United States Patent

Cleusix

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[54] TIMEPIECE MOVEMENT

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[52] **U.S. Cl.**.....**58/42.5**, 58/85.5

[51] **Int. Cl.**.....**G04b 19/22**, G04b 27/02

[58] **Field of Search**.....58/23 R, 43, 45, 8, 34, 42.5, 58/85.5, 116 M

[56] **References Cited**

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[57] **ABSTRACT**

A timepiece movement for driving a plurality of hands, one of which is an hour hand, comprises a power train including a pair of identical, coaxially mounted, independently rotatable gears operatively connected with the hour hand, one of said gears being driven by said power train and the other of said gears being selectively operated manually, with magnetic means normally coupling said gears for simultaneous rotation but permitting adjustment of said manually operable gear relative to the other gear to change the indication of the hour hand without affecting any other hand. Means are provided under the control of the manually operated means for selectively positively coupling said gears to enable rotation simultaneously of said gears by such manual means.

10 Claims, 3 Drawing Figures

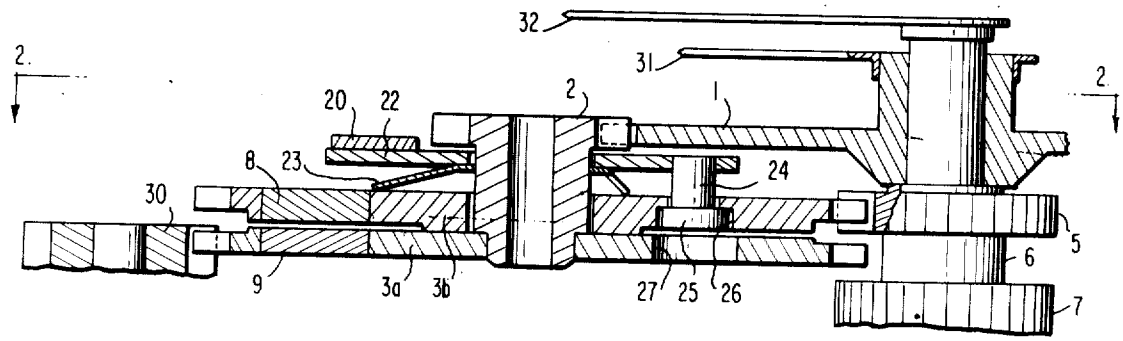
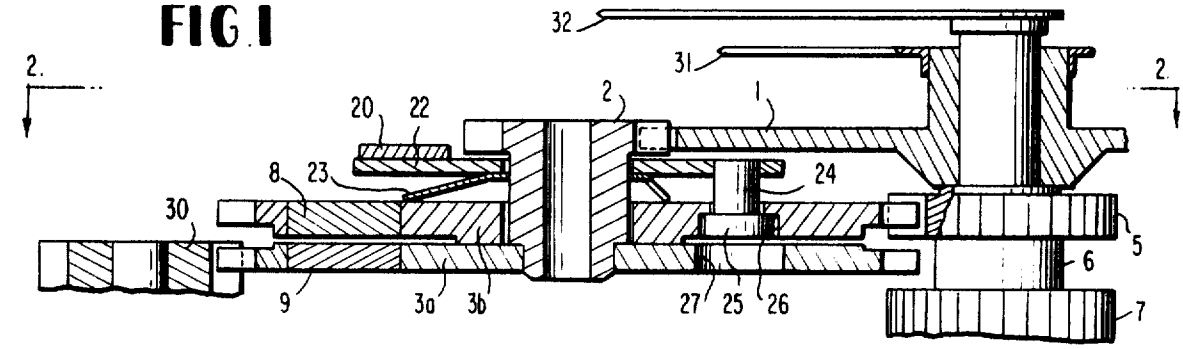


