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(54) MECHANISM FOR USE IN A TIMEPIECE

(71) We, KABUSHIKI KAISHA SUWA SEIKOSHA, a Japanese company of 3—4, 4-chome, Ginza, Chuo-ku, Tokyo, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention concerns a mechanism for use in a time-piece. Although the invention is not so restricted, it is more particularly concerned with a mechanism for adjusting one only of a plurality of time displays in a timepiece, e.g. in the kind of timepiece which simultaneously indicates the time prevailing in two different time zones.

In one known mechanism, the different time displays are indicated by hands driven by first and second hour wheels respectively, the drive between the hour wheels and the hands including resilient means. Such a mechanism, however, requires considerable torque to drive it, with the result that it is not suitable in an electronic timepiece or in a ladies' timepiece, where the torque will be small. In another known mechanism a jumper, which engages the said second hour wheel, is used to locate the first and second hour wheels relatively to each other. However, as there is comparatively little space for the jumper, its spring cannot be made of adequate length. In consequence, the jumper may in use suffer fatigue such that the first and second hour hands may not be correctly located with respect to each other, i.e. the time indications provided thereby may not differ by an exact number of hours.

Moreover, timepieces which have plural time displays are normally, by reason of the large number of parts in them, thick, expensive and complicated to use.

According to the present invention, there is provided a mechanism for use in a time-piece comprising two spaced apart wheels and a sliding member disposed therebetween all of which are mounted on a common axis, each said wheel being drivingly connected

to a respective timepiece hand, one of the wheels being provided with teeth which face the other wheel and which are drivingly engaged with saw teeth on the sliding member, the sliding member being driven by the said other wheel, a spring for urging the sliding member towards the said one wheel, and means for rotating the said one wheel with respect to the said other wheel.

Preferably the spring drivingly engages both the said other wheel and the said sliding member.

Thus the spring may have projections which fit in respective recesses in the said other wheel and in the said sliding member. Each said wheel may be a gear wheel or may be secured to a gear wheel.

The invention also comprises a timepiece provided with a mechanism as set forth above.

The invention is illustrated, merely by way of example, in the accompanying drawings, in which:—

Figure 1 is an exploded perspective view of a mechanism for use in a timepiece according to the present invention, and

Figure 2 is an exploded perspective view showing the parts of one of the components of the mechanism shown in Figure 1.

Referring to the drawings, a mechanism, e.g. for use in an electronic watch or in a ladies' watch, comprises a first hour wheel gear 1 which is secured to a stub shaft 10, a spring 2 of substantially annular shape, a sliding member 3, a second hour wheel assembly 4, and a first hour wheel shaft 7, all of which are mounted on a common axis 9.

In Figure 1 the parts 1, 2, 3, 4 and 7 are all shown as being completely separated from each other, but in fact the spring 2 is mounted about the stub shaft 10, the sliding member 3 is slidably mounted on the stub shaft 10, and the second hour wheel assembly 4 is rotatably mounted on the stub shaft 10. The first hour wheel shaft 7 is, moreover, mounted within the outer end of the

stub shaft 10 and is driven from the first hour wheel gear 1, the stub shaft 7 having a flange 14.

The stub shaft 7 drives a first hour hand (not shown) while the second hour wheel assembly 4 drives a second hour hand (not shown).

The second hour wheel assembly 4 comprises, as best seen in Figure 2, a ratchet wheel 5 and a second hour wheel gear 6, the second hour wheel gear 6 having a hub portion 11 within which the ratchet wheel 5 is secured.

The sliding member 3, which is thus disposed between the spaced apart wheels 1, 5, is provided with twelve equi-angularly spaced apart saw teeth 12. The ratchet wheel 5 is similarly provided, on its side facing the first hour wheel gear 1, with twelve equi-angularly spaced apart saw teeth 13 which are drivingly engaged with the saw teeth 12 on the sliding member 3.

