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Hoyma Mazara, Santo Domingo (DO)(52) **U.S. Cl.**
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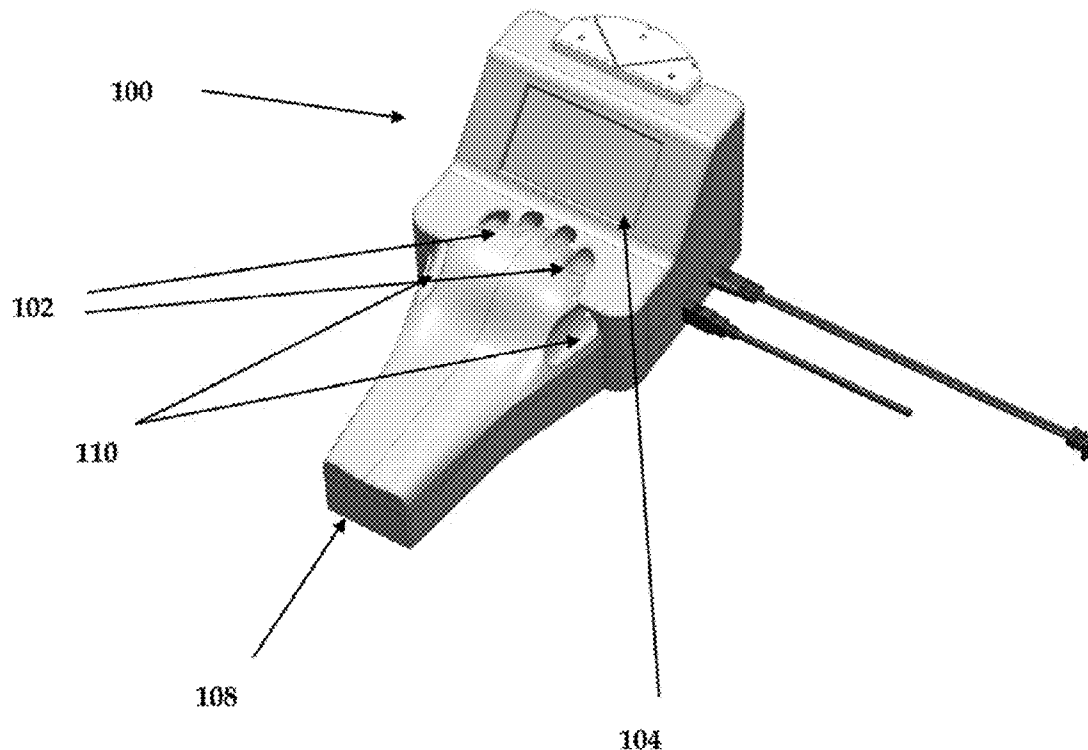
(60) Provisional application No. 61/871,287, filed on Aug. 28, 2013.

(30) **Foreign Application Priority Data**

Dec. 12, 2012 (DO) P 2012 311

(57) **ABSTRACT**

Electronic device for the automated painting and drying of fingernails, which allows the user to choose the color they want to paint the nails as well as to carry the device due to its light weight. In one embodiment, the device has a sensor that identifies the hand that has been introduced in it and activates the activation of the device, a touch LED screen, which allows the user to choose the nail and color with which to paint it, without the need for specialized personnel to operate it, as well as to inform the user through visible and audible means the process taking place. In one embodiment, the unit contains capacitive and infrared sensors to detect the difference of the surface of the finger and nail, a computer or processor which guides and controls the paint head with the ink that carries the staining of the surface of the nail. In one embodiment, a device expels air towards the nails and then applies a beam of ultraviolet light for rapid and uniform curing/drying. Once the process with one hand is done, the device prompts user messages through the speaker and LED touch screen, so that the user may insert another hand to repeat the process.



