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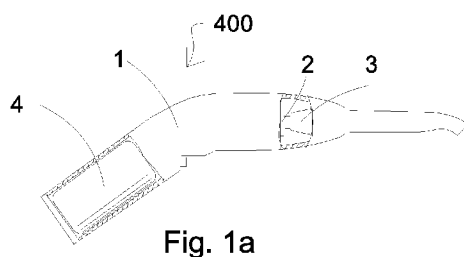


Fig. 1a

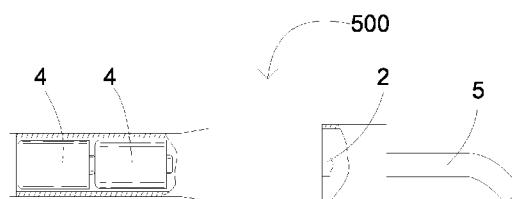


Fig. 1b

(57) Abstract: A curing light device for the polymerization of resin-based composites is provided with a short charge time cordless light polymerization device primarily for dental use that provides time and light required for curing resin-based composites.



A CURING LIGHT DEVICE

FIELD OF THE INVENTION

5 The present invention relates to curing light devices, more particularly, to a pen style, high power output, cordless light polymerization device for use in dentistry.

BACKGROUND OF THE INVENTION

10 Curing light devices are commonly used in dental clinics for the purpose of polymerization of resin-based composites. The clinical performance of light polymerized resin-based composites is greatly influenced by the quality of the light curing device. The efficiency and convenience of the dentist's work
15 greatly depends on the structure, shape, dimensions, and weight of the light curing device, and particularly on the necessary charging time and the lighting time that the device is capable of.

 The common sources of energy for curing light devices are the domestic power grid, namely connection of curing light devices to the grid by means of
20 an electric cable, or rechargeable batteries. Dependency on a constant connection to the power grid is a disadvantage seeing as the electric cable complicates the dentist's work, while dependency on rechargeable batteries requires either excessively long intervals for charging or use of more than one curing light device.

25 An additional drawback of using rechargeable batteries is their large size and weight, which weighs down the hand of the working dentist.

United States Patent no. 7,182,597 (February 27, 2007), to Gill, which is incorporated by reference for all purposes as if fully set forth herein, discloses a curing light instrument.

5 Figure 1a is a side view of the prior art schematic illustration of components of a curing light instrument **400** constructed in accordance with US Patent No. 7,182,597 to Gill, two side parts of which have been removed to show its content.

 Curing light instrument **400** is a handheld portable instrument whice
10 comprises a housing **1**, a light emitted structure **2** supported in the housing **1**, and a reflector **3** configured to interface with the light emitting structure **2** such that light emitted is captured and directed by the reflector **3** onto a light-curable compound.

 Curing light instrument **400** may also have a self-contained power supply
15 lending portability and convenient of use. The power supply may be a portable power supply, such as a battery **4**, contained in the housing **1**. Advantageously, battery **4** is a rechargeable battery contained in housing **1**. Alternatively, the curing light instrument **400** may be powered by an external source such as an AC power source coupled to a converter to supply DC power to the light
20 emitting structure.

 United States Patent no. 6,611,110 (August 26, 2003), to Fregoso which is incorporated by reference for all purposes as if fully set forth herein, discloses a photopolymerization apparatus.

Figure 1b of the prior art is a side view schematic illustration of components of a photopolymerization apparatus **500** constructed in accordance with US Patent no. 6,611,110 to Fregoso, two side parts of which have been removed to show its content.

5 Photopolymerization apparatus **500** delivers light of sufficient intensity to cause photopolymerization using a light emitted structure **2** such as single light emitting diode (LED). The single LED can be positioned internally within the apparatus or at the tip of the apparatus. When placed internally, a system of one or more lenses and/or known light focusing means or light guider **5** can be
10 added to the device to further focus and intensify the light provided by the LED.

Photopolymerization apparatus **500** can be powered by batteries **4**, one or more alkaline batteries, or rechargeable batteries, such as lithium ion or nickel metal hydride; or be plugged into a wall socket.

15

SUMMARY OF THE INVENTION

There is therefore a need for a cordless curing light device, whose necessary time for electrical charging is no longer than about several tens of seconds and provides lighting for an extended period of time, thus enabling the
20 dentist to work without needless interruptions.

The curing light device according to at least some embodiments of the present invention overcomes these drawbacks of the background art, by providing a curing light device powered by at least one high power, high

energy capacitor, such as a supercapacitor for example. Within the context of this application the term supercapacitor refers to capacitors that provide high energy density, for example including but not limited to electric double-layer capacitors, electrochemical double layer capacitors (EDLCs), or ultracapacitors as is known in the art. Optionally the device according to the present invention may comprise a KorChip DR2R3506 supercapacitor as is known in the art.. Optionally and preferably, the device according to the present invention charges rapidly as described herein. Optionally the device according to the present invention may be charged in time a frame of about ninety seconds, optional up to about sixty seconds, optionally and preferably up to about twenty seconds, optionally up to about fifteen seconds and more preferably from about ten seconds to about fifteen seconds. Optionally and preferably, the device according to the present invention may operate for at least about 40 to about 130 seconds.

The curing light device according to an optional embodiment of the present invention preferably includes two units, a high power output cordless lighting unit, which also includes one or more high energy and high power capacitors, and a charging unit.

The design functionality of the high power output cordless lighting unit and of the charging unit resembles that of a pen and inkwell. This enables the dentist to perform polymerization, by removing the so-called pen from the so-called inkwell, lighting, and inserting it back into the inkwell for a few seconds at a time to recharge it as necessary.

The high power output cordless lighting unit optionally and preferably includes a housing, at least one or more high-energy capacitors (for example including capacitors AKA ultra capacitors or super-capacitors), at least one or more control buttons for example including but not limited to a switch, user interface controller, user interface button, touch sense button or the like electronic circuit to control the current provided to at least one or more light emitting element, such as a LED for example a buck, boost or buck-boost (AKA SEPIC) circuit or the like current stabilizing circuitry as is known in the art, contacts to recharge the capacitors.

10 According to the present invention there is provided a curing light device for polymerization of resin-based composites, the curing light device including: (a) a cordless lighting unit having predetermined form and dimensions, the cordless lighting unit includes: (i) a lighting unit housing; (ii) at least one capacitor disposed inside the lighting unit housing; and (iii) at least one light emitting element disposed inside the lighting unit housing, wherein the light emitting element is electronically connected to the at least one capacitor.

According to further features in described embodiments of the invention described below, the curing light device further including: (b) a charging unit having predetermined form and dimensions that fit the predetermined form and dimensions of the cordless lighting unit, the charging unit includes: (i) a charging unit housing; and (ii) a socket securely connected to the charging unit housing.

According to further features in described embodiments of the invention described below, the at least one capacitor has an empty state to a full capacity state.

According to further features in described embodiments of the invention described below, the charging unit can charge electronically, the at least one capacitor, from an empty state to a full capacity state, at a time interval, wherein the period of time interval is up to about ninety seconds, more preferably up to about sixty seconds, most preferably up to about twenty seconds.

Additional objects and advantages of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is herein described, by way of example only, with reference to the accompanying drawings, wherein:

Figure 1a of the prior art is a side view schematic illustration of components of a curing light instrument constructed in accordance with US Patent No. 7,182,597.

