DEVICE AND METHOD FOR ALIGNING PRINTHEADS

The invention is directed to a device and a method for adjusting printheads relative to one another, the printheads each being provided with a nozzle plate having multiple nozzles for printing, and having at least one round hole and/or at least one elongated hole in this nozzle plate for manufacturing and/or assembly purposes, in particular before and during installation in a shared printhead retaining plate.

Multiple printheads are often operated simultaneously to print different colors and/or to increase the printing speed. These printheads are then generally fastened, in particular screwed, to a shared mounting. It is important that the individual nozzles of different printheads are precisely aligned in a shared grid, i.e., their spacing and orientation are exactly adjusted to one another.

In order to align or adjust multiple such printheads relative to one another, in the prior art micrometer screws are used, by means of which the individual printheads may be moved relative to one another until a desired precision of the alignment is achieved. This requires displacements in two directions that are oriented at right angles with respect to one another, for example to the left and the right on the one hand, and forward and backward on the other hand, so that such an adjustment requires a number of iterative steps and therefore is very tedious.

For this reason, attempts have already been made to improve the software for controlling the printheads as an alternative to the tedious adjustment. In particular, there is an option to compensate for an offset in the feed direction of the printing device by firing certain nozzles or entire printheads earlier/later. If an offset transverse to the feed direction is to be compensated for, there is at least the option to control the nozzle rows with correspondingly shifted and/or interchanged signals when there is an offset in the range of a whole-number grid spacing. However, finding the correct compensation here is likewise extremely labor-intensive. In addition, it is difficult to compensate for tilting and inclined positions without unreasonable effort.

The disadvantages of the described prior art result in the object on which the invention is based, to provide an option via which printheads of a printing device may be adjusted relative to one another with little complexity.

This object is achieved by an assembly template for multiple printheads, in particular wherein for each printhead, at least one precisely fitting counterpart to at least one round hole and/or to at least one elongated hole is provided in the corresponding nozzle plate, so that when the printheads are inserted into the assembly template in such a way that a pair of round hole counterparts and elongated hole counterparts engages with the corresponding round hole and elongated hole in the nozzle plates in question, the nozzles of all printheads are aligned with one another in the desired manner.

The invention is based on the following consideration:

The round holes and/or elongated holes used for centering according to the invention are not the lateral mounting holes in the area of the narrow end-face sides of the printheads, through which the mounting screws are inserted and screwed down, but, rather, are recesses in the nozzle plate itself, i.e., in the lowest plate of the printhead. In the normal case, these recesses do not pass through the housing of the printhead mounted above the nozzle plate, and therefore are not suited for screwing in fastening screws. Since the fastening holes of a printhead are thus not utilized by the assembly template, they remain open for screwing in the fastening screws.

On the other hand, the alignment holes according to the invention are also not one of the nozzles themselves, since these are extremely filigreed objects that must not come into direct contact with external objects.

Instead, during the manufacture of printheads their individual components are produced separately, and must then be placed on one another with a preferably precise fit and subsequently adhesively bonded and/or welded. In order to achieve this assembly, each

part, also the nozzle plate, is often manufactured with two holes, preferably with one round hole and one elongated hole. Each of these two holes, in particular a round hole, is, in a manner of speaking, like an oversized nozzle that is a perfect distance from the other, normal-size nozzles. This nozzle plate, via at least one round hole and/or at least one elongated hole, is then applied and fitted to the chamber and adhesively bonded thereto, and this structural unit is then applied to the piezo elements, etc. This module is subsequently adhesively bonded somewhere on the body and the actual outer shell, together with the receptacle, for installing on a retaining plate or the like. One, two, or multiple alignment pins may then be inserted into this receptacle. However, since the dimensional tolerance between the components in question becomes increasingly greater with each step of the assembly, there is no longer an exact alignment between these alignment pins and the actual nozzles – the relative tolerances may be in the range of one-tenth to several tenths of a millimeter. The printheads must therefore be manually aligned, and/or imprecision must be compensated for using software.