The spring 2 urges the sliding member 3 towards the ratchet wheel 5 and thus urges the saw teeth 12, 13 into driving engagement with each other. The spring 2 has projections 2a which fit in recesses 1a in the first hour wheel gear 1. The spring 2 also has projections 2b which fit in recesses 3a in the sliding member 3. Thus the spring 2 drivingly engages both the first hour wheel gear 1 and the sliding member 3 so as to transmit driving motion from the first hour wheel gear 1 and through the spring 2 and sliding member 3 to the ratchet wheel 5.

The second hour wheel gear 6 meshes with a second hour hand correcting wheel 8 which may be rotated by means not shown, such for example as a crown of the watch.

Thus if it is desired to adjust the second hour hand by one or more hours with respect to the first hour hand (e.g. in order to indicate the time prevailing in a different time zone from that originally selected) all that is necessary is to rotate the second hour hand correcting wheel 8 through an appropriate angular distance, a click being heard each time that the indication provided by the second hour hand is adjusted by one hour. Thus as the second hour hand correcting wheel 8 is rotated so as to rotate the ratchet wheel 5 through an angular distance corresponding to the pitch of its teeth 13, the teeth 13 will ride over the teeth 12. Since the flange 14 prevents the ratchet wheel 5 from moving axially away from the first hour wheel gear 1, the forcing of the saw teeth 13 over the saw teeth 12 will be accompanied by flexure of the spring 2 such as to permit movement of the sliding member 3 towards the first hour wheel gear 1. The spring force of the spring 2 will then securely locate the sliding member 3 in the next adjacent angular position.

Thus in the mechanism illustrated in the drawings, unduly high torque is not required to drive the mechanism, which is therefore suitable for use in an electronic timepiece or in a ladies' timepiece. The spring 2, moreover, is of symmetrical shape and thus less subject to fatigue than the jumper mentioned above, while the adjustment of the second hour hand will not involve axial movement of the second hour wheel assembly 4 and therefore will not involve axial movement of the second hour hand. Moreover, the number of parts of the mechanism shown in the drawings is small so that the mechanism is not expensive to produce. Furthermore, the first and second hour wheels form a compact assembly so that the mechanism of the present invention can be substituted for that of a conventional time adjustment mechanism merely by exchanging a few parts.

Since, moreover, the spring 2 is located within the second hour wheel gear 6, deformation of the spring 2 during dismantling and assembly is easier to avoid while it is easier to adjust the strength of the spring since the number of parts which affect the spring force are few.

WHAT WE CLAIM IS:—

1. A mechanism for use in a timepiece comprising two spaced apart wheels and a sliding member disposed therebetween all of which are mounted on a common axis, each said wheel being drivingly connected to a respective timepiece hand, one of the wheels being provided with teeth which face the other wheel and which are drivingly engaged with saw teeth on the sliding member, the sliding member being driven by the said other wheel, a spring for urging the sliding member towards the said one wheel, and means for rotating the said one wheel with

2. A mechanism as claimed in claim 1 respect to the said other wheel. in which the spring drivingly engages both the said other wheel and the said sliding member.

3. A mechanism as claimed in claim 2 in which the spring has projections which fit in respective recesses in the said other wheel and in the said sliding member.

4. A mechanism as claimed in any preceding claim in which each said wheel is a gear wheel or is secured to a gear wheel.

5. A mechanism substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

6. A timepiece provided with a mechanism as claimed in any preceding claim.

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stub shaft 10 and is driven from the first hour wheel gear 1, the stub shaft 7 having a flange 14.

5 The stub shaft 7 drives a first hour hand (not shown) while the second hour wheel assembly 4 drives a second hour hand (not shown).

10 The second hour wheel assembly 4 comprises, as best seen in Figure 2, a ratchet wheel 5 and a second hour wheel gear 6, the second hour wheel gear 6 having a hub portion 11 within which the ratchet wheel 5 is secured.