Figure 2 is an isometric schematic illustration of an illustrative, exemplary embodiment of a curing light device, according to the present invention.

Figure 3a is a lower isometric schematic illustration of an illustrative, exemplary embodiment of the cordless lighting unit, according to the present invention.

Figure 3b is a lower isometric schematic illustration of an illustrative, exemplary embodiment of the cordless lighting unit, according to the present invention.

Figure 3c is an upper isometric schematic illustration of an illustrative, exemplary embodiment of the cordless lighting unit, according to the present invention.

Figure 3d is an upper isometric schematic illustration of an illustrative, exemplary embodiment of the cordless lighting unit, according to the present invention.

Figure 4a is a top view schematic illustration of an illustrative, exemplary embodiment of the cordless lighting unit, according to the present invention.

Figure 4b is a side view schematic illustration of an illustrative, exemplary embodiment of the cordless lighting unit, according to the present invention.

Figure 4c is a bottom view schematic illustration of an illustrative, exemplary embodiment of the cordless lighting unit, according to the present invention, upon which section plane 4d-4d is marked.

Figure 4d is a 4d-4d schematic cross sectional view illustration of an illustrative, exemplary embodiment of the cordless lighting unit, according to the present invention, the illustration marking detail A in a circle.

Figure 5a is an isometric schematic illustration of an illustrative, exemplary embodiment of a charging unit, according to the present invention.

Figure 5b is a side view schematic illustration of an illustrative, exemplary embodiment of a charging unit, according to the present invention.

5 Figure 5c is a top view schematic illustration of an illustrative, exemplary embodiment of a charging unit, according to the present invention.

Figure 5d is an isometric schematic illustration of an illustrative, exemplary embodiment of a charging unit, according to the present invention, in which part of the charging unit housing has been removed.

10 Figures 6a-c are schematic electronic schemes of an illustrative, exemplary embodiments of the curing light device, according to the present invention.

DETAILED DESCRIPTION OF EMBODIMENTS

15 The principles and operation of a curing light device according to the present invention may be better understood with reference to the drawings and the accompanying description.

Before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details
20 of construction and the arrangement of the components set forth in the following description or illustrated in the drawings.

Unless otherwise defined, all technical and scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which this invention belongs. The materials, dimensions, methods, and

examples provided herein are illustrative only and are not intended to be limiting.

The following list is a legend of the numbering of the application illustrations:

5	1	housing (of the prior art)
	2	light emitted structure (of the prior art)
	3	reflector (of the prior art)
	4	battery (of the prior art)
	5	light guider (of the prior art)
10	10	heat sink
	11	lighting unit housing
	12	electrical contact
	13	capacitor
	14	operation button
15	15	first PCB
	16	second PCB
	17	light emitting element
	18	lens
	19	reflector
20	21	charging unit housing
	22	handpiece recharging socket
	23	third PCB
	24	status indicator

	25	power connector
	26	charging unit energy storage element / internal power source
	100	cordless lighting unit
	200	charging unit
5	300	curing light device
	400	curing light instrument (prior art)
	500	photopolymerization apparatus (prior art)
	602	Mains power supply
	604	AC/DC charger adapter
10	610/611	charging base unit
	612	charging unit controller
	614b	battery charging circuitry
	614c	super capacitor charging circuitry
	618	charger discharge circuit

15

Referring now to the drawings, Figure 2 is an isometric schematic illustration of an illustrative, exemplary embodiment of a curing light device **300**, according to the present invention.

A cordless lighting unit **100** is inserted into or otherwise associated with a
20 charging unit **200**. In this state, charging unit **200** may optionally be connected to an electrical power source (not shown) that may charge at least one or more capacitors housed within cordless lighting unit **100**. Optionally, charging unit may comprise an internal power source (not shown here described in more

detail in Figures 6A-6B) that most preferably will be used to provide the necessary power to charge at least one or more capacitors housed within cordless lighting unit 100.

Most preferably cordless lighting unit **100** has external design, dimensions,
5 and weight to enable convenient and ergonomic use in the dentist's hand, while providing effective lighting and illumination of any necessary place in the oral cavity.

Figure 3a is a lower isometric schematic illustration of an illustrative, exemplary embodiment of the cordless lighting unit **100**, according to an
10 optional embodiment of the present invention.

A lighting unit housing **11** which may be made from plastic and/or from a suitable metal such as aluminum or a combination of suitable materials, holds internal elements of lighting unit 100 together. Lighting unit housing **11** is provided with at least one or more electrical contact **12**, for the purpose of
15 conducting a current from the charging unit **200** (not shown) while charging capacitors housed within lighting unit housing **11**.

In another optional embodiment of the present invention cordless lighting unit 100 may be provided with inductive charging capabilities, wherein cordless lighting unit 100 may be provided without electrical contacts 12.

20 Figure 3b is a lower isometric schematic illustration of an illustrative, exemplary embodiment of the cordless lighting unit **100**, according to the present invention. Part of the lighting unit housing **11** has been removed in order to show internal components.

Cordless lighting unit **100** most preferably comprises at least one or more capacitor **13**. Capacitor **13** most preferably is provided with properties suitable for its designation, namely, to enable a brief charging time of about a few seconds, and supply of electric energy to lighting unit **100** which enables
5 lighting at the necessary level for long times of about tens of seconds, or at a very high burst of power for about 1 to 2 seconds, usually with high capacitance such as at the range of 30 to 100 Farad, and low maximum voltage ratings such as at the range of about 2 to 5 Volts (Energy in the range of about 50 to 100 Joule). Optionally when provided with more than one capacitor **13**,
10 they may be connected in series or parallel according to suitable electronic control design. One optional such capacitor **13** is the PSHLR-0030C0-002R3 type capacitor, manufactured by NessCap[®], which has the specifications of :

Rated Capacitance (discharge with constant current at 25°) of 30F,
Max. Current (1 sec. discharge rate to $1/2V_R$) of 14.1A,
15 Stored Energy (at V_R) of 0.022Wh
Weight of 3.7gr.
Length of 30 millimeter , and
Diameter of 10 millimeter.

Figure 3c is an upper isometric schematic illustration of an illustrative,
20 exemplary embodiment of the cordless lighting unit **100**, according to the present invention. The lighting unit housing **11** is preferably provided with at least one operation button **14**. The operation button **14** is preferably connected mechanically and electronically to a printed circuit board (herein referred to

“PCB”) (not shown in the present illustration), that enables user control and operation of the emitting and cessation of lighting from the cordless lighting unit **100**.

Figure 3d is an upper isometric schematic illustration of an illustrative, exemplary embodiment of the cordless lighting unit **100**, according to the present invention. Part of the lighting unit housing **11** has been removed, in order to show internal components at least one or more capacitor **13** and operating button **14** as previously described in Figures 3b and 3d.

Figure 4a is a top view schematic illustration of an illustrative, exemplary embodiment of the cordless lighting unit **100**, according to the present invention.

Figure 4b is a side view schematic illustration of an illustrative, exemplary embodiment of the cordless lighting unit **100**, according to the present invention.

Figure 4c is a bottom view schematic illustration of an illustrative, exemplary embodiment of the cordless lighting unit **100**, according to the present invention, upon which section plane 4d–4d is marked.

Figure 4d is a 4d–4d schematic cross sectional view illustration of an illustrative, exemplary embodiment of the cordless lighting unit **100**, according to the present invention, the illustration marking detail A in a circle.

