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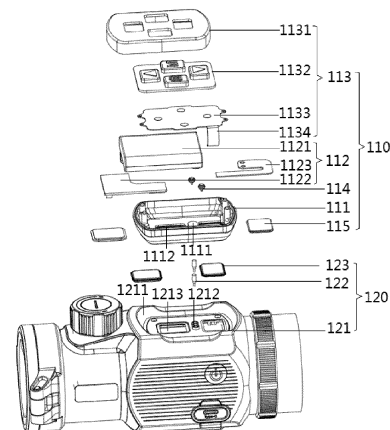
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(54) **DETACHABLE REMOTE CONTROL MODULE, FRONT INFRARED THERMAL IMAGER ASSEMBLY AND DUAL-LIGHT SIGHT**

(57) A detachable remote control module, a front infrared thermal imager assembly and a dual-light sight are provided according to the present application, which relates to the technical field of electronic devices. The remote control module includes a mounting housing for detachably connecting with a front infrared module, and a charging unit and/or a user operation unit arranged in the mounting housing. In a case that the remote control module is mounted to the front infrared module through the mounting housing, the charging unit is electrically connected with the front infrared module, to charge the front infrared module; and in both cases that the remote control module is mounted to and detached from the front infrared module, the user operation unit is communicatively connected to the front infrared module, to transmit a received user operation instruction to the front infrared module. The remote control module can be quickly and easily mounted to and detached from the front infrared module, to realize charging and/or control for the front infrared module. Compared with the conventional structure, the convenience of charging and/or operating the front infrared module can be greatly improved.



**FIG. 3**

**Description****FIELD**

5     **[0001]** The present application relates to the technical field of electronic devices, and in particular to a detachable remote control module, a front infrared thermal imager assembly and a dual-light sight.

**BACKGROUND**

10    **[0002]** At present, a white-light sight (i.e. a day sight) in the market can only be used for aiming in daytime, and cannot be used at night. In order to develop a night vision function of the white-light sight, a front infrared module (such as a front infrared lens) is generally added to a front end of the white-light sight, to form a dual-light sight. However, an overall length of the product after adding the front infrared module is relatively large, and due to the long distance, it is difficult to operate the front infrared thermal imager assembly while aiming, which leads to a poor operation experience. In  
15    addition, due to an increase in power consumption, the power of the whole machine can only keep for a few hours, and rechargeable products in the market are generally large and need to be plugged in for charging, which makes it very inconvenient to carry and install, and the charging operation is inconvenient as well. Therefore, a remote control module that can be quickly mounted to and detached from the front infrared module is to be provided by those skilled in the art.

**SUMMARY**

**[0003]** An object of the present application is to provide a detachable remote control module, a front infrared thermal imager assembly and a dual-light sight, where the remote control module can be quickly and easily mounted to and detached from the front infrared module.

25    **[0004]** In order to achieve the above object, a detachable remote control module is provided according to the present application. The detachable remote control module includes a mounting housing for detachably connecting with a front infrared module, and a charging unit and/or a user operation unit arranged in the mounting housing;

30    in a case that the remote control module is mounted to the front infrared module through the mounting housing, the charging unit is electrically connected with the front infrared module, to charge the front infrared module; and

in both cases that the remote control module is mounted to and detached from the front infrared module, the user operation unit is communicatively connected to the front infrared module, to transmit a received user operation instruction to the front infrared module.

35    **[0005]** In some embodiments, the remote control module further includes a first electrical connector, which is arranged on the mounting housing and is electrically connected with the charging unit and/or the user operation unit; and the first electrical connector is configured to connect with a second electrical connector on the front infrared module, so that the charging unit is electrically connected with the front infrared module, and/or the user operation unit is communicatively connected to the front infrared module.

40    **[0006]** In some embodiments, the charging unit includes:

a rechargeable battery arranged in the mounting housing, and the rechargeable battery is configured for charging the front infrared module;

45    a control panel connected with the rechargeable battery and the first electrical connector, and the control panel is configured for controlling operation of the rechargeable battery;

50    a flat battery cable connecting the control panel and the first electrical connector;

where when the mounting housing is mounted on the front infrared module, the first electrical connector is in contact and conduction with the second electrical connector, so that the rechargeable battery and the control panel realize charging the front infrared module through physical contact; and when the mounting housing is detached from the front infrared module, the first electrical connector is disconnected from the second electrical connector, so that the  
55    rechargeable battery and the control panel stop charging the front infrared module.

**[0007]** In some embodiments, the user operation unit includes an instruction receiving part, which is electrically connected with the control panel via a flexible flat cable and is configured to receive the user operation instruction and

transmit the user operation instruction to the control panel; and

when the mounting housing is mounted on the front infrared module, the first electrical connector is in contact and conduction with the second electrical connector, so that the instruction receiving part and the control panel is communicatively connected to a control part of the front infrared module through the physical contact; and when the mounting housing is detached from the front infrared module, the first electrical connector is disconnected from the second electrical connector, and the control panel is communicatively connected to the control part in a wireless way.

**[0008]** In some embodiments, the control panel is communicatively connected to the control part via a wireless communication network, such as WiFi, Bluetooth or ZigBee.

**[0009]** In some embodiments, the first electrical connector is a first contact pin and the second electrical connector is a second contact pin, and the first contact pin is configured to be in contact with the second contact pin, to make the control panel be communicatively connected to the control part.

**[0010]** In some embodiments, the user operation unit further includes a push-button assembly which is connected with the instruction receiving part, to allow the user operation instruction to be received by the instruction receiving part when the push-button assembly is operated by a user.

**[0011]** In some embodiments, the push-button assembly includes an upper cover and a leather sheath, and the instruction receiving part is arranged in an accommodation space defined by the upper cover and the mounting housing. An upper surface of the leather sheath is provided with a raised push button, and a lower surface of the leather sheath is connected with the instruction receiving part. The upper cover is provided with a through hole matching the push button, and the push button passes through the through hole and protrudes from a surface of the upper cover. When the user presses the raised push button, the instruction receiving part receives the user operation instruction.

**[0012]** In some embodiments, the mounting housing is provided with a first fixing connector, and the first fixing connector is configured to be detachably connected with a second fixing connector on the front infrared module, so that the mounting housing is detachably mounted on the front infrared module.