FIG. 1



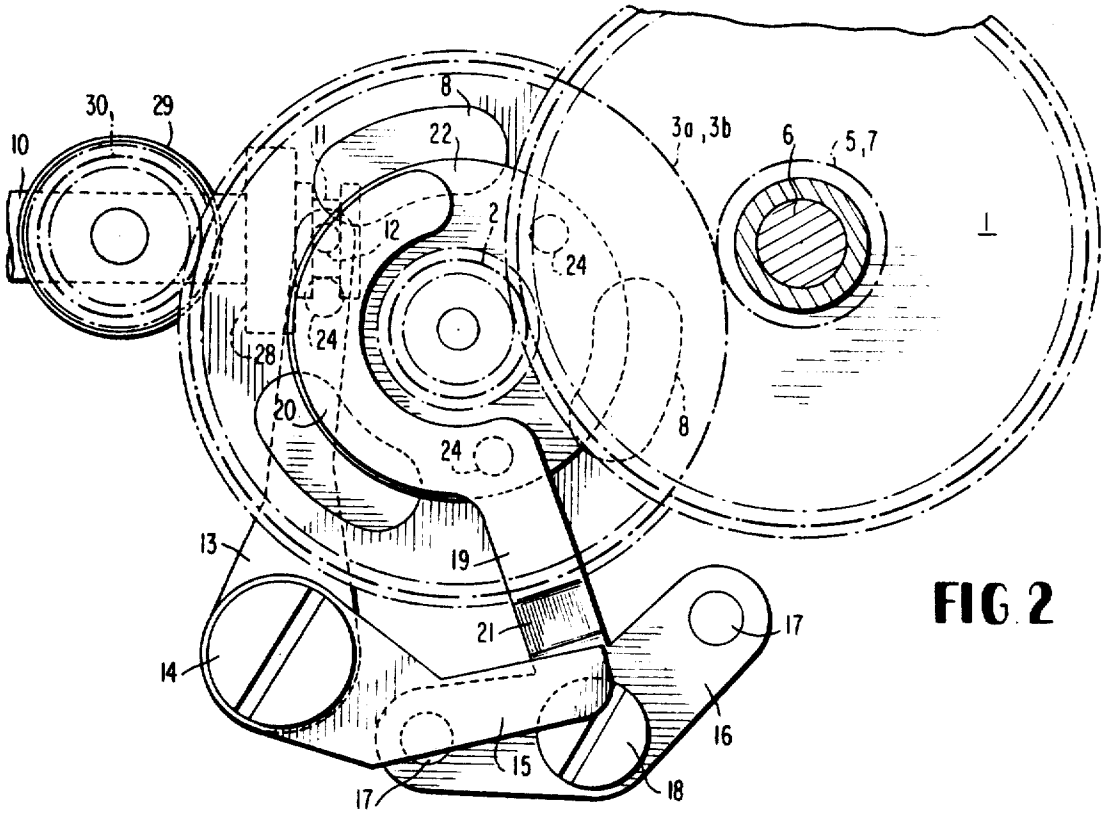
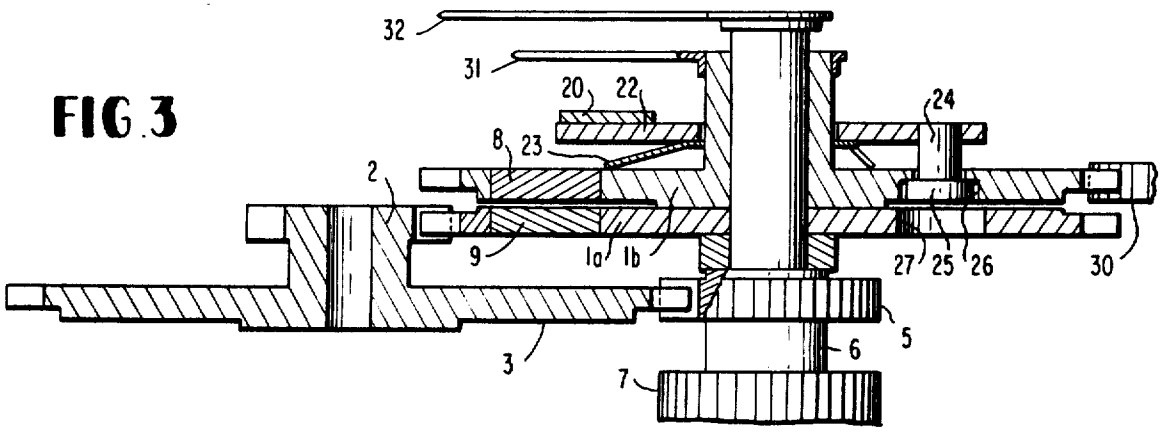


