O. W. Waste.

Chronometer Escapement.

No. 3,759. Patented Sept. 24, 1844.

Fig. 1.

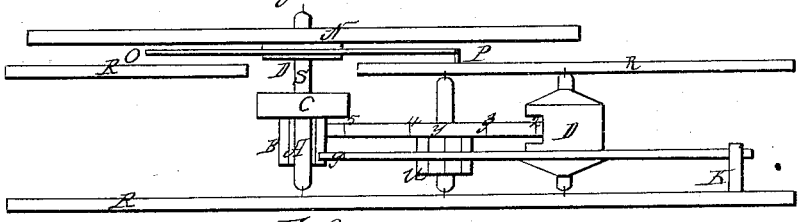


Fig. 2.

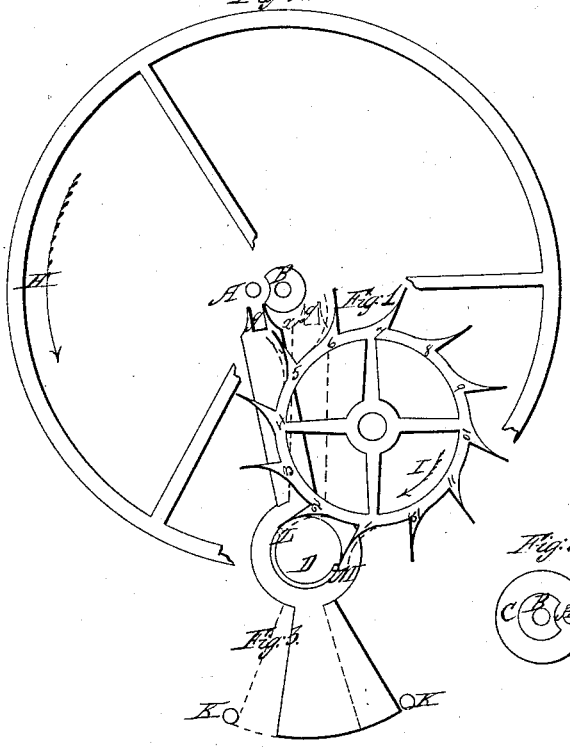


Fig. 7.

Fig. 8.

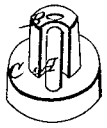


Fig. 4.

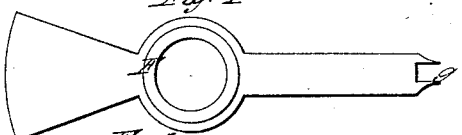


Fig. 6.

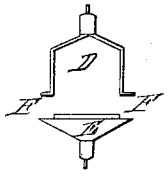
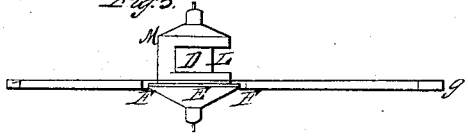


Fig. 5.



UNITED STATES PATENT OFFICE.

ORAMEL W. WASTE, OF PITTSFORD, NEW YORK.

CHRONOMETER-ESCAPEMENT.

Specification of Letters Patent No. 3,759, dated September 24, 1844.

To all whom it may concern:

Be it known that I, ORAMEL W. WASTE, of Pittsford, in the county of Monroe and State of New York, have invented a new and useful Improvement in the Escapements of Chronometers, Watches, Clocks, &c., which I call "Improved Combination Chronometer-Escapements"; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figures 1, 2, and 3 are a vertical view, showing the relative position of each of the parts of the escapement. Fig. 4 is a view of the under side of the lever. Fig. 5 is a longitudinal elevation of the same with the detent cylinder attached and shown by the blue coloring at D and E. Fig. 6 is a detached view of the detent cylinder shown with its two parts separated. Fig. 7 is a view of the under side of the roller and jewel-pin. Fig. 8 is a perspective view of the same turned bottom side up. The two views shown at Figs. 7 and 8, show the roller and jewel-pin to be detached from the staff of the balance. Fig. 9 is a side elevation of the escapement.

The nature of my invention consists in applying detents or a detent cylinder to the lever as it is used with the roller and jewel-pin in the lever watches now in use, and placing the staff of the balance in such position with the scape wheel so, that by its teeth being locked and unlocked in a peculiar manner the balance may receive its impulse directly from the teeth of the scape wheel as in the chronometer and duplex watches without being subject to many of their disadvantages.

The chief advantage it claims over the chronometer escapement is, that it dispenses with the delicate scape springs, which require being so nicely adjusted and which are so easily deranged by any little violence. The advantage it claims over the duplex is that after the balance has received its impulse from the tooth of the scape wheel it swings perfectly free and detached from any friction except that of its pivots until it comes to unlock and receive again the impulse from the next tooth, while the tooth of the scape wheel in the duplex is resting continually on the staff of the balance which can make only one or little less than one revolution alternately, while this arrangement will admit of nearly two alternate revolutions as is the case in the common detached lever watches. Its claim over the lever watch is that the balance receives its impulse directly from the teeth of the scape wheel, upon the jewel-pin and saves the amount of power that is lost in its being communicated to the pallets and through the lever to the balance.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

I construct my scape wheel with the most convenient number of teeth to suit the train of the watch, clock or chronometer as the case may be, but have ascertained the number most appropriate generally to be twelve, see drawing Fig. 1, which does not differ in principle from those in present use in clocks and watches. The lever is the same as that used in detached lever watches with the exception of its shape which is modified to accommodate the fastening in of the detents or detent cylinder. See drawing Fig. 4.