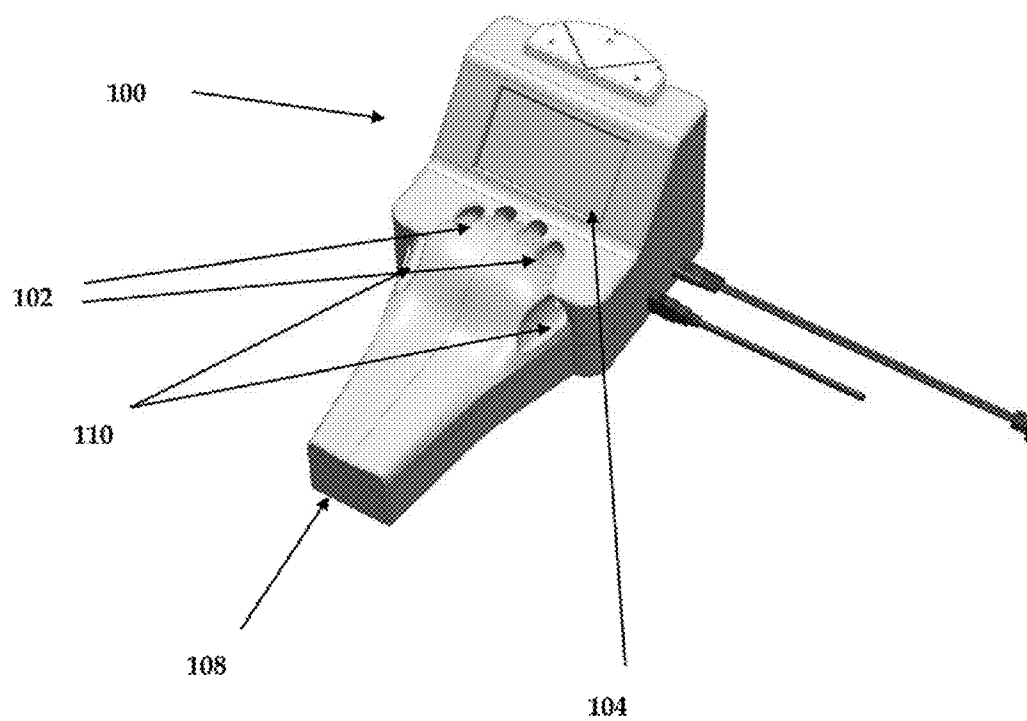


Figure 1

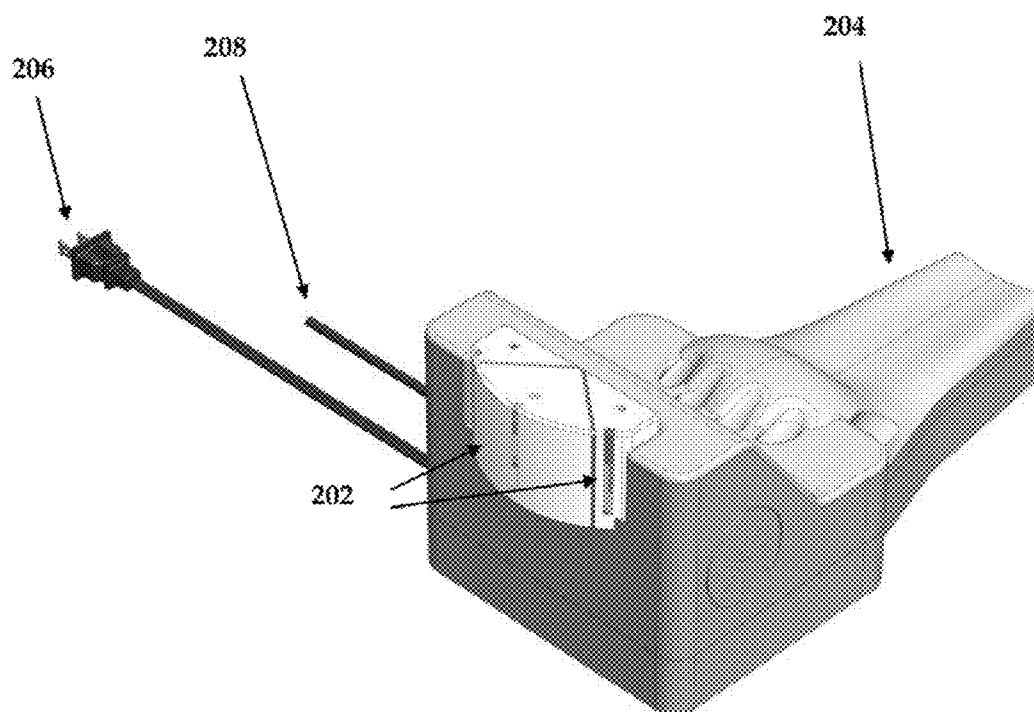


Figure 2

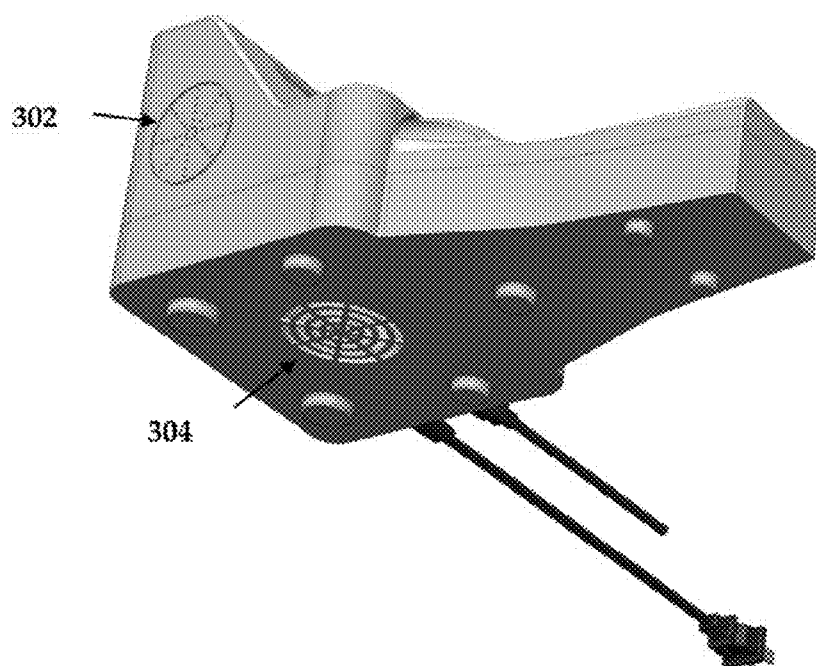


Figure 3

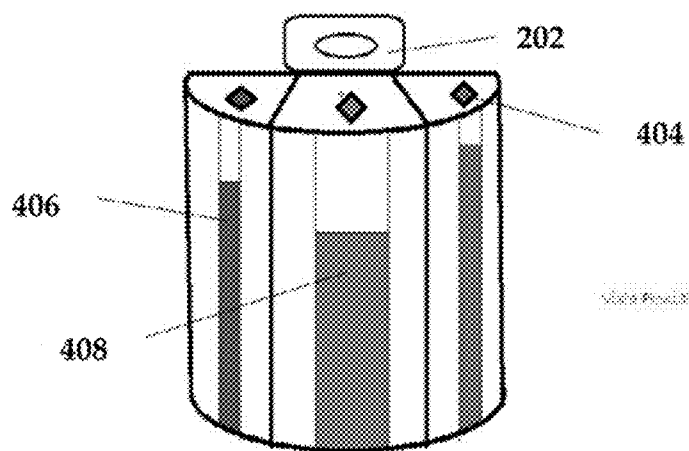


Figure 4A

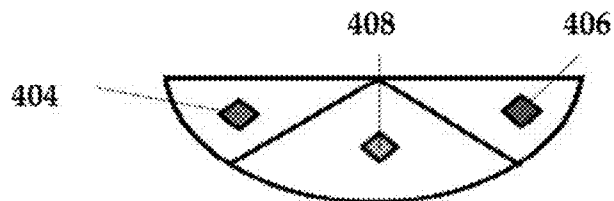


Figure 4B

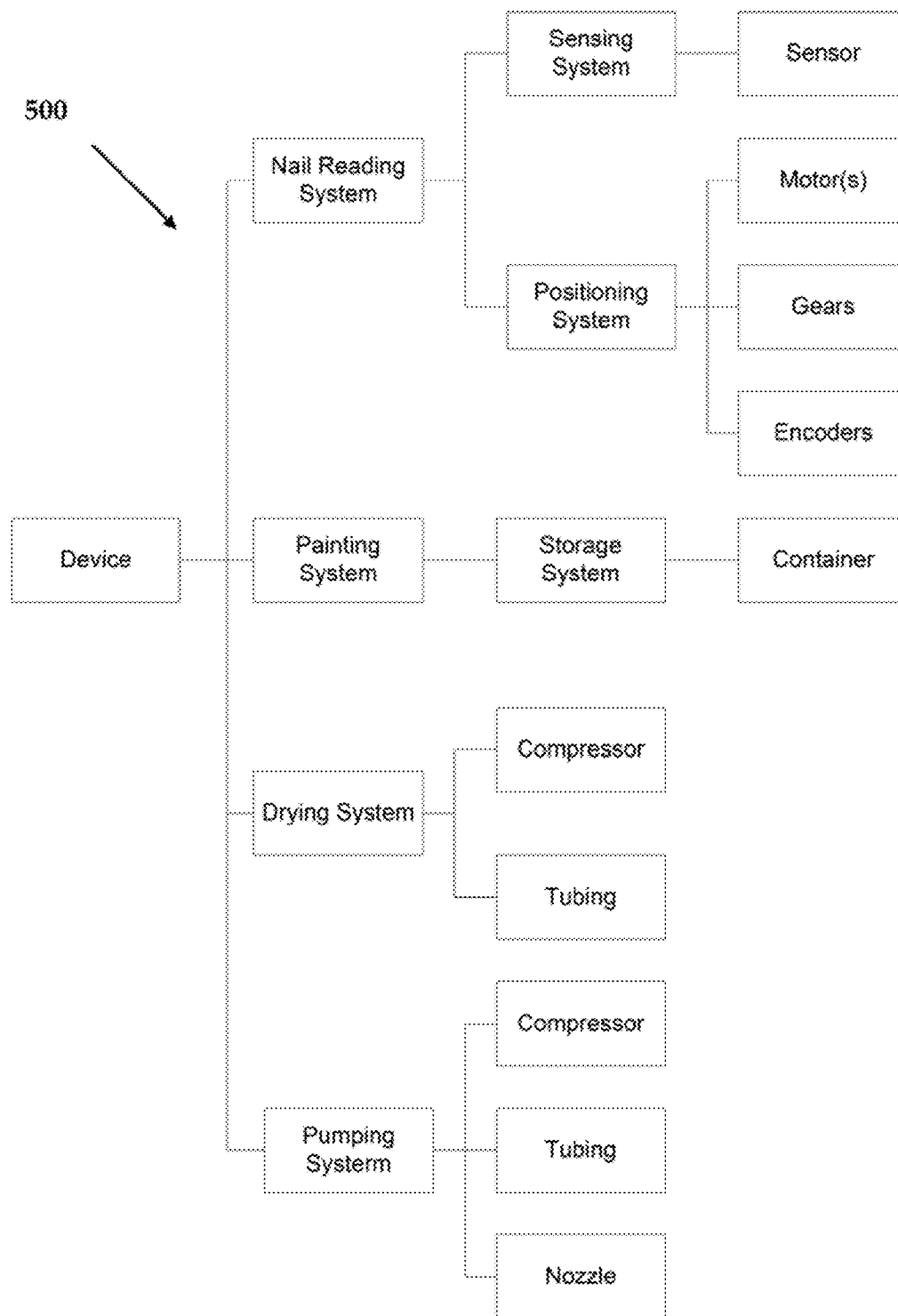


Figure 5

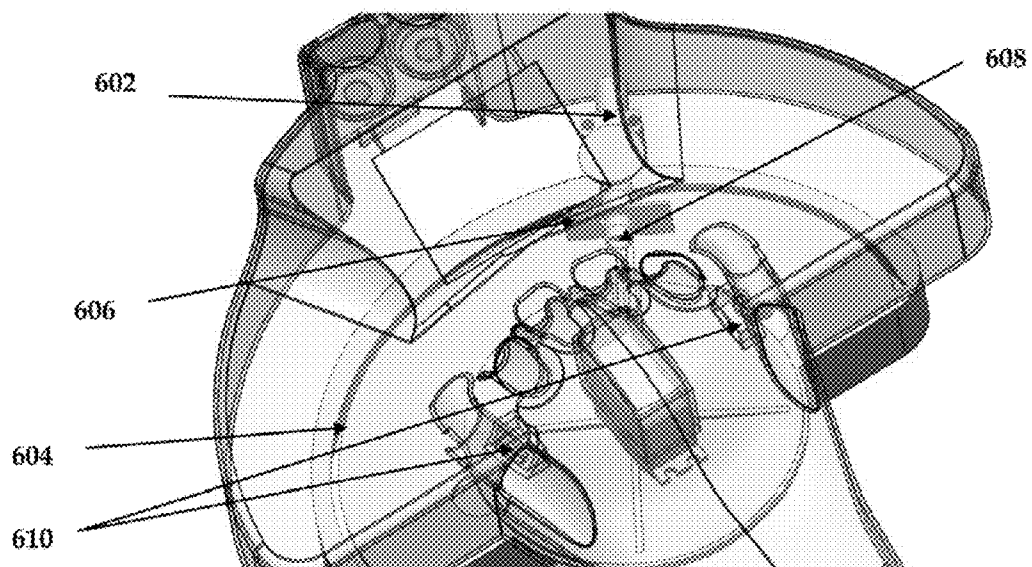


Figure 6

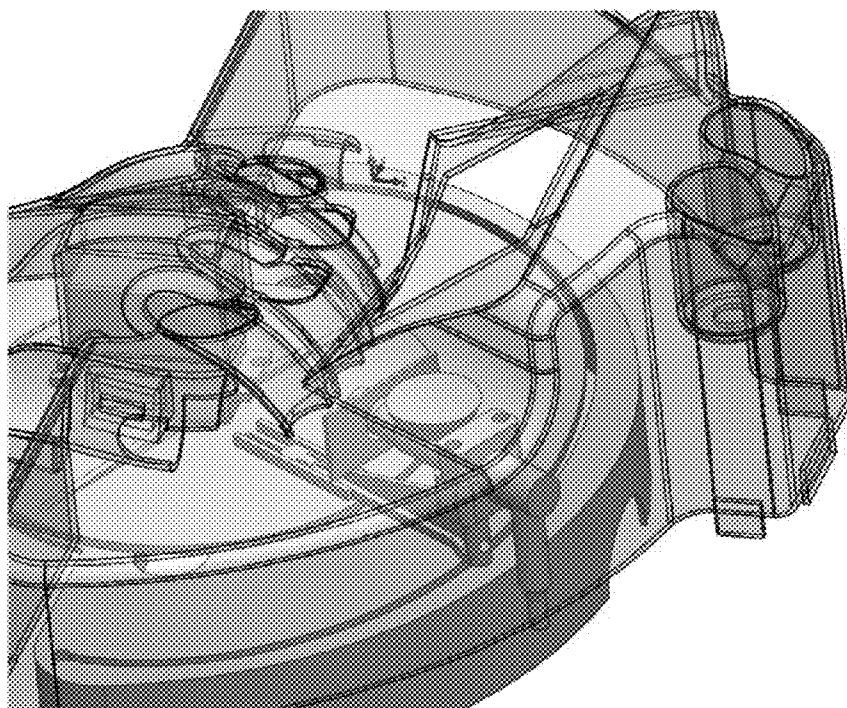


Figure 7

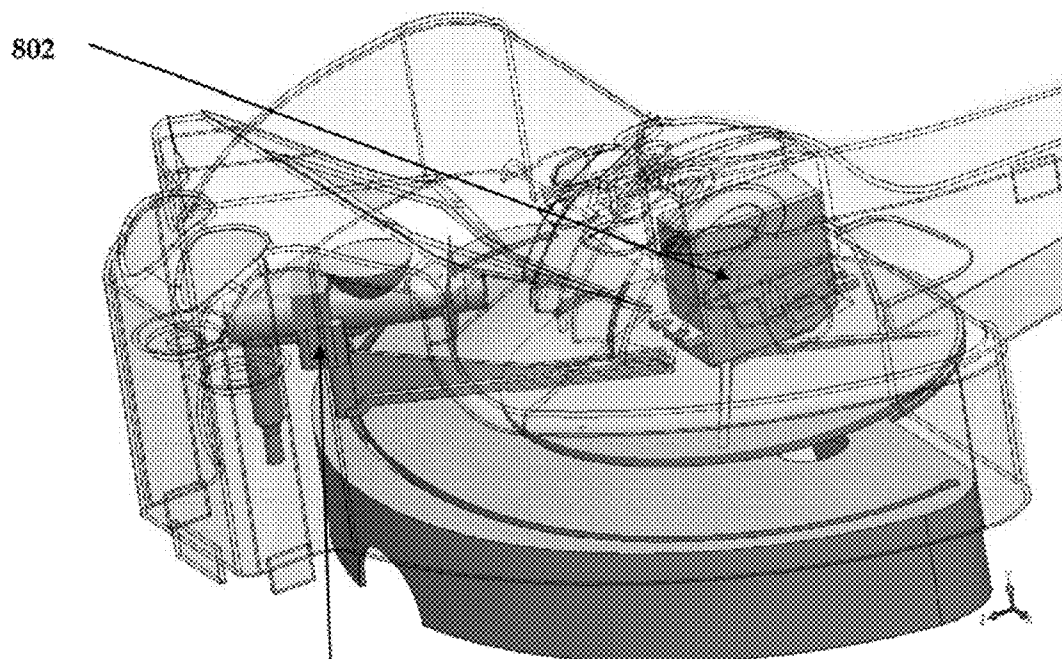


Figure 8

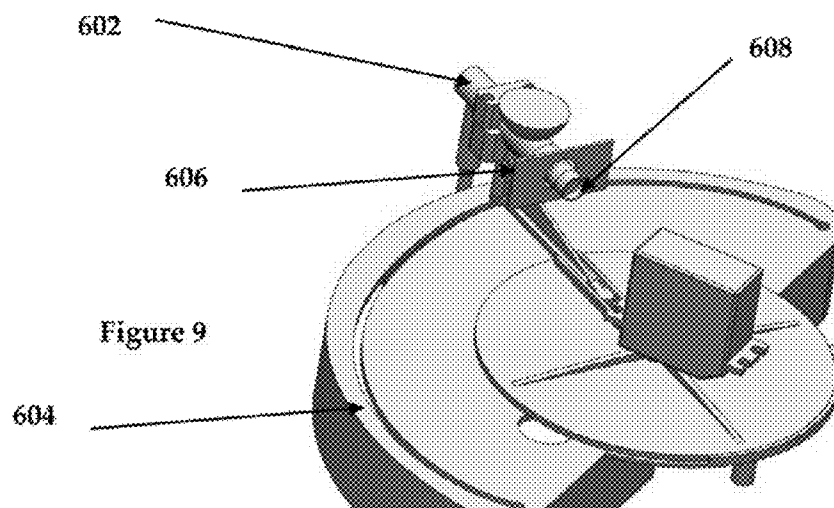


Figure 9

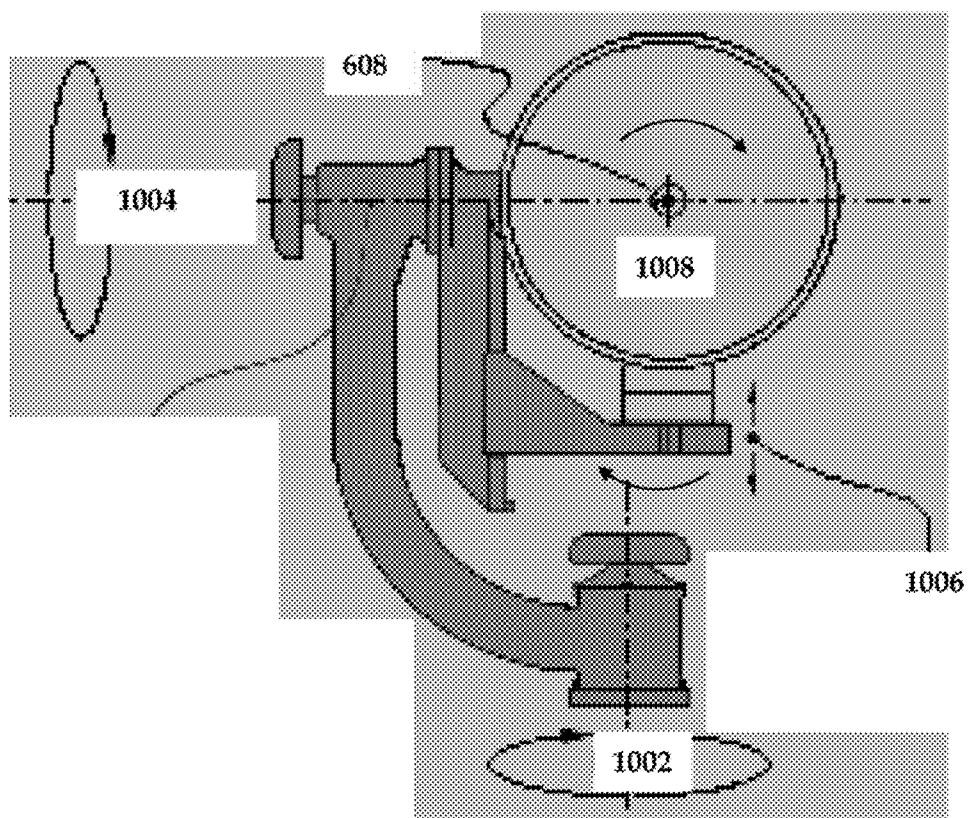


Figure 10

AUTOMATIC NAIL PAINTING MACHINE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to co-pending U.S. Provisional patent application Ser. No. 61/871,287 entitled "Automated Nail Machine" filed on Aug. 28, 2013 as well as to PCT/IB13/060784 titled "Dispositivo electronico automatizado de tintado y secado de uñas", filed on Dec. 9, 2013, the disclosure of both being incorporated by reference in their entirety into this application.

PATENTS CITED

[0002] The following documents and references are incorporated by reference in their entirety; Jenkins et al (U.S. Pat. No. 5,302,224), Kondo et al (U.S. Pat. Appl. No. 2005/0174367), Watabe (JP 2007062062), Gerber (JP2000175732), Kondo (U.S. Pat. Appl. No. 2005/0174367) and Plenty (KR20040060776).