However, since the nozzle plate having the nozzle spacings, together with the round hole and/or the elongated hole, is manufactured as a single part, at best there is a dimensional tolerance in the micron range between the round hole and the elongated hole and the individual nozzles. This is more accurate, by approximately a factor of 100, than the relative tolerances between the alignment pins on the one hand and the nozzle openings on the other hand. As the result of assembling a printhead, the printing chamber in particular is moved behind the nozzle plate, and the piezo elements, housing parts, and alignment pins may also have an offset, which within the scope of the present invention, however, may be ignored for the adjustment accuracy of the nozzles.

Within the scope of the invention, an assembly template is used which represents one or preferably multiple "negative imprints" of the nozzle plate(s), and for each printhead preferably has two exact counterparts to its manufactured round and/or elongated hole which fit precisely into the corresponding round or elongated hole. These counterparts are two pins: one for fitting engagement with the round hole, and the other for fitting

engagement with the elongated hole. The pin for the round hole preferably has a circular cross section, while the pin for the elongated hole has an elongated cross section. Since the round hole and elongated hole are entirely sufficient for an adjustment, the "negative imprint" according to the invention of the nozzle plate does not need to have counterparts for the individual nozzles.

Due to the fact that the nozzle plates of the individual printheads are accessible through the retaining plate of the printing device in order to have free access to the substrate to be imprinted for the printing, there is an option for placing the assembly template according to the invention directly beneath the retaining plate. The printheads may then be attached to the retaining plate in such a way that their round holes and elongated holes provided on the bottom of the nozzle plate maintain direct contact with the counterpart pins in the assembly template, and may be put together with them.

As a result, all nozzle plates are aligned absolutely perfectly with one another, regardless of whether the remaining components of the printheads (housing, piezo elements, mounting, alignment pins, etc.) are also optimally aligned, and it is much more important that each nozzle plate itself is absolutely dimensionally accurate; i.e., by precisely positioning the nozzle plate by means of its round hole and elongated hole, the nozzle openings provided in the nozzle plate in question are also aligned with the same precision. In this state, the printheads may then be screwed onto the printhead retaining plate, and with minimal effort a printing device is obtained which has a corresponding majority or plurality of printheads that are optimally aligned with one another.

The following advantages are achievable with the invention:

Simple and time-saving alignment of all printheads of a printing device with maximum precision.

Large printhead arrays with a plurality of individual printheads may be assembled with the same nozzle precision as for an individual printhead.

Customers can easily replace a printhead without problems, and without spending a large amount of time on adjustments.

As a purely mechanical approach, the assembly template according to the invention is less susceptible to malfunctions.

An assembly template according to the invention may be used for replacing one or more printheads; on the other hand, entire retaining plates with printheads applied thereto may also be replaced, since each equipped printhead retaining plate, with use of the same assembly template, has identical nozzle arrangements, and software compensation is therefore not necessary.

The invention further provides that the assembly template is designed for application to the bottom side of a retaining plate for multiple printheads. Due to plane-parallel fitting, a first adjustment between the printhead retaining plate and the assembly template takes place.

For this purpose, the assembly template should have a preferably top-side contact surface that faces the bottom side of the retaining plate. This contact surface may be substantially flat, while elevations or depressions that differ therefrom may be provided in the area of the installation sites of the individual printheads.

For accommodating the nozzle plates of multiple printheads, a printhead retaining plate should have continuous recesses by means of which the actual printing then takes place.

Within the scope of the invention, the assembly template on its contact surface facing the retaining plate has marked, emphasized, or in particular elevated, areas, preferably

for centering on the retaining plate, in particular for centering engagement with the continuous recesses in the retaining plate, for accommodating the nozzle plates of multiple printheads.

On the other hand, the assembly template on its contact surface facing the retaining plate, in particular in the area of the marked or emphasized or elevated areas, may have one or more depressions, preferably one or more elongated depressions, for accommodating one or more rows of nozzles of a printhead.