F, is a counter bore which is made sufficiently deep to receive the flanges of the detent cylinder and allow the metal to be staked or driven over them so as to hold the two parts of the cylinder together. See Figs. 5 and 6, F, F.

Fig. 5: D, is the detent cylinder which is hollow as is shown by Fig. 6, D, and is made in two parts, D and E, which shut together so as to form a complete joint on its flanges, F, F, as may be seen at Fig. 5, F, F, and is fastened as above described. It should be made of steel and polished outside and in, and its pivots should be made as small as possible and have suitable strength. It should have $\frac{7}{16}$ of its circumference cut away as shown by Fig. 5, M, D, L, and by Fig. 3, L and M, which allows the teeth of the scape wheel to pass as they are unlocked by the motion of the lever between the banking pins K, K. The size of the cylinder should be such as will measure from the inside corner at L, to the outside corner at M, Fig. 3, $\frac{9}{10}$ of the distance from the point of one tooth to the point of the next in the scape wheel, so that when the tooth No. 1 rests on the detent or cylinder at M, Fig. 3, the balance is making its returning evolution as may be seen by the arrow H, to receive the impulse from the tooth No. 5 in scape wheel on the jewel-pin A. It will

now be seen that the jewel-pin A, in regaining its natural position when at rest at *x* passes into the rear mouth of the lever at G, and moves out the detent M, and at the same time the tooth No. 1 leaves the detent M, the jewel-pin A, is in a position to receive the tooth No. 5 on its side. Now as the scape wheel is impelled by the train in the direction shown by the arrow I, as its tooth No. 1 leaves the detent M, it will pass $\frac{9}{10}$ of the distance from the point of one tooth to the point of the next, and on its way will communicate its force to the balance, by the tooth No. 5, on the jewel-pin A, and will become locked again, by the tooth No. 1, on the detent L, as shown by the dotted lines. It will now be seen that the lever occupies the position shown, by the dotted lines, and that the scape wheel teeth lack $\frac{1}{10}$ of their distance apart, of being in their former relative position. Now the balance having its force overcome by the strength of the hair-spring, returns back and moves the lever into its former position, which unlocks the tooth at L, and lets it pass the remaining $\frac{1}{10}$ of its distance, from the next tooth and the wheel is locked again by the tooth No. 12 on the detent M, and so on with each succeeding tooth in the scape wheel.

The balance N, Fig. 9, with its hairspring O and P, its staff S, and roller B, and jewel-pin A, are the same in principle as those used in the detached lever watches.

C, Fig. 9, is the head of the roller, and is drilled through as seen at A, Fig. 7, to receive the jewel-pin as seen at A, Fig. 8. The roller and jewel-pin should be long enough so as to operate the lever and have sufficient room for the teeth of the scape wheel to operate on the jewel-pin. See Fig. 9.

T is the scape wheel shown as its teeth pass through the cut in the detent cylinder, and communicate the power to the jewel-pin A.

U is the pinion of the scape wheel.

P is the post, in which the outer end of the hairspring is fastened.

K is one of the banking pins, as shown in Fig. 3.

R, R, R, are the plates of the time piece.

In Fig. 2, the head of the roller is not shown and the arms and rim of the balance are broken away to show the work beneath them.

The staff of the balance should stand as near the scape wheel as possible, and not allow the teeth to touch the roller. The detents or detent cylinder should be placed so that its pivots will stand just without the line or circle that the extreme points of the scape wheel teeth would describe, and such distance from the staff of balance, that whether the tooth No. 1 rests on the detent M, or L, the jewel-pin will swing clear of either of the teeth 5 and 6.

Instead of the cylinder D, Fig. 3, there may be used square pins or detents of steel or ruby by placing them in the place of the edges of the cylinder M, and L, and having an axle straight through the lever. The effect and operation will be the same as that produced by the detent cylinder. The lever and roller may be made of brass or steel, as the manufacturer may deem judicious; but steel would be preferable, and would make the time piece a little more expensive.

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

1. The application of detents or a detent cylinder to the lever as it is used with the roller and jewel-pin in the lever watches now in use.

2. Also the manner of constructing my detent cylinder, as herein described.

3. Also the arrangement attained in the use of the detents or detent cylinder as combined with the lever as herein described, together with the placing of each of the three axles of this escapement so that, by their relative position with each other, they shall produce in connection with the detents or detent cylinder, the above described locking and unlocking of the teeth of the scape wheel, so that the balance shall receive its impulse on the jewel-pin at the time the tooth shall pass the whole distance from one detent to the other, it being $\frac{9}{10}$ or a greater part of the distance from the point of one tooth to the point of the next, and shall pass the remaining tenth or lesser distance as it is unlocked by the balance returning as herein described.

4. And I also claim the right of applying my escapement in the construction of chronometers, watches, clocks, and such other instruments or machines to which it may be advantageously applied.

ORAMEL W. WASTE.

Witnesses:
JOSEPH TRUE,
ALEXR. VOORHEES.