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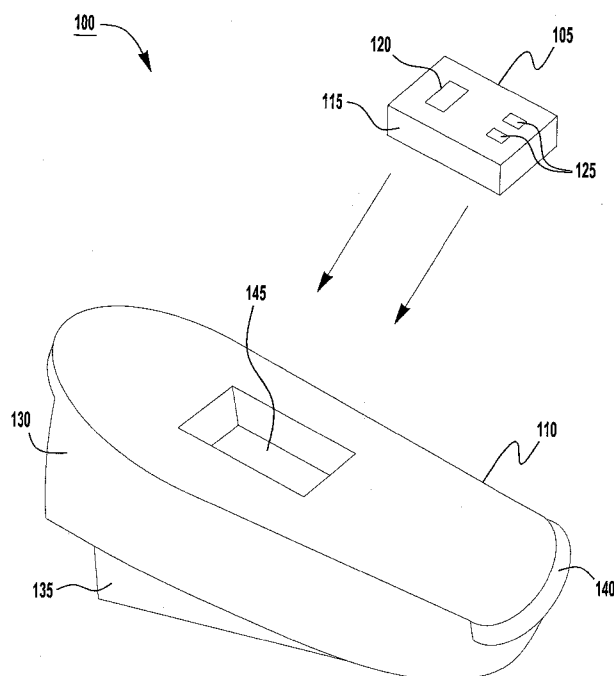


FIG. 1

(57) Abstract: A system (100) for controlling a welder supports remote operation of the welder by either a hand or a foot of the user. The controls of the system share components such that the user can readily change from hand control of the welder to foot control of the welder and vice versa.



CONTROL SYSTEM FOR WELDER

FIELD OF THE INVENTION

[0001] The invention is related to a system for controlling a welder according to claim 1 and to a method of controlling a welder according to claim 11 and 14. The general inventive concepts relate, among other things, to methods, apparatus, systems, programs, and techniques for remotely controlling operation of a welding device.

TECHNICAL BACKGROUND

[0002] Welding devices typically require a user to input and/or adjust operating parameters for the device, such as specifying a particular welding process to be performed. Controls on the welding device allow the user to manually perform the input and adjustment operations at the welding device. One exemplary welding device is the Invertec® V350 PRO Multi-Process Welder, Product No. K1728, manufactured and sold by the Lincoln Electric Company.

[0003] Devices for remotely controlling a welding device during a welding operation are known. These remote controls allow commands to be transmitted to and received by the welding device. The welding device processes the received commands and performs the operations corresponding to the commands. Transmission of data between a remote control and the welding device can be wired or wireless.

[0004] One type of remote control is a hand control, which allows commands to be input by the user's hand. An example of a hand control is the Hand Amptrol™,

Product No. K963, manufactured and sold by the Lincoln Electric Company. Another example of a hand control is the Hand Held Remote 500, Product No. K857, manufactured and sold by the Lincoln Electric Company, as shown in FIG. 5.

[0005] Another type of remote control is a foot control, which allows commands to be input by the user's foot. An example of a foot control is the Foot Amptrol™ 600, Product No. K870, manufactured and sold by the Lincoln Electric Company, as shown in FIG. 6.

[0006] Each of these different remote control devices may be better suited to specific welding methods and situations. Furthermore, different users may have different preferences for remote control devices. Accordingly, there is an unmet need for a control system that can readily support remote, wireless operation of a welding device by either a hand or a foot of the user through the sharing of components.

DESCRIPTION OF THE INVENTION

[0007] Against this background it is an object to provide a control system that can readily support remote, wireless operation of a welding device by either a hand or a foot of the user through the sharing of components. This problem is solved by a system for controlling a welder according to claim 1 and by a method of controlling a welder according to claim 11 and 14. Preferred embodiments of the invention are subject of the subclaims. By way of example to illustrate various aspects of the general inventive concepts, several exemplary methods, devices, and systems are disclosed herein.

[0008] One exemplary aspect of the general inventive concepts is that a single communications means, such as a transceiver or other communications circuitry, logic, or the like, is usable by any one of several distinct controllers.