**[0013]** In some embodiments, the first fixing connector is one of a magnetic adhesion member, a snap-fit member, and a plug-in member.

**[0014]** In some embodiments, the mounting housing is provided with a first fixing hole and a second fixing hole, the first electrical connector is arranged in the first fixing hole, and the first fixing connector is arranged in the second fixing hole.

**[0015]** A front infrared thermal imager assembly is provided according to the present application, which includes a front infrared module and the remote control module according to any one of the above solutions, and the remote control module is detachably mounted on the front infrared module.

**[0016]** In some embodiments, the front infrared module includes an outer housing, which is provided with a mounting recess for mounting the remote control module.

**[0017]** A dual-light sight is provided according to the present application, which includes a white-light sight and the front infrared thermal imager assembly according to any one of the above solutions, where the front infrared module is arranged at a front end of the white-light sight.

**[0018]** In some embodiments, the front end of the white-light sight is provided with an adapter ring, and the front infrared module is mounted at the adapter ring.

**[0019]** It can be noted that in a case that the detachable remote control module according to the embodiments of the present application includes the charging unit, the charging for the front infrared module can be realized as long as ensuring that the remote control module is mounted on the front infrared module. After the charging is completed, the user can remove the remote control module from the front infrared module, place it at any convenient positions, and then mount it on the front infrared module when recharging is needed. In a case that the detachable remote control module according to the embodiments of the present application includes the user operation unit, no matter whether the user operation unit is connected with or detached from the front infrared module, the user operation unit is always communicatively connected to the front infrared module, and the user operation unit transmits the received user operation instruction to the front infrared module, so that preset control of the front infrared module is realized. In this way, the user can remove the user operation unit from the front infrared module during use and place it at any convenient positions, the infrared thermal imager assembly can still be controlled, and the user operation unit can be mounted on the front infrared module when it is not in use. In a case that the detachable remote control module according to the embodiments of the application includes both the charging unit and the user operation unit, the user can remove the remote control module from the front infrared module during use and place it at any convenient positions, the front infrared module can still be operated and controlled, and the remote control module can be mounted on the front infrared module when it is not in use, to supply power to the whole machine, thus prolonging the power supply time of the whole machine.

**[0020]** The detachable remote control module according to the embodiments of the application can be quickly and easily mounted to and detached from the front infrared module, thereby realizing the charging and/or control of the front infrared module. Compared with the conventional structure, the remote control module is very convenient to carry and detach, thus greatly improving the convenience of charging and/or controlling the front infrared module.

**BRIEF DESCRIPTION OF THE DRAWINGS**

**[0021]** In order to more clearly describe the technical solutions in the embodiments of the present application or in the conventional technology, the drawings required to be used in the embodiments or the conventional technology are briefly described below. Apparently, the drawings in the following description only show the embodiments of the present application, and other drawings may be obtained by those skilled in the art from the drawings without any creative work.

FIG. 1 is a schematic view of a dual-light sight in a state that a first type of remote control module being detached from a front infrared thermal module according to an embodiment of the present application;

FIG 2 is a schematic view of the dual light sight in a state that the first type of remote control module being connected with the front infrared thermal module according to the embodiment of the present application;

FIG. 3 is an exploded view of showing the first type of remote control module and the front infrared thermal module being assembled according to the embodiment of the present application;

FIG. 4 is an exploded view showing a second type of remote control module and a front infrared thermal module being assembled according to another embodiment of the present application;

FIG. 5 is schematic view of a dual light sight in a state that a third type of remote control module being detached from a front infrared thermal module according to yet another embodiment of the present application;

FIG 6 is a schematic view of a dual-light sight in a state that the third remote control module being connected with the front infrared thermal module according to the yet another embodiment of the present application; and

FIG. 7 is an exploded view showing the third type of remote control module and the front infrared thermal module being assembled according to the yet another embodiment of the present application.

**[0022]** Reference numerals in the drawings are listed as follows:

100	dual-light sight,	110	remote control module,
120	front infrared thermal module,	130	white-light sight,
140	adapter ring,	111	mounting housing,
1111	first fixing hole,	1112	second fixing hole,
112	charging unit,	1121	rechargeable battery,
1122	control panel,	1123	flat battery cable,
113	user operation unit,	1131	upper cover,
1132	leather sheath,	1133	instruction receiving part,
1134	flexible flat cable,	114	first electrical connector,
115	first fixing connector,	116	cover plate,
121	outer housing,	1211	mounting recess,
1212	third fixing hole,	1213	fourth fixing hole,
122	second electrical connector,	123	second fixing connector.

**DETAILED DESCRIPTION OF THE EMBODIMENTS**

**[0023]** Technical solutions in the embodiments of the present application are clearly and completely described below in conjunction with the drawings of the embodiments of the present application. Apparently, the embodiments described in the following are only some embodiments of the present application, rather than all of the embodiments. Any other embodiments acquired by those skilled in the art based on the embodiments in the present application without any creative efforts fall within the protection scope of the present application.

**[0024]** In order to make those skilled in the art have a better understanding of solutions of the present application, the present application is described in further detail hereinafter, in conjunction with the drawings and embodiments.

**[0025]** It should be noted that directional wordings such as "upper end", "lower end", "left side", "right side" mentioned below are all defined based on the accompanying drawings.

**[0026]** With reference to FIG. 1 to FIG. 7, a detachable remote control module 110 is provided according to an em-

bodiment of the present application, which includes a mounting housing 111 for detachably connecting with a front infrared module 120, and a charging unit 112 arranged in the mounting housing 111 and/or a user operation unit 113 arranged in the mounting housing 111. The charging unit 112 is configured to charge the front infrared module 120, and the user operation unit 113 is configured to receive a user operation instruction and transmit the received user operation instruction to the front infrared module 120, to operate and control the front infrared module 120.

**[0027]** In the embodiment corresponding to FIG. 1 to FIG. 3, a charging function and a control function are integrated in the remote control module 110, in this case, the remote control module 110 includes both the charging unit 112 and the user operation unit 113. In the embodiment corresponding to FIG. 4, the remote control module 110 only has the charging function, and in this case, only the charging unit 112 is included in the remote control module 110. In the embodiment corresponding to FIG. 5 to FIG. 7, the remote control module 110 only has the control function, and in this case, only the user operation unit 113 is included in the remote control module 110.

