J. KANGAS.

DRIVING TRAIN FOR TIMEPIECES.

APPLICATION FILED APR. 15, 1910.

975,959. **Patented Nov. 15, 1910.**

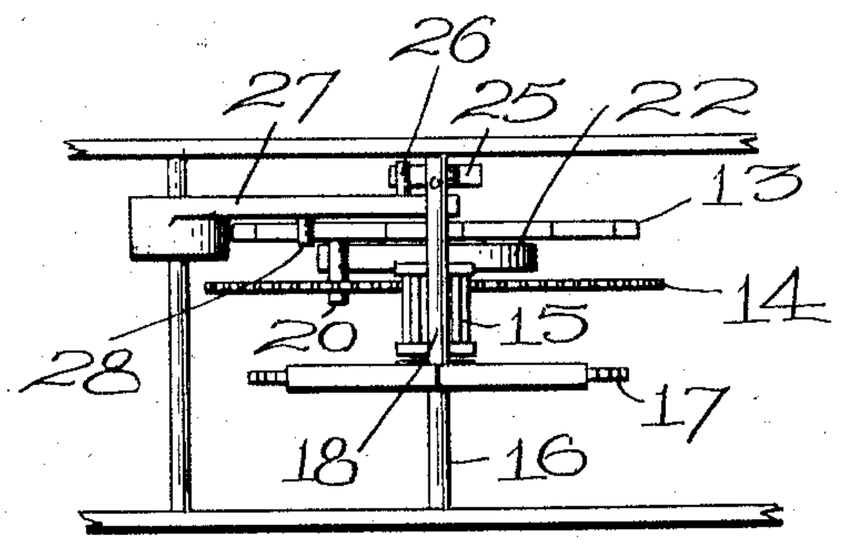


Fig. 2.

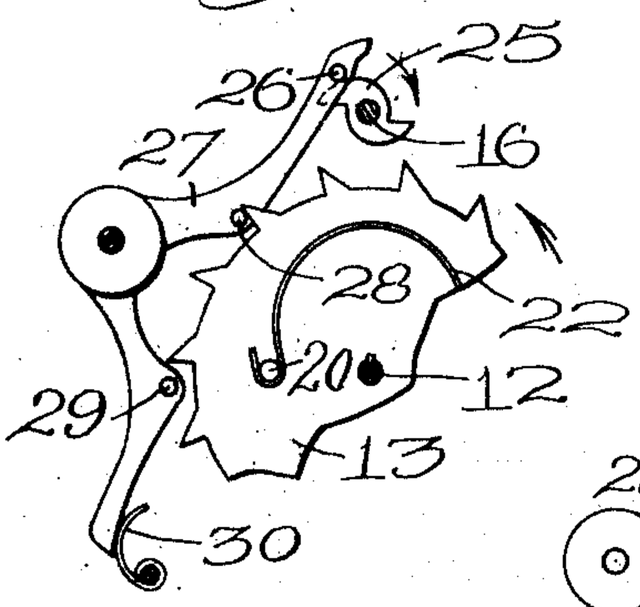


Fig. 4.

