

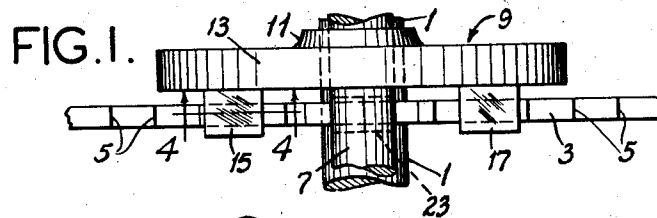
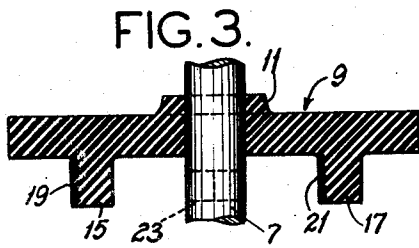
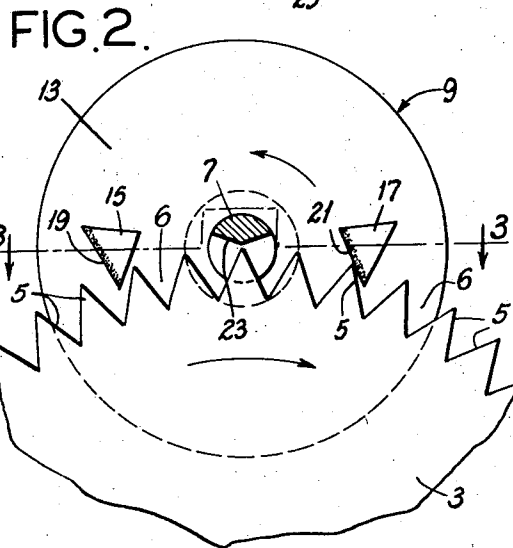
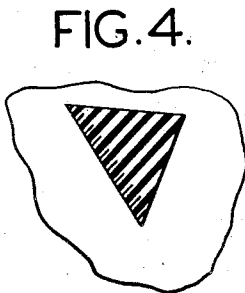
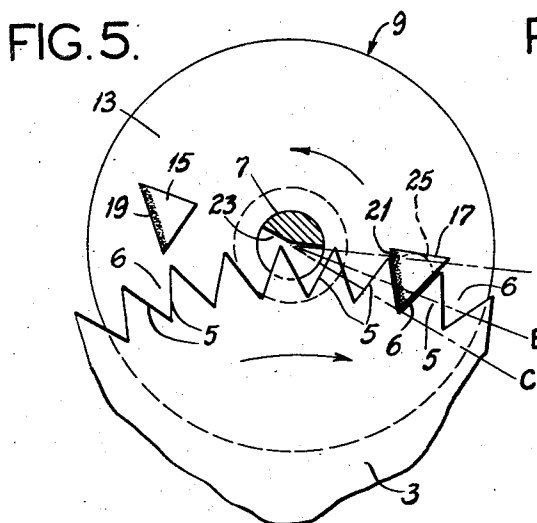
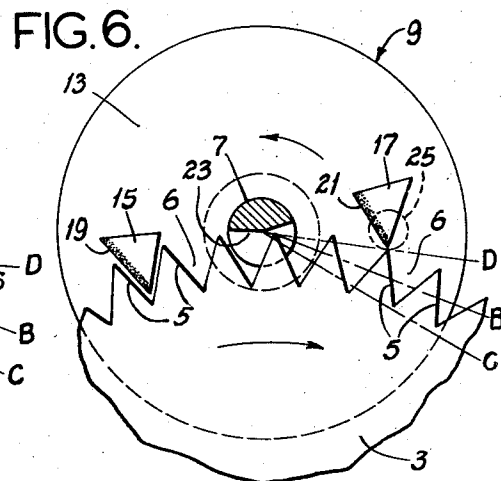
Oct. 8, 1946.

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2,408,998

ESCAPEMENT

Filed March 6, 1944



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## UNITED STATES PATENT OFFICE

2,408,998

## ESCAPEMENT

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Application March 6, 1944, Serial No. 525,163

6 Claims. (Cl. 58—117)

1

This invention relates to escapements, and with regard to certain more specific features to escapement for clocks, interval timers and similar mechanisms.

Among the several objects of the invention may be noted the provision of a quiet escapement; the provision of an escapement of the class described having a greater arc of action of the balance staff whereby reliable action and a longer run-down period may be obtained; and the provision of an escapement of the class described which is economical in its construction. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structures hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawing, in which is illustrated one of various possible embodiments of the invention,

Fig. 1 is a plan view of the escapement mechanism;

Fig. 2 is a front elevation of Fig. 1 shown in an escaping action of parts;

Fig. 3 is a horizontal section, the view being taken on line 3—3 of Fig. 2;

Fig. 4 is a vertical detail section taken on line 4—4 of Fig. 1;

Fig. 5 is a view similar to Fig. 2 showing preceding positions of parts; and,

Fig. 6 is a view similar to Fig. 2 showing subsequent positions of parts.