**[0028]** Specifically, in a case that the remote control module 110 is mounted to the front infrared module 120 through the mounting housing 111, the charging unit 112 is electrically connected with the front infrared module 120, so as to charge the front infrared module 120. In both cases that the remote control module 110 is mounted on the front infrared module 120 and detached from the front infrared module 120, the user operation unit 113 is communicatively connected to the front infrared module 120, so as to transmit the received user operation instruction to the front infrared module 120.

**[0029]** With reference to FIG. 4, it can be seen that, in the case that the detachable remote control module 110 according to the embodiment of the present application includes only the charging unit 112, the charging for the front infrared module 120 can be realized as long as the remote control module 110 is ensured to be mounted on the front infrared module 120. When the charging is completed, the user may remove the remote control module 110 from the front infrared module 120 and place it at any convenient positions, and then remount it on the front infrared module 120 when recharging is needed.

**[0030]** With reference to FIG. 5 to FIG. 7 together, in the case that the detachable remote control module 110 according to the embodiment of the present application includes only the user operation unit 113, no matter whether the user operation unit 113 is connected with or detached from the front infrared module 120, the user operation unit 113 is always communicatively connected to the front infrared module 120, and the user operation unit 113 can transmit the received user operation instruction to the front infrared module 120, so that preset control of the front infrared module is realized. In this way, the user can remove the user operation unit 113 from the front infrared module 120 during use and place it at any convenient positions for operation, the infrared thermal imager structure assembly can still be controlled, and the user operation unit can be mounted on the front infrared module 120 when it is not in use.

**[0031]** With reference to FIG. 1 to FIG. 3, in the case that the detachable remote control module 110 according to the embodiment of the present application includes the charging unit 112 and the user operation unit 113, the user can remove the remote control module 110 from the front infrared module 120 during use and place it at any convenient positions for operation, the front infrared module 120 can still be operated and controlled through the user operation unit 113, and then the remote control module 110 can be mounted on the front infrared module 120 when the front infrared module 120 is not required to be controlled, to supply power to the whole machine through the charging unit 112, thus prolonging the power supply time for the whole machine.

**[0032]** The detachable remote control module 110 according to the embodiments of the present application can be quickly and easily mounted to and detached from the front infrared module 120, thereby realizing the charging and/or control of the front infrared module 120. Compared with the conventional structure, the remote control module 110 is very convenient to carry, and mounting and detaching are also convenient, thus greatly improving the convenience of charging and/or controlling the front infrared module 120.

**[0033]** In this embodiment, the charging unit 112 and the user operation unit 113 may be used as two separate units for replacing each other, that is, two remote control modules as shown respectively in FIG. 4 and FIG. 7 are provided, where one remote control module includes only the charging unit 112, and the other remote control module includes only the user operation unit 113, and the two remote control modules can be used as needed in an alternative manner. Alternatively, the charging unit 112 and the user operation unit 113 may be integrated into one remote control module, so that both the charging unit 112 and the user operation unit 113 can be used.

**[0034]** In some embodiments, the remote control module 110 further includes a first electrical connector 114 which is arranged at the mounting housing 111, and the first electrical connector 114 is electrically connected with the charging unit 112 and/or the user operation unit 113. Correspondingly, the front infrared module 120 is provided with a second electrical connector 122, and the first electrical connector 114 is configured to be connected with the second electrical connector 122 on the front infrared module 120, so that the charging unit 112 is electrically connected with the front infrared module 120, and/or the user operation unit 113 is communicatively connected to the front infrared module 120.

**[0035]** Of course, according to actual needs, the first electrical connector 114 is a first contact pin or a first pogo pin, and the second electrical connector 122 is a second contact pin or a second pogo pin. When the first contact pin is in contact with the second contact pin, the remote control module 110 is electrically connected with the front infrared module 120.

**[0036]** In some embodiments, the charging unit 112 includes a rechargeable battery 1121 and a control panel 1122, where the rechargeable battery 1121, which may be a lithium battery, is arranged in the mounting housing 111 and is configured for charging the front infrared module 120. The control panel 1122 is connected with the rechargeable battery 1121 and the first electrical connector 114, and the control panel 1122 is configured for controlling the rechargeable battery 1121.

**[0037]** It should be noted that the rechargeable battery 1121 and the control panel 1122 are combined to form a charging assembly. In this embodiment, the control panel 1122 can be bonded to the rechargeable battery 1121, the control panel 1122 is used to control the charging of the rechargeable battery 1121 and turn off the charging when a charging temperature reaches a threshold value, thereby protecting the rechargeable battery 1121.

**[0038]** In addition, in order to facilitate the connection between the control panel 1122 and the first electrical connector 114, the charging unit 112 further includes a flat battery cable 1123 configured for connecting the control panel 1122 and the first electrical connector 114.

**[0039]** It can be understood that when the mounting housing 111 is mounted on the front infrared module 120, the first electrical connector 114 is in contact and conduction with the second electrical connector 122, so that the rechargeable battery 1121 and the control panel 1122 realize charging the front infrared module 120 through physical contact, and when the mounting housing 111 is detached from the front infrared module 120, the first electrical connector 114 is disconnected from the second electrical connector 122, so that the rechargeable battery 1121 and the control panel 1122 stop charging the front infrared module 120.

**[0040]** In addition, the charging unit 112 further includes a cover plate 116, which is mounted on the mounting housing 111. The rechargeable battery 1121 and the control panel 1122 are located in an accommodation cavity defined by the cover plate 116 and the mounting housing 111.

**[0041]** In some embodiments, the user operation unit 113 includes an instruction receiving part 1133, which is communicatively connected to the control panel 1122 via a flexible flat cable 1134. The instruction receiving part 1133 is configured to receive a user operation instruction and transmit the user operation instruction to the control panel 1122, the control panel 1122 is communicatively connected to a control part (control chip) in the front infrared module 120 and is configured to feed back the received user operation instruction to the control part of the front infrared module 120.

