Fixing device intended to detachably connect an attachment element to a component

Technical background

[0001] The present invention relates to a fixing device intended to detachably connect an attachment element to a component such as a timepiece, piece of jewellery or item of leather goods. The invention relates in particular to a fixing device intended to connect a wristband to a watch case or two straps to each other by means of the fixing device. The present invention also relates to a method for mounting a fixing device.

Prior art

[0002] Watch wristbands have two straps fastened to the watch case by means of a bar passing through a hole in the wristband in order to connect it to the lugs of the case. A strap is a wristband segment with at least one end connected to the watch case, sometimes via an intermediate piece or a fixing device. The other end of each strap can be free or be connected, for example, to a wristband clasp.

[0003] In order to remove or replace a strap, the bar which connects this strap to the case must be withdrawn. This intervention is difficult for a user who doesn't have a tool or is not used to doing it and requires removable bars which are fragile and complex to produce. Consequently, most people who wear a watch only replace their wristband when it is worn out and not at all, or very rarely, for aesthetic reasons. This is also true for the detachable fixing of a buckle on a strap. Indeed, the value of a precious metal buckle or clasp is such that the user would like to be able to swap

wristbands without changing the buckle, and to do so simply, quickly, safely and without using a tool.

[0004] In the watchmaking sector, solutions have been proposed to enable the user to easily change the wristband of their watch, in particular in the case of replacement when it is worn out, to switch between a leather wristband and a metal wristband, for example, or to regularly change the colour of the wristband.

[0005] The document CH704810A1 describes a flexible wristband strap intended to be connected detachably to the wristband fixing bar of a watch case. The wristband strap has a flexible portion and an attachment.

[0006] The document EP3838054A1 describes a device for attaching a wristband, comprising an end body of the wristband, a lock mounted on the end body so as to slide between a locking position and an unlocking position.

Summary of the invention

[0007] The present description relates to a fixing device intended to detachably connect an attachment element, such as a wristband strap, to a component such as a timepiece, piece of jewellery or item of leather goods. The device comprises a first intermediate element intended to be fixed to the attachment element and having a fixing housing extending in a transverse axis and configured so as to interact with a fixing element intended to be fixed to the component. A second intermediate element is assembled with a sliding connection with the first intermediate element, in a longitudinal axis substantially perpendicular to the transverse axis. The fixing device is configured so as to be in a locked position in which the fixing element is fixed in the fixing housing and an unlocked position enabling the fixing element to be released relative to the fixing housing, elastic means being provided for holding the fixing device in the locked position. The second intermediate element is held assembled with the first

intermediate element by a locking plate, the locking plate being housed in a plate housing provided in the first intermediate element and coming into abutment, in the longitudinal axis, with a connecting catch provided on the first intermediate element. At least a portion of the locking plate and/or the connecting catch is elastically deformable such that the locking plate can be introduced into the plate housing.

[0008] The present description also relates to a fixing device intended to detachably connect a strap to a component of a watch or item of leather goods, comprising: a strap element (or first intermediate element) intended to be fixed to the strap and having a fixing housing, extending along a transverse axis and configured so as to interact with a fixing element intended to be fixed to the component. The fixing device also comprises a lock element (or second intermediate element) configured so as to be assembled with a sliding connection with the strap element, along a strap axis (or longitudinal axis) substantially perpendicular to the transverse axis so as to be secured to the strap element. The fixing device is configured so as to be in a locked position in which the fixing element is fixed in the fixing housing, and an unlocked position enabling the fixing element to be released relative to the fixing housing. The fixing device comprises a locking plate having at least a portion which is elastically deformable in a direction away from the plane formed by the strap axis and the transverse axis. The lock element interacts with the locking plate such that, when the lock element is assembled with the strap element, the deformable portion is elastically deformed so as to pass above an abutment element provided on the strap element and, when the lock element is secured, the locking plate comes into abutment with the connecting catch, preventing the lock element from being disconnected from the strap element.

[0009] The present description also relates to a method for mounting a fixing device, comprising the steps:

partially engaging the locking plate in the plate housing;

engaging the second intermediate element in the first intermediate element;

sliding the second intermediate element in the first intermediate element, the locking plate being advanced by the second intermediate element until the locking plate is engaged in the plate housing, supported on the connecting catch;

at least a portion of the locking plate and/or the connecting catch being elastically deformed during the introduction of the locking plate into the plate housing and reassuming its undeformed shape when the locking plate is introduced into the plate housing.