Since the counterparts to at least one round hole and/or to at least one elongated hole, preferably the pins, provided on the assembly template must engage with the respective round holes and/or elongated holes of the nozzle plates of the printheads, they should be situated on the contact surface of the assembly template facing the retaining plate, in particular in the area of the marked or emphasized or elevated areas.

Further advantages of the invention result from the fact that the counterparts to at least one round hole and/or to at least one elongated hole, preferably the pins, provided on the assembly template are situated on the contact surface of the assembly template, facing the retaining plate, in the area of oppositely situated ends of one or more elongated depressions for accommodating one or more rows of nozzles of a printhead. At that location, two alignment holes are relatively far apart from one another, and can therefore provide optimal centering.

The invention may be refined in such a way that in each case a pair of counterparts, provided on the assembly template, to at least one round hole and/or to at least one elongated hole, preferably the pins, on the contact surface of the assembly template facing the retaining plate is in approximate alignment, but preferably not in exact alignment, with an elongated depression for accommodating one or more rows of nozzles of a printhead. There is sufficient space at any location on a nozzle plate to provide the round and/or elongated holes without impairing the printing mechanism.

According to another design rule, in each case a pair of counterparts, provided on the assembly template, to at least one round hole and/or to at least one elongated hole, preferably the pins, on the contact surface of the assembly template facing the retaining plate is laterally offset with respect to the longitudinal center axis of the elongated depression in question for accommodating one or more rows of nozzles of a printhead, preferably offset by one-half the width of the printhead plate or less. As a result, in addition to such a round and/or elongated hole there is room on the printhead for other elements, such as extensions situated on the rear side of the printhead, for example for preferably automatic handling of the printhead during its installation.

According to the invention, it is recommended that multiple pairs of counterparts, provided on the assembly template, to at least one round hole and/or to at least one elongated hole, preferably the pins, on which the contact surface of the assembly template facing the retaining plate are provided, [are] each laterally offset with respect to the longitudinal center axis of the elongated depression, associated with each pair, for accommodating one or more rows of nozzles of a printhead, in particular laterally offset in the same direction for all pairs. This ensures that all printheads are installed with exactly the same orientation, thus achieving an optimal printing result.

The assembly template according to the invention may have one or more means, for example clamping elements, for fixing to the retaining plate so that undesirable shifting during installation of the printheads on the printhead retaining plate is not possible.

The assembly template should be made from a metal plate, in particular a plate made of a noble metal or nonferrous metal or stainless steel, or a corrosion-resistant metal alloy, so that it cannot warp or otherwise deform. In particular, for this reason the assembly template should also have a sufficient minimum thickness, for example 3 mm or greater, preferably 5 mm or greater.

To achieve an alignment between different printheads that is optimal for the subsequent printing result, the elevated counterparts, provided on the assembly template, to at least

one round hole and/or to at least one elongated hole, preferably the pins, on the contact surface of the assembly template facing the retaining plate should be manufactured in one piece with the plate-shaped base body of the assembly template, and thus, not by inserting or screwing pins into boreholes provided for this purpose, but, rather, by manufacturing the elevated counterparts together with the plate itself from an originally single part. Milling and/or eroding are particularly suited as manufacturing and/or finishing processes.

Within the scope of one special embodiment of the invention, at least one elevated counterpart to at least one round hole and/or to at least one elongated hole, preferably at least one pin, provided on the assembly template may be releasably retained in the assembly template, in particular in a retaining recess in same. After the printheads are assembled with the printhead retaining plate, these types of alignment pins may be individually pulled out of the plate-shaped portion of the assembly template from the rear, so that the plate-shaped portion of the assembly template may ultimately be easily removed.

In order to precisely fix such a releasable alignment pin in a retaining recess of the assembly template, it is recommended according to the invention that at least one pin provided on the assembly template is held in an insertion opening in the assembly template in the form of a transition fit or press fit.