FIELD OF THE INVENTION

[0003] The present invention relates to an electronic device for the automated painting and drying of fingernails. It is addresses to all those who wish to have their fingernails clean, with enamel color of their choice and treated with a coat of gloss in the shortest time without third party assistance, which would allow its use in your home, office or vehicle, being portable. This device significantly reduces the time the user spends in the dyeing and drying of nails as well as through applying nail polish.

DESCRIPTION OF THE RELATED ART

[0004] The market has seen various proposals and solutions, as well as some inventions very different to those presented herein. The Japanese application for Gerber (JP2000175732) discloses a device for the automatic application of liquid nail polish which is provided with a camera having the image of the nail, a processor for analyzing the image and convert it into a tool locus for movement, and application means for applying the liquid nail polish along the tool moving locus. The means of implementation can be changed to various other types of tools to carry out other work.

[0005] The Japanese Patent to Watabe (JP 2007062062) describes a device designed to accurately draw a picture in a short time regardless of the complexity of the drawing. The device uses a default template that transfers the image to the nail, and a platform to transfer pattern printing plates prepared in a template fingernail.

[0006] The US patent application for Kondo (U.S. Appl. No. 2005174367) describes a nail painter capable of representing pictorial images with different contents on the nails using different colors of ink accurately during the short period of time without requiring the user to perform the expensive operation, and pollutes the device periphery. A key part of the apparatus shown consists of a measure for securing fingertip on a nail art operating a changer for the selection of a printing plate to be used from a plurality of printing plates.

[0007] A table selector to select an area of the plate to be used on board selected printer, an ink layer selected to apply to the surface of the plate selected ink while the ink is introduced selected from a plurality of ink container housed in a container or housing section and a printing section for print-

ing nail so as to re-transcribe the pictorial image to the nail in order to produce this pad in contact with the nail user's finger, after transcription of this ink to the pad.

[0008] The Korean application to Plenty (KR20040060776) describes an apparatus provided to quickly and accurately paint images of diverse content in nails with various ink colors without disturbing operations a user with relatively little staining of the periphery of the apparatus.

[0009] Having found the above, the disadvantage persists regarding device portability, ease of use by people with visual and/or hearing disability, dependence on third parties to operate the device and practicality. The other electronic devices for painting nails are usually large (60 cm×90 cm×90 cm) and heavy weight (10-20 kg). They do not allow the user to choose the brand of enamel to use, the user must use the existing colors used by the device manufacturer. Current devices allow paint one nail at a time or more and not ergonomically but in an awkward way.

SUMMARY OF THE INVENTION

[0010] This section is for the purpose of summarizing some aspects of the present invention and to briefly introduce some preferred embodiments. Simplifications or omissions may be made to avoid obscuring the purpose of the section. Such simplifications or omissions are not intended to limit the scope of the present invention.