Preferably, at least one or more light emitting element **17** emits light in a certain range of wavelengths most preferably in keeping with the curing properties required to bring about the polymerization of resin-based composites

utilized. Optionally at least one or more light emitting element 17 may be provided in the form of a light bulb with a wide range of available wavelengths that may optionally and preferably be filtered to provide a required wavelength by means of a wavelength filter, and power to comply with the curing material sensitivity. Such light emitting element 17 may be, but is not limited to, at least one or more light emitting diode (herein referred to as "LED"). Optionally at least one or more light emitting element 17 may be provided in the form of an LED array.

One such optional LED is the LUXEON Rebel royal-blue LED, manufactured by Philips LumiledsTM, operated between 350mA and 1,000mA, approximately 225mW of radiometric power.

Light emitted from at least one or more light emitting element 17 is most preferably reflected by a reflector 19 toward a lens 18. Lens 18 preferably directs light, emitted from at least one or more light emitting element 17, which is reflected onto it directly from reflector 19 and focuses light onto the desired location for the purpose of convenient performance of the procedure by the dentist.

A first electronic printed circuit board, a first PCB 15 comprising an electronic circuit (not shown) most preferably provides controls of the energy flow rate to at least one or more light emitting element 17, keeping it according to a controlled sequence per press of operation button 14. Optionally the controlled sequence may be provided as a constant current, or pulse currents or ramp up current or the like as is known in the art. Optionally, the electronic

circuit (not shown) associated with PCB 15 may optionally consist of a buck, boost, buck-boost driver and a micro-controller, or the like. The driver circuitry (not shown) provided with PCT 15 is optionally and preferably dependent on the capacitor(s) 13 and capacitor configuration utilized (e.g. parallel or series) and on at least one or more light emitting element(s) 17 chosen and their configuration (e.g. parallel or serial).

A second PCB 16 is preferably provided to hold at least one or more light emitting element 17, optionally and preferably provided in the form of a surface mounted LED on PCB 16. Most preferably second PCB 16 is not directly linked or coupled to PCB 15 and is provided with a separation from first PCB 15 most preferably to provide at least one or more light emitting element 17 with an angle relative to first PCB 15.

Most preferably, a heat sink 10 serves for dispersal of the heat generated by at least one or more light emitting element 17 during operation.

Figure 5a is an isometric schematic illustration of an illustrative, exemplary embodiment of a charging unit 200, according to the present invention. The charging unit 200 most preferably enables charging of at least one capacitor 13 with electricity, to full charge most preferably in short time interval in comparison with a similar charge level in prior devices.

The charging unit 200 comprises charging unit housing 21 which maybe composed of at least one or more parts, optionally an preferably housing 21 is provided in two halves as shown in the illustrations, or of other configurations of two parts, or even more than two parts. Preferably the upper face of

charging unit **200** comprises a handpiece recharging socket **22**, with which a corresponding portion of cordless lighting unit **100** is electrically coupled for electrically charging cordless lighting unit 100 with power provided from charging unit 200. Optionally lighting unit 100 may be coupled with charging
5 unit 200 via wireless, wire, contact, contactless, induction or the like electronic coupling. Optionally and preferably lighting unit 100 is charged by inserted into handpiece recharging socket 22, for the purpose of electric charging, similar to the insertion of a quill into an inkwell for charging with ink. Most preferably, the geometric shapes of socket **22** and of cordless lighting unit **100**
10 are compatible, to allow for charging by electric contact and/or induction between them.

Figure 5b is a side view schematic illustration of an illustrative, exemplary embodiment of a charging unit **200**, according to the present invention.

Power connectors **25** optionally protrude from charging unit housing **21**,
15 although they may also be provided in sunken and/or surface level formations relative to housing 21. Power connectors **25** enable power feed from an external source such as the domestic grid, Mains power supply (in this case, charging unit **200**, as well as transformer and current AC to DC adaptor, not shown in the present illustration show in more detail in Figure 6A-C), or from
20 a DC current source, for example a battery. Optionally and preferably charging unit 200 is provided with at least one status indicator **24** optionally and preferably for displaying the charge status of capacitor **13**. For example, after a few seconds when the capacitor **13** is full, a green light of the status indicator

24 is lit. The status indicator **24** may also optionally show the status of a charging unit energy storage element **26** (not shown; shown in Figure 5d).

Figure 5c is a top view schematic illustration of an illustrative, exemplary embodiment of a charging unit **200**, according to the present invention.

5 Figure 5d is an isometric schematic illustration of an illustrative, exemplary embodiment of a charging unit **200**, according to the present invention, part of whose charging unit housing **21** has been removed to reveal internal portions.

Removal of part of charging unit housing **21** reveals internal components, including a charging unit energy storage element **26**, which may be provided in the form of rechargeable battery, to allow high power to flow from charging unit **200** to capacitor **13** while charging, and to provide a user the option of using curing light device **300** without charging unit **200** being connected permanently to an external and/or Mains power source. Figure 5d also reveals
15 a third PCB **23** comprising an electric circuit that preferably serves to control the charging process for at least one or more capacitor **13** . Optionally and preferably PCB **23** may provide for control of the charging process for the charging unit energy storage element **26**. Optionally PCB **23** may comprise an indicator, for example including but not limited to acoustic or optical indicators
20 such as a buzzer and/or light, to indicate to a user the charge status.

Charging of capacitor **13** may optionally be provided by conducting an electric current through corresponding electrical contacts **12** respectively disposed on socket **22** and lighting unit **100**, or optionally by way of induction.

In order to perform a procedure with the light curing device 300 according to the present invention following charging cordless lighting unit 100 comprising at least one or more capacitor **13** with charging unit 200 optionally through an outside source of energy such as Mains power, the user holds the tip
5 of the cordless lighting unit **100**, in which at least one or more light emitting element **17** is disposed, in front of the material to be cured. The user then presses the operation button **14** and energy is transferred by a current control circuit optionally PCB 15 and PCB 16 from the capacitors to at least one or more light emitting element **17**. Light is then optionally directed through filters
10 19 and lens 18 and is emitted onto the material to be cured.

Figures 6A-C provide schematic block diagrams of optional electronic circuitry of curing light device 300 according to optional embodiments of the present invention showing optional power configurations as depicted in a charging unit 610 and 611. Curing light device 300 comprises charging unit
15 610,611 (previously referred to as 200) and handpiece unit 100, an electrical adaptor 604 for example an AC/DC charger, as described above. Electrical adaptor 604 mediates electrical power provided to curing light device 300 and specifically to charging unit 610, 611 from the input mains power source 602. Handpiece unit 100 comprises at least one capacitor 13, contacts 12, controller
20 14, discharge circuit 15, at least one or more light source 17 as described above in Figures 2-4.

Figure 6A shows a schematic circuit diagram of an optional embodiment of curing light device 300 where charging unit 610 is provided with an internal

power source 26, for example a battery, for charging handpiece unit 100 when charging unit 610 is not connected to the mains power supply 602. For example, such an internal power source may provide for mobile power and use of curing light device 300 allowing a user to optionally charge handpiece 100 without being connected to mains power supply 602. Optionally and preferably internal power source 26 may be provided in the form of rechargeable batteries as are known in the art and may be controllably charged with charging circuit 614b. Optionally internal power source may be provided in the form of non rechargeable batteries that may be replaced once their energy source is spent. Charger unit 610 circuit scheme may provide for charging handpiece 100, many times before internal power source 26 is spent requiring replenishment by recharging using adaptor 604 with mains power 602.

