D. J. Mozart's Watch.

No. 121,401. Patented Nov. 28, 1871.

Fig: 1

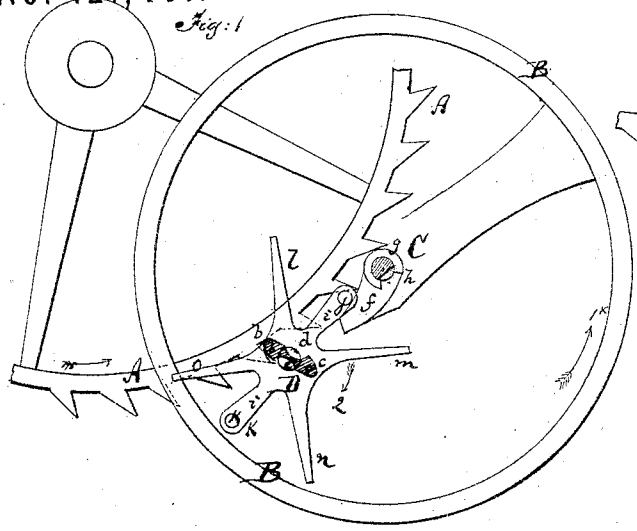


Fig: 3

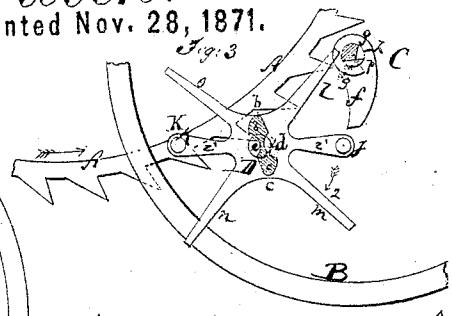


Fig: 5

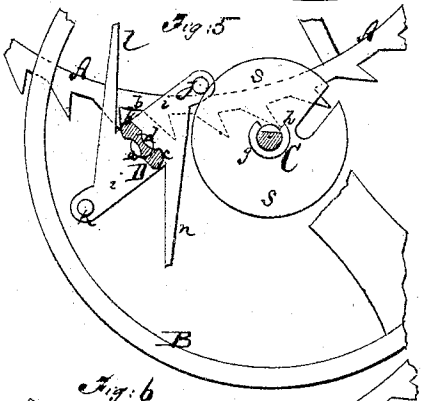


Fig: 2

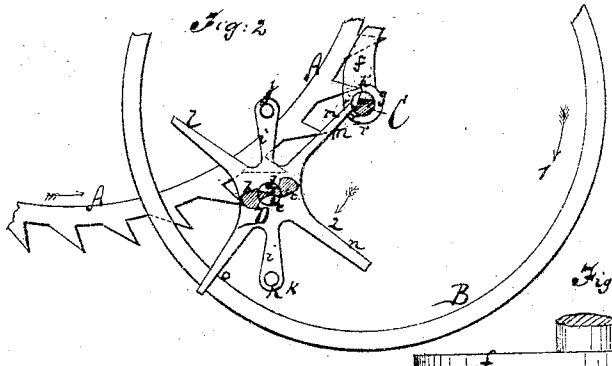


Fig: 6

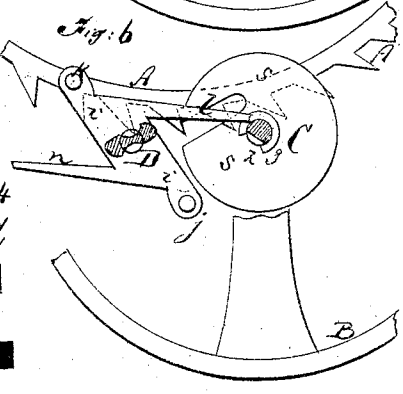


Fig: 4

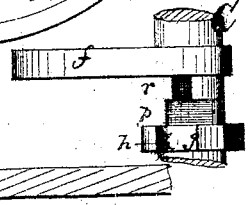
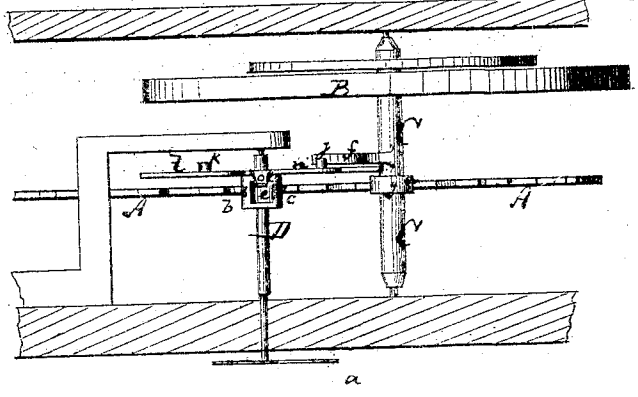


Fig: 7



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UNITED STATES PATENT OFFICE.

