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(54) **HAIR STYLING DEVICE COMPRISING A HAIR WETTING MECHANISM**

(57) A hair styling device (1) comprises a hinge jaw assembly (10) including a first jaw (11) having a first plate (12) and a second jaw (13) having a second plate (14). In an opened position of the jaw assembly (10), hair can be received between the plates (12, 14), and in a closed position of the jaw assembly (10), hair can be hair styled between the plates (12, 14). The hair styling device (1) further comprises a heater arrangement (20) configured

to heat at least one of the plates (12, 14), and a hair wetting mechanism (30) configured to supply a mist of liquid between the plates (12, 14) in the closed position of the jaw assembly (10), wherein the hair wetting mechanism (30) includes a two fluid nozzle (31), and an air pump (33) and a liquid tank (35) connected to respective inlets of the two fluid nozzle (31).

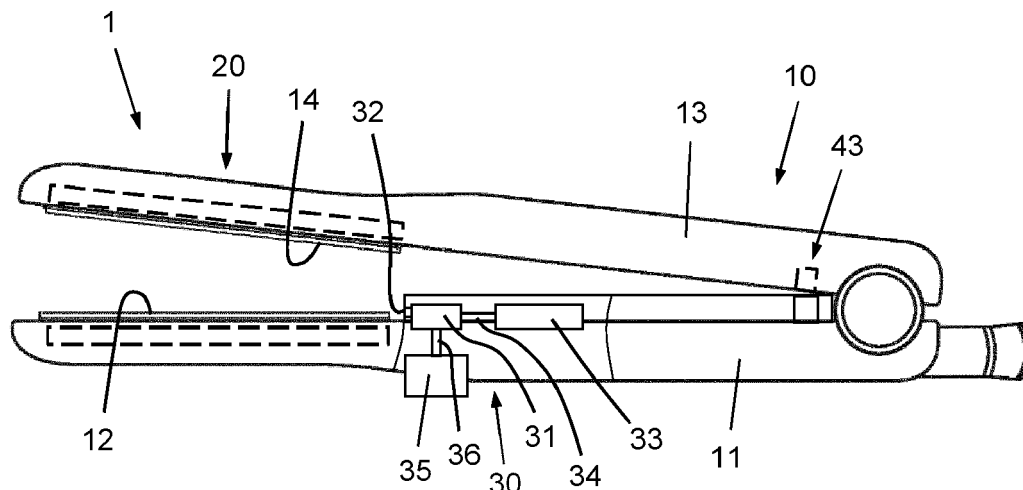


Fig. 1

Description

FIELD OF THE INVENTION

[0001] The invention relates to a hair styling device comprising a jaw assembly including a first jaw having a first plate and a second jaw having a second plate, and a hair wetting mechanism configured to supply a mist of liquid between the first plate and the second plate in the closed position of the jaw assembly.

BACKGROUND OF THE INVENTION

[0002] CN 205682727 U discloses a manual hair straightener comprising a jaw assembly including a first jaw and a second jaw which are hingably connected to each other. The first jaw includes a housing, a water tank, and an atomizing device. One part of the housing of the first jaw includes an electric heating plate and a spray nozzle positioned at one side of the plate, wherein the atomizing device is installed in the spray nozzle, and wherein the atomizing device is connected to the water tank through a duct.

[0003] When the hair straightener is put to an activated state, the heating plate is put to a heated state. An induction switch is provided at a position between the first jaw and the second jaw, and the induction switch is used to control a switch of the atomizing device, whereby it is ensured that the atomizing device is only operated in a closed position of the jaw assembly. Carrying out a hair straightening action by means of the hair straightener in the activated state involves making sure that the jaw assembly is in the opened position, placing the hair straightener with respect to the hair such that a strand of hair is received in the jaw assembly at a position close to the scalp, putting the jaw assembly to the closed position as a result of which the atomizing device is activated to spray water on the hair that is caught between the jaws of the jaw assembly, and pulling the hair straightener downwards on the strand of hair. In this way, it is achieved that the strand of hair is subjected to both a wetting action and a heating action while the hair straightener is moved to glide along the hair, as a result of which the strand of hair is straightened.

[0004] Hair straighteners which are only capable of subjecting hair to a heating action during a hair straightening action are also known in the art, but such hair straighteners are actually only suitable for use on damp hair, so that it is necessary to wet the hair prior to operating such hair straighteners, whereas hair straighteners which are capable of subjecting hair to both a wetting action and a heating action during a hair straightening action do not require a wetting pretreatment of the hair. Further advantages of configuring a hair straightener so as to spray water on hair during operation involve opening the hair cuticle, enabling effortless gliding of the hair straightener on the hair, and enhancing shininess of the hair.