Most preferably controller 612 and discharge circuit 618 provide for controllable charging of handpiece 100 through contacts 12 optionally from internal power supply 26 or from mains power source 602 and adaptor 604.

Figure 6B provides a schematic circuit diagram of an optional embodiment of curing light device 300 comprising an internal power source 26 with a super capacitor charging circuit 614c which may optionally and preferably provide for a quick charge of handpiece 100, optionally providing a single handpiece charge time of up to about ninety seconds, optional up to about sixty seconds, optionally and preferably up to about twenty seconds, more preferably up to about fifteen seconds and most preferably from about ten seconds to fifteen

seconds. Optionally internal power source 26 comprises at least one or more rechargeable battery. Optionally internal power source 26 comprises at least one or more super capacitor and/or at least one or more battery.

Most preferably controller 612 and discharge circuit 618 provide for
5 controllable charging of handpiece 100 through contacts 12 optionally from internal power supply 26 or from mains power source 602 and adaptor 604.

Figure 6C provides an optional embodiment of base unit 611 that does not comprise an internal power source 26 as described in base unit 610 of Figures 6A and 6B above. Base unit 611 is devoid of an internal power source and
10 therefore requires both adaptor 604 and mains power 602 to recharge and/or power handpiece 100. Most preferably controller 612 and discharge circuit 618 provide controllable charging of handpiece 100 through contacts 12.

While the invention has been described with respect to a limited number
15 of embodiments, it will be appreciated that many variations, modifications and other applications of the invention may be made.

WHAT IS CLAIMED IS:

1. A curing light device for polymerization of resin-based composites, the curing light device comprising:

(a) a cordless lighting unit having predetermined form and dimensions, said cordless lighting unit includes:

- (i) a lighting unit housing; and
- (ii) at least one capacitor disposed inside said lighting unit housing; and
- (iii) at least one or more light emitting elements disposed inside said lighting unit housing, wherein said light emitting element is electronically connected to said at least one capacitor.

2. The curing light device of claim 1 wherein said lighting unit housing further comprises at least one or more electrical contacts for powering said at least one capacitor disposed on at least one face of said lighting unit housing.

3. The curing light device of claim 1 wherein said lighting unit housing is ergonomically designed for hand held use.

4. The curing light device of claim 1 wherein said at least one or more light emitting source is chosen from the group consisting of a broadband light

source, full spectrum light source, spectrum range specific light source, wavelength specific light source, a light source array, full spectrum LED, wavelength specific LED, spectrum range specific LED, and LED array.

5. The curing light device of claim 1 wherein said lighting unit housing further comprising at least one filter provided for filtering light emitting from said light emitting source.

6. The curing light device of claim 1 wherein said lighting unit housing further comprising at least one lens provided for focusing and/or directing light emitting from said light emitting source.

7. The curing light device of claim 1 further comprising:

(b) a charging unit having predetermined form and dimensions corresponding to said predetermined form and dimensions of said cordless lighting unit, said charging unit includes:

(i) a charging unit housing; and
(ii) at least one or more electrical contacts for electrically coupling said charging unit housing with said cordless lighting unit.

8. The curing light device of claim 7 wherein said at least one capacitor has an empty state to a full capacity state.

9. The curing light device of claim 8 wherein said charging unit can charge electronically, said at least one capacitor, from an empty state to a full capacity state, within a time interval, wherein said time interval is at most ninety seconds.

10. The curing light device of claim 7 wherein said at least one or more electrical contacts are provided within a socket on a face of said charging unit housing; and wherein said socket comprises predetermined form and dimensions provided for securely fitting with said predetermined form and dimensions of said cordless lighting unit.

11. The curing light device of claim 7 wherein said charging unit housing further comprises an internal power supply source.

12. The curing light device of claim 11 wherein said internal power supply source is chosen from at least one or more of the group consisting of a battery, rechargeable battery, super capacitor, or any combination thereof.

13. The curing light device of claim 1 further comprising:

(b) a charging unit having predetermined form and dimensions corresponding to said predetermined form and dimensions of said cordless lighting unit, said charging unit includes:

(i) a charging unit housing; and

- (ii) a socket for securely coupling said cordless lighting unit to said .charging unit housing.

14. The curing light device of claim 1 wherein said cordless lighting unit is provided with inductive charging capabilities.

15. The device of claim 13 wherein said charging unit is provided with inductive charging capabilities.

16. A curing light device for polymerization of resin-based composites, the curing light device comprising:

(a) a cordless lighting unit having predetermined form and dimensions, said cordless lighting unit includes:

- (i) a lighting unit housing;
- (ii) at least one capacitor disposed inside said lighting unit housing; and
- (iii) at least one or more lighting unit electrical contact for powering said at least one capacitor wherein said lighting unit electrical contact is disposed on a face of said lighting unit housing; and
- (iv) at least one light emitting element is disposed inside said lighting unit housing, wherein said light emitting element

is electronically connected to said at least one capacitor;

and

(b) a charging unit for charging said cordless lighting unit having predetermined form and dimensions corresponding to said predetermined form and dimensions of said cordless lighting unit, said charging unit includes:

(i) a charging unit housing; and

(ii) at least one or more electrical contacts for electrically coupling said charging unit housing to said cordless lighting unit over said lighting unit electrical contact.

17. The device of any of claims 1-16 wherein said capacitor is a supercapacitor.

18. The device of any of claims 1-16 wherein each of said at least one or more capacitors provides said cordless lighting unit with operational power for a period of about 40 to 130 seconds.

19. The device of claim 18, wherein said one or more capacitors collectively provide operational power for a period of about 40 to 130 seconds.