FIG. 2

FIG. 3



TIMEPIECE MOVEMENT

BACKGROUND OF THE INVENTION

To enable adjustment of the hour hand as when passing from one time zone to another the timepiece movement comprises a pair of identical, coaxially mounted, independently rotatable gears operably connected with the hour hand. One of said gears is driven by the power train of the timepiece movement and the other of said gears is selectively operated by manual means for adjusting the hour hand without affecting other hands. The two gears normally are magnetically coupled so that they are driven simultaneously by the power train but the one gear may be manually adjusted without affecting the indication of any other hand such as the minute hand. Following adjustment of the hour hand the magnetic means effects coincidence of said gears to accurately position the hour hand not only with respect to the hour but also the minute and even the second. Occasionally, it becomes necessary to completely reset the timepiece but the foregoing arrangement does not enable such resetting, including not only the adjustment of the hour hand but also the minute hand and a second hand if such is included.

SUMMARY OF THE INVENTION

The present invention relates to a timepiece movement, comprising conventional gear and an additional gear controlling the hour hand, which gears are identical, coaxially mounted but relatively rotatable, and magnetically coupled with respect to each other with the additional gear actuated by the movement of the timepiece. Manually operable means are connectable for rotating the additional gear by one or more pitches or steps, thus correspondingly rotating the hour hand, without influencing the indication of any other hand and also controls for interlocking said gears in the direction of rotation upon normal setting of the timepiece.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary cross-sectional view of a timepiece movement according to the invention;

FIG. 2 is a cross-sectional view taken on line 22 of FIG. 1 with the movement in plan and illustrating the control mechanism, and

FIG. 3 is a cross-sectional view similar to that of FIG. 1 but showing a modification.

DETAILED DESCRIPTION OF THE INVENTION

The timepiece movement partially illustrated in the drawings, includes a conventional hour wheel 1, which carries the hour hand 31 and is in mesh with a minute wheel pinion 2 of a power train of the movement. The latter is rigidly connected with a timer gear constituted, in this instance, by a lower minute wheel 3*a* whereas an additional gear constituted, in upper minute wheel 3*b* is rotatably mounted on the pinion 2 and is in mesh with a cannon pinion 5; the latter is frictionally mounted, by conventional means, on an arbor 6 of a center pinion 7. The hour wheel 1 is rotatably mounted on the cannon pinion 5. The lower minute wheel 3*a* constitutes an additional gear controlling the hour hand, whereas the upper minute wheel 3*b*, coaxial with the lower minute wheel 3*a* is the conventional minute wheel, normally

actuated by operation of the timepiece movement, through the intermediary of the cannon pinion 5. Both minute wheels 3*a* and 3*b* have the same diameter and the same number of teeth. The minute hand 32 is carried as usual by the cannon pinion 5. A second hand, coaxial or not with the other hands, may be provided.

The additional (lower) minute wheel 3*a* is magnetically positioned with respect to the other (upper) minute wheel 3*b* by a like number of correspondingly positioned pole pieces. To this end, three small permanent magnets 8 are inserted in the wheel 3*a*, these magnets being uniformly distributed around the axis of the wheel. Three pieces 9 of soft iron, of the same size as the magnets 8, are secured in the wheel 3*b*, opposite the magnets 8.

Alternatively, the magnets may be mounted in the wheel 3*b* and the pieces of soft iron in the wheel 3*a*, or magnets may be mounted in both wheels. Furthermore, one or both wheels may comprise a magnetizable material and be magnetized so as to obtain three poles or three pole pairs.

FIG. 2 shows a control stem 10, which may consist of the conventional winding stem or of a stem distinct from the winding stem. This stem 10 is capable of movement between three different axial positions which are determined by a known device (not shown), of the type including a setting lever and a setting lever spring. In FIG. 2, the stem 10 is shown in its first or inner position. In a groove 11 of the stem 10 is engaged a stud 12 carried by an arm 13 pivotally mounted on a stepped screw 14, threaded into the pillar plate (not shown). The arm 13 is rigidly connected with a lever 15 in the vicinity of which is arranged a supporting spring 16. The latter, oriented by two feet 17, is secured to the pillar plate by means of a screw 18 and has a flexible arm 19 ending in an arcuate portion 20, coaxial with the minute wheels 3*a* and 3*b*. The flexible arm 19 has near its junction with the base of the supporting spring 16, an inclined portion or ramp 21 which is engageable by the lever 15 of the arm 13.

