

CORRECTION DEVICE FOR TIMEPIECE
DISPLAY MECHANISM AND WHEEL FITTED THERETO

The present invention relates to the field of horology. It concerns more specifically a correction device for a time indication display mechanism including a wheel fitted with two toothings located in the same
5 plane. The invention also concerns said wheel itself.

Mechanisms displaying a time indication, such as the date, are known to those skilled in the art. They typically include a display member, such as a date ring, a mechanism driving the display member, and a correction device activated by a winding stem. Correction devices are
10 generally complex and cumbersome. They typically include at least one intermediate wheel activated by a pinion mounted on the winding stem, and a sliding or stationary corrector pinion, meshed with the intermediate wheel and with the display member.

A major drawback of this type of correction device is its thickness,
15 mainly due to the intermediate wheel which includes two toothing levels. By way of example, JP Patent No 59 160791 may be cited, wherein the intermediate wheel includes a first toothing level meshed with the pinion of the winding stem, and a second toothing level meshed with a second intermediate wheel. In JP Patent No 48 35856, the intermediate wheel is
20 arranged as a overthickness of the winding stem pinion. It includes a contrate toothing meshed with the pinion, and a radial toothing meshed with the corrector pinion. Further, the corrector pinion also includes two active levels. Because of their thickness, these devices are not suited to ultra-thin movements.

25 Other correction devices, of much simpler design, include a pinion mounted on the winding stem, directly meshed with a toothing of the display

member. The pinion therefore includes two substantially helical wings, arranged for cooperating in one direction of rotation only, with the tothing of the display member. The display member is generally positioned using a jumper spring. This type of correction device is certainly extremely simple, but it is cumbersome for display members of large diameter. Indeed, the diameter of the pinion must be in ratio to the pitch of the display member tothing, so that each wing drives the display member through one step when the pinion rotates. The diameter of the pinion is, consequently, all the more important the larger the diameter of the display member, which is why this device is ill suited to ultra-thin movements.

The present invention proposes overcoming these drawbacks by providing a simple correction device with a minimum space requirement, mainly as regards thickness.

More specifically, the invention concerns a correction device for a timepiece display mechanism of the type including a display member fitted with a tothing of pitch P , the correction device including a pinion fitted with a tothing of pitch p , mounted on a winding stem so as to occupy at least one correction position, and an intermediate wheel mounted between the pinion and the display member. According to the invention, the intermediate wheel includes a main tothing of pitch P , of head diameter D , of foot diameter d_1 meshed with the tothing of pitch P of the display member, and a secondary tothing of pitch p less than P , concentric to the main tothing, located in the same plane as the main tothing, of head diameter D equal to the head diameter d_1 of the main tothing, and of foot diameter d_2 greater than the foot diameter of the main tothing, meshed with the tothing of pitch p of the pinion when the pinion occupies the correction position.

Owing to the features of the intermediate wheel, the thickness of the correction device according to the invention does not exceed the diameter of the pinion. Moreover, as the pinion is not directly meshed with the display member as is the case of the pinion with wings that was described above,

but with the second toothing of pitch p , the diameter and space requirement thereof are reduced.

The invention also concerns a timepiece wheel fitted to this correction device.

5 More specifically, the invention concerns a substantially plane timepiece wheel including a first toothing defined by a pitch P , a head diameter D and a foot diameter d_1 , including at least one tooth provided with a tip that extends substantially angularly. According to the invention, the tip portion of the first teeth is cut so as to form a second coplanar
10 toothing concentric to the first toothing, said second toothing being discontinuous, defined by a pitch p less than pitch P of the first toothing, a head diameter D equal to the head diameter of the first toothing, and a foot diameter d_2 greater than the foot diameter d_1 of the first toothing.

Other features and advantages of the present invention will appear
15 more clearly upon reading the following detailed description of an example embodiment of the display mechanism correction device according to the invention, said example being given solely by way of non limiting illustration, with reference to the annexed drawings, in which:

- Figures 1 and 2 are respectively top and cross-sectional views of a
20 display mechanism correction device according to the invention,

- Figure 3 is a perspective view of one part of the correction device according to the invention,

- Figure 4 shows a timepiece wheel fitted to this device, and

- Figure 5 illustrates a variant of the correction device according to
25 the invention.