[0010] The fixing device described here enables quick and robust mounting of the fixing device. Other advantages and other embodiments of the invention are described in the following description and in the attached dependent claims.

Brief description of the Figures

[0011] Exemplary embodiments of the invention are indicated in the description illustrated by the attached Figures, in which:

Figures 1a and 1b show an exploded view of a fixing device comprising a lock element, a locking plate and a first intermediate element provided with a fixing element, according to the invention;

Figure 2 shows the locking plate in an isolated fashion, according to one embodiment;

Figures 3a and 3b show the fixing device with the lock element absent;

Figures 4a and 4b illustrate the second intermediate element assembled on the fixing device, according to one embodiment;

Figures 5a and 5b show the fixing device in which the second intermediate element is displaced in a direction moving away from the fixing housing;

Figures 6a and 6b show the second intermediate element advancing the locking plate towards the base of the first intermediate element;

Figures 7a and 7b show the fixing device once the second intermediate element has been assembled with the first intermediate element;

Figures 8a and 8b show the fixing device once the second intermediate element has been assembled with the first intermediate element when the second intermediate element is in the locked position;

Figure 9 shows a perspective view of the fixing device when the second intermediate element is assembled with the first intermediate element and when the second intermediate element is in the unlocked position;

Figure 10 shows a perspective view of the fixing device when the second intermediate element is assembled with the first intermediate element and when the second intermediate element is in the locked position;

Figure 11 shows an exploded view of the fixing device, according to another embodiment;

Figure 12 shows an isolated view of the first intermediate element;

Figure 13 shows the second intermediate element and the locking plate before assembly;

Figure 14 shows the second intermediate element assembled with the locking plate;

Figure 15 shows the second intermediate element placed on the first intermediate element, the second intermediate element projecting;

Figure 16 shows the second intermediate element placed on the first intermediate element, the second intermediate element being retracted;

Figures 17a ~~and~~ to ~~17b~~ 17c show the second intermediate element placed on the first intermediate element when the second intermediate element is retracted~~, Figure 17b showing a view in section of a detail of the second intermediate element and the first intermediate element~~;

Figures 18a, b and c show the second intermediate element when it has been lowered to come into abutment in the first intermediate element;

Figures 19a, b and c show the fixing device when the second intermediate element is pulled towards the base of the first intermediate element; and

Figures 20a, b and c show the fixing device when the second intermediate element comprising the locking plate is assembled on the first intermediate element.

Exemplary embodiments of the invention

[0012] **Figure 1a** shows an exploded view of a fixing device 100, according to one embodiment. The fixing device 100 comprises a first intermediate element 1 intended to be fixed on a strap (not shown), for example of a wristband or lanyard. The first intermediate element 1 has a fixing housing 20 extending along a transverse axis A_{20} and configured so as to interact with a fixing element (not shown) intended to be fixed to a component (not shown).

[0013] The component can comprise a watch case or a buckle, and the fixing element a bar. The strap can comprise a watch wristband, a belt, or a lanyard of an item of leather goods. The first intermediate element 1 can be a constituent part of the strap, be overmoulded in the strap, be

sheathed in the material of the strap, be attached to the strap, or be fixed to the strap.

[0014] The fixing device 100 furthermore comprises a second intermediate element 2 configured so as to be assembled with a sliding connection with the first intermediate element 1 along a longitudinal axis A_{10}, substantially perpendicular to the transverse axis A_{20} so as to be assembled with the first intermediate element 1. The fixing device 100 furthermore comprises a locking plate 3, at least a portion of which is elastically deformable.

[0015] The second intermediate element 2 interacts with the locking plate 3 such that, when the second intermediate element 2 is assembled with the first intermediate element 1, the deformable portion of the locking plate 3 is elastically deformed so as to pass a connecting catch 11 provided on the first intermediate element 1. When the second intermediate element 2 is assembled with the first intermediate element 1, the locking plate 3 comes into abutment with the connecting catch 11, preventing the second intermediate element 2 from being disassembled from the first intermediate element 1.

[0016] According to one aspect, elastic means can be arranged so as to hold the second intermediate element in its locked position. For example, a return spring 4 can be arranged so as to push the second intermediate element 2 back into the locked position when no external force is exerted on the second intermediate element 2, as illustrated below.