[0005] Hair straighteners which are of the type that includes some kind of water spraying device normally comprise one of i) a transducer configured to generate mist and ii) an assembly of a thermoblock and a manual pump or peristaltic pump configured to generate steam. Disadvantages associated with using a transducer in hair straighteners involve the facts that it is required to use distilled water because otherwise minerals and small particles will block the micro hole on the transducer, that clogging of the micro hole is still prone to occur, and that water droplets accumulate on the transducer disc. Disadvantages associated with using an assembly that is configured to emit steam in hair straighteners involve the facts that there is a risk of clogging at one or more components of the assembly, that micro explosions of water vapor on hair take place, that there are safety issues arising from the high steam temperatures, that housing components need to be designed such as to withstand the high temperatures, and that normally some kind of heat exchange system is needed.

SUMMARY OF THE INVENTION

[0006] It is an object of the invention to provide an improved hair styling device. The invention is defined by the independent claims. The dependent claims define advantageous embodiments.

[0007] One aspect of the invention provides a hair styling device comprising a jaw assembly including a first jaw having a first plate and a second jaw having a second plate, wherein the first jaw and the second jaw are hingably connected to each other to thereby be capable of realizing an opened position of the jaw assembly for receiving hair between the first plate and the second plate and a closed position for styling hair between the first plate and the second plate, a heater arrangement configured to heat at least one of the first plate and the second plate, and a hair wetting mechanism configured to supply a mist of liquid between the first plate and the second plate in the closed position of the jaw assembly, wherein the hair wetting mechanism includes a two fluid nozzle having at least one outlet configured to emit the mist of liquid, an air pump, and a tank configured to contain a liquid, and wherein both the air pump and the tank are in fluid communication with the two fluid nozzle.

[0008] It follows from the foregoing definition that the hair wetting mechanism of the hair styling device according to the invention includes a two fluid nozzle having at least one outlet configured to emit the mist of liquid, an air pump, and a tank configured to contain a liquid, and wherein both the air pump and the tank are in fluid communication with the two fluid nozzle. As a result of this configuration of the hair wetting mechanism, it is achieved that the disadvantages associated with known configurations of the hair wetting mechanism of hair styling devices, particularly hair straighteners, are alleviated. In particular, when the invention is put to practice and the two fluid nozzle is used in combination with the re-

spective components involved in air and liquid supply to the two fluid nozzle, the following advantages are applicable: i) it is possible to use tap water and high viscosity liquid with additive, ii) there is no surface where water droplets may otherwise accumulate, iii) micro explosion of water vapor on hair does not occur, iv) the temperature level is much lower than the temperature level associated with steam generation and emission, v) clogging phenomena at one or more components of the hair wetting mechanism are not likely to occur, and vi) due to the fact that the two fluid nozzle uses kinetic energy of both gas (air) and liquid to atomize the liquid and to accelerate the liquid drops, the mist that is generated can easily penetrate the hair and enhance hair shininess.

[0009] In a practical embodiment of the hair styling device according to the invention, the at least one outlet of the two fluid nozzle is positioned at a hinge side of the first plate and the second plate. It may particularly be so that the at least one outlet of the two fluid nozzle has a position at a central level between the first plate and the second plate, seen in a height direction of the first plate and the second plate in the closed position of the jaw assembly. In that way, it is possible to have optimal coverage of a space between the first plate and the second plate with only one or a limited number of outlets of the two fluid nozzle. According to another optional measure aimed at realizing optimal coverage of the space as mentioned, at least one of the first plate and the second plate comprises a slot, and the at least one outlet of the two fluid nozzle is positioned at an end of the slot. In such an arrangement, the slot in the at least one plate facilitates transport of a mist of liquid emitted from the at least one outlet of the two fluid nozzle through the space, in a direction from the end of the slot where the at least one outlet of the two fluid nozzle is positioned to the other end of the slot.

[0010] In the context of the option of at least one of the first plate and the second plate comprising a slot, it may be practical if the slot has a cross-sectional U-shape. Further, it may be practical if the at least one of the first plate and the second plate has an otherwise flat appearance.

[0011] A notable advantageous option associated with using a two fluid nozzle in the hair styling device resides in the fact that it is possible to have pulse-width modulated release of the mist of liquid from the two fluid nozzle. In view thereof, it is advantageous if the hair styling device comprises a controller configured to control operation of the hair styling device according to one of at least two different wet operation modes involving actuation of the hair wetting mechanism, wherein each of the respective wet operation modes involves a different pulse rate of operation of the air pump. In this respect, it is further advantageous if the hair styling device comprises a user interface configured to enable a user to set one of the respective wet operation modes. Such a user interface may comprise a touchscreen, for example, or may be designed in a less complex manner, comprising a button

to be positioned in one of at least two predefined positions.