Designated by the general reference number 10, the correction device shown in Figures 1 and 2 is for correcting the display of a time indication provided by a display member 12. The time indication is, for example, a date, a month or a day of the week. Display member 12 is
30 conventionally formed of a ring 14, on which time indication markings are

marked. It is provided with an inner tothing 16 of pitch P, formed of teeth 17 of width s, separated by a space of width $S = P - s$. Display member 12 is also mounted so as to be guided in rotation on a plate 18, and angularly positioned via a jumper spring 20. A holding plate 22 partially covering
5 tothing 16 and secured to plate 18, positions display member 12 axially. A drive mechanism for display member 12 is provided but not shown. It includes, for example, in the case of a date display, a date drive wheel activating display member 12 by one step per day, driven by an intermediate hour wheel. This mechanism is conventional and will not be
10 described further.

Correction device 10 includes, in a conventional manner, a winding stem 24 mounted to move in rotation in plate 18 and provided, at the external end thereof, with a winding crown that is not shown. Winding stem 24 is slidably mounted so as to occupy a neutral position, in which it is
15 pushed in as far as possible, and two active positions, which are first and second pulled out positions. A sliding pinion 26 is secured in rotation to winding stem 24. Winding stem therefore has a square section on one portion occupied by sliding pinion 26. Sliding pinion 26 has a hole that is adapted in shape and size to the section of winding stem 24. It further
20 includes at a first end thereof a first straight contrate tothing 28, and at a second end, a second contrate tothing 30 of pitch p. Said second contrate tothing 30 is straight, but other tothing shapes could be envisaged, as will appear below.

Sliding pinion 26 is activated conventionally by a mechanism formed
25 of a pull out piece 32 and a lever 34 cooperating with each other to pass the pinion from a neutral position, when winding stem 24 is in a neutral position, to a time indication correcting position A, when winding stem 24 occupies a first pulled out position, then to a time setting position B, when winding stem 24 occupies the second pulled out position. This mechanism activating
30 sliding pinion 26 is well known to those skilled in the art and will not be described further.

In the time setting position B, sliding pinion 26 meshes, via the first tothing 28 thereof, with intermediate wheel 36, kinematically connected to a cannon pinion that is not shown. The time can be set by activating winding stem 24, in either direction of rotation.

5 In the time indication correcting position A, sliding pinion 26 meshes, via the second tothing 30 thereof, with a correction wheel 38 mounted to rotate freely on holding plate 22. Correction wheel 38 is itself meshed with tothing 16 of display member 12. The assembly formed by winding stem 24, sliding pinion 26, correction wheel 38 and display member 12 is shown
10 in Figure 3, in the time indication correcting position A. The features of correction wheel 38 appear in more detail in Figure 4.

Correction wheel 38 includes a first tothing 40 of pitch P, of head diameter D, and foot diameter d1. Tothing 40 meshes with tothing 16 of display member 12. Thus tothing 40 is completely complementary to
15 tothing 16. It is formed of teeth 42, of width S, equal to the width of the space between two consecutive teeth 17, separated by a space of width $s = P - S$, equal to the width of teeth 17.

Teeth 42 further include two substantially radial flanks and a tip 44 that extends substantially angularly. Tip 44 is cut so as to form a second
20 tothing 46, which is discontinuous, coplanar and concentric to first tothing 40, of pitch p less than pitch P of the first tothing, of head diameter D equal to the head diameter of first tothing 40 and of foot diameter d2 greater than the foot diameter d1 of first tothing 40. Tothing 46 meshes with the contrate tothing 30 of sliding pinion 26.

25 It will be noted that tothing 46 has large discontinuities, because it is only present at tip 44 of teeth 42 of the first tothing 40. However, in order for correction device 10 to operate properly, the second tothing 46 must be meshed, at least via one tooth, with contrate tothing 30 of sliding pinion 26. Therefore, the spaces of width s separating two consecutive teeth 42
30 are as small as possible. In practice, they cannot be less than the width s of teeth 17 forming tothing 16 of display member 12. Consequently, one

must ensure that the width s of teeth 17 of display member 12 is as small as possible.

When winding stem 24 is activated, as sliding pinion 26 is in position A, the latter drives correction wheel 38 in rotation, which itself drives display
5 member 12, in one direction of rotation or the other. The time indication is thus corrected.

