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Improvements in Watches.

The first of these improvements consists in an escapement of novel character, which is not influenced by shaking the watch, and is, therefore, more regular in its action than any of the existing or known forms of escapement. A second improvement consists in a novel device for compensating for the tendency to variations of the balance consequent upon changes of temperature. And a third improvement consists in certain novel arrangements of the barrel, main spring, fusee, and chain, for the purpose of reducing the friction on the fusee pivots, and equalizing the friction on the barrel.

The invention is illustrated in the accompanying engravings, in which fig. 1 is a plan of a watch movement with the improvements. Fig. 2 is a separate diagram of the escapement.

A is the escape wheel, having its teeth, *a a*, beveled inwards, in the direction of their revolution, which is indicated by an arrow in fig. 2. B B are two balance wheels, each having a hair spring, *j*, applied in the usual manner. These are arranged with their axis on the same plane with the axis of the escape wheel and on opposite sides thereof, and are supposed to be geared together, to oscillate in opposite directions by very fine teeth. These teeth, which are not exhibited in the drawing on account of their extreme fineness, are to be cut and finished in the most accurate manner known, so as to work together with the least possible degree of friction, and without lubrication. On the staff of each balance is a cylinder, or, more properly speaking, a segment of a cylinder, *h*, which is concentric to its respective balance, the versed sine of the said segment being about equal to one-third of the diameter of the cylinder, of which it forms a portion. Each balance receives in its turn an impulse from the escape wheel, by a tooth of the escape wheel working across the chord of its cylindrical segment, *h*, and giving motion, by the gearing, to its fellow in an opposite direction, and the escape wheel remaining, for a time, stationary, between the operations on the segments, in consequence of one of its teeth resting on the cylindrical portion or arc of one or other of the segments, thus producing a perfect dead beat. The balances, in their vibrations, are intended to make about one complete revolution. The escapement wheel remains stationary during half a revolution of the balances.

The operation of the escapement is partly illustrated by fig. 2, where a tooth of the escapement wheel is represented in the act of escaping from the segment of the right hand balance, after having moved across the straight face or chord thereof, and given it an impulse in the direction of the arrow shown near the balances, and another tooth at the opposite side is just falling on the arc of the segment of the left hand balance, which is at the time rotating in the opposite direction to that which has just received its impulse from the escape wheel. The rotation of the two balances will continue in the directions indicated, the escapement being, in the meantime, stationary, until the force of the impulse has been overcome by the hair springs, when the direction of the rotation of both balances will be changed, but the escapement will still be held stationary till the segment of the left hand balance begins to present its chord or flat side to the tooth, and to receive impulse from the tooth moving across it. The continued operation is but a repetition of what has been described, each balance in turn receiving the impulse and imparting it to the other. This alternate action of the cylindrical segments of the balances produces an exceedingly regular escapement, which is not to be influenced by any shaking or jarring of the watch, for the two balances being differently influenced by any movement of the watch, the influence upon

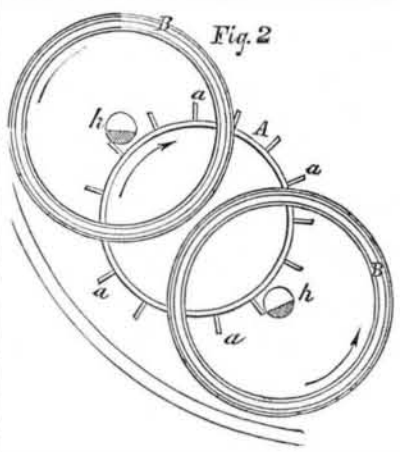

Fig. 2

one will be counteracted by that upon the other, and they will vibrate their proper distance, and neither more nor less, even if the watch be violently shaken in a circular direction. This escapement requires less impulse than a single balance escapement, owing to the peculiarly effective action of the teeth of the escapement wheel on the cylindrical segments.

The device for compensating for the variations of the balance is applied to each balance; it consists of a stout ring surrounded by a closely fitting coil of spring steel, one end of the said coil being secured to the ring, and the other end being forked to receive and form a curb to the hair spring, *j*. The brass ring fits tightly to a fixed pivot, which is concentric to the staff of the balance, the said staff passing freely through it. The expansion and contraction of the brass ring, by changes of temperature, being greater than that of the surrounding steel coil, causes the forked end of the coil to move in a circumferential direction, and thereby to increase or diminish the effective length of the hair spring, and thus to diminish or increase its power, the expansion causing the effective length of the spring to be diminished and its power increased, and the contraction causing its effective length to be increased and its power diminished.

The regulation of the watch is effected by an endless screw, *g*, (see fig. 1) which is fitted in suitable bearings to gear with toothed segments, *r*, attached firmly to each compensating ring, so as to turn both rings at once in opposite directions, and with them the forks or curbs *m m*, to lengthen or shorten the effective length of both hair springs, as may be necessary.

The arrangement of the barrel, H, main spring, E, fusee, F, and chain, G, in this watch differs from the arrangement of the corresponding parts of other watches in two particulars. In the first place, the chain, instead of being arranged to draw on the opposite side of the fusee to that from whence the power is transmitted by the fusee wheel to the center pinion, as in other watches, is arranged to draw on the same side as that from which the power is given to the center pinion, as is illustrated in fig. 1. In the old arrangement, the drag of the chain and the resistance offered by the pinion act in similar directions on opposite sides of the axis of the fusee, and both forces are thrown upon the fusee pivots, thus producing the greatest possible amount of friction; but in the new arrangement which is shown in fig. 1, the drag of the chain and the resistance offered by the pinion are in opposite directions on the same side of the center of the fusee, and hence are made as nearly as possible to counteract each other in their effect on the pivots of the fusee, and thus the friction on the fusee pivots may be reduced so as to average only about one-fifth of what it is in the old arrangement. This new arrangement involves the arrangement of the coil of the main spring in a direction the reverse of what it is in the old arrangement of the chain, and the consequent revolution of the barrel in the reverse direction. The other point of difference in the arrangement of the barrel, main spring, chain, and fusee, consists in reversing the positions of the larger and smaller ends of the fusee, that is to say, placing the small end of the fusee next the fusee wheel, instead of the large end. The effect of this is to bring the drag of the chain at the time when the watch is fully wound, which time the spring is most powerful, opposite the middle of the barrel, and opposite the middle of the length of the arbor of the fusee, instead of at one end of each, as is thus causing the friction to be equally distributed on the ends of the barrel and both pivots of the fusee arbor instead of nearly all on one end of the barrel and one pivot of the fusee arbor.