Below the portion 20 of the supporting spring 16 is arranged a supporting plate 22 freely fitted on the sleeve of the minute wheel pinion 2 and bearing against a leaf spring 23 having a plurality of resilient arms in contact with the top face of the minute wheel 3*b*. The supporting plate 22 carries three pins 24 the lower ends of which is enlarged heads 25. The pins 24 with their heads 25 are engaged into stepped openings 26 of the upper minute wheel 3*b*, and corresponding openings 27, of a somewhat larger diameter, are provided in the lower minute wheel 3*a*, opposite the openings 26.

On the control stem 10 is keyed a settings pinion 28, adapted to cooperate with an intermediate pinion 29 having a contrate or radial toothing with relatively long teeth. The intermediate pinion 29, pivotally mounted on the frame of the watch, is rigidly connected with a minute setting pinion 30, which is in mesh with the lower minute wheel 3*a*.

The timepiece as shown and described operates as follows:

As already said, the stem 10 is illustrated in its first or inner position in FIG. 2. This position is normally the winding position for a mechanical watch; in the case of an electric watch, no function occurs if the stem 10 is rotated. The setting pinion 28 is not in mesh with the

intermediate pinion **29**. On the other hand, the lever **15** of the arm **13** does not bear on the ramp **21** of the supporting spring **16**, so that the portion **20** of this spring, while being in contact with the supporting plate **22**, does not exert any axial pressure on the latter. Therefore, as shown in FIG. **1**, the leaf spring **23** is not deformed and the pins **24**, with their heads **25**, are engaged only in the openings **26** of upper minute wheel **3***b*. When the watch is running, the cannon pinion **5** drives the upper minute wheel **3***b* whose rotation is transmitted through the magnets **8** and the pieces **9** of soft iron to the lower minute wheel **3***a* and, therefore, to the hour hand.

If the control stem **10** is pulled into its second or intermediate position, the setting pinion **28** engages the intermediate pinion **29**. In this position, the lever **15** of the arm **13** may engage the ramp **21** of the supporting spring **16**, but does not press on it sufficiently to deflect the end portion **20**. If the stem **10** is now rotated, in the one direction or the other, the lower minute wheel **3***a* is rotated and, therefore, the hour hand is also rotated. However, the rotation of the wheel **3** is not transmitted to the wheel **3***b*, since the magnetic force exerted by the magnets **8** is not sufficient as to overcome the friction of the cannon pinion **5** on its arbor **6**. Therefore, the hour hand may be advanced or moved back by one or more steps, without influencing the indication given by the other hand or hands. When this correction has been made, the stem **10** is pushed back into its first position and the wheel **3** takes the exact angular position, of the wheel **3***b* the pole pieces **9** having shifted to approximately coincide with the pole pieces **8** to eventually align the gear **3***a* with the gear **3***b*. A small error in the correction of the hour hand is, therefore, immaterial. Such a correction is useful particularly when the user passes from one time zone to another one, since the hour indication can be changed by one or more units without losing the indication of the minute and of the second.

If the control stem **10** is pulled into its third or outer position, the setting pinion **28** remains in mesh with the intermediate pinion **29**, this being rendered possible due to the long teeth of the contrate toothing of the intermediate pinion **29**. On the other hand, the lever **15** of the arm **13** now bears on the ramp **21** of the supporting spring **16** and flexes its end portion **20** towards the gears **3***a* and **3***b*. The portion **20** presses (FIG. **1**) the supporting plate **22**, against the action of the leaf spring **23**, so that the heads **25** of the pins **24** enter the openings **27** of the lower minute wheel **3***a*, thus interlocking both wheels **3***a* and **3***b* in the direction of rotation. If the stem **10** is rotated, in the one or the other direction, lower minute wheel **3***a* is rotated as well as the hour hand. Simultaneously, the upper minute wheel **3***b* is rotated by the pins **24**, so that the cannon pinion **5** is also driven. Therefore, it is thus possible to carry out the normal setting of the watch, i.e., the simultaneous correction of the hour and minute hands. As soon as the control stem **10** is moved back into its first or inner position, the parts return into the position illustrated in the drawings; the leaf spring **23**, lifts the supporting plate **22** and the setting pinion **28** is disengaged from the intermediate pinion **29**.