**[0042]** It can be understood that when the mounting housing 111 is mounted on the front infrared module 120, the first electrical connector 114 is in contact and conduction with the second electrical connector 122, so that both the instruction receiving part 1133 and the control panel 1122 are communicatively connected to the control part of the front infrared module 120 through the physical contact; and when the mounting housing 111 is detached from the front infrared module 120, the first electrical connector 114 is disconnected from the second electrical connector 122, and the control panel 1122 is communicatively connected to the control part in a wireless manner.

**[0043]** In some embodiments, in a case that the first electrical connector 114 is the first contact pin and the second electrical connector 122 is the second contact pin, the control panel 1122 is communicatively connected to the control part through the first contact pin being in contact and conduction with the second contact pin.

**[0044]** In some embodiments, the control panel 1122 is communicatively connected to the control part through a wireless communication network. In this case, the control part has a network module for linking with the Internet, and the wireless communication network may be WiFi, Bluetooth or ZigBee.

**[0045]** Of course, the control panel 1122 may be communicatively connected to the control part through the remote control technology. For example, the control panel 1122 is a remote controller and the control part is a remote control receiver adapted to the remote controller. The wireless communication network is not limited to WiFi, Bluetooth or ZigBee, but may also be a 2G/3G/4G/5G network, in which case the control part has a wireless mobile communication module.

**[0046]** In some embodiments, the user operation unit 113 further includes a push-button assembly, which is connected with the instruction receiving part 1133, so that when the user operates the push-button assembly, the instruction receiving part 1133 receives the user operation instruction.

**[0047]** Specifically, the push-button assembly includes a leather sheath 1132 and an upper cover 1131 fitted to the leather sheath 1132. The upper cover 1131 is connected with the mounting housing 111, and the instruction receiving part 1133 is located in an accommodation space defined by the upper cover 1131 and the mounting housing 111. An upper surface of the leather sheath 1132 is provided with a raised push button, and a lower surface of the leather sheath 1132 is connected with the instruction receiving part 1133. The upper cover 1131 is provided with a through hole matching the push button, and the push button passes through the through hole and protrudes from a surface of the upper cover 1131.

**[0048]** In this way, when the user presses the raised push button, the instruction receiving part 1133 can receive the user operation instruction.

**[0049]** When the push-button assembly is being assembled, the leather sheath 1132 is directly assembled to the upper cover 1131 through the raised push button, thus completing the assembly of the push button assembly.

**[0050]** When the user operation unit 113 is being assembled, the push-button assembly and the mounting housing 111 are fixed together by screws, thus completing the assembly of the user operation unit 113.

**[0051]** In some embodiments, in order to facilitate the detachable connection between the mounting housing 111 and the front infrared module 120, the mounting housing 111 is provided with a first fixing connector 115, and correspondingly, the front infrared module 120 is provided with a second fixing connector 123. The first fixing connector 115 is configured to be detachably connected with the second fixing connector 123 on the front infrared module 120, so that the mounting housing 111 can be detachably mounted to the front infrared module 120.

**[0052]** In some embodiments, the first fixing connector 115 is one of a magnetic adhesion member, a snap-fit member, and a plug-in member.

**[0053]** That is, the first fixing connector 115 and the second fixing connector 123 are one of the mutually matching magnetic adhesion members, mutually matching snap-fit members and mutually matching plug-in members.

**[0054]** For convenience of use, preferably, the mutually matching magnetic adhesion members are employed in this embodiment. Specifically, the first fixing connector 115 is a first magnet piece, and the second fixing connector 123 is a second magnet piece. The combination of the remote control module 110 and the front infrared module 120 is realized through magnetic coupling between the first magnet piece and the second magnet piece. In this case, the remote control module 110 can be removed directly when it needs to be detached, so that the operation convenience is greatly improved.

**[0055]** In some embodiments, in order to facilitate mounting the first electrical connector 114 and the first fixing connector 115, the mounting housing 111 is provided with a first fixing hole 1111 and a second fixing hole 1112, where the first electrical connector 114 is arranged in the first fixing hole 1111 and the first fixing connector 115 is arranged in the second fixing hole 1112.

**[0056]** When the first electrical connector 114 is being assembled with the first fixing connector 115, the first electrical connector 114 is molded on a corresponding fixing block through a molding process. A whole assembly of the first electrical connector 114 and the fixing block, and the first fixing connector 115 are fixed in the mounting housing 111 by a secondary molding process, to form a mounting housing assembly, where the whole assembly of the first electrical connector 114 and the fixing block is fixed in the first fixing hole 1111 of the mounting housing 111, and the first fixing connector 115 is fixed in the second fixing hole 1112.

**[0057]** When the charging unit 112 and the user operation unit 113 are being assembled, the flat battery cable 1123 is welded to the first electrical connector 114 by a welding process, the control panel 1122 is bonded to the rechargeable battery 1121, and the instruction receiving part 1133 (push-button panel) is bonded to an upper side of the rechargeable battery 1121 and connected with the control panel 1122 through the flexible flat cable 1134. After the flat battery cable 1123 is connected with the control panel 1122, the entire charging unit 112 is mounted in the mounting housing 111. Then, the leather sheath 1132 and the upper cover 1131 are connected with each other and then assembled with the instruction receiving part 1133 (push-button panel), thus completing the assembly of the user operation unit 113.

**[0058]** A front infrared thermal imager assembly according to the present application includes a front infrared module 120 and the remote control module 110 according to the above embodiments, and the remote control module 110 is detachably mounted on the front infrared module 120.

**[0059]** In this embodiment, the remote control module 110 can be quickly and easily mounted to and detached from the front infrared module 120, so as to charge and/or operate the front infrared module 120. The remote control module 110 includes the charging unit 112 and/or the user operation unit 113. Compared with the conventional structure, the remote control module 110 is very convenient to carry, and mounting and detaching of the remote control module 110 are also convenient, thus greatly improving the convenience of charging and/or operating the front infrared module 120.

**[0060]** It should be emphasized that the charging unit 112 and the user operation unit 113 may be used as two separate units for replacing each other, that is, two remote control modules as shown respectively in FIG. 4 and FIG. 7 are provided, where one remote control module includes only the charging unit 112, and the other includes only the user operation unit 113, and the two remote control modules can be used as needed in an alternative manner. Alternatively, the charging unit 112 and the user operation unit 113 may be integrated into one remote control module, so that both the charging unit 112 and the user operation unit 113 can be used.