At least one pin provided on the assembly template should be longer than the thickness of the plate of the assembly template, in particular in such a way that the pin protrudes at the front side of the assembly template facing the retaining plate, and also at the rear side of the assembly template facing away from the retaining plate, and is removable from the plate of the assembly template from the rear. When an assembly template is mounted on a retaining plate, such a pin is thus accessible at all times from the rear side of the assembly template, and at the area of the pin protruding at that location may be gripped, for example with pliers, and pulled out.

Moreover, the invention provides that at least one pin that is provided on the assembly template has a preferably continuously circumferential collar, in particular in the area of the pin that is situated directly behind the rear side of the assembly template facing away from the assembly template when the pin is inserted into the retaining plate. When such an alignment pin is inserted, from the rear side of the assembly template, into the pin's retaining recess until this collar rests against the rear side of the assembly template, the alignment pin in question protrudes beyond the front side of the assembly template by a standardized extent.

To allow such an alignment pin to be smoothly inserted into a retaining recess of the assembly template, it is recommended according to the invention that at least one pin that is provided on the assembly template has a cross-sectionally beveled or rounded edge on its end-face side that protrudes beyond the front side of the assembly template facing the retaining plate. During initial contact the pin is thus in a type of clearance fit, which gradually changes into a transition fit or press fit only in the course of insertion, and then provides for a precise seat of the alignment pin in its retaining recess.

A method for adjusting printheads relative to one another, the printheads each including a nozzle plate having multiple nozzles for printing, and having at least one round hole and/or at least one elongated hole in the nozzle plate for manufacturing and/or assembly purposes, is characterized in that according to the invention, multiple printheads are inserted into an assembly template for multiple printheads, wherein for each printhead at least one counterpart is provided, preferably in the form of a pin, that fits exactly into at least one round hole and/or at least one elongated hole in the corresponding nozzle plate in such a way that each pair of round hole counterparts and/or elongated hole counterparts engages with the corresponding round hole and/or elongated hole in the nozzle plate, so that the nozzles of all printheads are aligned with one another in the desired manner, and the printheads that are then adjusted relative to one another in this way are screwed onto the printhead retaining plate or affixed in some other way before the assembly template is removed.

The assembly template thus remains in contact with the printheads until all are irrevocably fixed to the printhead retaining plate.

The invention provides that the assembly template is placed beneath the printhead retaining plate before the printheads are inserted into the assembly template. It is thus possible to insert the printheads into the assembly template through the recesses in the printhead retaining plate. An area of a printhead that protrudes, preferably on the side, in particular on the end-face side, remains above the printhead retaining plate and may be screwed to same without an assembly template, situated in between, being in the way.

In addition, it may be provided that the assembly template is fixed to the bottom side of the printhead retaining plate before the printheads are inserted into the assembly template. On the bottom side the assembly template remains releasable at all times; however, for installation of the printheads it may be temporarily fixed to prevent relative displacements.

As the result of the printheads being inserted into the assembly template through recesses in the printhead retaining plate, the nozzle plates on the bottom side may directly engage with the mounting plate without having to make changes to the printhead retaining plate or to a printhead.

The printheads inserted into the assembly template may be fastened to the printhead retaining plate by screwing, for example, preferably by means of screws that are screwed into the printhead retaining plate from the top, and which in particular in each case may be screwed in from the side, next to a continuous recess in the retaining plate for accommodating the nozzle plate of the printhead in question, where there is direct contact between a printhead and the printhead retaining plate.

Lastly, according to the teaching of the invention, the assembly template is not removed from the printhead retaining plate until the printheads have been fastened, in particular

screwed, to the printhead retaining plate, since the assembly template according to the invention has fulfilled its task only after a printhead has been firmly, irrevocably connected to the printhead retaining plate. However, for purposes of repairs the assembly template may be reused when printheads are temporarily removed, so that the unit made up of the printheads and the printhead retaining plate may be restored at any time with reproducible accuracy.