[0017] **Figure 2** shows the locking plate 3 in an isolated fashion. The locking plate 3 has an opening 35 with a length d in the direction of the longitudinal axis A_{10}. In this configuration, the locking plate 3 has a distal arm 34 and a proximal arm 31 connected to the distal arm by two lateral arms 33. Still in this configuration, the proximal arm 31 can have a slot 38 configured so as to interact with the connecting catch 11 as will be discussed below. The second intermediate element 2 comprises at least one

advancing catch 21 (see **Figure 1b**) configured so as to interact with the distal arm 34 so as to advance the locking plate 3 when the second intermediate element 2 is assembled with the first intermediate element 1. According to one embodiment, the advancing catch 21 is formed from two studs as illustrated in Figure 1b. In Figure 1b, the second intermediate element 2 is shown inverted relative to the axis A_{30} in comparison with the second intermediate element 2 shown in Figure 1a. The lateral width of the two studs can correspond to the width between the two lateral arms 33.

[0018] **Figures 3** to **6** illustrate views in section at different stages in the assembly of the fixing device 100, according to one embodiment. More particularly, **Figures 3a** and **3b** show a perspective view (Figure 3a), and a view in section along the line of section A-A in Figure 3a (Figure 3b), of the fixing device 100 with the second intermediate element 2 absent. The locking plate 3 is mounted in the first intermediate element 1 in a plate housing 12 provided in the first intermediate element 1. The locking plate 3 is mounted with the proximal arm 31 on the same side as the fixing housing 20. Where present, the return spring 4 can be mounted in a hole 16 provided in the first intermediate element 1. The return spring 4 can also be formed so that it is integral with the first intermediate element 1 or with the second intermediate element 2.

[0019] According to one embodiment, as illustrated in Figures 1, 3-8, the return spring 4 forms an angle θ with the longitudinal axis A_{10}, in a direction away from the plane A_{30} (axis A_{30}) formed by the longitudinal axis A_{10} and the transverse axis A_{20}. This configuration of the return spring 4 makes it possible to realize a fixing device 100 which has a reduced thickness.

[0020] In **Figures 4a** and **4b** which show a perspective view (Figure 4a) and a view in section along the line of section A-A in Figure 4a (Figure 4b), the second intermediate element 2 is assembled on the fixing device 100. The second intermediate element 2 can be assembled with a sliding connection with the first intermediate element 1. For example, the second

intermediate element 2 is positioned at the entry to a guide rail 17, on the same side as the fixing housing 20. When the second intermediate element 2 is assembled, the advancing catch 21 is situated at the level of the opening 35 and within the plane of the locking plate 3.

[0021] **Figures 5a** and **5b** which show a perspective view (Figure 5a) and a view in section along the line of section A-A in Figure 5a (Figure 5b), the fixing device 100 in which the second intermediate element 2 is displaced along the longitudinal axis A_{10}, in a direction moving away from the fixing housing 20 (shown by the arrow). The advancing catch 21 situated in the opening 35 comes into engagement with the distal arm 34. The advancing catch 21 advances the locking plate 3 when it is being displaced. The locking plate 3 is configured so as to be guided in a groove 13 provided on each side of the plate housing 12 when the locking plate 3 is advanced by the second intermediate element 2. The locking plate 3 can have a sliding portion 39 provided on each of the lateral arms 33 and configured so as to be introduced and slide in the groove 13.

[0022] When it is being displaced by the second intermediate element 2, the locking plate 3 is deformed elastically so as to pass above the connecting catch 11. More particularly, the proximal arm 31 of the locking plate 3 comes into contact with the connecting catch 11. The proximal arm 31 and the two lateral arms 33 are deformed elastically in the direction away from the plane A_{30} such that the proximal arm 31 passes above the connecting catch 11. In the example illustrated, the connecting catch 11 takes the form of a tooth having an inclined plane 111. During its passage, the proximal arm 31 is supported on the inclined plane 111 until it reaches the other side of the connecting catch 11 which has an essentially vertical face.