In the embodiment presented above, contrate toothing 30 and second toothing 46 are straight, which allows coupling in both directions of rotation. In a particular embodiment illustrated in Figure 5, contrate toothing
10 30 and second toothing 46 are saw like toothings, such that the two toothings cooperate in a single direction of rotation, like two Breguet toothings. Sliding pinion 26 and correction wheel 38 then form a single directional coupling for correcting the display member in a single direction of rotation. For more details as to the operating mode of this type of coupling,
15 reference can be made to the Application filed on 3 April 2007, in the name of ETA S.A., and entitled "Accouplement à sens unique et dispositif de correction comportant un tel accouplement".

Correction device 10 thus described is extremely simple and compact. It is perfectly suited to an ultra-flat movement of the mechanical or
20 electromechanical type.

It goes without saying that the present invention is not limited to the embodiments that have just been described and that various simple alterations and variants could be envisaged by those skilled in the art without departing from the scope of the present invention as defined by the
25 annexed claims. It will be noted in particular that a correction wheel 38 that comprises only one tooth 42, wherein one tip portion 44 extends angularly and is cut so as to form a second toothing 46, coplanar and concentric to the first, is within scope of the invention.

CLAIMS

1. Substantially plane timepiece wheel (38) including a first
tooththing (40) defined by a pitch P , a head diameter D , a foot diameter d_1 ,
including a plurality of teeth (42) each provided with a tip (44) at least one
5 portion of which extends substantially angularly, characterized in that said
tip portion (44) is cut so as to form a second tooththing (46) that is coplanar
and concentric to said first tooththing (40), defined by a pitch p less than the
pitch P of said first tooththing (40), a head diameter D equal to the head
diameter of the first tooththing (40), and a foot diameter d_2 that is greater
10 than the foot diameter d_1 of the first tooththing (40).

2. Timepiece wheel according to claim 1, characterized in that
said first tooththing (40) is formed of teeth (42) provided with a tip (44)
extending substantially angularly, and in that said tip (44) is cut so as to
form a second discontinuous tooththing (46) that is coplanar and concentric to
15 said first tooththing (40), defined by a pitch p less than the pitch P of the first
tooththing (40), a head diameter D equal to the head diameter of the first
tooththing (40), and a foot diameter d_2 greater than the foot diameter d_1 of
the first tooththing (40).

3. Timepiece wheel according to claim 1, characterized in that the
20 pitch P is a multiple of the pitch p .

4. Timepiece wheel according to any of claims 1 and 2,
characterized in that said second tooththing (46) is a saw-shaped tooththing.

5. Timepiece wheel according to any of claims 1 and 2,
characterized in that said second tooththing (46) is straight.

25 6. Timepiece wheel according to any of claims 1 to 4,
characterized in that said teeth (42) have a width S , separated by a space
of width s , said width S of the teeth (42) being large relative to the width s of
the space separating two teeth (42).

7. Correction device (10) for a timepiece display mechanism of the type including a display member (12) fitted with a tothing (16) of pitch P, said correction device (10) including a pinion (26) provided with a tothing (30) of pitch p, mounted on a winding stem (24) so as to occupy at least
5 one display correcting position A, and a correction wheel (38) mounted between said pinion (26) and said display member (12), characterized in that said correction wheel (38) includes a first tothing (40) defined by a pitch P, a head diameter D, and a foot diameter d1, formed of teeth (42) including a tip (44) extending substantially angularly, and in that said tip (44)
10 is cut so as to form a second discontinuous tothing (46) that is coplanar and concentric to said first tothing (40), defined by a pitch p less than the pitch P of the first tothing (40), a head diameter D equal to the head diameter of the first tothing (40), and a foot diameter d2 greater than the foot diameter d1 of the first tothing (40).

15 8. Correction device (10) according to claim 7, characterized in that said pinion (26) is slidably mounted between a time-setting position B and said display correcting position A.

9. Correction device (10) according to claim 8, characterized in that it includes means (32, 34) for tipping said pinion (26) from said time-setting position B to said display correcting position A and vice versa.
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10. Correction device (10) according to any of claims 7 to 8, characterized in that said tothing (30) of said pinion (26) and said second tothing (46) of said correction wheel (38) are saw shape tothings