Further features, particulars, advantages, and effects based on the invention result from the following description of one preferred embodiment of the invention, and with reference to the drawings, which show the following:

Figure 1 shows a printing device having multiple printheads that are fastened to a shared retaining plate, in an oblique perspective view from above;

Figure 2 shows the retaining plate of the printing device from Figure 1 after the printheads are removed, in a perspective corresponding to Figure 1;

Figure 3 shows an assembly template according to the invention for assembling the printheads with the retaining plate, likewise in a perspective view;

Figure 4 shows a vertical section of an arrangement having multiple printheads that are fixed to a retaining plate, with simultaneous alignment by means of an assembly template according to the invention;

Figure 5 shows an arrangement having multiple printheads that are fixed to a retaining plate, with simultaneous alignment by means of an assembly template according to the invention in a transparent perspective illustration;

Figure 6 shows a detail from Figure 5 in an enlarged illustration; and

Figure 7 shows an illustration, corresponding to Figure 4, of a modified embodiment of the invention.

The drawings show a device 1 for adjusting printheads 2 relative to one another, which for printing are each equipped with multiple nozzles 3 situated in a nozzle plate 4 on the bottom side.

During the assembly of a printing machine, it is often necessary to fix multiple such printheads 2 together on a printhead retaining plate 5 in the frame of a printing device. For example, for multicolor printing machines it is customary to provide one or even multiple printheads 2 for each color. In some cases, the same color may be printed at different printheads 2, but with different color intensities. In addition, the printing speed may be increased, in the ideal case by many times, by using multiple printheads for inks of the same color and color intensity.

It is extremely important that the individual printheads 2 are positioned relative to one another in such a way that their nozzles 3 are situated in a shared predefined grid.

Figure 2 shows the printhead retaining plate 5 before it is equipped with printheads 2. An elongated opening 6 that approximately corresponds to the base area or that is slightly larger than a nozzle plate 4 is situated at the location of each printhead 2. A stepped area 8 having a reduced thickness of the retaining plate 5 is present in each case in the area of the narrow end-face sides 7 of an elongated opening 6. At that location one printhead 2 having laterally protruding tabs 9 is to be anchored, in particular screwed down, in each case. The tabs 9 are offset at the rear or the top with respect to the nozzle plate 4, so that they may each be inserted into a stepped area 8 and fastened therein, while the nozzle plate 4 is then situated lower, namely, approximately in alignment with the bottom side 10 of the retaining plate 5.

In the area of the lateral tabs 9, on the one hand alignment pins 11, and on the other hand fastening holes 12, may be provided for screwing a printhead 2 to the retaining

plate 5. However, since the tabs 9 are not manufactured in one piece with the nozzle plate 4, but instead are subsequently adhesively bonded together, they are not suitable for sufficiently centering the printheads 2 with respect to the retaining plate 5, and readjustment is necessary. To allow this, the alignment pins 11 (if present) must not have boreholes with a fit in the stepped areas 8; rather, there must be play in between to allow manual alignment.

As is apparent in Figures 4 and 5, in addition to the actual nozzles 3, a round hole 13 and an elongated hole 14 are present in the illustrated nozzle plate 4 of a printhead 2. However, the elongated hole 14 is generally barely larger than the round hole 13. When the round hole 13 has a diameter of 1.5 mm, for example, the elongated hole 14 may have a width of likewise 1.5 mm and a length of approximately 2 mm. These two holes 13, 14 are also present in other parts of the printhead 2, but not necessarily in the housing 15 thereof, and in any case not necessarily passing through the housing; they are intended only to allow precisely fitting assembly of these parts, but are not used to anchor the printhead 2 on the printhead retaining plate 5. Since the round hole 13 and the elongated hole 14 together with the nozzles 3 are situated directly in the one-piece nozzle plate 4, these openings 3, 13, 14 generally have tolerances within one micron due to the manufacturing process.

An assembly template 16 according to the invention makes use of multiple printheads 2.