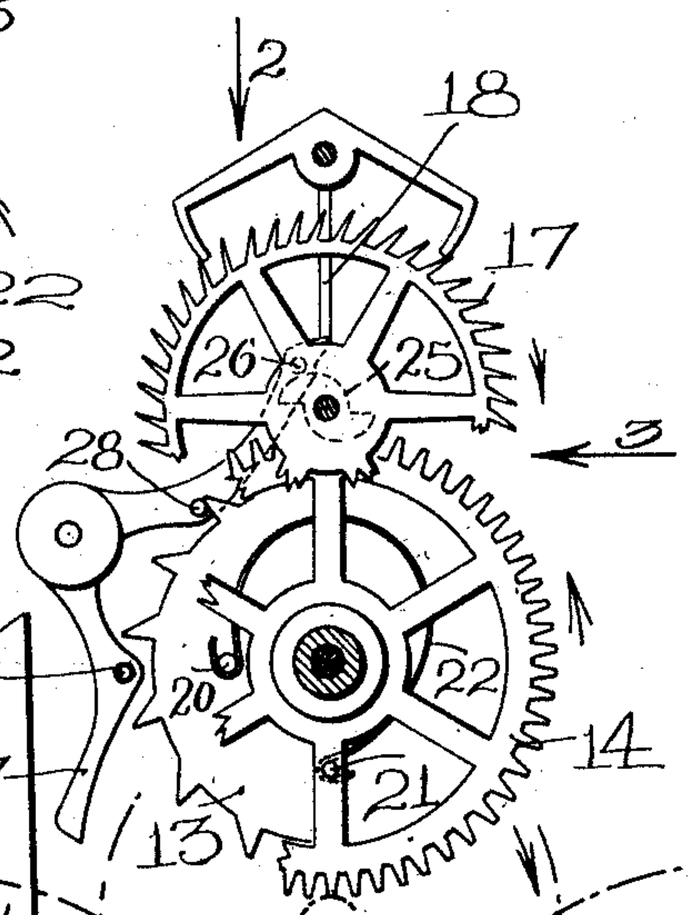
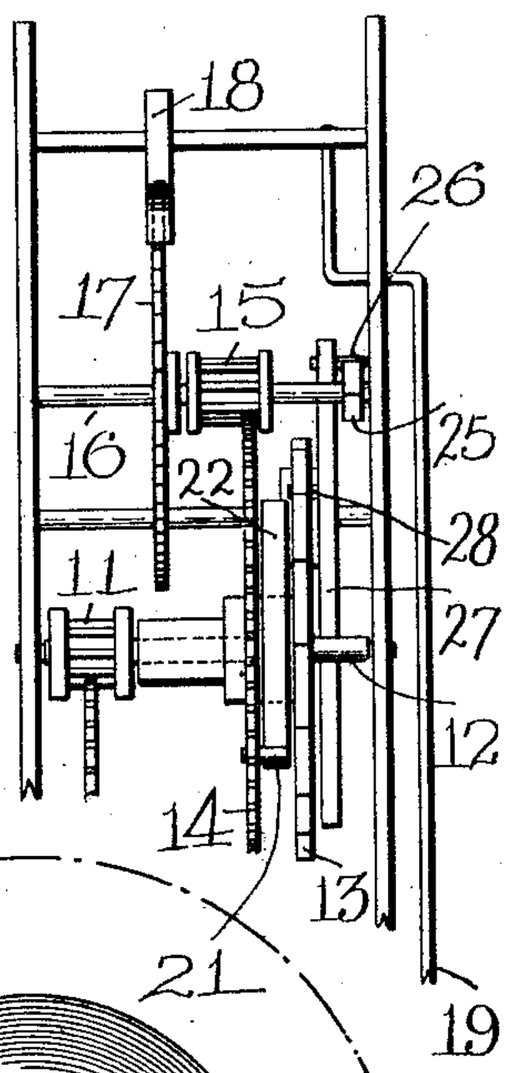


Fig. 3.