**[0061]** In some embodiments, the front infrared module 120 includes an outer housing 121, which is provided with a mounting recess 1211 for mounting the remote control module 110. Further, the mounting recess 1211 is provided with a third fixing hole 1212 and a fourth fixing hole 1213, and the second electrical connector 122 is arranged in the third fixing hole 1212 through a corresponding fixing block, and the second fixing connector 123 is arranged in the fourth fixing hole 1213.

**[0062]** When the outer housing 121 is being assembled, the second electrical connector 122 is molded on the corresponding fixing block by a molding process. A whole assembly of the second electrical connector 122 and the fixing block, as well as the second fixing connector 123 are fixed in the outer housing 121 by a secondary molding process to form a housing assembly, where the second electrical connector 122 and the fixing block are molded in the third fixing hole 1212 in the outer housing 121, and the second fixing connector 123 is molded in the fourth fixing hole 1213 in the outer housing 121, thus completing the assembly of the outer housing 121. In this case, the control panel 1122 of the remote control module 110 is in communication connection with the control part inside the outer housing 121.

**[0063]** In a case that magnetic adhesion is employed as a connection manner, the remote control module 110 and

the front infrared module 120 are attracted together through two magnets, to form the physical contact between the first electrical connector 114 and the second electrical connector 122, so as to realize a physical connection when the remote control module 110 is placed on the front infrared module 120. When the product is turned on, charging and data connection of the front infrared module 120 can be realized; when the remote control module 110 is removed, the signal is communicated through wireless protocols such as WiFi, Bluetooth or ZigBee.

**[0064]** A dual-light sight 100 according to the present application includes a white-light sight 130 and the front infrared thermal imager assembly according to the above embodiments, and the front infrared module 120 is placed at a front end of the white-light sight 130.

**[0065]** In order to facilitate mounting, the front end of the white-light sight 130 is provided with an adapter ring 140, and the front infrared module 120 is mounted on the adapter ring 140. That is, the adapter ring 140 is used to connect the white-light sight 130 with the front infrared module 120.

**[0066]** Specifically, the adapter ring 140 includes an adapter ring body and a fixing inlaid member, where the fixing inlaid member is connected to the adapter ring body and is used for fixing the front infrared module 120. Further, the adapter ring body includes an annular body and a connecting end, where the annular body is used to be sleeved on the white-light sight 130, the connecting end is arranged at one end, facing away from the white-light sight 130, of the annular body, and the connecting end is configured to be connected to the fixing inlaid member. It can be seen that in this embodiment, the fixing inlaid member is further provided on the adapter ring body of the adapter ring 140, and the fixing inlaid member is fixedly connected to the connecting end of the adapter ring body, so that the front infrared module 120 can be fixedly connected to the fixing inlaid member, and the white-light sight 130 can be connected to the annular body of the adapter ring body in a nested manner, thereby realizing connection between the white-light sight 130 and the front infrared module 120.

**[0067]** In this way, with the adapter ring 140 according to the embodiment of the present application, the part which is weak and easily damaged is optimized in structure, that is, the fixing inlaid member is provided locally. The fixing inlaid member is made of metal, and the body of the adapter ring 140 is still made of plastic, which not only reduces the weight of the adapter ring 140, but also improves the strength of the adapter ring 140, thus solving the problem that the adapter ring 140 is easily damaged when the front infrared module 120 is impacted, which meets the user's needs.

**[0068]** It should be noted that, terms such as "first" and "second" are merely used to distinguish an entity from other entities and do not require or imply that there are any such actual relationships or sequences between these entities.

**[0069]** The detachable remote control module, the front infrared thermal imager assembly and the dual-light sight provided by the present application have been described in detail hereinbefore. Principles and embodiments of the present application are described herein through specific examples. Description of the above embodiments is merely used to facilitate understanding the solutions and concept of the present application. It should be noted that, for those skilled in the art, several modifications and improvements may be made to the present application without departing from the principle of the present application, and these modifications and improvements are also deemed to fall into the scope of protection of the present application.

## Claims

1. A detachable remote control module (110), comprising a mounting housing (111) configured for detachably connecting with a front infrared module (120), and a charging unit (112) and/or a user operation unit (113) arranged in the mounting housing (111); and wherein

the charging unit (112) is electrically connected with the front infrared module (120) in a case that the remote control module (110) is mounted to the front infrared module (120) through the mounting housing (111), to charge the front infrared module (120); and

the user operation unit (113) is communicatively connected to the front infrared module (120) in both cases that the remote control module (110) is mounted to and detached from the front infrared module (120), to transmit a user operation instruction which is received to the front infrared module (120).

2. The remote control module (110) according to claim 1, further comprising a first electrical connector (114), wherein the first electrical connector (114) is arranged on the mounting housing (111) and is electrically connected with the charging unit (112) and/or the user operation unit (113); and the first electrical connector (114) is configured to connect with a second electrical connector (122) on the front infrared module (120), to make the charging unit (112) be electrically connected with the front infrared module (120), and/or the user operation unit (113) be communicatively connected to the front infrared module (120).

3. The remote control module (110) according to claim 2, wherein the charging unit (112) comprises:



a rechargeable battery (1121) arranged in the mounting housing (111), and the rechargeable battery (1121) is configured for charging the front infrared module (120);

a control panel (1122) connected with the rechargeable battery (1121) and the first electrical connector (114), and the control panel (1122) is configured for controlling operation of the rechargeable battery (1121); and

a flat battery cable (1123) connecting the control panel (1122) and the first electrical connector (114); wherein in a case that the mounting housing (111) is mounted on the front infrared module (120), the first electrical connector (114) is in contact and conduction with the second electrical connector (122), to make the rechargeable battery (1121) and the control panel (1122) realize charging the front infrared module (120) through physical contact; and in a case that the mounting housing (111) is detached from the front infrared module (120), the first electrical connector (114) is disconnected from the second electrical connector (122), to make the rechargeable battery (1121) and the control panel (1122) stop charging the front infrared module (120).