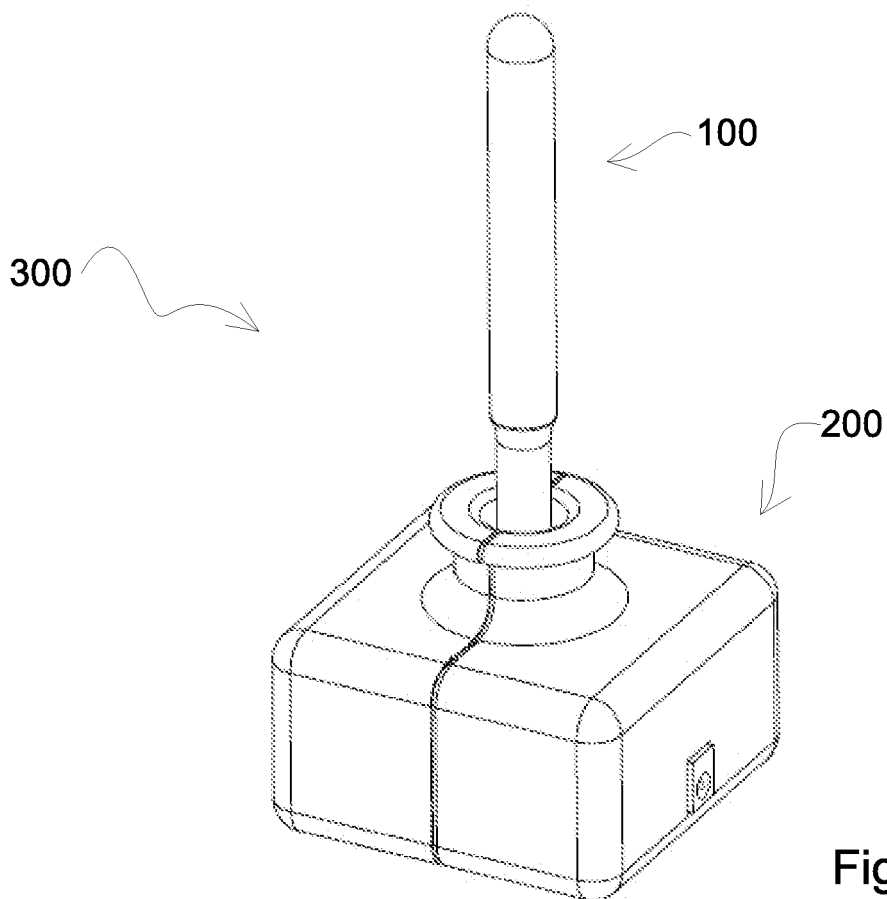
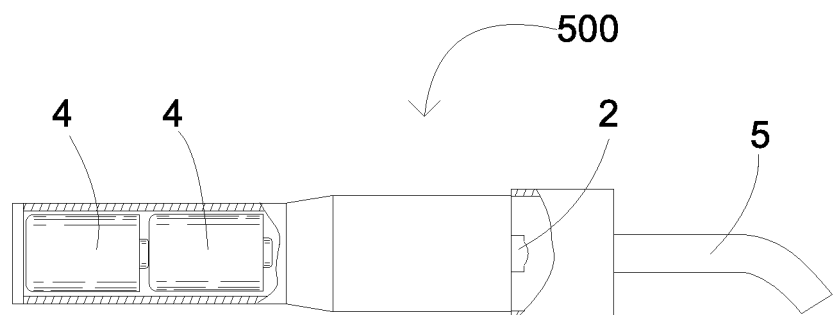
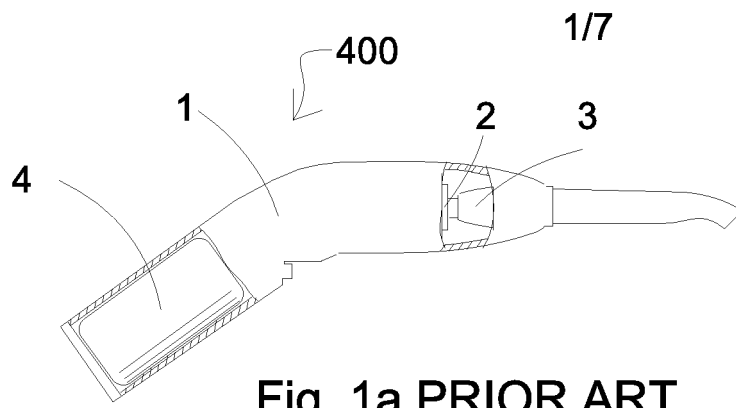
20. The device of any of claims 7-16 wherein said charging unit provides said cordless lighting unit with operational power within a time period of about ninety seconds.

21. The device of claim 20, wherein said time period is up to about sixty seconds.

22. The device of claim 21, wherein said time period is up to about twenty seconds.

23. The device of claim 22, wherein said time period is up to about fifteen seconds.

24. The device of claim 23, wherein said time period is from about ten seconds to about fifteen seconds.



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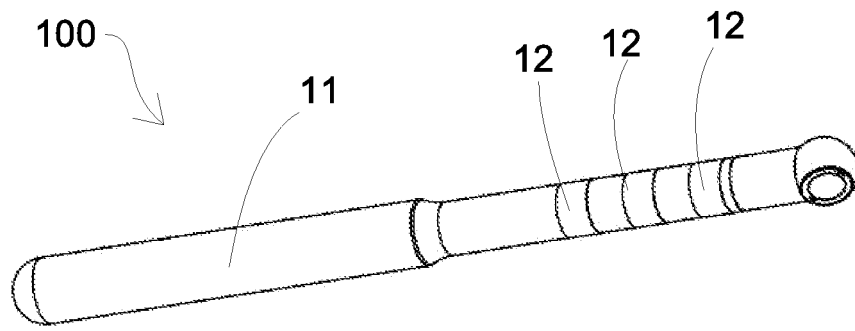


Fig. 3a

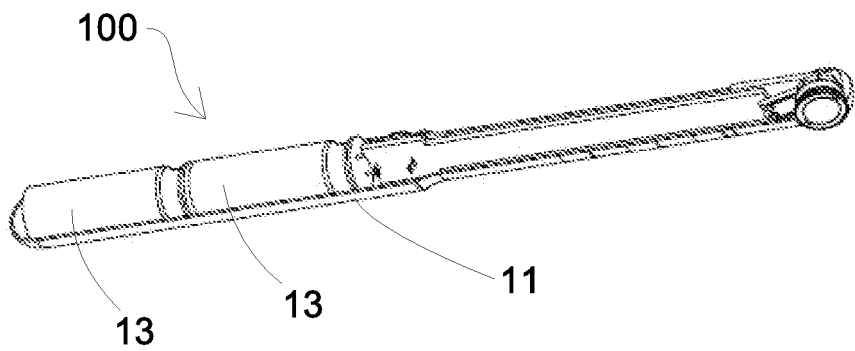


Fig. 3b

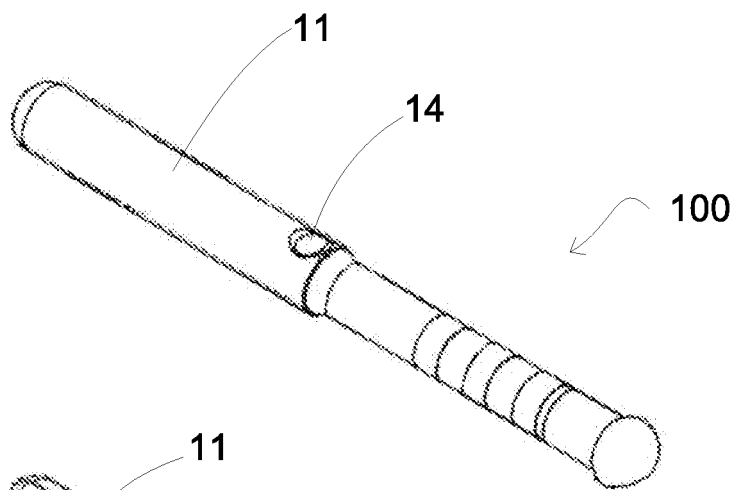


Fig. 3c

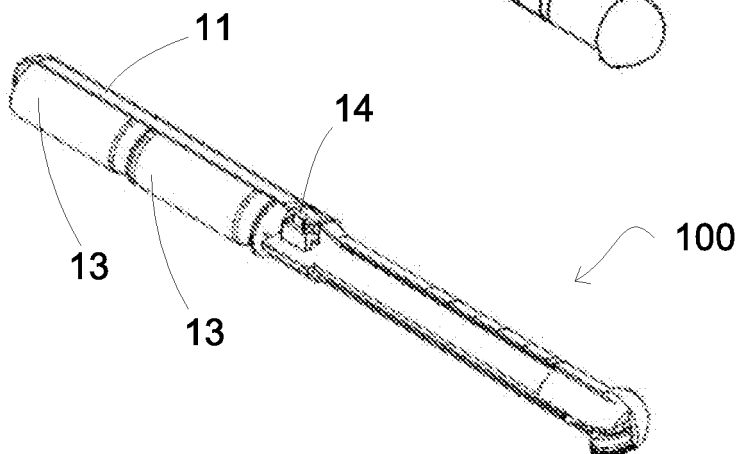


Fig. 3d

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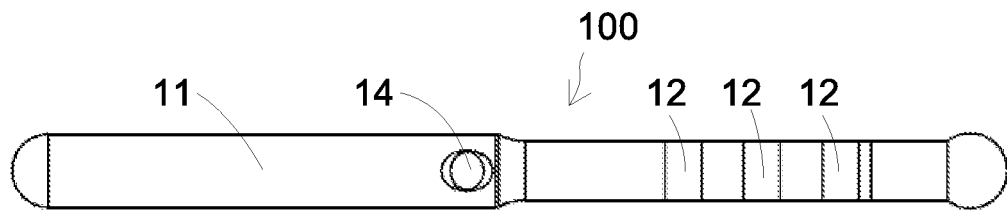