DON J. MOZART, OF NEW YORK, N. Y.

IMPROVEMENT IN WATCH-ESCAPEMENTS.

Specification forming part of Letters Patent No. 121,401, dated November 28, 1871.

To all whom it may concern:

Be it known that I, DON J. MOZART, of the city, county, and State of New York, have invented a new and useful Improvement in Watches; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification.

My invention consists in the improvement of watch-escapements, as hereinafter fully described and subsequently pointed out in the claims.

In the accompanying drawing, Figures 1, 2, and 3 represent detail horizontal sectional views on an enlarged scale, of my improved escapement, showing it in different positions. Fig. 4 is a detail side view of the notched part of the balance-wheel staff. Figs. 5 and 6 are detail horizontal sectional views of a modified arrangement of the escapement, showing it also in different positions. Fig. 7 is a general side view of the escapement.

Similar letters of reference indicate corresponding parts.

I will first proceed to describe the escapement mechanism, which is composed of the escapement-wheel A, balance-wheel B, staff C, and of the detent-arbor D, which constitutes also the arbor for the second-hand *a*. The escapement-wheel bears with its teeth against a flattened or two-toothed part of the arbor D, and imparts thereby the necessary rotary motion to said arbor. The flattened part of the arbor D forms two teeth or prongs, *b* and *c*, which are separated by concave portions *d* and *e*, as is clearly shown in Figs. 1, 2, and 3. The said prongs are of such size and so shaped that, when a tooth of the escapement-wheel bears against the end of one—say *b*—it will have leverage enough on it to impart a quarter revolution to the arbor, moving it from the position shown in Fig. 2 to that shown in Fig. 3. The impelling tooth of A now enters with its point the cavity *e*, which is also so curved as to provide leverage for another quarter turn of the arbor D, at the end of which the end of the next prong, *c*, comes under the influence of the next tooth of the escapement-wheel, which continues the operation. In this manner a double mechanism for controlling the movements of the hair-spring staff is provided, one being the escapement-wheel direct and the other the arbor D.

Before explaining how I utilize this double mechanism, I desire to point out the defects of ordinary escapements springing from the back of just such a double regulator. The ordinary escapement has a projecting pin or ruby on the staff, which receives an impulse from the double-pronged anchor alternately in opposite directions. The impulse for either movement is given when the ruby-pin is in one—the central—position, and exerts its influence to the very end of its extent—or, in other words, until the power of the hair-spring exceeds that of the impulse. The hair-spring will then, in attempting to adjust itself, carry the staff back until the ruby-pin is again in the central position, where it receives an impulse in the opposite direction, and so forth, every stroke using the entire force of the impulse as against that of the hair-spring. This arrangement, although satisfactory in a limited degree, is nevertheless unreliable as to exactness, since too much reliance is placed upon the slender hair-spring, whose slight power varies under the least change of temperature and atmosphere. The division of the movements of the second-hand, which is more than any other part of the watch, dependent upon the exactitude of escapement, becomes difficult by the use of the old mechanism, and has, whenever effected, added greatly to the complication and expense of the watch.

By my double-regulating and impelling mechanism I am enabled to give the impulse at the end of each swing of the balance-wheel, and not to the middle, as before, and thereby to confine the vibrations of the balance-wheel between certain definite limits. A beautiful precision is thus produced by simple means, and the subdivision of the second movement made easy by the mere application of detent-arms to the arbor D.

The staff C carries a projecting lever, *f*, and a notched shoulder, *g*, which at one end, *h*, forms a surface for contact with the teeth of the escapement-wheel. The arbor D carries two projecting arms, *i i*, in the ends of which pins *j* and *k*, called impelling ruby-pins, are respectively set. The arbor D has also four radial arms or detents, *l*, *m*, *n*, and *o*, so set that the arms *i i* are respectively between the arms *l m* and *o n*, as is clearly shown in Figs. 1, 2, and 3 of the drawing. The ends of the diametrically-opposite detents *l* and *n* are bent up or down to be in a higher or lower plane from that in which

the ends of the remaining detents move. The distance between the staff C and the arbor D and the length of the detents are such that the ends of the latter will reach the staff and be in contact with it until certain notches, *p* and *r*, cut into the sides of the staff, come in line with the ends of the detents to let them pass. As the ends of the detents are in different planes, as aforesaid, the notches *p* and *r* are at different heights, as shown in Fig. 4, and the notches are also cut in different angles, as the staff is in different positions as it lets the several detents pass.