4. The remote control module (110) according to claim 3, wherein the user operation unit (113) comprises an instruction receiving part (1133), the instruction receiving part (1133) is electrically connected with the control panel (1122) via a flexible flat cable (1134) and is configured to receive the user operation instruction and transmit the user operation instruction to the control panel (1122); and wherein in a case that the mounting housing (111) is mounted on the front infrared module (120), the first electrical connector (114) is in contact and conduction with the second electrical connector (122), to make the instruction receiving part (1133) and the control panel (1122) be communicatively connected to a control part of the front infrared module (120) through physical contact; and in a case that the mounting housing (111) is detached from the front infrared module (120), the first electrical connector (114) is disconnected from the second electrical connector (122), and the control panel (1122) is communicatively connected to the control part in a wireless way.

5. The remote control module (110) according to claim 4, wherein the control panel (1122) is communicatively connected to the control part via a wireless communication network, such as WiFi, Bluetooth or ZigBee.

6. The remote control module (110) according to claim 4, wherein the first electrical connector (114) is a first contact pin and the second electrical connector (122) is a second contact pin, and the first contact pin is configured to be in contact with the second contact pin, to make the control panel (1122) be communicatively connected to the control part.

7. The remote control module (110) according to claim 4, wherein the user operation unit (113) further comprises a push-button assembly which is connected with the instruction receiving part (1133), to allow the user operation instruction to be received by the instruction receiving part (1133) when the push-button assembly is operated by a user.

8. The remote control module (110) according to claim 7, wherein

the push-button assembly comprises an upper cover (1131) and a leather sheath (1132), and the instruction receiving part (1133) is arranged in an accommodation space defined by the upper cover (1131) and the mounting housing (111); and wherein

an upper surface of the leather sheath (1132) is provided with a raised push button, and a lower surface of the leather sheath (1132) is connected with the instruction receiving part (1133);

the upper cover (1131) is provided with a through hole matching the pushbutton, and the push button passes through the through hole and protrudes from a surface of the upper cover (1131); and

the instruction receiving part (1133) is configured to receive the user operation instruction when the user presses the raised push button.

9. The remote control module (110) according to any one of claims 2 to 8, wherein the mounting housing (111) is provided with a first fixing connector (115), and the first fixing connector (115) is configured to be detachably connected with a second fixing connector (123) provided on the front infrared module (120), to make the mounting housing (111) be detachably mounted on the front infrared module (120).

10. The remote control module (110) according to claim 9, wherein the first fixing connector (115) is one of a magnetic adhesion member, a snap-fit member, and a plug-in member.

11. The remote control module (110) according to claim 9, wherein the mounting housing (111) is provided with a first fixing hole (1111) and a second fixing hole (1112), the first electrical connector (114) is arranged in the first fixing

hole (1111), and the first fixing connector (115) is arranged in the second fixing hole (1112).

5 12. A front infrared thermal imager assembly, comprising a front infrared module (120) and the remote control module (110) according to any one of claims 1 to 11, wherein the remote control module (110) is detachably mounted on the front infrared module (120).

13. The front infrared thermal imager assembly according to claim 12, wherein the front infrared module (120) comprises an outer housing (121), which is provided with a mounting recess (1211) for mounting the remote control module (110).

10 14. A dual-light sight (100), comprising a white-light sight (130) and the front infrared thermal imager assembly according to claim 12 or 13, wherein the front infrared module (120) is arranged at a front end of the white-light sight (130).

15 15. The dual-light sight (100) according to claim 14, wherein the front end of the white-light sight (130) is provided with an adapter ring (140), and the front infrared module (120) is mounted at the adapter ring (140).

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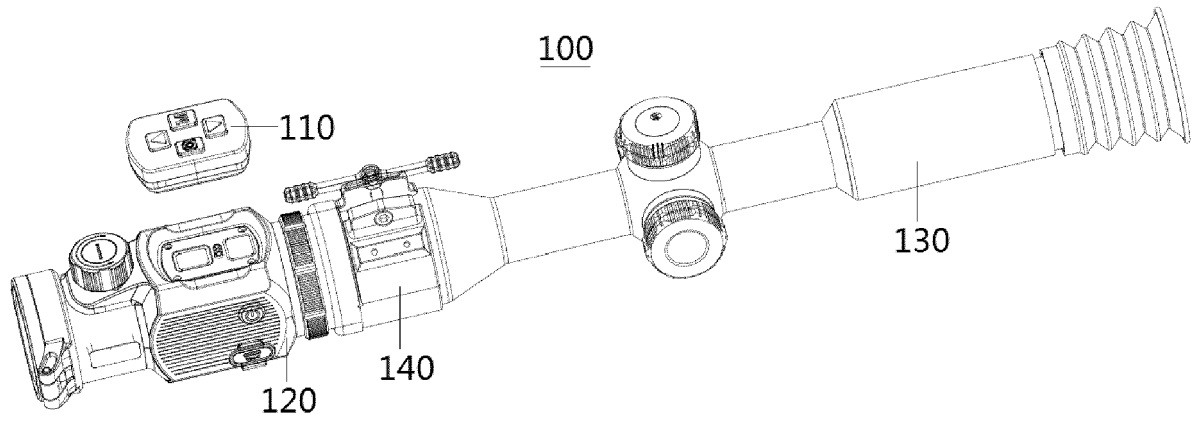