Fig. 4a

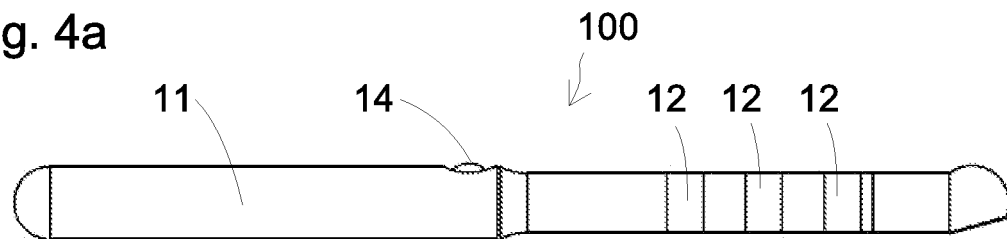


Fig. 4b

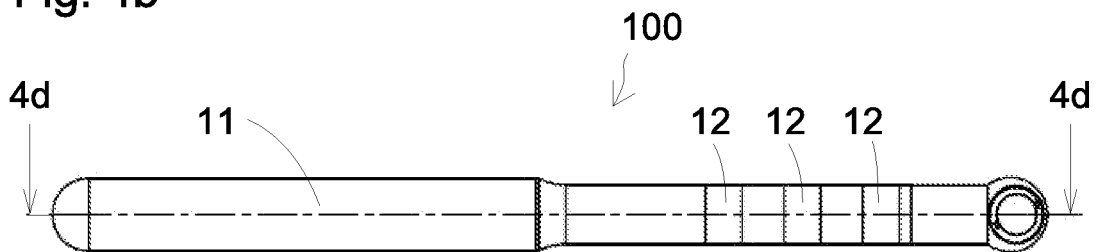


Fig. 4c

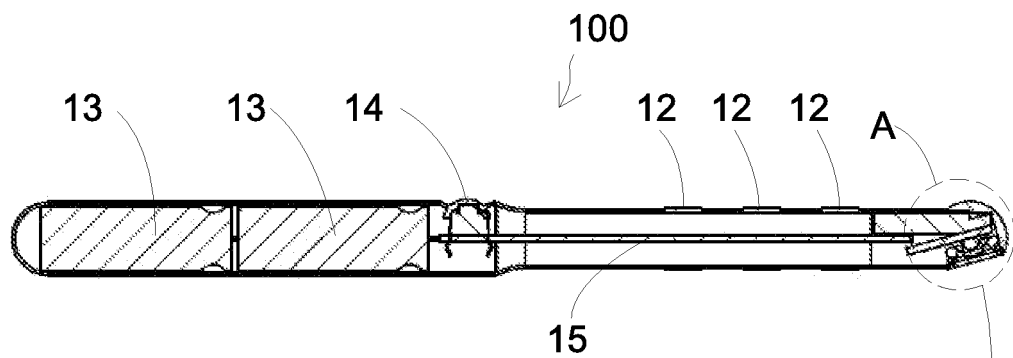
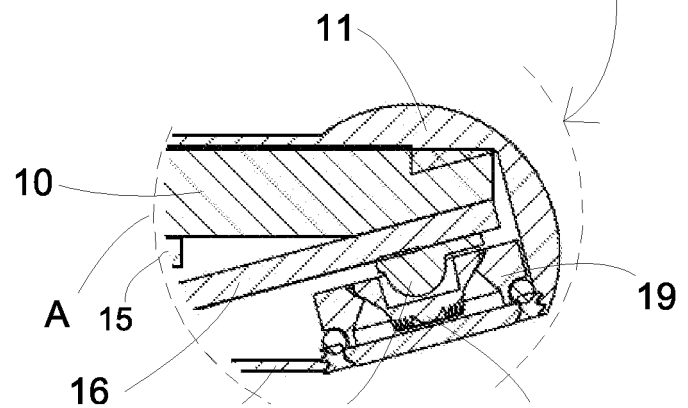


Fig. 4d



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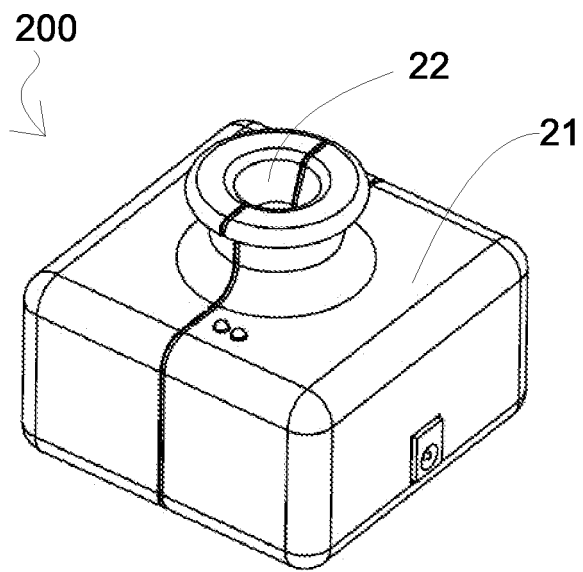