[0012] An example of the at least two different wet operation modes involves three different wet operation modes, namely a first wet operation mode for realizing a high level of humidity of the hair, a second wet operation mode for realizing a medium level of humidity of the hair, and a third wet operation mode for realizing a low level of humidity of the hair. During each of the wet operation modes, the air pump is successively switched on and off, wherein a duration of on time compared to a duration of off time is the highest in the first wet operation mode and the lowest in the third wet operation mode.

[0013] When the hair styling device according to the invention comprises a controller, it is practical if the hair styling device also comprises a detecting mechanism configured to cause the controller to actuate the hair wetting mechanism only in the closed position of the jaw assembly. Such a detecting mechanism may comprise a switching mechanism configured to be in one of at least two different conditions and to be caused to switch from one condition to another when the position of the jaw assembly is changed.

[0014] In a practical design, the hair wetting mechanism includes at least one of a system configured to transport air from the air pump to the two fluid nozzle, and a system configured to transport the liquid from the tank to the two fluid nozzle. In any case, it is practical if the two fluid nozzle includes a liquid inlet configured to let in liquid to the two fluid nozzle and an air inlet configured to let in air to the two fluid nozzle, wherein the tank is connected to the two fluid nozzle at the position of the liquid inlet, and wherein the air pump is connected to the two fluid nozzle at the position of the air inlet.

[0015] Another aspect of the invention provides a hair styling device, comprising a jaw assembly including a first jaw having a first plate and a second jaw having a second plate, a heater arrangement configured to heat at least one of the first plate and the second plate, and a hair wetting mechanism configured to supply a mist of liquid between the first plate and the second plate in the closed position of the jaw assembly, wherein at least one of the first plate and the second plate comprises a slot, and wherein at least one outlet of the hair wetting mechanism is positioned at an end of the slot.

[0016] Preferably, the slot has a cross-sectional U-shape. Advantageously, the at least one of the first plate and the second plate has an otherwise flat appearance.

[0017] Preferably, the at least one outlet of the hair wetting mechanism is positioned at a hinge side of the first plate and the second plate. Advantageously, the at least one outlet has a position at a central level between the first plate and the second plate, seen in a height direction of the first plate and the second plate in the closed position of the jaw assembly.

[0018] The above-described and other aspects of the invention will be apparent from and elucidated with reference to the following detailed description of a hair

straightener comprising a hair wetting mechanism.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The invention will now be explained in greater detail with reference to the figures, in which equal or similar parts are indicated by the same reference signs, and in which:

Fig. 1 diagrammatically shows a side view of a hair styling device according to an embodiment of the invention, the hair styling device comprising a jaw assembly including a first jaw having a first plate and a second jaw having a second plate, with a portion of the first jaw being shown in an opened condition so that interior components of the first jaw can be seen,

Fig. 2 diagrammatically shows a view on the first jaw, with a top cover removed so as to show a number of the interior components of the first jaw,

Fig. 3 illustrates how an outlet of a two fluid nozzle that is included in the first jaw is positioned relative to the first plate and the second plate,

Fig. 4 diagrammatically shows a sectional view of the two fluid nozzle and a portion of the first jaw having the first plate and the second jaw having the second plate, and

Fig. 5 is a block diagram of a number of components of the hair styling device.

DETAILED DESCRIPTION OF EMBODIMENTS

[0020] Fig. 1 shows a hair styling device 1 according to an embodiment of the invention. The hair styling device 1 comprises a jaw assembly 10 including a first jaw 11 having a first plate 12 and a second jaw 13 having a second plate 14. The first jaw 11 and the second jaw 13 are hingably connected to each other to thereby be capable of realizing an opened position of the jaw assembly 10 for receiving hair between the first plate 12 and the second plate 14 and a closed position for styling hair between the first plate 12 and the second plate 14. Fig. 1 shows the hair styling device 1 with the jaw assembly 10 in the opened position. The hair styling device 1 as shown is particularly suitable to be used as a manual hair straightener, which does not alter the fact that the invention is applicable to other types of hair styling device as well.