[0009] A system for controlling a welder, according to one exemplary embodiment, is disclosed. The system includes a hand control including first means for remotely adjusting an operating parameter of the welder and a foot control including second means for remotely adjusting an operating parameter of the welder. The system also includes logic for detecting if the hand control is interfaced with (e.g., inserted in) the foot control. If the hand control is interfaced with the foot control, the foot control is active (i.e., able to control the welder) and the hand control is inactive (i.e., prevented from controlling the welder). In one exemplary embodiment, if the hand control is not interfaced with the foot control, the foot control is inactive and the hand control is active.

[0010] In one exemplary embodiment, the hand control is sized to fit in a hand of the user so that the user can manipulate the first means using one or more fingers on his hand.

[0011] In one exemplary embodiment, the foot control includes an upper housing and a lower housing, and wherein the upper housing is movable relative to the lower housing. In one exemplary embodiment, the second means includes movement of the upper housing relative to the lower housing.

[0012] In one exemplary embodiment, the upper housing of the foot control includes a cavity. The hand control interfaces with the foot control by placement of at least a portion of the hand control within the cavity.

[0013] In one exemplary embodiment, the logic is embedded in the hand control.

[0014] In one exemplary embodiment, the hand control includes transmission means for enabling wireless communication between the hand control and the welder. In one exemplary embodiment, the transmission means is an RF transceiver.

[0015] In one exemplary embodiment, if the foot control is active, the foot control uses the transmission means of the hand control to communicate with the welder.

[0016] In one exemplary embodiment, the hand control includes a power source and the foot control does not. In one exemplary embodiment, the power source includes a battery.

[0017] In one exemplary embodiment, the hand control includes a display for displaying information to the user.

[0018] In one exemplary embodiment, the first means includes a plurality of buttons.

[0019] In one exemplary embodiment, the hand control includes a potentiometer. In one exemplary embodiment, the foot control includes a potentiometer.

[0020] A method for controlling a welder, according to one exemplary embodiment, is disclosed. The method includes: providing a hand control including first means for remotely adjusting an operating parameter of the welder; providing a foot control including second means for remotely adjusting an operating parameter of the welder; detecting if the hand control is interfaced with the foot control; activating the hand control for control of the welder if the hand control is not interfaced with the foot control; and activating the foot control for control of the welder if the hand control is interfaced with the foot control. In one exemplary embodiment, the method further includes detecting if the hand control is interfaced with a piece of equipment (e.g., a helmet), wherein if the

hand control is interfaced with the piece of equipment, the piece of equipment uses a transmission means within the hand control to communicate with the welder.

[0021] A method for controlling a welder, according to one exemplary embodiment, is disclosed. The method includes: providing a foot control for allowing a user to remotely adjust a first operating parameter of the welder using a foot; and removing a portion of the foot control, wherein the removed portion of the foot control functions as a hand control for allowing the user to remotely adjust a second operating parameter of the welder using a hand. In one exemplary embodiment, the first operating parameter and the second operating parameter are the same.

[0022] Given the sharing of components between different control devices, as contemplated by the general inventive concepts, numerous advantages may result. For example, and not by way of limitation, the inventive control systems may realize cost savings since fewer parts are necessary due to the sharing of components. As another example, the control systems may be readily transported (e.g., from site to site) when not in use, as one control may be stowed in the other control for each system. Similarly, storage of the control systems requires less space, as one control may be stowed in the other control for each system. As yet another example, the control systems may be simpler to configure and/or use, as each control belongs to the same overall system and thus can have similar designs, interfaces, operations, etc.

[0023] Numerous aspects of the general inventive concepts will become readily apparent from the following detailed description of exemplary embodiments, from the claims and from the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

[0024] The general inventive concepts as well as embodiments and advantages thereof are described below in greater detail, by way of example, with reference to the drawings in which:

[0025] FIG. 1 is a drawing illustrating a wireless control system for a welder, according to one exemplary embodiment;

[0026] FIG. 2 is a block diagram showing a hand control, according to one exemplary embodiment, for use in the wireless control system of FIG. 1.

[0027] FIG. 3 is a block diagram showing a foot control, according to one exemplary embodiment, for use in the wireless control system of FIG. 1.

[0028] FIG. 4 is a flowchart illustrating a wireless control method for a welder, according to one exemplary embodiment.

[0029] FIG. 5 is an image of a conventional hand control.