Fig. 5a

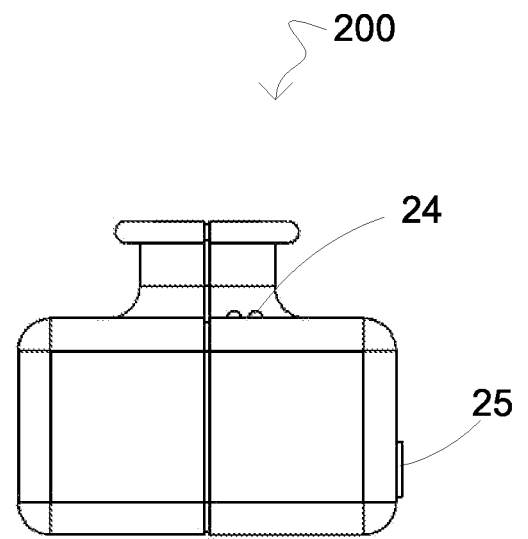


Fig. 5b

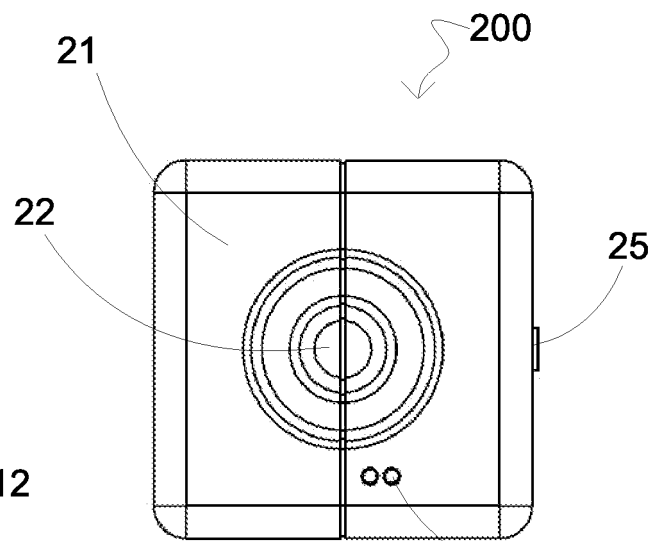


Fig. 5c

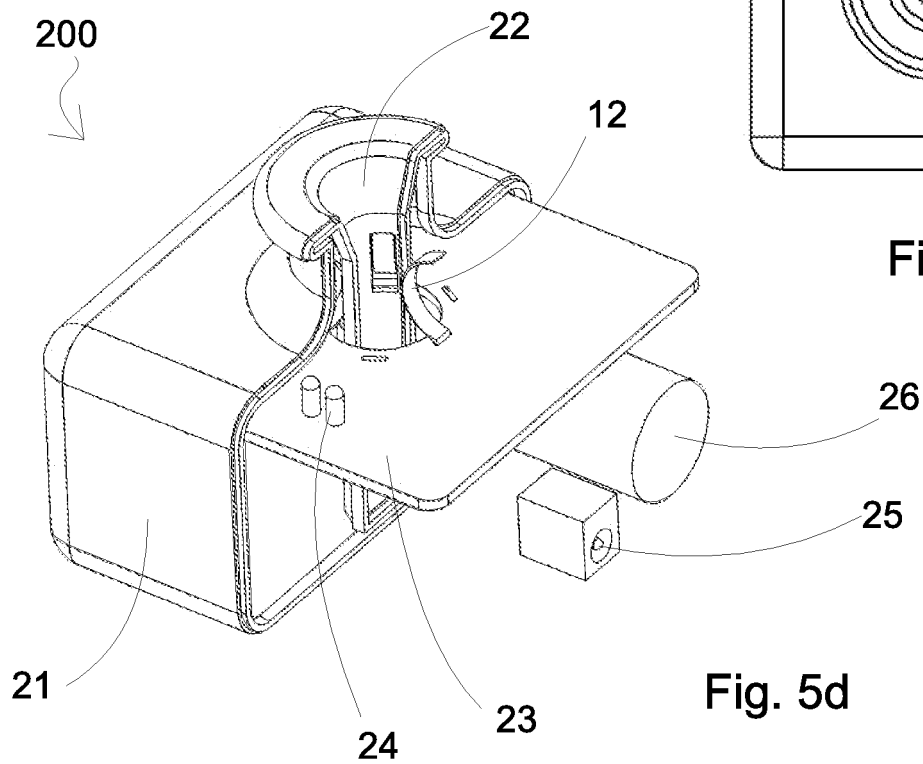


Fig. 5d