[0023] **Figures 6a** and **6b** which show a perspective view (Figure 6a) and a view in section along the line of section A-A in Figure 6a (Figure 6b), the locking plate 3 at the moment when the proximal arm 31 is almost above the connecting catch 11. Figure 6 also shows the distal arm 34 of the

locking plate 3 being guided in the groove 13 of the plate housing 12. A relieved portion 24 can be provided in the second intermediate element 2 in order to accommodate the deformed portion of the locking plate 3 when it is deformed in the direction away from the plane A_{30} (see Figure 1b).

[0024] **Figures 7a** and **7b** show a perspective view (Figure 7a), and a view in section along the line of section A-A in Figure 7a (Figure 7b), of the fixing device 100 once the second intermediate element 2 is assembled with the first intermediate element 1. The locking plate 3 has passed above the catch element 11 and reassumes its substantially plane initial shape in the plate housing 12. In this position, if the second intermediate element 2 is pulled in the direction of the fixing housing 20 by means of the advancing catch 21, the proximal arm 31 of the locking plate 3 comes into abutment with the connecting catch 11. The locking plate 3 is then held captive in the plate housing 12 and prevents the second intermediate element 2 from being disassembled from the first intermediate element 1. The slot 38 provided on the proximal arm 31 (see Figure 1b) interacts with the connecting catch 11 in order to keep the locking plate 3 aligned along the longitudinal axis A_{10}.

[0025] When the second intermediate element 2 is assembled with the first intermediate element 1, the second intermediate element 2 can be displaced relative to the first intermediate element 1 between a locked position in which the fixing element is fixed in the fixing housing 20, and an unlocked position enabling the fixing element to be released relative to the fixing housing 20. Figure 7 shows the fixing device 100 when the second intermediate element 2 is in the unlocked position.

[0026] **Figures 8a** and **8b** show a perspective view (Figure 8a), and a view in section along the line of section A-A in Figure 8a (Figure 8b), of the fixing device 100 once the second intermediate element 2 is assembled with the first intermediate element 1 and when the second intermediate element 2 is in the locked position. The return spring 4 is arranged so as to

exert a return force pushing the second intermediate element 2 in the direction of the fixing housing 20 such that the second intermediate element 2 is in the locked position when no external force is exerted on the latter.

[0027] When the second intermediate element 2 is assembled with the first intermediate element 1, in the case where the second intermediate element 2 is pushed in the opposite direction to fixing housing 20, the distal arm 34 comes into abutment with the base 15 of the plate housing 12. Consequently, when the second intermediate element 2 is assembled with the first intermediate element 1, the length d of the opening 35 defines the free travel of the advancing catch 21 in the opening 35 and hence the travel of the second intermediate element between the locked and unlocked positions.

[0028] The fixing device 100 according to the embodiment in Figures 1 to 8 can be disassembled from the first intermediate element 1 by pushing back the second intermediate element 2 in a direction towards the base 15 of the plate housing 12 such that the second intermediate element 2 does not cover the fixing housing 20 and by aligning the relieved portion 24 with the proximal arm 31 of the lock plate 3. In this position, it is then possible to lift up the locking plate 3 (using an appropriate tool) in order to move the proximal arm 31 above the connecting catch 11 and return the locking plate 3 into the initial mounting position in Figures 3 and 4. The relieved portion 24 being aligned with the proximal arm 31, it can accommodate the locking plate 3 when it is deformed. The locking plate 3 and the second intermediate element 2 are then disassembled from the first intermediate element 1.

[0029] Figures 9 and 10 show a perspective view of the fixing device 100 when the second intermediate element 2 is assembled with the first intermediate element 1 and when the second intermediate element 2 is in the unlocked position (Figure 9) and the locked position (Figure 10). In the embodiment illustrated in Figures 1, 2-10, the second intermediate element

2 comprises a tab 27 which, when the second intermediate element 2 is in the locked position, covers at least a part of the fixing housing 20 so as to prevent the fixing element from exiting the fixing housing 20. In the locked position, the tab 27 is retracted, opening the fixing housing 20 such that the fixing element can exit therefrom.

[0030] The fixing device 100 can be configured such that, in the locked position, the tab 27 of the second intermediate element 2 covers the entirety of the width L of the fixing housing 20 (see Figure 9). Alternatively, the fixing device 100 can be configured such that, in the locked position, the tab 27 of the second intermediate element 2 covers only part of the width L of the fixing housing 20, for example approximately half the width L of the fixing housing 20. In this case, the travel of the second intermediate element 2 between the locked and unlocked positions can be reduced.