This assembly template 16 has the shape of a plate, wherein at least one precisely fitting counterpart to at least one round hole 13 and to at least one elongated hole 14 is provided in the nozzle plate 4 in question for each printhead 2. These counterparts have the shape of pins 17, 18, of which one pin 17 has a circular cross section that precisely fits the round hole 12, and the other pin 18 may have an elongated or also a circular cross section, of which at least the width precisely fits the width of the elongated hole 14, so that this pin 18 may be inserted into the elongated hole 14 with a precise fit, at least in one dimension.

This assembly template 16 may be applied to the bottom side 10 of the retaining plate 5, and, preferably by means of mutually fitting pins and openings or in some other way, aligned in such a way that the pins 17, 18 are each situated in the area of an opening 6 in the retaining plate 5. For this purpose, slightly elevated areas on the surface of the assembly template 16 facing the retaining plate 5 may also be used, which may each engage with an opening 6 in the retaining plate 5.

The printheads 2 are now inserted into the openings 6 in the retaining plate 5 in such a way that in each case a pin 17 of the assembly template 16 engages with a round hole 13 in the nozzle plate 4 of a printhead 2, and in each case a pin 18 engages with an elongated hole 14. When this is done for all printheads 2, they are exactly aligned with one another. When the lateral tabs 9 of the printheads 2 are now screwed to the stepped areas 8 by means of fastening screws 19, all printheads 2 are precisely joined to the retaining plate 5, and an additional adjustment is no longer necessary.

Of course, the printheads 2 may also be inserted into the assembly template 16 in succession, and in each case simultaneously screwed to the retaining plate 5, when it is ensured that the assembly template 16 cannot be moved relative to the retaining plate 5 during the entire assembly, so that when the last printhead 2 is being installed, the assembly template 16 is still situated at exactly the same location, relative to the retaining plate 5, as when the first printhead 2 was inserted.

Figure 7 illustrates a slightly modified embodiment of the invention in a view according to Figure 4; the special feature of the additional embodiment becomes immediately apparent from a comparison of these two figures.

In contrast to the previously described embodiment, in the embodiment according to Figure 7 the pins 17, 18 of the assembly template that engage with the round hole or elongated hole 13, 14 are separated from the actual plate thereof and inserted into boreholes specifically provided for this purpose in the plate of the assembly template 16, in such a way that they protrude at the top side of the plate of the assembly

template 16 facing the printhead 2. The pins 17, 18 are accommodated in these boreholes with a press fit or a transition fit, and are thus precisely aligned.

It is apparent that these pins 17, 18 protrude beyond their receiving holes in the assembly template 16 also on the rear side facing away from the printhead 2. Thus, after the printheads 2 are assembled with the printhead retaining plate 5, it is possible to initially pull out the pins 17, 18 on the rear side of the assembly template 16, and the assembly template 16 may then be easily removed from the printhead retaining plate 5. It is also apparent in Figure 7 that in their rear area facing away from the round hole or elongated hole 13, 14, the pins 17, 18 may have a continuously circumferential collar that limits the insertion depth into the boreholes in the assembly template 16.

If pins 17, 18 are also used without such a collar, they could be inserted into the nozzle plate 4 of the printhead 2 in question even before a printhead 2 is assembled with the printhead retaining plate 5, so that they penetrate into the boreholes thereof when the printhead 2 is mounted on the assembly template 16, thus centering the printhead 2 in question.

List of reference numerals

1 device
2 printhead
3 nozzle
4 nozzle plate
5 printhead retaining plate
6 opening
7 end-face side
8 stepped area
9 tab
10 bottom side
11 alignment pin
12 fastening hole
13 round hole
14 elongated hole
15 housing
16 assembly template
17 pin
18 pin
19 fastening screws

Patent Claims

1. A method [sic; device] for adjusting printheads (2) relative to one another, the printheads each including a nozzle plate (4) having multiple nozzles (3) for printing, and having at least one round hole (13) and/or at least one elongated hole (14) in the nozzle plate for manufacturing and/or assembly purposes, **characterized by** an assembly template (16) for multiple printheads (2), wherein for each printhead (2) at least one counterpart is provided, preferably in the form of a pin (17, 18), that fits exactly into at least one round hole (13) and/or at least one elongated hole (14) in the corresponding nozzle plate (4), so that when the printheads (2) are inserted into the assembly template (16) in such a way that each pair of round hole counterparts and elongated hole counterparts (17, 18) engages with the corresponding round hole and elongated hole (13, 14) in the nozzle plate (4), the nozzles (3) of all printheads (2) are aligned with one another in the desired manner.