[0011] In one aspect, the invention is about a housing having two or more apertures, where such apertures are suitable for insertion of one or more human digits, including the thumb, sensor means for sensing the position of a finger and your fingernail, means of applying nail polish or nail polish and said means to position in three-dimensional space and through said drying enamel paint or said one or more nails. In another aspect this means for applying nail polish or nail polish comprises a moving spray mechanism. In another aspect, said sensor means includes an infrared sensor.

[0012] In one aspect, said sensor means includes a capacitive sensor. In another aspect, said moving mechanism includes a gimbaled spray mechanism. In one aspect, said housing has six or more openings, with two of those openings suitable for the insertion of a human thumb. In another aspect further comprises indicators of the operating status of the unit.

[0013] Other features and advantages of the present invention will become apparent upon examining the following detailed description of an embodiment thereof, taken in conjunction with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] FIG. 1 shows a top view of three-dimensional shape of the exterior of the electronic device automated dyeing and drying of the fingernails, include the LED screen, the apertures of the fingers, electrical lines, the container of enamel, and the rest of the forearm, according to an illustrative embodiment of the invention.

[0015] FIG. 2 shows a three dimensional view of the front of the device, showing the container of enamel and electric wires and the rest of the forearm, according to an illustrative embodiment of the invention.

[0016] FIG. 3 shows a three dimensional view of the outside bottom of the device, showing the horn side and the air inlet at the bottom of the device, according to an illustrative embodiment of the invention.

[0017] FIGS. 4A-4B show views of the container of enamel, according to illustrative embodiments of the invention.

[0018] FIG. 5 shows the diagram of the electronic components forming the automated device of nails dyeing and drying, according to an illustrative embodiment of the invention.

[0019] FIGS. 6-8 show three dimensional views of the inside of the device, according to illustrative embodiments of the invention.

[0020] FIG. 9 shows the diagram of the components that comprise an option for automated electronic device nails dyeing and drying according to an illustrative embodiment of the invention.

[0021] FIG. 10 shows an illustration (“gymbal”) gimbaled applicator system, according to an illustrative embodiment of the invention.

[0022] The above-described and other features will be appreciated and understood by those skilled in the art from the following detailed description, drawings, and appended claims.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0023] This section is for the purpose of summarizing some aspects of the present invention and to briefly introduce some embodiments, bodies, and preferred implementations modifications. Simplifications or omissions may be made to avoid obscuring the purpose of the section. Such simplifications or omissions are not intended to limit the scope of the present invention.

[0024] To provide an overall understanding of the invention, certain illustrative embodiments and examples will now be described. However, it will be understood by one of ordinary skill in the art that the same or equivalent functions and sequences may be accomplished by different embodiments that are also intended to be encompassed within the spirit and scope of the disclosure.

[0025] The compositions, apparatuses, systems and/or methods described herein may be adapted and modified as is appropriate for the application being addressed and that those described herein may be employed in other suitable applications, and that such other additions and modifications will not depart from the scope hereof.

[0026] As used in the specification and claims, the singular forms “a,” “an” and “the” include plural referents unless the context clearly indicates otherwise. For example, the term “transaction” may include a plurality of transaction, unless the context clearly dictates otherwise. As used in the specification and claims, the singular names or reference include variations within the family of that name, unless the context clearly dictates otherwise.

[0027] Certain terminology is used in the following description for convenience only and is not limiting. The words “low,” “down,” over “,” top “,” front “,” back “,” left “,” right “and” parts “designate directions in the drawings to which reference is made, but they are not limiting with respect to the orientation in which the modules can be used for mounting or any of them.

[0028] All references, including any patents or patent applications cited herein are incorporated herein by reference. No

admission is made that any reference constitutes prior art. The discussion of the references states what their authors assert, and applicants the right to challenge the accuracy and relevance of the documents cited are reserved. It is clearly understood that, although reference in this document are a number of prior art publications is done, this reference does not constitute an admission that any of these documents are part of the common general knowledge in the art.

[0029] It is acknowledged that the term ‘comprise’ may, under varying jurisdictions, be attributed with either an exclusive or an inclusive meaning. For the purpose of this specification, and unless otherwise noted, the term ‘comprise’ shall have an inclusive meaning—i.e. that it will be taken to mean an inclusion of not only the listed components it directly references, but also other non-specified components or elements. This rationale will also be used when the term ‘comprised’ or ‘comprising’ is used in relation to one or more steps in a method or process.

[0030] Referring to FIG. 1 we see an embodiment of the electronic device 100 for the automated dyeing and drying polish of nails. This device has been designed to paint and dry nails automatically in the shortest time possible. The invention consists of two objects: the internal functionality of the device and the exterior and interior design of it, without which we could not reach the solution to the problem.

[0031] In a preferred form of use, the user reaches into the machine, it uses a sensor that activates the ignition thereof. The user inserts the fingers of one hand in one or more openings 102, which allows a computer to recognize which hand is inserted (preferably noting the position of the thumb on one of the two openings 110 using thumb (FIGS. 6-9) one or more sensors 610 fingers). A see the hand is detected, the head unit 602 moves along the periphery of the hand, using one or more sensors mounted on one or more areas 606 of sense head 602 to detect the position of each of nails.

[0032] To determine the position of the digit, in one embodiment a combination of means, resources or ways to detect the digit, position and position of the area of the nail, which may include capacitive, infrared sensors are used. Alternate embodiments may also use detectors colors, visual cameras, etc., Vision systems (“machine vision”) with filters and/or illumination capable of detecting and delineating the nail area vis-à-vis the cuticle and finger.

[0033] In one embodiment, the head 602 is moved to the area where it is expected that the distal area of the finger or digit, and determines its location using a capacitive sensor mounted on the sensory area 606. So the nail is detected, allowing recognize the presence of the nail, preventing the system is activated by introducing object other than the one specified in the design.

[0034] In one embodiment, a capacitive sensor, which delivers different voltages according to the object which is already close to the distance that is used for this. This information allows you to adjust the sensor to detect a person’s claw and enable the system begins to operate only with the presence of a human finger. This also contributes to the added accuracy when painted provide vital information in conjunction with an infrared sensor also mounted on one or more areas 606 of sense head 602.