Similar reference characters indicate corresponding parts throughout the several views of the drawing.

Referring now more particularly to Fig. 1, there is shown at numeral 1 the last shaft of a gear train which the escapement is to control. This gear train is not shown but as is usual is driven by a main spring. Running down of this train is that which is to be controlled by the escapement. This shaft 1 carries escapement wheel 3 having triangular, outwardly-pointed teeth 5 with triangular spaces 6 therebetween.

At numeral 7 is shown a balance staff with which is connected (but not shown) the usual hair spring for return action. On the balance shaft 7 is the balance wheel 9 which forms an important part of the present invention. This wheel 9 preferably is made of molded natural or artificial rubber and is provided with a hub 11, integral with the disc portion 13. The hub 11

2

forms a support upon the balance shaft 7. A molded attachment or other suitable connection may be employed. Other materials may be used for the wheel 9, provided they have similar resiliency.

Molded integrally with the disc 13 are triangular or wedge-shaped extensions 15 and 17 which form pallet members. Being integral they are also formed of rubber. The faces 19 and 21 respectively of the pallet members 15 and 17, although integrally formed with the remainder of the rubber balance wheel, are preferably extracured so as to cause a greater surface hardness of rubber and a somewhat glazed surface. This may be done for example by having the heated mold for the wheel 9 thinner at the regions 19 and 21, thus allowing more heat to process the rubber to a greater degree of hardness at the desired points.

The balance staff 7 is notched as indicated at 23 to clear the teeth 5; and the pallets 15 and 17 are located oppositely as indicated.

Operation is as follows, referring to Figs. 2, 5 and 6.

Fig. 5 shows the right-hand pallet 17 seated in a notch 6 between two teeth 5 and about to receive an impulse to rotate the balance wheel 9 counterclockwise. The left-hand face 21 of the pallet 17 is then engaged by the forward face of a tooth 5.

The mechanism then advances to the Fig. 2 position in which the end of the tooth 5 (then contacting 17) sweeps under the face 21 of pallet 17 to deflect the latter upward. This brings the pallet 15 down ahead of another advancing tooth 5 as the pallet 17 clears. The pallet 15 acts as a stop for the advancing tooth which engages it. Contact is substantially along a straight line. Such contact is about to occur in Fig. 6.

Since the faces 19 and 21 of the pallets 15 and 17 are harder than the remainder of the rubber wheel assembly 9, and provide a smooth or glazed finish, they do not tend to hang on the teeth 5. Nevertheless, quietness of operation is insured since, as the surfaces 19 and 21 are struck, impact is absorbed by the soft rubber behind them. This absorbs much of the noise of any shock. Furthermore, the linear contact further minimizes the sound of impact.

An important feature of the invention is illustrated in Figs. 5 and 6. In these figures the dotted circle 25 illustrates the maximum swing that could be expected in bringing about a clearing swing of the balance wheel with an old pin type of escapement. Line B illustrates the maximum

3

extent to which the pin circle 25 could be depressed between teeth 5 and the line D shows the tangent clearing position of the bottom of the circle. Between lines B and D is the impulse angle. Line C in Fig. 5 illustrates the increased impulse angle which the triangular pallet 17 brings about.

The result is a longer impulse applied to the balance wheel which is always desirable, since the hair spring associated therewith is wound more, thus not only requiring more time to swing the balance wheel through a cycle, but providing it with more reaction positively to return it back into position on the return swing.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

Any many changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. In an escapement, a toothed escapement wheel, a balance wheel, an integral pallet means extending from said balance wheel and engageable with the teeth of the escapement wheel, said pallet means and balance wheel being composed of a non-metallic resilient material, the points of cooperation between the pallet means and the teeth of the escapement wheel being harder than the remainder of the integral parts.

2. In an escapement, a balance wheel, integral pallet means extending therefrom, said wheel and pallet means being composed of a resilient mate-

4

rial, said pallet at local operating surfaces being more dense than the material elsewhere in the organization.

3. In an escapement, a balance wheel, integral pallet means extending therefrom, said wheel and pallet means being composed of a non-metallic resilient material, said pallet at local operating surfaces being more dense than the material elsewhere in the organization and providing a harder surface.

4. In an escapement, an escapement wheel having triangular teeth providing triangular spaces between them, a balance wheel oscillating about an axis of rotation, pallets extending from the balance wheel and oppositely located with respect to said axis, said pallets being wedge-shaped downward so as to have their lower-most points movable to the lower-most points of the triangular spaces between teeth, said pallets comprising non-metallic resilient extensions from the balance wheel.

5. In an escapement, a balance wheel, integral pallets extending from said balance wheel, the wheel and the pallets being composed of a non-metallic resilient material, said pallets having operating faces which are denser than the remainder of the material.

6. In an escapement, a balance wheel, integral pallets extending from said balance wheel, the wheel and the pallets being composed of non-metallic resilient material, said pallets having operating faces which are denser than the remainder of the material and providing glazed operating surfaces.

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