2. The device according to Claim 1, characterized in that the assembly template (16) is designed for application to the bottom side (10) of a retaining plate (5) for multiple printheads (2).

3. The device according to Claim 1 or 2, characterized in that the assembly template (16) has a preferably top-side contact surface that faces the bottom side (10) of the retaining plate (5).

4. The device according to Claim 3, characterized in that the retaining plate (5) has continuous recesses for accommodating the nozzle plates (4) of multiple printheads (2).

5. The device according to Claim 4, characterized in that the assembly template (16) on its contact surface facing the retaining plate (5) has marked or emphasized, in particular elevated, areas, preferably for centering engagement with the

continuous recesses in the retaining plate (5), for accommodating the nozzle plates (4) of multiple printheads (2).

6. The device according to one of the preceding claims, characterized in that the assembly template (16) on its contact surface facing the retaining plate (5), in particular in the area of the marked or emphasized or elevated areas, has one or more depressions, preferably one or more elongated depressions, for accommodating one or more rows of nozzles (3) of a printhead (2).

7. The device according to one of the preceding claims, characterized in that the counterparts to at least one round hole (13) and/or to at least one elongated hole (14), preferably the pins (17, 18), provided on the assembly template (16) are situated on the contact surface of the assembly template (16) facing the retaining plate (5), in particular in the area of the marked or emphasized or elevated areas.

8. The device according to one of the preceding claims, characterized in that the counterparts to at least one round hole (13) and/or to at least one elongated hole (14), preferably the pins (17, 18), provided on the assembly template (16) are situated on the contact surface of the assembly template (16) facing the retaining plate (5) in the area of oppositely situated ends of one or more elongated depressions for accommodating one or more rows of nozzles (3) of a printhead (2).

9. The device according to one of the preceding claims, characterized in that in each case a pair of counterparts, provided on the assembly template (16), to at least one round hole (13) and/or to at least one elongated hole (14), preferably the pins (17, 18), on the contact surface of the assembly template (16) facing the retaining plate (5) is in approximate alignment with an elongated depression for accommodating one or more rows of nozzles (3) of a printhead (2).

10. The device according to one of the preceding claims, characterized in that in each case a pair of counterparts, provided on the assembly template (16), to at least one round hole (13) and/or to at least one elongated hole(14), preferably the pins (17, 18), on the contact surface of the assembly template (16) facing the retaining plate (5) is laterally offset with respect to the longitudinal center axis of the elongated depression in question for accommodating one or more rows of nozzles (3) of a printhead (2), preferably offset by one-half the width of the printhead plate or less.

11. The device according to one of the preceding claims, characterized in that multiple pairs of counterparts, provided on the assembly template (16), to at least one round hole (13) and/or to at least one elongated hole (14), preferably the pins (17, 18), on which the contact surface of the assembly template (16) facing the retaining plate (5) is provided, [are] each laterally offset with respect to the longitudinal center axis of the elongated depression, associated with each pair, for accommodating one or more rows of nozzles (3) of a printhead (2), in particular laterally offset in the same direction for all pairs.

12. The device according to one of the preceding claims, characterized in that the assembly template (16) has one or more means, for example clamping elements, for fixing to the retaining plate (5).

13. The device according to one of the preceding claims, characterized in that the assembly template (16) is made from a metal plate, in particular a plate made of a noble metal or nonferrous metal or stainless steel, or a corrosion-resistant metal alloy.

14. The device according to one of the preceding claims, characterized in that the elevated counterparts, provided on the assembly template (16), to at least one round hole (13) and/or to at least one elongated hole (14), preferably the pins (17, 18), on the contact surface of the assembly template (16) facing the retaining

plate (5) are manufactured in one piece with the plate-shaped base body of the assembly template (16).