[0035] Using this information, particularly through the difference between the detected surface capacitive sensor and/or infrared, allows the processor 802 of the system to understand the specific location of the perimeter of the surface of the nail. That is, the spatial point of change between the surface of the

nail and finger (both the cuticle and the same finger). This abrupt change in the characteristic of the surface delimiting the end of the nail and the start of the cuticle or the edge of the finger and the periphery of this.

[0036] With this information, the processor unit can send signals to where to aim the applicator, so how and when to start and/or stop dyeing, controlling the means, resources or manner of painting, which may include spray, brush, applicator once or injector **608** to the surface of the nail. Providing this signal to said processor, the sensor providing the information required for controlling the motors and actuators of various means or ways of moving resources precise locations of the applicator. These means are the measure by which the applicator **608** used to paint the surface of the nail moves.

[0037] With the spatial information detected by sensors, and set in a 'real time' (to adjust any changes induced restlessness, nervousness or other movement of the user), the applicator **608** moves nail by nail to paint or register any graphic design on it.

[0038] In one embodiment, the applicator **608** is mounted on a movable head **602** to the full width of the user's hand, said head gimbaled device also containing a (FIG. **10**) that allows the applicator to be moved in three planes or positions X, Y, Z. X **1002** or longer, from the cuticle to the end of the nail. And wide or **1004**, from the left end to the right. **1006** Z or depth that allows both the offset approach, withdrawal) and optionally the rotation angle of the applicator **1008** to the surface **606** of the nail. The information given by the sensor will be sent to a processor which has the angles of the location where the fingers are.

[0039] The fingers enter the device through channels or openings which will take you to the desired location to be detected and identified its dimensions. This manages to locate the nail polish or other paint evenly across the entire surface of the nail according to the size, curvature and length of each type of nail, allowing the application to be orthogonal to the surface of the nail, or in any other desired angle. As an example, when this near the cuticle, is desirable angular applicator **608** into the painted area, minimizing any splashed or overspray.

[0040] The infrared sensor in combination with capacitive provides accuracy when starting the painting process, the sensor has pinpoint accuracy allowing to determine the physical limits of the nail, creating a temporary map to the device is capable of performing the painting process in a quick and precise manner. At the end of drying equipment shall repeat the process but now with the protective lacquer for the nails. All these steps are displayed by LED touch "touch screen" display showing each step and is also where the user controls what color you want to paint each nail.

[0041] The system can be programmed by the user via the display **104**, for a remote application on another computer, tablet, Smartphone or cell unit. In one embodiment, the system is programmed to paint all fingers at the same time, with the same color, in alternate embodiments, various colors and graphic designs are scheduled in advance by the user. The unit (FIGS. **2-3**) can be operated by batteries **108**, AC voltage **206**, DC voltage **208** (either USB or a car).

[0042] After the applicator **606** has completed the course of painting nails, stopping angles are located where the toes and having performed tinting the nail of a particular hand, returns to its initial position and the processor will send a signal to the drying system to fix the paint or enamel to the

nail. This drying system can be as simple as only air (operated by a fan located near the air inlet **304** with the air coming out of the peripheral input finger **102** and/or **110**, the area of the speaker/announcer **302**, or others. In another embodiment, the system comprises a drying device issuing air into nails and a beam of ultraviolet light for drying enamel in the shortest time possible.

[0043] The ink, enamel or other liquid or gas required to paint the nails is stored in one or more containers, dispensers, receptacles or containers that feed the applicator **202 608** in the supply of the tinted according to the required demand. This storage device has a capacity or level sensor to warn the system and the user when the container is running low audible and visual way through lights, indicators, horn **302** and/or display **104** (the LCD screen can be, LED or similar) device and any application linked to the device via USB, Wi-Fi, Ethernet, Bluetooth or similar technology.

[0044] In one embodiment (FIGS. **4A-4B**), each package **404, 406, 408** has a code that will be identified by the computer to determine the authenticity of the container and confirm that it has not been used previously and no been altered or container or paint to prevent equipment damage by repainting of the same or other brand not recognized. After reading the code, the team may refuse the use of this container if it is not genuine or has been used previously.

[0045] This code may be a bar code, "Near Field Communication" (NFC), RFID, reading human, or the like. Each cartridge will bring your utilization code. In one embodiment, the code will be typed on the screen when the cartridge is new. When the new cartridge is inserted the equipment, ask for the key that will bring the cartridge inside the box to ensure the originality of it.

[0046] In one embodiment, if the client last long with enamel unused equipment detected based on elapsed time, if the paint is in good condition for use. Eventually glazes tend to change their density by the time of manufacture. The team measured the density will determine whether the enamel is not able to be used. The team will tell and show the client the message: 'Change the Package XXX' in the case that the quality of the enamel has been compromised.

[0047] The system is controlled by a processor and memory (FIG. **5**), able to be linked with the various sensors described above. This microprocessor uses electronics to control the various functions **500** and processes required to operate the system as described above.

[0048] Once the process with one hand, the device prompts audibly and visually, the user inserts the other hand to repeat the process. In one embodiment, the computer shuts down after 2 minutes without having to save energy use.

Examples

[0049] In an example, show one embodiment of an electronic device automated painting and drying of nails, comprising at least two openings for the fingers, at least one opening to place dispenser enamel that identifies the color, touch screen Led graphically showing the hand that has been introduced, ergonomic base to place the hands, wrist and forearm, electrical cable, electrical connector vehicle cigarette lighter, rechargeable battery, speaker, access to outside air.

[0050] In another, the device is characterized in that it comprises six ports, each with a channel-shaped front of the hands directed into, a nozzle distance to nail of 0.1 mm to 75 mm. In another aspect, the device comprises an opening for dispens-

ing enamel having a device that connects it to the electronic device, and gives access to the enamel, which moves through a channel through which passes to the injector and/or applicator.