[0021] The hair styling device 1 further comprises a heater arrangement 20 configured to heat both the first plate 12 and the second plate 14. The heater arrangement 20 is only diagrammatically indicated in Fig. 1, as two dashed boxes which are each associated with one of the plates 12, 14. The present description is also applicable in the alternative case of the heater arrangement 20 being configured to heat only one of the plates 12, 14. Further, the hair styling device 1 comprises a hair wetting mechanism 30 configured to supply a mist of liquid be-

tween the first plate 12 and the second plate 14 in the closed position of the jaw assembly 10. As is generally known from the field of manual hair straighteners, proper use of the hair styling device 1 as shown involves a user's actions of i) picking up a strand of hair at a position near the scalp, which is done with the jaw assembly 10 in the opened position, ii) putting the jaw assembly 10 to the closed position with the hair being at a position of being clamped between the first plate 12 and the second plate 14, and iii) pulling the hair styling device 1 down on the strand of hair. Assuming that those actions are taken with the hair styling device 1 in an activated state, it is achieved that the first plate 12 and the second plate 14 are made to glide over the strand of hair while being in a heated state, wherein the strand of hair is sandwiched between the first plate 12 and the second plate 14, and that the strand of hair is moisturized in the process.

[0022] The invention relates to the design and use of the hair wetting mechanism 30 of the hair styling device 1. The hair wetting mechanism 30 includes a two fluid nozzle 31 having at least one outlet 32 configured to emit the mist of liquid, an air pump 33, a system 34 configured to transport air from the air pump 33 to the two fluid nozzle 31, a tank 35 configured to contain a liquid, and a system 36 configured to transport the liquid from the tank 35 to the two fluid nozzle 31. Examples of the liquid include tap water, and a high viscosity liquid with additive.

[0023] The various components of the hair wetting mechanism 30 are only diagrammatically depicted in Fig. 1. Fig. 2 illustrates in a more realistic fashion how the two fluid nozzle 31, the air pump 33 and the tank 35 can be positioned in the first jaw 11. The tank 35 is preferably removably arranged in the first jaw 11, so that refilling the tank 35 or replacing the tank 35 by a new one is facilitated.

[0024] The at least one outlet 32 of the two fluid nozzle 31 is positioned at a hinge side of the first plate 12 and the second plate 14. As can best be seen in Fig. 3, which provides a view in a length direction of the plates 12, 14 towards the two fluid nozzle 31 with the jaw assembly 10 being in the closed position, the two fluid nozzle 31 has a single outlet 32 in the shown example, which outlet 32 has a position relative to the first plate 12 and the second plate 14 that is central in both a height direction of the plates 12, 14 and a width direction of the plates 12, 14.

[0025] For the purpose of transporting a mist of liquid emitted from the two fluid nozzle 31 during operation, it is advantageous if at least one of the first plate 12 and the second plate 14 comprises a slot 15 while having an otherwise flat appearance. Fig. 2 shows that the outlet 32 of the two fluid nozzle 31 is positioned at an end of the slot 15. Fig. 3 shows that both the first plate 12 and the second plate 14 may be provided with the slot 15, and that it may be practical if the slot has a cross-sectional U-shape.

[0026] Fig. 4 serves to show further details of the two fluid nozzle 31 and to illustrate the way in which the hair wetting mechanism 30 functions to supply a mist of liquid

between the first plate 12 and the second plate 14 in the closed position of the jaw assembly 10. During operation, the liquid is supplied to the two fluid nozzle 31, through a liquid inlet 37 of the two fluid nozzle 31, and air is supplied to the two fluid nozzle 31 as well, through an air inlet 38 of the two fluid nozzle 31. The respective ingoing flows of liquid and air are indicated by means of arrows in Fig. 4. The respective systems 34, 36 for transporting the air and the liquid to the two fluid nozzle 31 may comprise any suitable type of conduit or the like, connecting the liquid inlet 37 to the tank 35, and connecting the air inlet 38 to the air pump 33. The air is used as an atomizing gas, and kinetic energy of both the air and the liquid is used to break the liquid down to drops and to accelerate the liquid drops. The two fluid nozzle 31 may be designed such that a Venturi effect occurs in respect of the liquid, so that under the influence of the flow of air that is generated by the air pump 33, liquid is sucked from the tank 35 and a flow of the liquid is obtained in the two fluid nozzle 31, without a need for a separate pump. The mist 16 of liquid that is emitted from the outlet 32 of the two fluid nozzle 31 and that flows from the two fluid nozzle 31 in the direction of the plates 12, 14, particularly a space at the position where the plates 12, 14 are provided with the slot 15, is diagrammatically depicted as a row of individual drops in Fig. 4.

[0027] On the basis of Fig. 5, a practical option of controlling operation of the hair styling device 1 will now be explained.