[0031] In an alternative embodiment, the connecting catch 11 can be deformed elastically such that, when the locking plate 3 is advanced by the second intermediate element 2, the connecting catch 11 is deformed elastically. In this case, the locking plate 3 can be rigid.

[0032] According to one embodiment, a method for mounting the fixing device comprises the steps of:

partially engaging the locking plate 3 in the plate housing 12;

engaging the second intermediate element 2 in the first intermediate element 1;

sliding the second intermediate element 2 in the first intermediate element 1, the locking plate 3 being advanced by the second intermediate element 2 until the locking plate 3 is engaged in the plate housing 12, supported on the connecting catch 11;

at least a portion of the locking plate 3 and/or the connecting catch 11 being elastically deformed during the introduction of the locking

plate 3 into the plate housing 12 and reassuming its undeformed shape when the locking plate 3 is introduced into the plate housing 3.

[0033] The locking plate 3 is advanced whilst the second intermediate element 2 is slid.

[0034] According to the embodiment in Figures 1 to 10, the locking plate 3 is arranged in the plate housing 12 prior to the engagement of the second intermediate element 2 in the first intermediate element 1.

[0035] **Figure 11** shows an exploded view of the fixing device 100 according to another embodiment. In this embodiment, the locking plate 3 comprises a spring portion 32 configured, when the second intermediate element 2 is assembled, so as to expand and be compressed along the longitudinal axis A_{10} so as to cover at least a portion of the fixing housing 20. In other words, the spring portion 32 is configured so as to expand and be compressed along the longitudinal axis A_{10}, respectively, between a locked position in which the fixing element is fixed in the fixing housing 20 and an unlocked position enabling the fixing element to be released relative to the fixing housing 20. **Figure 12** shows an isolated view of the first intermediate element 1 where the first intermediate element 1 is inverted relative to the representation in Figure 11.

[0036] According to one embodiment, the locking plate 3 also comprises an abutment arm 31. In the example illustrated, the locking plate 3 comprises two abutment arms 31 on each side of the spring portion 32. In this configuration, the abutment arms 31 form the elastically deformable portion. When the second intermediate element 2 is assembled with the first intermediate element 1, each abutment arm 31 comes into abutment with the connecting catch 11 provided on the first intermediate element 1. According to the embodiment illustrated, the connecting catch takes the form of a hook 11 interacting with each of the abutment arms 31 in the plate housing 12 provided in the first intermediate element 1 (see Figure

12). It should be noted that the locking plate 3 could have just one abutment arm 31.

[0037] Still according to an embodiment illustrated in Figure 11, the locking plate 3 comprises a latch 36 at its end on the same side as the fixing housing 20.

[0038] **Figures 13** to **20** illustrate different steps in the assembly of the fixing device 100 according to the configuration in Figure 11. More particularly, **Figure 13** shows the second intermediate element 2 and the locking plate 3 before assembly and **Figure 14** shows the second intermediate element 2 assembled with the locking plate 3. According to an embodiment, the second intermediate element 2 comprises a first plate catch 23 situated on the same side as the fixing housing 20 when the second intermediate element 2 is assembled with the first intermediate element 1, and a second plate catch 22 situated on the opposite side of the second intermediate element 2. When the locking plate 3 is assembled with the second intermediate element 2, the locking plate 3 is stressed between the first and the second plate catch 23, 22. In the example illustrated, the second intermediate element 2 is provided with a second plate housing 25 in which the locking plate 3 is received when it is assembled with the second intermediate element 2. The first plate catch is formed from two studs 23 interacting with the base of a notch 37 provided on the spring portion 32 of the locking plate 3. The locking plate 3 is stressed between the first plate catch, formed from two studs 23, and the second plate catch, formed by the opposite side 22 of the second plate housing 25.

[0039] In **Figures 15** and **16**, the second intermediate element 2 comprising the locking plate 3 is assembled with a sliding connection with the first intermediate element 1. The second intermediate element 2 comprising the locking plate 3 is first placed on the first intermediate element 1 (Figure 15). In this position, the second intermediate element 2 and the locking plate 3 completely overlap the fixing housing 20. In the

example illustrated, the latch 36 which projects from the second intermediate element 2 comes to bear against the edge of the fixing housing 20. The locking plate 3 can be compressed such that the latch 36 is retracted inside the second intermediate element 2 (Figure 16) so as to lower the second intermediate element 2 into the plate housing 12 of the first intermediate element 1.