[0051] In another example, the device is characterized by comprising a dispenser containing a nail system that allows you to identify the color of the enamel which contains the date of last use and the remaining amount in it. In one example, the device is characterized in that it comprises an LED touch screen showing graphically both hands, pointing the fingers and numbering them from 1 to 5, colors are available in the dispenser, the level of remaining enamel and last date of use. In another example, the device is characterized by comprising an ergonomic base, to place the hand, wrist and forearm.

[0052] In one example, the device is characterized by comprising a horn, which reports that the process is performing. In another example, the device is characterized by comprising an air gap, which allows with the help of an internal fan, the inlet and outlet of air and/or air issuing device. In another example, the device is characterized in that it comprises the operation of capacitive sensors, infrared sensors, motors, nozzles, tubes, compressor, pneumatic valves for painting, device issuing air gears UV lamp for drying enamel and final lacquer, rechargeable battery and electric cables. In another example, the device is characterized by comprising a USB port that allows users to download songs to place while the device performs the nail polish.

[0053] In one embodiment, the device has a sensor that identifies the hand that has been introduced and activates the ignition device has LED touch screen that allows the user to choose the nails and the color you want to paint, without need for specialized personnel to operate and informs the user of visible and audible way the process is performing.

[0054] In another embodiment, consists of capacitive and infrared sensors that detect the difference in the surface of the finger and nail, a computer or word processor that guides and controls the head with the ink hits the tint on the surface of the nail. In one embodiment, a device that has issued air towards the nails and then applies a beam of ultraviolet light for rapid and uniform drying.

[0055] In another example, the process ended with one hand, the device prompts audibly through the speaker and visual way LED touch screen, the user inserts the other hand to repeat the process.

CONCLUSION

[0056] In concluding the detailed description, it should be noted that it would be obvious to those skilled in the art that many variations and modifications can be made to the preferred embodiment without substantially departing from the principles of the present invention. Also, such variations and modifications are intended to be included herein within the scope of the present invention as set forth in the appended claims. Further, in the claims hereafter, the structures, materials, acts and equivalents of all means or step-plus function elements are intended to include any structure, materials or acts for performing their cited functions.

[0057] It should be emphasized that the above-described embodiments of the present invention, particularly any "preferred embodiments" are merely possible examples of the implementations, merely set forth for a clear understanding of the principles of the invention. Any variations and modifications may be made to the above-described embodiments of the invention without departing substantially from the spirit

of the principles of the invention. All such modifications and variations are intended to be included herein within the scope of the disclosure and present invention and protected by the following claims.

[0058] The present invention has been described in sufficient detail with a certain degree of particularity. The utilities thereof are appreciated by those skilled in the art. It is understood to those skilled in the art that the present disclosure of embodiments has been made by way of examples only and that numerous changes in the arrangement and combination of parts may be resorted without departing from the spirit and scope of the invention as claimed. Accordingly, the scope of the present invention is defined by the appended claims rather than the forgoing description of embodiments.

1. (canceled)
2. (canceled)
3. (canceled)
4. (canceled)
5. (canceled)
6. (canceled)
7. (canceled)
8. (canceled)
9. (canceled)
10. (canceled)

11. An apparatus for the automated painting of human fingernails comprising;

a housing having two or more apertures, where each such aperture is suitable for the insertion of one or more human digits, including the thumbs;

sensor means for sensing the position of a finger and its fingernail;

means of applying nail polish said fingernail, where said nail polish or nail enamel application means allow for the application and positioning in three-dimensional space of said application means on said one or more fingernails.

12. the apparatus of claim 11 wherein;

said means for applying nail polish or nail enamel comprises a moving spray mechanism.

13. the apparatus of claim 12 wherein;

said sensor means includes an infrared sensor.

14. the apparatus of claim 13 wherein;

said sensor means includes a capacitive sensor.

15. the apparatus of claim 14 wherein;

said moving mechanism includes a gimbaled spray mechanism.

16. the apparatus of claim 15 wherein;

said housing has six or more openings, with two of those openings suitable for the insertion of a human thumb.

17. the apparatus of claim 16 wherein;

said apparatus further comprises indicators of the operating status of the unit.

18. An apparatus for the automated painting and drying of finger nails comprising;

an enclosure housing the unit, said enclosure comprising an LED touch screen for graphically showing the hand which has been introduced, an ergonomic base to place the hand, wrist and forearm, one or more openings for the placement of enamel dispensing containers, said containers identifying said enamel's color, electrical cable connectors, speaker, and access to air outside said enclosure, and two or more openings for the insertion of human fingers;

a sensor for detecting the position of a finger and the position of the nail within said finger; and nail painting mechanism movable in three or more dimensions.

19. the apparatus of claim **18** further comprising; said enclosure has six finger openings, each opening having a channel, so that the five from one side and the five from the other side form the shape of a human hand; and said nail painting mechanism is comprised of a painting nozzle, with a nozzle distance to nail adjustable between 0.1 mm to 75 mm.

20. the apparatus of claim **19** wherein; said nail painting mechanism is comprised of both capacitive sensors and infrared sensors; said nail painting system is comprised of one or more motors, one or more nozzles, one or more tubes, one or more compressors, one or more pneumatic valves for painting, an air issuing device, gears, and a UV lamp for drying enamel and lacquer finish.

21. the apparatus of claim **20** wherein; one or more of said enamel dispensing containers connects to the device and provides access to the enamel glaze so

that when moved through a channel said glaze passes to the injector and/or applicator.

22. the apparatus of claim **21** wherein; said dispenser system allows the identification of the color of enamel, date of last use and the remaining amount in the same.

23. the apparatus of claim **22** wherein; said LED touch screen shows graphically the hand in place, points the fingers and numbers them from 1 to 5, colors that are available in the dispenser, the level of remaining glaze and the last date of use.

24. the apparatus of claim **23** wherein; said enclosure comprises a speaker.

25. the apparatus of claim **24** wherein; said enclosure has an air opening, which allows for cross ventilation through the help of an internal fan.

26. the apparatus of claim **25** wherein; the enclosure includes a USB port that allows users to download songs to play while the device performs the nail polish.

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