[0028] In the first place, it is advantageous if the hair styling device 1 is provided with a controller 40 configured to control operation of the hair styling device 1 according to one of at least two different wet operation modes involving actuation of the hair wetting mechanism 30, and a user interface 41 configured to enable a user to set one of the respective wet operation modes. The wet operation modes differ in that each of them involves a different pulse rate of operation of the air pump 33, so that the extent to which the hair is wetted as a result of the wetting action performed by the hair wetting mechanism 30 on the hair can be varied. It is a feasible option for the number of different wet operation modes to be three, in which case it is possible to allow a user to choose from a first wet operation mode for realizing a high level of humidity of the hair, a second wet operation mode for realizing a medium level of humidity of the hair, and a third wet operation mode for realizing a low level of humidity of the hair. As an arbitrary example, in order to illustrate how the different wet operation modes may actually be realized, it is mentioned here that the first wet operation mode may involve a pulse rate of operation of the air pump 33 of 0.2 milliseconds on and 0.1 milliseconds off, the second wet operation mode may involve a pulse rate of operation of the air pump 33 of 0.2 milliseconds on and 0.2 milliseconds off, and the third wet operation mode may involve a pulse rate of operation of the air pump 33 of 0.1 milliseconds on and 0.2 milliseconds off. The user interface 41 may comprise a button 42 or another suitable

switching device configured to be positioned in one of a number of predefined positions, wherein each of those positions is associated with one of the respective wet operation modes.

[0029] In the second place, it is noted that it is useful if the hair styling device 1 is equipped with a detecting mechanism configured to cause the controller 40 to actuate the hair wetting mechanism 30 only in the closed position of the jaw assembly 10. Such a detecting mechanism may be equipped with some kind of switching mechanism 43, for example, being arranged and configured to respond to the position of the jaw assembly 10, and being configured to cause the hair wetting mechanism 30 to be operated for emitting a mist 16 of liquid only when the jaw assembly 10 is in the closed position. In Figs. 1 and 2, it can be seen that a practical position of such a switching mechanism 43 is a position near the hinge axis 17 of the jaw assembly 10.

[0030] It follows from the foregoing that in the shown embodiment of the hair styling device 1 according to the invention, the hair wetting mechanism 30 is automatically activated when the jaw assembly 10 is closed and deactivated when the jaw assembly 10 is opened. The functioning of the hair wetting mechanism 30 relies on applying a two fluid nozzle 31, as a result a mist 16 of liquid as desired is generated in an effective, reliable and safe way, wherein it is further possible to offer a user a possibility of choosing from various wet operation modes because the pulse width of the release of liquid drops from the two fluid nozzle 31 can be modulated by varying the pulse rate of the air pump 33 that is used for supplying air to the two fluid nozzle 31.

[0031] It will be clear to a person skilled in the art that the scope of the invention is not limited to the examples discussed in the foregoing, but that several amendments and modifications thereof are possible without deviating from the scope of the invention as defined in the attached claims. It is intended that the invention be construed as including all such amendments and modifications insofar they come within the scope of the claims or the equivalents thereof. While the invention has been illustrated and described in detail in the figures and the description, such illustration and description are to be considered illustrative or exemplary only, and not restrictive. The invention is not limited to the disclosed embodiments. The drawings are schematic, wherein details which are not required for understanding the invention may have been omitted, and not necessarily to scale.

[0032] Variations to the disclosed embodiments can be understood and effected by a person skilled in the art in practicing the claimed invention, from a study of the figures, the description and the attached claims. In the claims, the word "comprising" does not exclude other steps or elements, and the indefinite article "a" or "an" does not exclude a plurality. Any reference signs in the claims should not be construed as limiting the scope of the invention.

[0033] Elements and aspects discussed for or in rela-

tion with a particular embodiment may be suitably combined with elements and aspects of other embodiments, unless explicitly stated otherwise. Thus, the mere fact that certain measures are recited in mutually different dependent claims does not indicate that a combination of these measures cannot be used to advantage.

[0034] The terms "comprise" and "include" as used in this text will be understood by a person skilled in the art as covering the term "consist of". Hence, the term "comprise" or "include" may in respect of an embodiment mean "consist of", but may in another embodiment mean "contain/have/be equipped with at least the defined species and optionally one or more other species".