A modified embodiment, FIG. **3**, comprises a standard minute wheel **3**, but has two hour wheels **1***a* and **1***b* controlling the hour hand, the additional hour wheel **1***b* being magnetically positioned with respect to the usual hour wheel **1***a*. The magnets and the pieces of soft iron are fixed to the hour wheels and, due to the gear ratio between the hour wheel and the minute wheel pinion, the number of these magnets are increased to 12.

More generally, if the gear ratio between the hour wheel and the minute wheel pinion is denoted by n, the number of the permanent magnets and of the pieces of soft iron carried by the minute wheels **3***a* and **3***b*, respectively, will be equal to $12/n$.

The device as illustrated and described might also be applied to a timepiece (watch or clock) with a dial having a scale of 24 hours. In this case, one of the hour wheels might take 24 positions with respect to the other one, or one of the minute wheels might take $24/n$ positions with respect to the other one.

I claim:

1. A timepiece movement comprising a timer gear, an hour hand, another hand for indicating another segment of time and controlled by the movement, an additional gear controlling the hour hand and magnetically positioned with respect to said timer gear, said timer gear being coaxial with the additional gear and actuated by the movement of the timepiece, manually operable means for selectively rotating the additional gear by at least one step and correspondingly rotating the hour hand without influencing the indication of any other hand, and means for interlocking interlocking said gears in the direction of rotation upon normal setting of the timepiece.

2. A timepiece movement according to claim **1**, wherein said gears consist of hour wheels.

3. A timepiece movement according to claim **1**, wherein said gears consist of minute wheels.

4. A timepiece movement according to claim **1**, wherein said gears have correspondingly located openings normally respectively in alignment, said means for interlocking said gears comprising a supporting plate carrying pins engaging in the openings of one of said gears, means movably supporting said supporting plate, and means for moving said supporting plate to move said pins to enter the openings in the other of said gears.

5. A timepiece movement according to claim **4** wherein said plate supporting means comprises a spring, said plate moving means comprises an arm for flexing said spring, and said manually operable means comprises a control stem operatively connected with said arm and axially movable selectively for moving said arm.

6. A timepiece movement comprising in combination:

first gear means controlling the hour hand in said movement;

second gear means mounted coaxially with said first gear means, said second gear means being driven commonly with another hand for indicating another time segment;

said first gear means being magnetically coupled to said second gear means whereby said first gear means is normally driven by said second gear means through said magnetic coupling;

manually operable means for rotating said first gear means by at least one step, said magnetic coupling being sufficiently weak as to not overcome the frictional forces between said second gear means and said other hand, whereby said hour hand is rotated without influencing the indication of said other hand; and

means controlled by said manually operable means for interlocking said first and second gear means in the direction of rotation, whereby to enable normal setting of said timepiece.

7. A timepiece movement comprising:

a power train;

a timer gear;

an additional gear identical with said timer gear and coaxially mounted for relative rotation therebetween;

a rotatably mounted hour hand drivingly connected with one of said gears;

another hand for indicating another segment of time and rotatably mounted coaxially with said hour hand;

means connecting one of said gears with said power train to drive said gear for rotating said hour hand in the usual manner;

manually operated means connected with the other of said gears for driving said gear to rotate said hour hand to change the hour indication thereof without affecting the other said hand;

magnetic means normally coupling said gears for maintaining angular coincidence therebetween, whereby said hour hand may be manually adjusted to change the hour indication thereof and the magnetic means will maintain the relative relation with respect to lesser time segments, and

means under the control of said manually operated means for selectively positively coupling said gears to enable normal simultaneous setting of said hands.

8. A timepiece movement according to claim 7, wherein said gears have correspondingly located openings normally respectively in alignment, said means for positively coupling said gears comprising a supporting plate carrying pins engaging in the openings of one of said gears, means movably supporting said supporting plate, and means for moving said supporting plate to move said pins to enter the openings in the other of said gears.

9. A timepiece movement according to claim 8 wherein said plate supporting means comprises a spring, said plate moving means comprises an arm for flexing said spring, and said manually operated means comprises a control stem operatively connected with said arm and axially movable selectively for moving said arm.

10. A timepiece movement according to claim 9 wherein said stem is movable between three axially spaced positions including a first inoperative position, a second intermediate position establishing a driving connection with said other gear for rotating only said hour hand, and a third position for moving said arm to positively couple said gears.

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