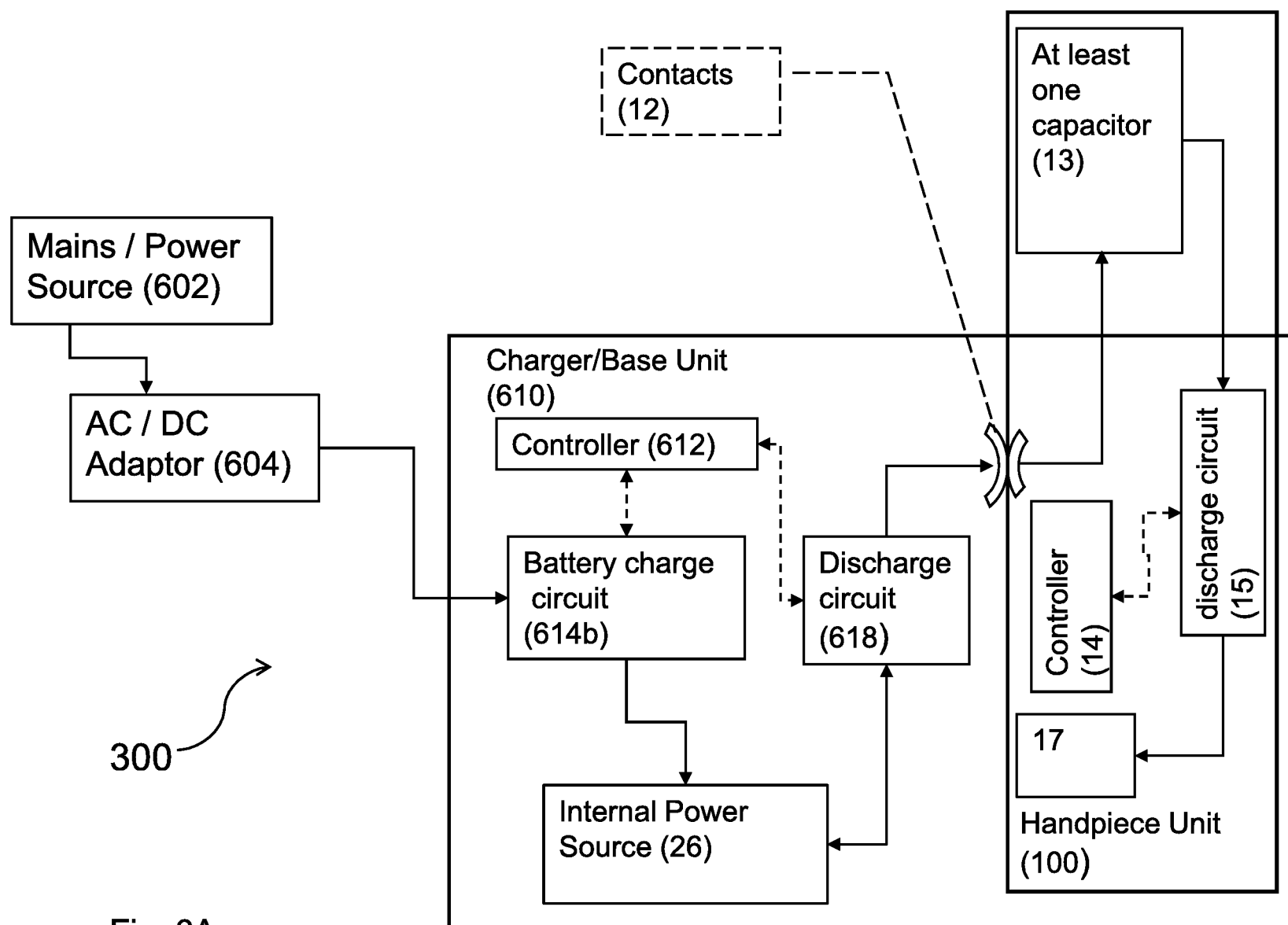


Fig. 6A

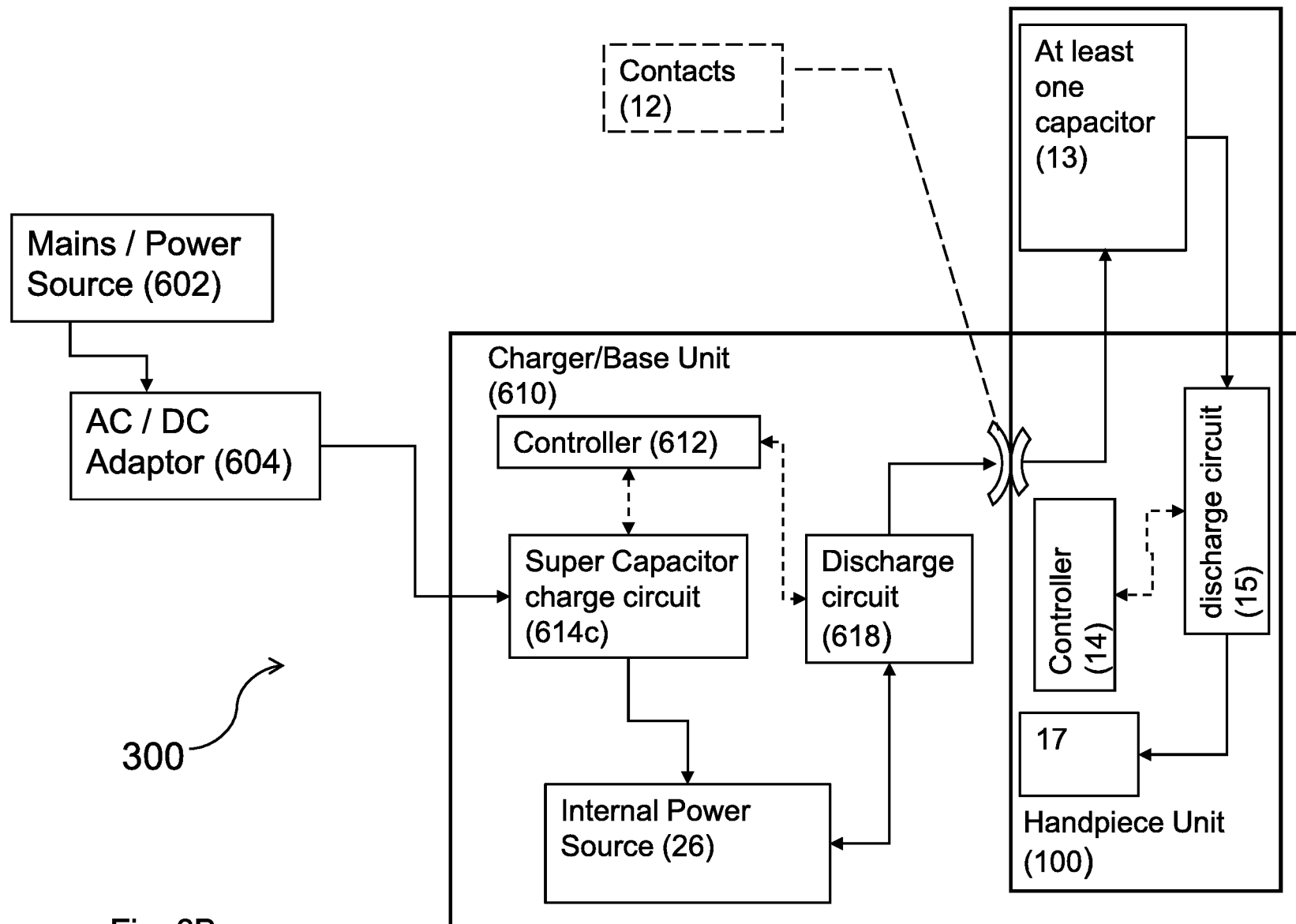


Fig. 6B

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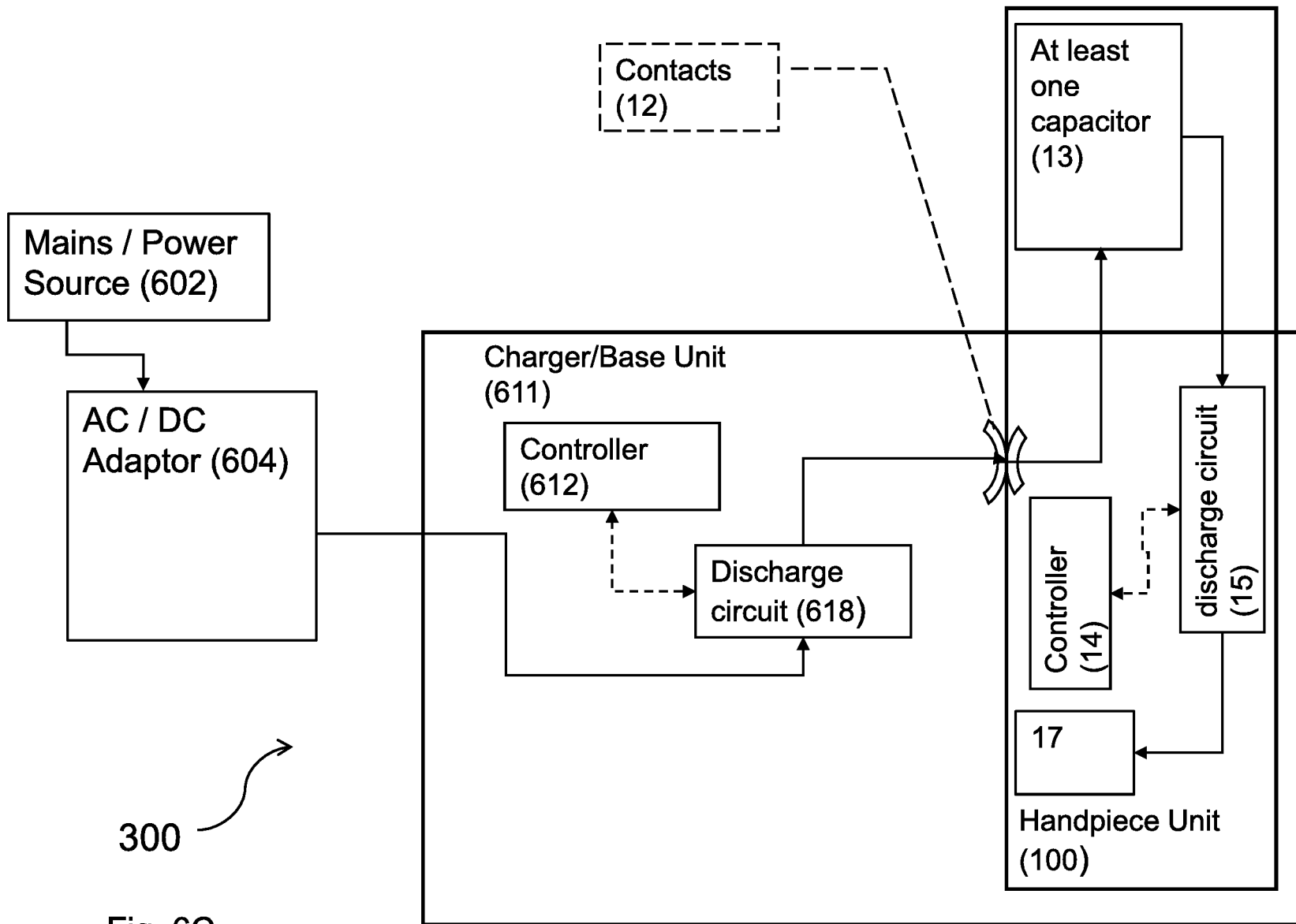


Fig. 6C