[0035] Notable aspects of the invention are summarized as follows. A hair styling device 1 comprises a hinge jaw assembly 10 including a first jaw 11 having a first plate 12 and a second jaw 13 having a second plate 14. In an opened position of the jaw assembly 10, hair can be received between the plates 12, 14, and in a closed position of the jaw assembly 10, hair can be hair styled between the plates 12, 14. The hair styling device 1 further comprises a heater arrangement 20 configured to heat at least one of the plates 12, 14, and a hair wetting mechanism 30 configured to supply a mist 16 of liquid between the plates 12, 14 in the closed position of the jaw assembly 10, wherein the hair wetting mechanism 30 includes a two fluid nozzle 31 having at least one outlet 32 configured to emit the mist 16 of liquid, and further includes an air pump 33 and a liquid tank 35 connected to respective inlets 37, 38 of the two fluid nozzle 31.

Claims

1. Hair styling device (1), comprising:

- a jaw assembly (10) including a first jaw (11) having a first plate (12) and a second jaw (13) having a second plate (14), wherein the first jaw (11) and the second jaw (13) are hingably connected to each other to thereby be capable of realizing an opened position of the jaw assembly (10) for receiving hair between the first plate (11) and the second plate (13) and a closed position for styling hair between the first plate (11) and the second plate (13),
- a heater arrangement (20) configured to heat at least one of the first plate (11) and the second plate (13), and
- a hair wetting mechanism (30) configured to supply a mist (16) of liquid between the first plate (11) and the second plate (13) in the closed position of the jaw assembly (10), wherein the hair wetting mechanism (30) includes a two fluid nozzle (31) having at least one outlet (32) configured to emit the mist (16) of liquid, an air pump (33), and a tank (35) configured to contain a liquid,

and wherein both the air pump (33) and the tank (35) are in fluid communication with the two fluid nozzle (31).

2. Hair styling device (1) according to claim 1, wherein the at least one outlet (32) of the two fluid nozzle (31) is positioned at a hinge side of the first plate (11) and the second plate (13).
3. Hair styling device (1) according to claim 2, wherein the at least one outlet (32) of the two fluid nozzle (31) has a position at a central level between the first plate (11) and the second plate (13), seen in a height direction of the first plate (11) and the second plate (13) in the closed position of the jaw assembly (10).
4. Hair styling device (1) according to any of claims 1-3, wherein at least one of the first plate (11) and the second plate (13) comprises a slot (15), and wherein the at least one outlet (32) of the two fluid nozzle (31) is positioned at an end of the slot (15).
5. Hair styling device (1) according to claim 4, wherein the slot (15) has a cross-sectional U-shape.
6. Hair styling device (1) according to claim 4 or 5, wherein the at least one of the first plate (11) and the second plate (13) has an otherwise flat appearance.
7. Hair styling device (1) according to any of claims 1-6, comprising a controller (40) configured to control operation of the hair styling device (1) according to one of at least two different wet operation modes involving actuation of the hair wetting mechanism (30), wherein each of the respective wet operation modes involves a different pulse rate of operation of the air pump (33).
8. Hair styling device (1) according to claim 7, comprising a user interface (41) configured to enable a user to set one of the respective wet operation modes.
9. Hair styling device (1) according to claim 8, wherein the user interface (41) comprises a button (42) configured to be positioned in one of at least two predefined positions.
10. Hair styling device (1) according to any of claims 7-9, comprising a detecting mechanism configured to cause the controller (40) to actuate the hair wetting mechanism (30) only in the closed position of the jaw assembly (10).
11. Hair styling device (1) according to claim 10, wherein the detecting mechanism comprises a switching mechanism (43) configured to be in one of at least two different conditions and to be caused to switch

from one condition to another when the position of the jaw assembly (10) is changed.

12. Hair styling device (1) according to any of claims 1-11, wherein the hair wetting mechanism (30) includes at least one of a system (34) configured to transport air from the air pump (33) to the two fluid nozzle (31), and a system (36) configured to transport the liquid from the tank (35) to the two fluid nozzle (31). 5 10
13. Hair styling device (1) according to any of claims 1-12, wherein the two fluid nozzle (31) includes a liquid inlet (37) configured to let in liquid to the two fluid nozzle (31) and an air inlet (38) configured to let in air to the two fluid nozzle (31), wherein the tank (35) is connected to the two fluid nozzle (31) at the position of the liquid inlet (37), and wherein the air pump (33) is connected to the two fluid nozzle (31) at the position of the air inlet (38). 15 20