15 The sliding member 3, which is thus disposed between the spaced apart wheels 1, 5, is provided with twelve equi-angularly spaced apart saw teeth 12. The ratchet wheel 5 is similarly provided, on its side facing the first hour wheel gear 1, with 20 twelve equi-angularly spaced apart saw teeth 13 which are drivingly engaged with the saw teeth 12 on the sliding member 3.

The spring 2 urges the sliding member 3 towards the ratchet wheel 5 and thus 25 urges the saw teeth 12, 13 into driving engagement with each other. The spring 2 has projections 2a which fit in recesses 1a in the first hour wheel gear 1. The spring 2 also has projections 2b which fit in recesses 3a in the sliding member 3. Thus 30 the spring 2 drivingly engages both the first hour wheel gear 1 and the sliding member 3 so as to transmit driving motion from the first hour wheel gear 1 and through the spring 2 and sliding member 3 to the ratchet 35 wheel 5.

40 The second hour wheel gear 6 meshes with a second hour hand correcting wheel 8 which may be rotated by means not shown, such for example as a crown of the watch.

Thus if it is desired to adjust the second hour hand by one or more hours with respect to the first hour hand (e.g. in order to indicate the time prevailing in a different 45 time zone from that originally selected) all that is necessary is to rotate the second hour hand correcting wheel 8 through an appropriate angular distance, a click being heard each time that the indication provided by 50 the second hour hand is adjusted by one hour. Thus as the second hour hand correcting wheel 8 is rotated so as to rotate the ratchet wheel 5 through an angular distance corresponding to the pitch of its teeth 13, 55 the teeth 13 will ride over the teeth 12. Since the flange 14 prevents the ratchet wheel 5 from moving axially away from the first hour wheel gear 1, the forcing of the saw teeth 13 over the saw teeth 12 will be accom- 60 panied by flexure of the spring 2 such as to permit movement of the sliding member 3 towards the first hour wheel gear 1. The spring force of the spring 2 will then securely locate the sliding member 3 in the next adjacent angular position. 65

Thus in the mechanism illustrated in the drawings, unduly high torque is not required to drive the mechanism, which is therefore suitable for use in an electronic timepiece or in a ladies' timepiece. The spring 2, moreover, is of symmetrical shape and thus less subject to fatigue than the jumper mentioned above, while the adjustment of the second hour hand will not involve axial movement of the second hour wheel assembly 4 and therefore will not involve axial movement of the second hour hand. Moreover, the number of parts of the mechanism shown in the drawings is small so that the mechanism is not expensive to produce. 70 Furthermore, the first and second hour wheels form a compact assembly so that the mechanism of the present invention can be substituted for that of a conventional time adjustment mechanism merely by exchanging a few parts. 75

Since, moreover, the spring 2 is located within the second hour wheel gear 6, deformation of the spring 2 during dismantling and assembly is easier to avoid while it is easier to adjust the strength of the spring since the number of parts which affect the spring force are few. 80

WHAT WE CLAIM IS:—

1. A mechanism for use in a timepiece 95 comprising two spaced apart wheels and a sliding member disposed therebetween all of which are mounted on a common axis, each said wheel being drivingly connected to a respective timepiece hand, one of the wheels 100 being provided with teeth which face the other wheel and which are drivingly engaged with saw teeth on the sliding member, the sliding member being driven by the said other wheel, a spring for urging the sliding member towards the said one wheel, and means for rotating the said one wheel with 105

2. A mechanism as claimed in claim 1 respect to the said other wheel. 110 in which the spring drivingly engages both the said other wheel and the said sliding member.

3. A mechanism as claimed in claim 2 in which the spring has projections which fit in respective recesses in the said other 115 wheel and in the said sliding member.

4. A mechanism as claimed in any preceding claim in which each said wheel is a gear wheel or is secured to a gear wheel.

5. A mechanism substantially as herein- 120 before described with reference to and as shown in the accompanying drawings.

6. A timepiece provided with a mechanism as claimed in any preceding claim.

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