15. The device according to one of the preceding claims, characterized in that the assembly template (16), in particular the elevated counterparts, provided on the assembly template (16), to at least one round hole (13) and/or to at least one elongated hole (14), preferably the pins (17, 18), is (are) produced or machined on the contact surface of the assembly template (16) facing the retaining plate (5) by milling and/or eroding of a preferably plate-shaped base body of the assembly template (16).

16. The device according to one of the preceding claims, characterized in that at least one elevated counterpart to at least one round hole (13) and/or to at least one elongated hole (14), preferably at least one pin (17, 18), provided on the assembly template (16) is releasably retained in the assembly template (16).

17. The device according to Claim 16, characterized in that at least one pin (17, 18) provided on the assembly template (16) is held in a through hole opening in the assembly template (16) in the form of a transition fit or press fit.

18. The device according to Claim 16 or 17, characterized in that at least one pin (17, 18) provided on the assembly template (16) is longer than the thickness of the plate of the assembly template (16), in particular in such a way that the pin (17, 18) protrudes at the front side facing the retaining plate (5), and also at the rear side of the assembly template (16) facing away from the retaining plate (5), and is removable from the plate of the assembly template (16) from the rear.

19. The device according to one of Claims 16 to 18, characterized in that at least one pin (17, 18) that is provided on the assembly template (16) has a preferably continuously circumferential collar, in particular in the area of the pin (17, 18) that is situated directly behind the rear side of the assembly template (16) facing away

from the assembly template (16) when the pin (17, 18) is inserted into the retaining plate (5).

20. The device according to one of Claims 16 to 19, characterized in that at least one pin (17, 18) that is provided on the assembly template (16) has a cross-sectionally beveled or rounded edge on its end-face side that protrudes beyond the front side of the assembly template (16) facing the retaining plate (5).

21. A method for adjusting printheads (2) relative to one another, the printheads each including a nozzle plate (4) having multiple nozzles (3) for printing, and having at least one round hole (13) and/or at least one elongated hole (14) in the nozzle plate for manufacturing and/or assembly purposes, **characterized in that** multiple printheads (2) are inserted into an assembly template (16) for multiple printheads (2), wherein for each printhead (2) at least one counterpart is provided, preferably in the form of a pin (17, 18), that fits exactly into at least one round hole (13) and/or at least one elongated hole (14) in the corresponding nozzle plate (4) in such a way that each pair of round hole counterpart and/or elongated hole counterparts (17, 18) engages with the corresponding round holes and elongated hole (13, 14) in the nozzle plate (4), so that the nozzles (3) of all printheads (2) are aligned with one another in the desired manner, and the printheads (2) that are adjusted relative to one another in this way are then screwed onto the printhead retaining plate (5) or affixed in some other way before the assembly template (16) is removed.

22. The method according to Claim 21, characterized in that the assembly template (16) is placed beneath the printhead retaining plate (5) before the printheads (2) are inserted into the assembly template (16).

23. The method according to Claim 21 or 22, characterized in that the assembly template (16) is fixed to the bottom side of the printhead retaining plate (5) before the printheads (2) are inserted into the assembly template (16).

24. The method according to one of Claims 21 to 23, characterized in that the printheads (2) are inserted into the assembly template (16) through recesses in the printhead retaining plate (5).

25. The method according to one of Claims 21 to 24, characterized in that the printheads (2) inserted into the assembly template (16) are fastened to the printhead retaining plate (5) by screwing, for example, preferably screwed into the printhead retaining plate (5) from the top, in particular in each case screwed in from the side, next to a continuous recess in the retaining plate (5) for accommodating the nozzle plate (4) of the printhead in question (2).

26. The method according to one of Claims 21 to 25, characterized in that the assembly template (16) is not removed from the printhead retaining plate (5) until the printheads (2) have been fastened, in particular screwed, to the printhead retaining plate (5).

***