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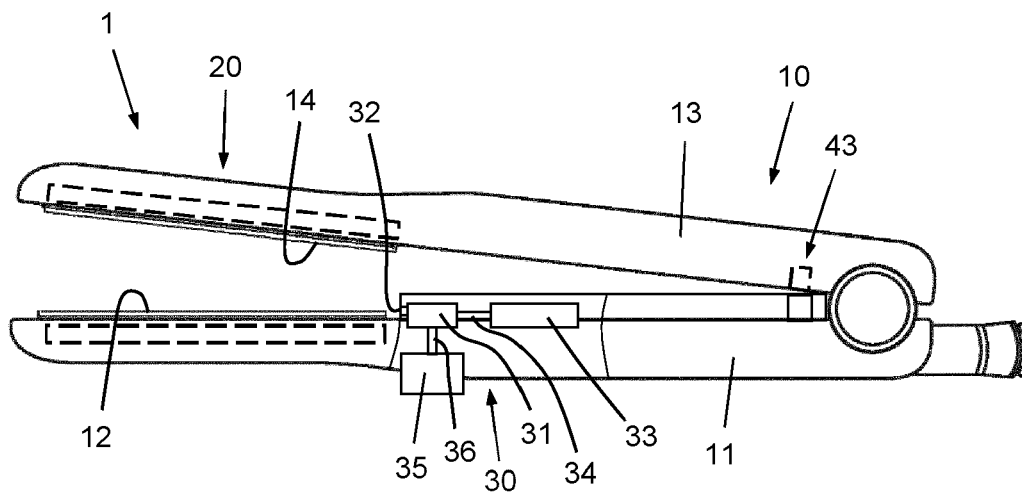