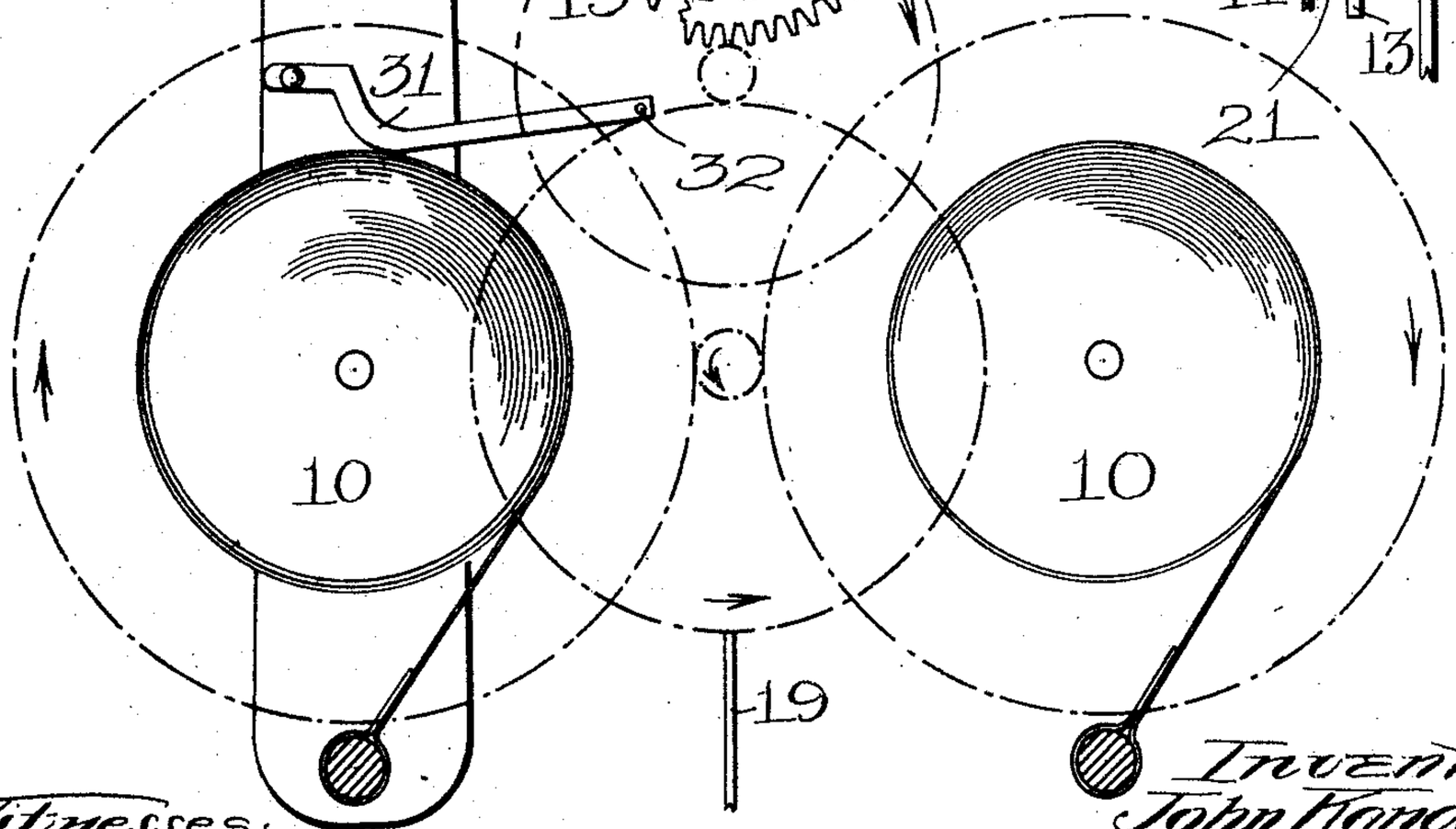


Fig. 1.

Witnesses:

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UNITED STATES PATENT OFFICE.

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DRIVING-TRAIN FOR TIMEPIECES.

975,959. Specification of Letters Patent. **Patented Nov. 15, 1910.**

Application filed April 15, 1910. Serial No. 555,670.

To all whom it may concern:

Be it known that I, JOHN KANGAS, a citizen of the United States, residing at Gardner, in the county of Worcester and State of Massachusetts, have invented a new and useful Driving-Train for Timepieces, of which the following is a specification.

This invention relates to a driving train for clocks and watches.

As spring operated time pieces are ordinarily made they keep time to a certain degree of accuracy, except when the main springs are nearly unwound. Although in theory they ought to keep time equally well then, yet in practice it has been found that the pendulum does not accurately control the movements of the train when the main springs are almost fully expanded.

The principal objects of this invention are to provide effective means within, and constituting a part of, the driving train whereby the regulation of the speed of the driving train will be accurate under all conditions even when the main spring is almost run down, and also to provide for a substantially constant force on the escapement wheel independently of the tightness or looseness of the main springs.

Another object of this invention is to provide means for stopping the mechanism in such a way when the clock runs down that the wheels will be left in a certain definite position.

Further objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawing, in which—

Figure 1 is a front elevation of a portion of a clock train constructed in accordance with this invention, parts being broken away to show mechanism in the rear and some of the wheels of the train being indicated merely by dot and dash pitch circles. Fig. 2 is a plan of the same. Fig. 3 is a side elevation; and Fig. 4 is a front view of one of the features of the invention with other mechanism removed.

