig. 3 represents a section taken in the line  $x x$  of Fig. 2. Fig. 4 represents a view of the under side of the sliding bar shown in Fig. 2. Fig. 5 represents a view of the under side of the pawl shown in Fig. 1. Fig. 6 represents an edge elevation of the escapement-wheel. Fig. 7 shows a modification in which the pallet and pawl are operated by means of a vibrating arm instead of the direct slide shown in Fig. 1. Fig. 8 shows a modification in which operative connection is made with the pivoted pawl instead of the vibrating arm or slide.

In the accompanying drawings, A is the escapement-wheel, provided on its face with a circular series of projecting pins or teeth,  $a$   $a'$   $a^2$   $a^3$   $a^4$ , and which, for illustration, is shown as supported upon a fixed stud, B, upon which it is made to revolve loosely. The drum C may be attached to the back of the escapement-wheel, and wound thereon may be the cord D,

to the free end of which is attached the weight E, of sufficient size to cause the revolution of the escapement-wheel in a direction corresponding to the unwinding of the cord from the drum. The projecting end  $c$  of the stud B is made to enter the slot  $b$  of the sliding bar F, thus serving to support one end of the bar, the opposite end of the same being supported by the fixed slide G. The bar H, pivoted to the bar F, serves to form a connection with any required variable or adjustable movement, which will serve to impart either a continuous or intermittent reciprocating movement to the bar. At the side of the bar F nearest to the face of the wheel A is formed the pallet  $d$ , adapted to enter the space between the projecting teeth at the face of the escapement-wheel, and thus serve to prevent the movement of the same in either direction. A notch,  $e$ , is made in the bar F at the end of the pallet  $d$  of sufficient extent to allow the passage of the projecting teeth of the escapement-wheel, and to the stud  $f$ , at the inner end of the bar F, is pivoted the pawl I, so arranged that its outer end will drop by gravity from one of the teeth of the escapement-wheel to that immediately below it upon the backward movement of the bar and pawl.

The operation of the escapement as shown in Fig. 1 will be as follows: Provision being first made to revolve the wheel A in one direction by means of a weight, E, and cord D, or by means of any suitable connection arranged in a machine to produce the required forward movement of the escapement-wheel, then at the extreme forward movement of the bar F the lip  $g$  of the pawl I will serve to cover the notch  $e$ , and thus prevent the passage of the escapement-teeth through the notch in the bar, and upon the rearward movement of the pawl the pallet  $d$  will pass between the teeth of the escapement-wheel, and thus prevent the same from turning, while the lip  $g$  of the pawl I, which has passed from under the tooth of the wheel, will be made to drop from the tooth  $a$  successively to the teeth  $a'$ ,  $a^2$ ,  $a^3$ , and  $a^4$ , at which point the pawl will have reached its extreme backward position, as shown in Fig. 2. Now, upon reversing the movement of the bar F, the lip  $g$  of the pawl will pass between the teeth  $a^3$  and  $a^4$ , and upon the continuation of



the retrograde movement of the bar the tooth  $a$  will become released from the holding-pallet  $d$ , thus allowing the teeth  $a$ ,  $a'$ ,  $a^2$ , and  $a^3$  to pass upward through the notch  $e$ , and thus bringing the pawl I back to the position shown in Fig. 1, with the lip  $g$  closing the lower entrance to the notch  $e$ ; and it is evident that the number of escapement-teeth allowed to pass through the notch  $e$  at each reciprocation of the bar F will be in proportion to the extent of the movement of the bar, and according to the extent of such movement either one, two, three, or four teeth may be allowed to pass, as desired.

A modification of my invention is shown in Fig. 7, in which the pallet and pawl are secured to a vibrating arm,  $F'$ , to which a backward and forward movement may be imparted by means of a suitable connection to the projecting arm  $h$ , or otherwise, the arm  $F'$  being pivoted to a fixed stud,  $i$ . The pawl I in Fig. 7 is arranged for action upon the upper side of the pallet  $d$ , and for this purpose the pawl is provided with a counterbalancing arm or weight,  $j$ , which will serve to raise the lip  $g$  to contact with the teeth  $a'$ ,  $a^2$ ,  $a^3$ , and  $a^4$ , for operation as hereinbefore described. In certain cases it may be desirable to assist the escapement-wheel in turning, and in that case I make an operative connection to the pawl I, as shown in Fig. 8, instead of the bar F, as hereinbefore described, and in this case an upward movement imparted to the pin  $k$  of the sliding bar  $r$ , which is pivoted to the pawl I at the point  $s$ , will first serve to draw the lip  $g$  of the pawl from between the tooth  $a$  and the side opening of the notch  $e$  in the bar F, and as the bar F and pawl continue to move upward the lip  $g$  will be thrown successively back against the

teeth  $a'$ ,  $a^2$ ,  $a^3$ , and  $a^4$ , as hereinbefore described, and upon the reversal of the movement the weight of the pawl I and sliding bar  $r$  will serve to assist in the rotation of the escapement-wheel until the pawl is brought against the side of the bar F to cover the notch  $e$ , as shown in the figure; and it is evident that upon the application of sufficient force to the pawl I through the sliding bar  $r$  the weight E or other tractive force applied to the escapement-wheel may be dispensed with, the power applied to produce the necessary reciprocation of the pawl and pallet serving also, by operating through the pawl, to produce the desired rotation of the escapement-wheel, and in this case a positive up-and-down movement either of a uniform or variable nature may be imparted to the connecting-bar  $r$ .

I claim as my invention—

1. The combination of the escapement-wheel, provided on its side with a circularly-arranged series of pins or teeth, with a reciprocating pallet and a pivoted pawl arranged for simultaneous movement with each other at the face of the escapement-wheel, substantially as and for the purpose specified.

2. The combination of the escapement-wheel, provided on its side with a circularly-arranged series of pins or teeth, with a reciprocating pallet and a pivoted pawl arranged for simultaneous movement with each other at the face of the escapement-wheel, and means for moving the reciprocating pawl both directly and pivotally, substantially as described.

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Witnesses:

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JOHN S. LYNCH.