Fig. 1

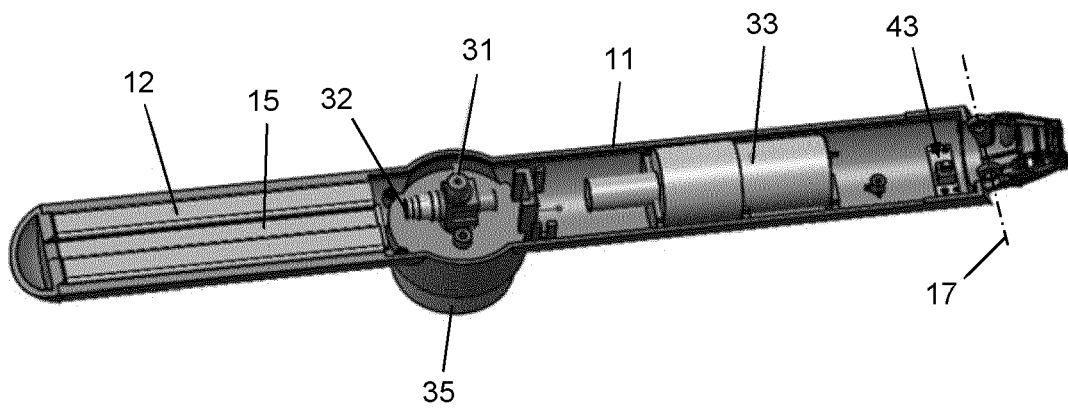


Fig. 2

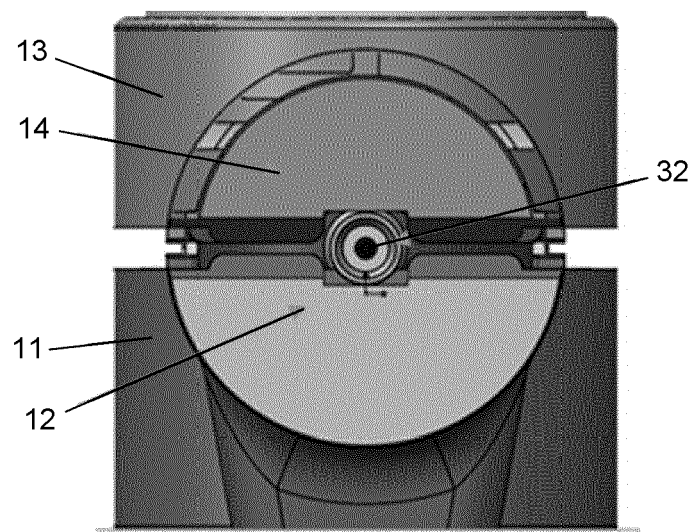


Fig. 3

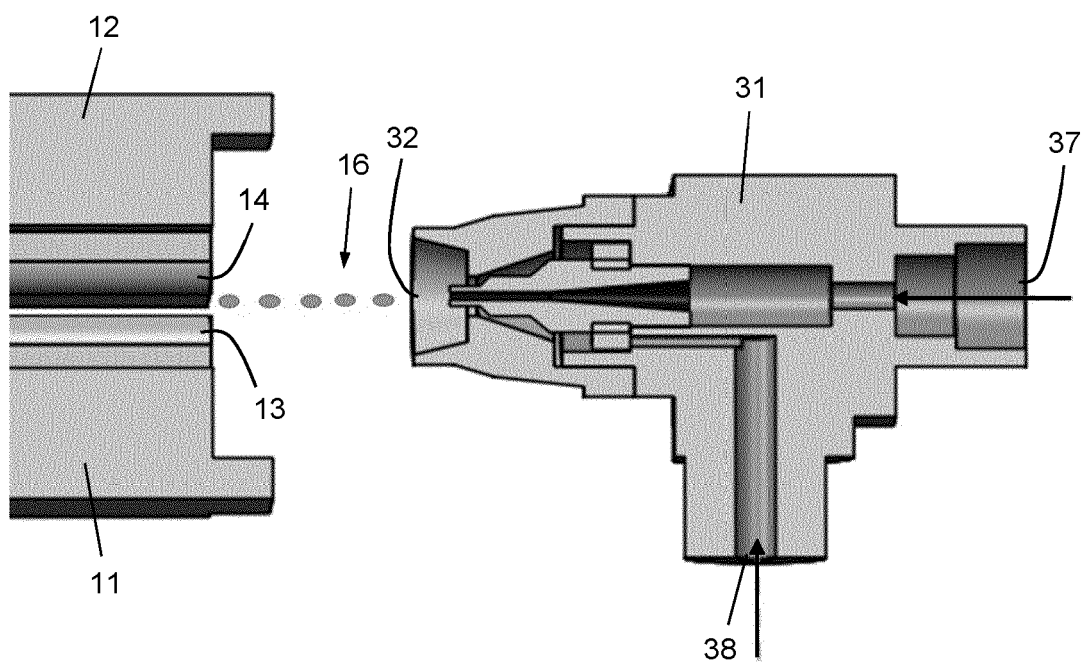


Fig. 4

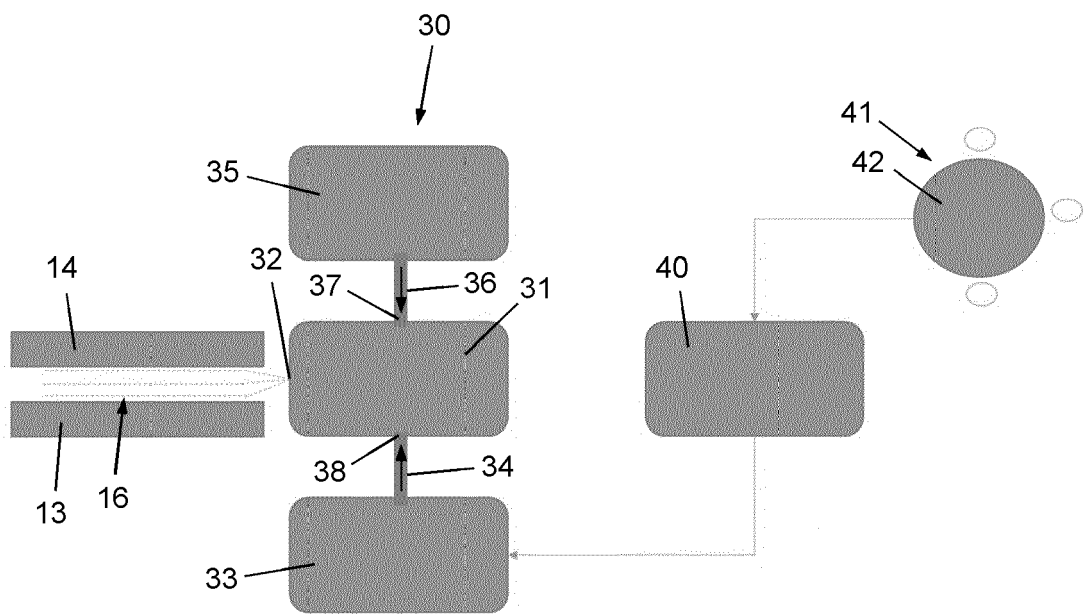


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 20 16 7816

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X,D	CN 205 682 727 U (CHEN JIANFENG) * See enclosed translation of D1 * -----	1-13	INV. A45D1/04
A	US 3 947 659 A (ONO TAKAMICHI) 30 March 1976 (1976-03-30) * the whole document * -----	1	
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			TECHNICAL FIELDS SEARCHED (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 31 August 2020	Examiner Fidalgo Marron, B
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 20 16 7816

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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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Patent documents cited in the description

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