FIG. 1

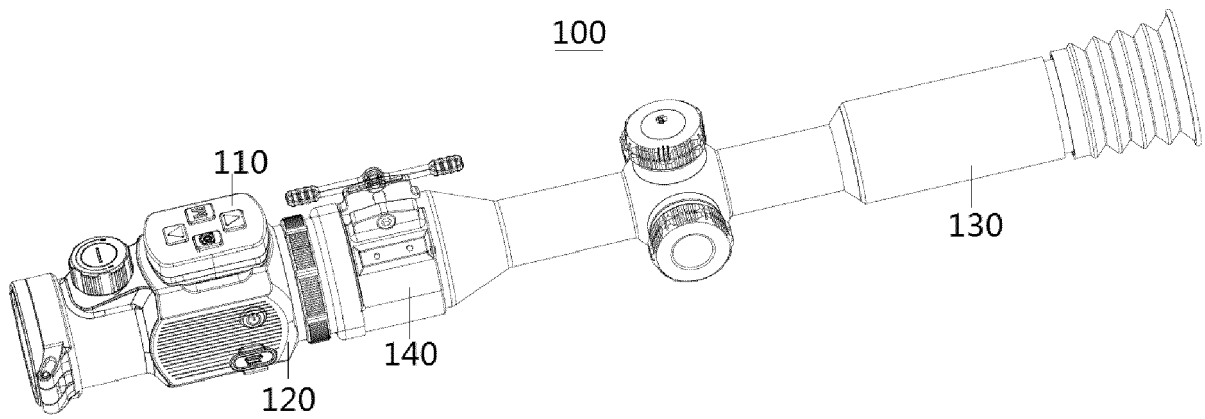


FIG. 2

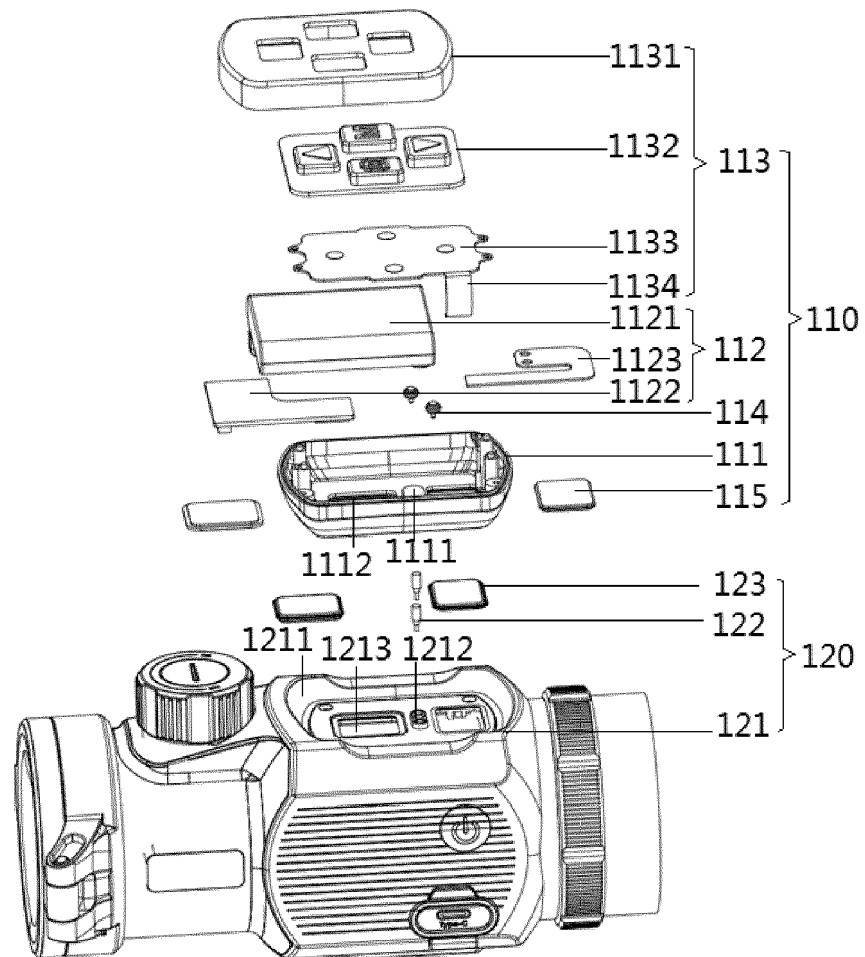


FIG. 3

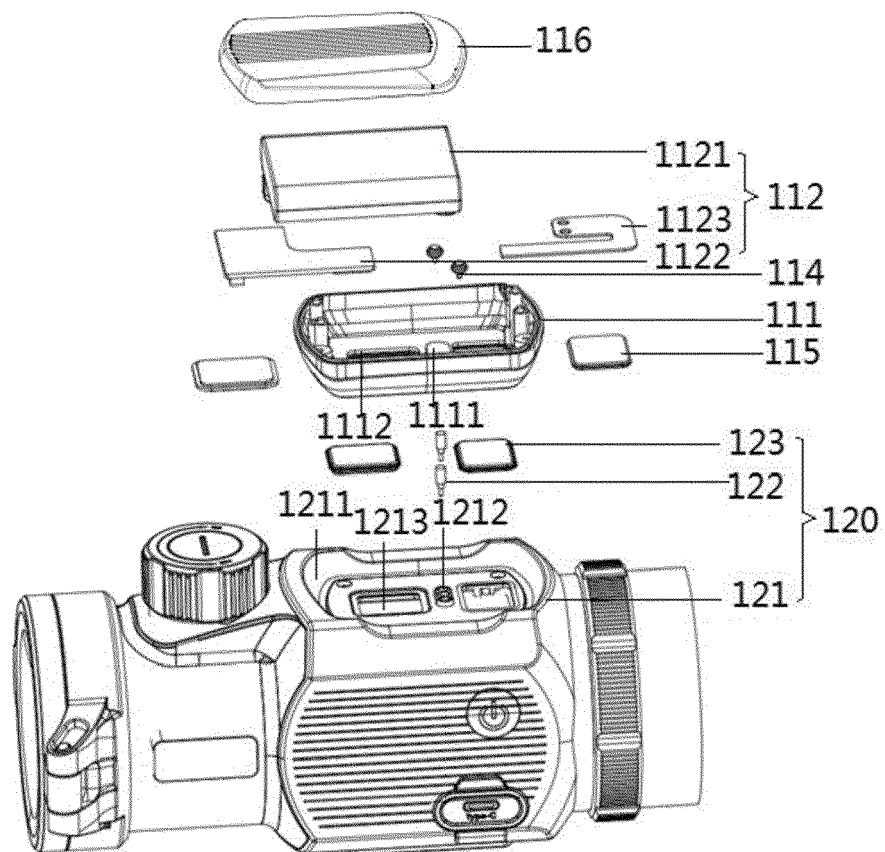


FIG. 4

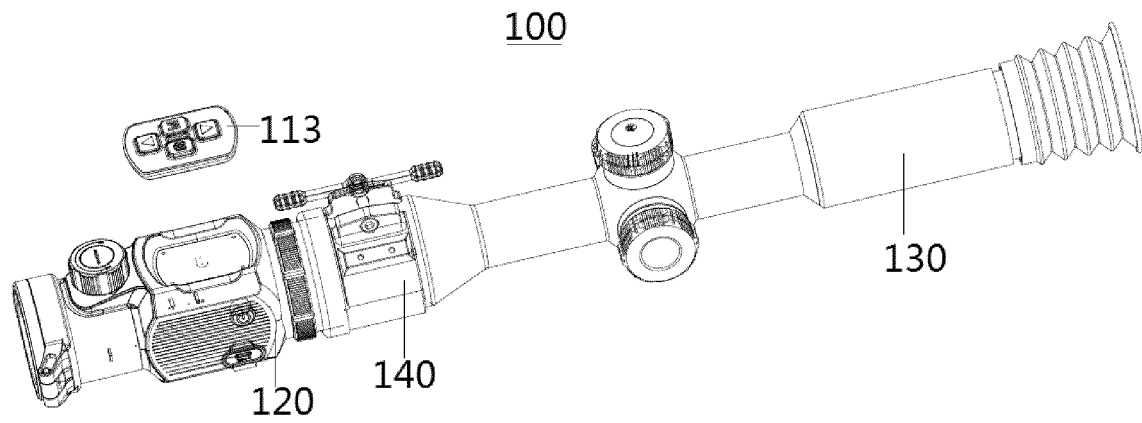


FIG. 5

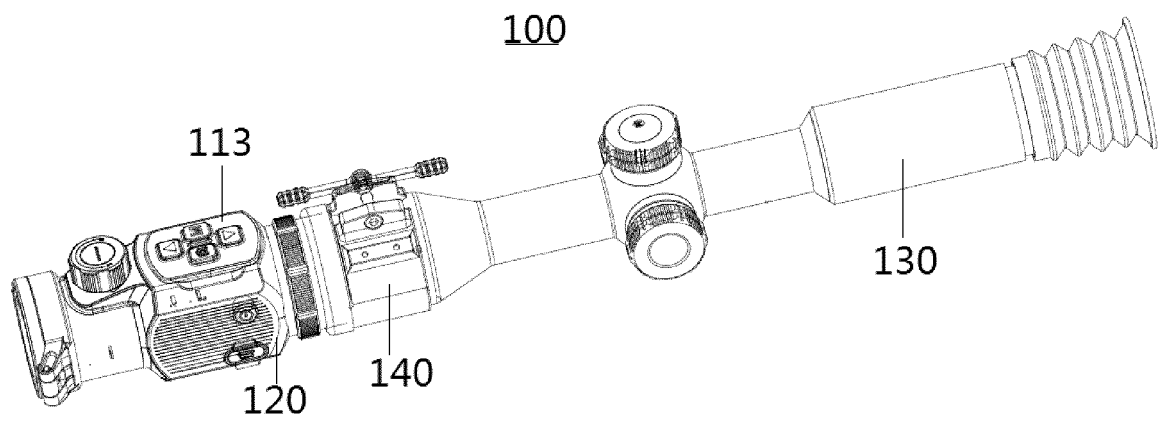


FIG. 6

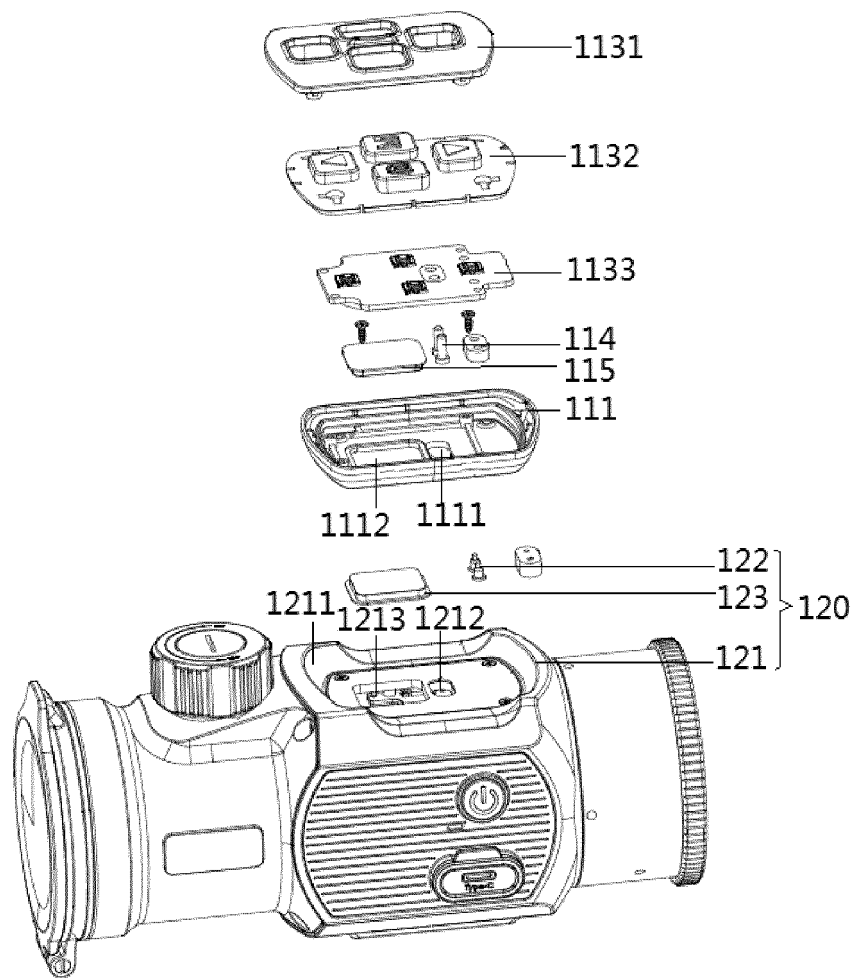


FIG. 7



## EUROPEAN SEARCH REPORT

Application Number

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EPO FORM 1503 03.82 (P04C01)

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A	* paragraph [0003] * * paragraph [0009] * * paragraph [0025] * * paragraph [0028] - paragraph [0055] * -----	3-8	
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A	* paragraph [0021] - paragraph [0030] * -----	3-8	
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A	* paragraph [0015] * * paragraph [0062] - paragraph [0078] * -----	3-8, 14, 15	
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			G08C F41G
Place of search		Date of completion of the search	Examiner
The Hague		5 October 2023	Pham, Phong
CATEGORY OF CITED DOCUMENTS		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	
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			



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

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5 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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05-10-2023

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