

UNITED STATES PATENT OFFICE.

E. JACOT DES COMBES, OF BALTIMORE, MARYLAND.

DUPLEX ESCAPEMENT IN WATCHES.

Specification of Letters Patent No. 1,570, dated April 30, 1840.

To all whom it may concern:

Be it known that I, EDWARD JACOT DES COMBES, of the city of Baltimore, in the State of Maryland, have invented certain
5 new and useful improvements in watches and other timekeepers, consisting of a new and improved mode of constructing the escapement, called by me "the American duplex escapement," and also of an improved
10 mode rendering the movement of the seconds independent; and I do hereby declare that the following is a full and exact description thereof.

In all the particulars the movement does
15 not differ from those in ordinary use.

In the accompanying drawings I have represented the respective parts shown on a scale enlarged much beyond the actual size, for the purpose of clear description.

20 Figures 1 and 2 show the arrangement of the parts constituting the escapement; Fig. 3, is a diagram intended to illustrate its action; and Figs. 4 and 5 show the arrangement of the double train dead seconds, as
25 constructed on my improved principle.

In Figs. 1, and 2, R, R, represents an escapement wheel moving in the direction E, F, under the force of the mainspring, in the same way with any other escapement.
30 Upon this wheel there are six arms D, D, each of which terminates in two small teeth d, d , which cause the escapement to rest by their engaging in the small notch s , upon the rouлеau, or enlargement r , upon the pivot
35 of the balance wheel, which is represented in dotted lines, because it is situated below the piece L. The small teeth d, d , enter and escape from the notch s , successively; the second tooth escapes at the fourth vibration
40 of the balance wheel, its situation at this time being that shown at A, Fig. 1. The pin V' , being one of six on the escapement wheel, then comes into contact with the lever, or tail piece L, and gives the impulse
45 to the balance wheel necessary to produce the required four vibrations, which must take place in order to mark the time of the seconds, by the striking of the pin V' , on the tail piece L.

50 In my first experiment I placed the pinion which engages into the seconds wheel, upon the escapement wheel R, which produced considerable friction upon the rouлеau r , the motive force communicated by the main
55 spring, pressing with its whole power upon it. The escapement when so made was a

very good one, operating with great regularity, as experience fully proved. But having discovered a mode of diminishing the pressure upon the rouлеau, to the extent of
60 nearly two thirds, without any diminution of the propulsion power on the lever L, its value has been thereby much enhanced. Instead of placing the pinion on the wheel R, I now place it on the wheel G, which has its
65 motion in the direction H, I. The effect of this arrangement will be illustrated by consulting the diagram Fig. 3. Suppose two radii, A a , B b , having motion in the circles C, D, the radius B b , giving motion to that
70 marked A a ; when they are parallel to each other the force B, is the greatest, and the force A, the least; but as they move in the direction E, F, the force diminishes and the resistance increases, until having arrived at
75 the point G, the angle formed by them is a right angle, and the force B b , is balanced by the resistance A a . The force being the greatest when the two radii are parallel, and being reduced to naught when they form a
80 right angle; from this it necessarily follows that the force must from this cause be undergoing a gradual diminution while it is approaching this angle. From this illustration it will readily be perceived that the
85 force which presses from the wheel G, upon the pin V' , Fig. 2, is diminished to the extent of two thirds, or nearly so, the two radii being of the same length, and forming an angle of 120° , or 30 degrees at the point γ ,
90 where the force will be naught, if the axis of the wheel G is placed there; or adding the angle O, P, which measures nearly 25° and the angle $o q$, (Fig. 2,) which measures 30° , total 55° , which taken from 90° leaves
95 $35/90$ of the primitive force as that which presses on the rouлеau. With a wheel R, R, having six arms, and two teeth upon each arm, 14,400 vibrations per hour are obtained; and if each of the six arms carries
100 three teeth, there will be 21,600 vibrations, the principle of action being the same in both cases, four vibrations in a second with two teeth, and six vibrations with three
105 teeth.

My new and simple mode of constructing the double train dead seconds is shown in Figs. 4 and 5. A, is a wheel which turns, with friction, upon the pivot C, of the seconds hand p , and this wheel is in the form of
110 a crown wheel, having sixty ratchet teeth on its upper side. There are two seconds hands,

E, E, and K, K, which ordinarily stand directly over each other, and appear as one, the lowermost of which E, E, may be stopped at any moment, while the uppermost, K, K, will continue to beat seconds. This is effected in the following manner: D, Fig. 5, represents a barrel which turns freely upon the pivot C; upon this barrel is affixed the hand E E, and upon its lower end is also affixed the spring *r*, having upon its lower side a tooth *t*, which takes into the ratchet teeth on the wheel A, connecting the barrel D, with said wheel when the spring is down, and leaving it free when the spring is raised, as it is represented at I, Fig. 5. For the purpose of raising this spring, I construct a ring B, B, seen flatwise in Fig. 4, which is attached to an elastic, or spring, piece G, the ring being so placed that the pivot of the seconds hand shall be in its center. The spring piece G, is operated upon by the latch H, which when in the position shown in Fig. 5, raises the ring B, B, and with it the spring *r*. When so raised, the hand E is immediately stopped, while the hand K, which is held upon the upper end of the pivot C, by friction, being forced on in the usual manner, continues its motion, its movement being accompanied by that of the wheel A, but not of the barrel D, which is arrested by the friction of the spring *r*, upon the ring B, B. The position of the spring *r*, when engaged in the ratchet wheel A, is represented by the letter S, the two hands then moving together. Time keepers constructed in the manner above described present several important advantages over those of the ordinary construction, as will be at once apparent to those familiar with watch movements. They are less complicated than those ordinarily showing dead seconds, having six wheels

and a main spring less than the latter. They can consequently be afforded at a less price, will be less liable to be out of repair, and be more easily kept in order. As a stop watch, for the purpose of making accurate observations its special utility will be evident; the arresting of the lower hand, and the continued motion of the upper, causing the latter to count the seconds with the utmost precision, the lower always indicating the point of departure of the upper hand.

Having thus fully described all those parts of a time keeper which are necessary to enable a competent workman to carry the same into operation, I hereby declare that what I claim as my invention, and desire to secure by Letters Patent, consists—

1. In constructing the escapement wheel R, with bifurcated teeth, so that in operating on the rouleau placed on the pivot of the balance wheel a greater number of vibrations may be produced than in ordinary duplex watches; and in making it without the pinion hitherto placed on its axis, (which in my arrangement is transferred to the wheel G,) by means of which improved construction of the escapement wheel its pressure on the rouleau is lessened, as above described.

2. I also claim the combining therewith the wheel G, with its pinion G', for the purpose and in the manner set forth.

3. In the seconds part I claim the manner of combining and arranging the double hands, the barrel D, the ratchet spring *r*, and the ratchet wheel, to be operated upon by means of the ring and latch, in the manner, and for the purpose described.

EDWARD JACOT DES COMBES.

Witnesses:

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