[0040] **Figure 17a** shows the second intermediate element 2 comprising the locking plate 3 mounted in the first intermediate element 1 when the latch 36 is in a retracted position. **Figure 17b** shows a detail of a section of the fixing device 100 in the assembly step in Figure 17a, during which the locking plate 3 comes to bear against the connecting catch 11 provided on the first intermediate element 1. **Figure 17c** shows a view in section and in perspective of the second intermediate element 2 mounted in the first intermediate element 1.

[0041] In **Figures 18a** and **18b**, the second intermediate element 2 is lowered in abutment into the base of the plate housing 12 of the first intermediate element 1, forcing the abutment arm 31 of the locking plate 3 to be deformed in the direction away from the plane A_{30} (shown by the arrow in dashed lines in Figure 18b). Figures 17b and 18b correspond respectively to the line of section A-A in Figures 17a and 18a, viewed from a position shown by the arrow "V". **Figure 18c** shows a view in section and in perspective of the second intermediate element 2 mounted in the first intermediate element 1.

[0042] The second intermediate element 2 comprises an advancing catch 21 configured so as to interact with the abutment arm 31 so as to advance the locking plate 3 when the second intermediate element 2 is assembled with the first intermediate element 1. In particular, the second intermediate element 2 comprises a relieved portion 24 (see also Figure 13) in order to accommodate the locking plate 3 when it is deformed in the direction away from the plane A_{30}. A projecting rim of the relieved portion

24 forms the advancing catch 21 against which the abutment arm 31 comes to bear (see Figures 13, 14 and 17b).

[0043] According to an embodiment, the first intermediate element 1 can comprise a guide rail 17. The second intermediate element 2 can comprise a guide rail counter-element 28 configured so as to interact with the guide rail 17. Furthermore, the second intermediate element 2 can also have a lip 29 configured so as to interact with an immobilizing groove 19 provided on the rim 18 of the first intermediate element 1 (see Figures 12, 19b and 19c).

[0044] **Figures 19a** and **19b** show the fixing device 100 when the second intermediate element 2 is pulled towards the base of the first intermediate element 1 (indicated by the arrow), i.e. in the direction away from the fixing housing 20. The locking plate 3 is advanced in the same direction by the advancing catch 21 of the second intermediate element 2. Figure 19b corresponds to the line of section B-B in Figure 19a. Once the second intermediate element 2 comes into abutment with the rim 18 of the plate housing 12, the abutment arm 31 has passed the connecting catch 11 and reassumes its initial shape within the same plane as the rest of the locking plate 3. **Figure 19c** shows a view in section and in perspective of the second intermediate element 2 mounted in the first intermediate element 1.

[0045] **Figures 20a** and **20b** show the fixing device 100 when the second intermediate element 2 comprising the locking plate 3 is assembled on the first intermediate element 1. Figure 20b corresponds to the line of section C-C in Figure 20a. The abutment arm 31 comes into abutment with both the connecting catch 11 of the first intermediate element 1 and the advancing catch 21 of the second intermediate element 2. The locking plate 3 is thus fixed and prevents the second intermediate element 2 from being disassembled from the first intermediate element 1. **Figure 20c** shows a view in section and in perspective of the second intermediate element 2 mounted in the first intermediate element 1.

[0046] According to an embodiment, the spring portion 32 of the locking plate 3 has an abutment finger 30 on each side of the spring portion 32. Each abutment finger 30 is configured so as to come into abutment with an abutment arm 31 when the second intermediate element 2 is assembled with the first intermediate element 1 and the spring portion 32 is compressed. This arrangement makes it possible to prevent the spring portion 32 from being compressed beyond its elastic limit. Furthermore, the distance between the abutment finger 30 and the abutment arm 31 corresponds to the travel of the spring portion 32 between the locked and unlocked positions.

[0047] Once the second intermediate element 2 has been assembled on the first intermediate element 1, the latch 36 projects from the second intermediate element 2 so as to cover at least a portion of the fixing housing 20. The locking plate 3 can be configured such that the latch 36 covers only part of the width L of the fixing housing 20, for example approximately half the width L of the fixing housing 20.