By the above arrangements for reducing the friction on the fusee pivots and equalizing the friction in the barrel and on the fusee pivots, a more easy and uniform transmission of the maintaining power is obtained, and the movement of the chain will be regular, instead of in a series of jumps, as it is in the old arrangement. The chain is hooked to the barrel near where the spring is fastened, to take away the friction in the barrel when the watch is fully wound, or the spring in its greatest force.

For further information address the inventor, J. Muma, Hanover, York Co., Pa. American and foreign patents applied for.

IMPROVEMENTS IN WATCHES.

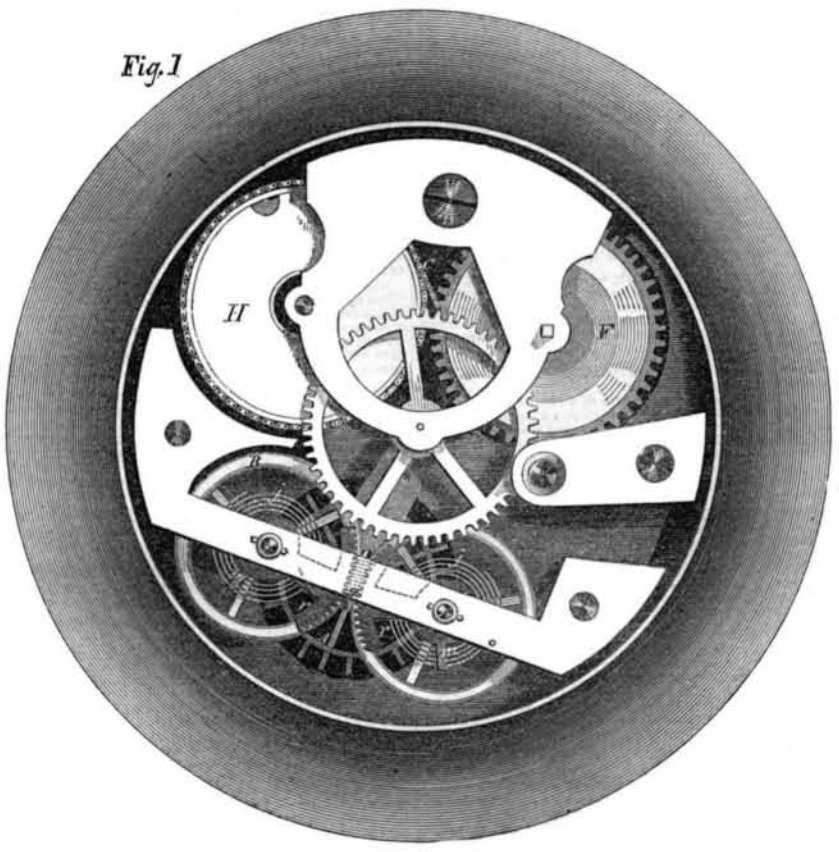

Fig. 1

Tooth Powders.

Tooth powders, regarded as a means merely of cleansing the teeth, assist greatly in preserving a healthy and regular condition of the dental machinery, and so aid in perfecting as much as possible the act of mastication. In this manner they may be considered as most useful, although it is true, subordinate medicinal agents. By a careful and prudent use of them, some of the most frequent causes of early loss of the teeth may be prevented; these are, the deposition of tartar, the swelling of the gums, and an undue acidity of the saliva. The effect resulting from accumulation of the tartar is well known to most persons, and it has been distinctly shown that swelling of the substance of the gums will hasten the expulsion of the teeth from their sockets; and the action of the saliva, if unduly acid, is known to be at least injurious, if not destructive. Now, the daily employment of a tooth powder sufficiently hard, to exert a tolerable degree of friction upon the teeth, without, at the same time, injuring the enamel of the teeth, will, in most cases, almost always prevent the tartar accumulating in such a degree as to cause subsequent injury to the teeth; and a flaccid, spongy, relaxed condition of the gums may be prevented or overcome by adding to such a tooth powder some tonic and astringent ingredient. A tooth powder containing charcoal and cinchona bark, will accomplish these results in most cases, and therefore dentists generally recommend such. Still there are objections to the use of charcoal; it is too hard and resisting, its color is objectionable, and it is perfectly insoluble by the saliva, it is apt to become lodged between the teeth, and there to collect, decomposing animal and vegetable matter, around such particles as may be fixed in this position. Cinchona bark, too, is often stringy, and has a bitter, disagreeable taste. M. Mialhe highly recommends the following formula:—Sugar of milk, 1000 parts; oil of mint, oil of aniseed, and oil of orange flowers, so much as to impart an agreeable flavor to the composition.

His directions for the preparation of this tooth powder, are, to rub well the lake with the tannin, and gradually add the sugar of milk, previously powdered and sifted; and lastly, the essential oils are to be carefully mixed with the powdered substances. Experience has convinced him of the efficacy of this tooth powder.—[S. Piesse's Perfumery.