In the form of the invention illustrated, the main springs 10 operate a pinion 11 fixed on a shaft 12 by the usual gearing. On this shaft 12 also is fixed a toothed wheel 13, and on the same shaft is loosely mounted a gear wheel 14. This gear wheel, except for being loosely mounted on the shaft performs the same functions as the corresponding wheel in ordinary clock trains, and is in fact a part of the train as is also the pinion 15 on the escapement wheel shaft 16 with which it meshes. The escapement wheel 17 on the latter shaft is controlled by the usual verge or escapement device 18 connected with the pendulum 19. The two wheels 13 and 14 are provided with studs 20 and 21 respectively, which studs are connected by a yielding connection or spring 22. On the escapement wheel shaft 16 is a cam 25 which turns regularly of course with the operation of the clock train. One or more times during its revolution this cam raises a pin 26 on a pivoted lever 27. This operates to allow the pin 28 on said lever to pass over one of the teeth of the wheel 13 so as to permit the latter to turn at regular intervals. The distance between the pin 28 and another pin 29 on the lever 27 is a little greater than the distance between two of the teeth of the wheel 13 and is such that when the cam turns, the pin 26 drops down on the low surface of the cam and the pin 29 moves into position to prevent the toothed wheel from moving through a space of more than one tooth. The lever 27 is operated by gravity in ordinary clocks, but a spring 30 is shown which can be employed on clocks and preferably is employed on watches.

On account of the spring 22 the force exerted by the main springs to rotate the escapement wheel is substantially the same when they are nearly run down as when they are freshly wound. The tightness or looseness of wind of the main springs does not materially affect the strain on the escapement wheel. As the pendulum swings at a constant speed at all times the operation of the rest of the train of mechanism is controlled directly by the pendulum one or more times during the rotation of the escapement shaft 16 in accordance with the number of projections on the cam 25. It has been found in practice that with this operation the clock keeps perfect time until it entirely stops.

When the clock runs down it is desired to stop the mechanism in proper position and for this purpose a lever 31 is pivoted on the frame in position to rest on the main spring. It is provided with a pin 32 on its end. When the main spring runs down and expands sufficiently, this pin 32 is forced between two of the teeth of the wheel 14 and stops the mechanism in a definite posi-

tion, so that this matter is not left to chance. Obviously when the main spring is wound up, the lever 31 drops back out of engagement with the wheel 14 and the wheel 14 starts from the definite position at which it was stopped.

While I have illustrated and described a preferred embodiment of the invention, I am aware that many modifications can be made therein by any person skilled in the art without departing from the scope of the invention as expressed in the claims. Therefore, I do not wish to be limited to all the details of construction herein shown and described, but

What I do claim is:—

1. In a driving train for time pieces, the combination of a main spring, gearing connected therewith, a shaft, a toothed wheel independent of said gearing fixed on said shaft, a gear wheel loosely mounted on said shaft and meshing with a pinion of the train, yielding connections between the toothed wheel and gear wheel, an escapement operated by said pinion of the train, a lever having means for intermittently engaging the teeth and controlling the rotation of said toothed wheel, and a cam fixed on the escapement wheel shaft for operating the lever.

2. In a time keeping mechanism, the combination with an escapement wheel, of a positively driven toothed wheel, a gear wheel rotatably mounted on the same axis as the toothed wheel, a spring connected with the toothed wheel and gear wheel, a pinion rotatable with the escapement wheel and meshing with said gear wheel, a cam rotatable by the train of gearing, a lever having a projection in engagement with said cam, whereby the cam will swing the lever on its fulcrum, and provided with two projections at a distance apart a little greater than the space between two of the teeth of the toothed wheel, and in position to engage said teeth periodically and to arrest the rotation of the toothed wheel intermittently.

3. In a time keeping mechanism, the combination with the escapement wheel, of a toothed wheel, a yielding driving means connected with said toothed wheel and constituting part of the driving train, means in the driving train for driving said escapement wheel from said driving means, a main spring for operating the toothed wheel, and a lever resting on said spring and in position to engage one of the wheels of the train and stop it when the main spring is unwound.

4. In a driving train for time pieces, the combination of a main spring, and gears connected therewith to be operated thereby, with a lever mounted adjacent to the main spring and in engagement therewith in position to be forced against the tooth of one of said gears to stop the same when the main spring is unwound or expanded.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

JOHN KANGAS.

Witnesses:
KLAUS A. HAMMILA,
THOMAS BROGAN.