[0048] According to the embodiment in Figures 11 to 20, the method for mounting the fixing device comprises the step of mounting the locking plate 3 in the second plate housing of the second intermediate element 2 prior to the engagement of the second intermediate element 2 in the first intermediate element 1.

[0049] It is understood that the present invention is not limited to the exemplary embodiments described above and that other exemplary embodiments are also possible within the scope of the patent claims. For example, the locking plate 3 can be elastically deformable in a different direction than the direction away from the plane A_{30}. For example, the locking plate 3 can be elastically deformable along the longitudinal axis A_{10} and/or transverse axis A_{20} so as to pass around the connecting catch 11.

[0050] According to an alternative embodiment, the connecting catch 11 is elastically deformable such that, when the locking plate 3 is advanced by

the second intermediate element 2, the connecting catch 11 is deformed elastically. The abutment arm 31 can be rigid.

[0051] According to an embodiment which is not shown, the fixing device 100 can also be configured so as to connect two straps to each other. For example, the first intermediate element 1 can be fixed to one of the straps and the other strap is fixed to the fixing element.

Reference numbers used in the Figures

1	first intermediate element
100	fixing device
11	connecting catch
111	inclined plane
12	plate housing
13	groove
14	relieved portion
15	base of the lock housing
16	hole
17	guide rail
18	rim of the plate housing
19	immobilizing groove
2	second intermediate element
20	fixing housing
21	advancing catch
22	second plate catch
23	first plate catch
24	relieved portion
25	second plate housing
26	relieved portion catch
27	tab
28	guide rail counter-element
29	lip
3	locking plate
30	abutment finger
31	abutment arm, proximal arm
32	spring portion
33	lateral arm
34	distal arm
35	opening
36	latch
37	notch
38	slot
39	sliding portion
4	return spring
θ	angle
A_{10}	longitudinal axis
A_{20}	transverse axis
A_{30}	direction away from the plane
d	length of the opening
L	width

Claims

1. Fixing device (100) intended to detachably connect an attachment element, such as a wristband strap, to a component such as a timepiece, piece of jewellery or leatherwork item, the device comprising:

a first intermediate element (1) intended to be fixed to the attachment element and having a fixing housing (20) extending in a transverse axis (A_{20}) and configured so as to interact with a fixing element intended to be fixed to the component; and

a second intermediate element (2) assembled with a sliding connection with the first intermediate element (1), in a longitudinal axis (A_{10}) substantially perpendicular to the transverse axis (A_{20});

the fixing device (100) being configured so as to be in a locked position in which the fixing element can be fixed in the fixing housing (20) and an unlocked position enabling the fixing element to be released relative to the fixing housing (20);

characterized in that

the second intermediate element (2) is held assembled with the first intermediate element (1) by a locking plate (3) housed in a plate housing (12) provided in the first intermediate element (1), the locking plate (3) interacting with the second intermediate element (2) and coming into abutment, in the longitudinal axis (A_{10}), with a connecting catch (11) provided on the first intermediate element (1); and

in that at least a portion of the locking plate (3) and/or the connecting catch (11) is elastically deformable, enabling the locking plate (3) to be introduced into the plate housing (12).

2. Fixing device (100) according to Claim 1,
in which the second intermediate element (2) is displaceable relative to the first intermediate element (1) between the locked position and the unlocked position.

3. Fixing device (100) according to Claim 2, in which the locking plate (3) has an opening (35) of a length (d) in the longitudinal axis (A_{10}), the second intermediate element (2) comprising at least one advancing catch (21) which can be displaced within the plane of the opening (35), the length (d) defining the travel of the second intermediate element (2) between the locked and unlocked positions.

4. Fixing device (100) according to Claim 3, in which the locking plate (3) is elastically deformable in a direction away from the plane (A_{30}) formed by the longitudinal axis (A_{10}) and the transverse axis (A_{20}), such that a proximal arm (31) of the locking plate (3) can pass above the connecting catch (11) when the locking plate (3) is introduced into the plate housing (12) and come into abutment with the connecting catch (11) once the second intermediate element (2) is assembled with the first intermediate element (1).

5. Fixing device (100) according to Claim 1, in which the plate housing (12) comprises a groove (13) configured so as to interact with a sliding portion (39) provided on the locking plate (3) and enabling the latter to be guided when it is inserted into the plate housing (12).