The escapement operates as follows: When the escapement-wheel strikes with one tooth the face *h* of the shoulder *g*, the parts will be in position shown in Fig. 2, the balance-wheel swinging still slightly under the impulse given by the escapement-wheel, in the direction of the arrow 1, Fig. 2. The impulse ceasing, the balance returns and brings the notch *r* in line with the detent *m*, which had been resting against the staff. The hair-spring, in thus reversing the motion of the staff, as indicated by the arrow $1^{\times}$ in Fig. 1, will cause the contact of the escapement-wheel with the staff to cease, as the tooth cleared the face *h*. But the contact of the escapement-wheel with the arbor D never ceases, as above described, so that said arbor has a constant tendency to turn in the direction of the arrow 2, shown in Figs. 1, 2, and 3. After, therefore, the detent *m* has been released, the arbor D is turned so as to carry the ruby-pin *j* against the concave edge of the lever *f*, said ruby-pin following on the lever, while the same completes its movement in the direction of the arrow $1^{\times}$. Fig. 1 shows the parts during this movement, and must not be misunderstood for a position at rest, being merely the middle movement between the stoppage produced by the detents *m* and *l*. The ruby-pin *j*, by being in contact with the lever *f*, gives the impulse to the balance-wheel in the direction $1^{\times}$, which impulse was started by the hair-spring, as aforesaid. As soon as the ruby-pin *j* has rolled past the lever *f*, the detent *l* strikes the staff and arrests the further motion of the arbor, (see Fig. 3,) until by the return movement of the staff, started by the hair-spring, the notch *p* is brought opposite the said detent to let the same clear it. The staff now moves again in the direction of the arrow 1, and during this motion the next tooth of the escapement-wheel strikes the face *h*, and gives the second impulse to the balance-wheel, until the parts are again in position, shown in Fig. 2, except that the detent *o* will be in contact with the staff. Thus the necessary impulse is given in opposite directions at the commencement of each vibration of the staff, and not, as heretofore, only after the balance has righted itself. As the second-hand is directly affixed to the arbor D, and as the latter makes one revolution during every second, the detents, whenever they rest against the staff, will arrest the movements of the second-hand to produce the desired quarter-second divisions.

By omitting reference to the detents, the movement of the escapement may be summed up in the statement that the staff receives an alternate impulse by escapement-wheel and ruby-pin, and that immediately after each impulse has spent itself, the hair-spring will reverse the movement of the staff, bringing it directly under the influence of the opposite impulse. The detents strike the arbor at the ends of each vibration, and slip by it at the commencement of the next vibration.

Instead of using four detents I may have but two, as shown in Figs. 5 and 6, by using in place of the leyer *f* a notched disk, *s*, which will arrest the ruby-pins until the notch comes in line with them, causing thereby the said ruby-pins to constitute detents as well as impellers. The shoulder *g* is the same as above described, and has also the face *h* to receive the impulse by the escapement-wheel. The pins *j k* are set to arms *i*, and detents *l* and *n* project from the arbor, as is clearly shown in Figs. 5 and 6.

Although this modification is still simpler and cheaper than the first-described escapement, and embodies the same principles of operation, I consider the first more exact and desirable, as, among other advantages, it produces less friction, and gives greater play to the mainspring.

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

1. The arbor D, having the prongs *b c* and intervening cavities *d e*, to be moved by constant contact with the escapement-wheel, and aid in impelling the staff, as set forth.

2. The staff C provided with recessed faces *r p* engaging with revolving detent arms, and the shoulder *g* having end surface *h*, combined with the escapement-wheel A, as and for the purpose set forth.

3. The revolving arms of arbor D having ruby-pins *j k* on the ends thereof, combined, as described, with projection *f* of the staff C, for the purpose set forth.

4. The detent arms affixed to the arbor D, which carries the second-hand to abut against the staff and produce quarter-seconds, as set forth.

5. An escapement, composed of the wheel A, pronged arbor D, which carries the ruby-pins *j k*, and the detents, and of the staff C, having the stops *f* and *g*, as set forth, all operating as specified.

6. The staff C, having notches, *p r*, of different heights and angles, combined with two pairs of revolving radial arms of the arbor D, as and for the purpose described.

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