6. Fixing device (100) according to Claim 4, in which the proximal arm (31) has a slot (38) configured so as to interact with the connecting catch (11) so as to align the locking plate (3) in the longitudinal axis (A_{10}).

7. Fixing device (100) according to Claim 1, in which the locking plate (3) comprises a spring portion (32) configured so as to expand and be compressed along the longitudinal axis (A_{10}), between the locked position and the unlocked position, respectively.

8. Fixing device (100) according to Claim 7, in which the elastically deformable portion comprises at least one

abutment arm (31) of the locking plate (3) such that the abutment arm (31) can pass above the connecting catch (11) when the locking plate (3) is introduced into the plate housing (12) and come into abutment with the connecting catch (11) once the second intermediate element (2) is assembled with the first intermediate element (1).

9. Fixing device (100) according to Claim 7,
in which the second intermediate element (2) comprises a first plate catch (23) and a second plate catch (22), the locking plate (3) being stressed between the first and the second plate catch (23, 22) when the second intermediate element (2) interacts with the locking plate (3).

10. Fixing device (100) according to Claim 7,
in which the spring portion (32) comprises a latch (36) projecting from the second intermediate element (2) so as to cover at least a portion of the fixing housing (20).

11. Fixing device (100) according to Claim 7,
in which the first intermediate element (1) comprises a guide rail (17) configured so as to interact with a guide rail counter-element (28) provided on the second intermediate element (2).

12. Fixing device (100) according to Claim 8,
in which the spring portion (32) comprises at least one abutment finger (30) configured so as to come into abutment with the abutment arm (31) when the spring portion (32) is compressed;
the spacing between the abutment finger (30) and the abutment arm (31) corresponding to the travel of the spring portion (32) between the locked and unlocked positions.

13. Fixing device (100) according to Claim 1,
in which the second intermediate element (2) comprises a relieved portion (24) configured so as to accommodate the deformed portion of the locking plate (3).

14. Fixing device (100) according to Claim 1, configured such that, in the locked position, the second intermediate element (2) covers only part of the width (L) of the fixing housing (20).

15. Wristband comprising at least one fixing device (100) according to Claim 1.

16. Wristwatch comprising the wristband according to Claim 15.

17. Method for mounting a fixing device comprising

a first intermediate element (1) intended to be fixed to the attachment element and having a fixing housing (20) extending in a transverse axis (A_{20}) and configured so as to interact with a fixing element intended to be fixed to the component; and

a second intermediate element (2) assembled with a sliding connection with the first intermediate element (1), in a longitudinal axis (A_{10}) substantially perpendicular to the transverse axis (A_{20});

the fixing device (100) being configured so as to be in a locked position in which the fixing element can be fixed in the fixing housing (20) and an unlocked position enabling the fixing element to be released relative to the fixing housing (20);

in which the second intermediate element (2) is held assembled with the first intermediate element (1) by a locking plate (3) housed in a plate housing (12) provided in the first intermediate element (1), the locking plate (3) interacting with the second intermediate element (2) and coming into abutment, in the longitudinal axis (A_{10}), with a connecting catch (11) provided on the first intermediate element (1); and

in which at least a portion of the locking plate (3) and/or the connecting catch (11) is elastically deformable, enabling the locking plate (3) to be introduced into the plate housing (12);

the method comprising the steps of:

partially engaging the locking plate in the plate housing,

engaging the second intermediate element (2) in the first intermediate element (1);

sliding the second intermediate element (2) in the first intermediate element (1), the locking plate (3) being advanced by the second intermediate element (2) until the locking plate (3) is engaged in the plate housing (12), supported on the connecting catch (11);

at least a portion of the locking plate (3) and/or the connecting catch (11) being elastically deformed during the introduction of the locking plate (3) into the plate housing (12) and reassuming its undeformed shape when the locking plate (3) is introduced into the plate housing (12).

18. Mounting method according to Claim 17,
in which the locking plate (3) is advanced whilst the second intermediate element (2) is slid.

19. Mounting method according to Claim 17,
in which the locking plate (3) is mounted in the plate housing (12) prior to the engagement of the second intermediate element (2) in the first intermediate element (1); or
in which the second intermediate element (2) has a second plate housing (25) in which the locking plate (3) is mounted prior to the engagement of the second intermediate element (2) in the first intermediate element (1).