[0030] FIG. 6 is an image of a conventional foot control.

DETAILED DESCRIPTION

[0031] While the general inventive concepts are susceptible of embodiment in many different forms, there are shown in the drawings and will be described herein in detail specific embodiments thereof with the understanding that the present disclosure is to be considered as merely an exemplification of the principles of the general inventive concepts. Accordingly, the general inventive concepts are not intended to be limited to the specific embodiments illustrated herein.

[0032] A wireless control system **100** for a welding device, welder, power supply or the like (not shown), according to one exemplary embodiment encompassed by the general inventive concepts, is shown in FIG. 1. The wireless control system **100** allows a user to remotely control a welding process by allowing the user to select and/or adjust one or more operating parameters of the welding device or parameters otherwise associated with the welding process. These parameters could include, for example, an electrode delivery rate, a shielding gas delivery rate, a beginning and end of a welding cycle, various characteristics of the welding arc (e.g., current or amperage, voltage, pulse frequency, initial slope, final slope), etc.

[0033] The wireless control system **100** may be used across diverse methods of welding including, but not limited to, shielded metal arc welding (SMAW) or "STICK" welding, gas metal arc welding (GMAW) also known as metal inert gas (MIG) or "wire feed" welding, and gas tungsten arc welding (GTAW) or "TIG" welding. One skilled in the art will appreciate that the wireless control system **100** may also apply to other welding methods and their associated welding devices.

[0034] The wireless control system **100** includes a hand control **105** (see FIG. 2) and a foot control **110** (see FIG. 3). The hand control **105** and the foot control **110** are remote controls, i.e., controls that are separate from and not physically part of the welding device itself. Furthermore, the hand control **105** and the foot control **110** are wireless devices that are readily portable by the user.

[0035] As shown in FIG. 2, the hand control **105** of the wireless control system **100** includes a housing **115**. The housing is sized to fit in a hand of a typical user. In one exemplary embodiment, the housing has dimensions of approximately 6" x 3" x

2.5". The housing **115** may include a display **120**, such as an LCD panel or screen, and one or more controls **125**. The controls **125** may take any form suitable for manipulation by the user's fingers or hands. For example, the controls **125** could take the form of one or more buttons, knobs, dials, switches, sliding members, rockers, etc. In one exemplary embodiment, the controls **125** could employ voice or sound recognition.

[0036] The housing **115** of the hand control **105** encloses a power source **202**, a transmission means **204**, and control logic **206**.

[0037] Any power source suitable for powering the functionality of the hand control **105** can be used. For example, the power source **202** could be one or more batteries (e.g., AAA batteries). The batteries could be disposable or rechargeable.

[0038] The transmission means **204** typically includes a transceiver for sending information to the welding device and receiving information from the welding device. In one exemplary embodiment, the transmission means uses a one-way transmitter. The transmission means can include other components (e.g., an antenna) as well. Communications between the hand control **105** and the welding device are wireless. Any suitable wireless communications technology or protocol can be used. In one exemplary embodiment the transmission means uses radio frequency (RF) communications.

[0039] The control logic **206** includes all internal components and related circuitry and wiring needed for operation of the hand control **105**. For example, the control logic interfaces with the power source **202** and transmission means **204**. The control logic **206** manages the display **120** of the hand control **105**. The control logic **206** also manages the controls **125** of the hand control **105**. For example, the control logic **206** can detect a state change in a switch (e.g., an on/off switch **208**) amongst the controls **125**.

Likewise, the control logic includes a potentiometer that is used to detect magnitude adjustments being made to an operating parameter (e.g., welding current), for example, using up and down buttons **210** and **212** amongst the controls **125**. In one exemplary embodiment, the control logic **206** includes a "switchpot," which is a potentiometer and a switch tied together, such that manipulation of a single control (e.g., a dial **214**) amongst the controls **125** by the user can control both the potentiometer and the switch. In one exemplary embodiment, the control logic **206** includes one or more programmable components (e.g., an EPROM **216**) and can be configured and/or updated to change or augment the functionality of the hand control **105**.

[0040] The display **120** of the hand control **105** can be used, for example, to display one or more current operating parameters for a welding process. In one exemplary embodiment, the operating parameters are selectively shown on the display **120** in response to user input. In one exemplary embodiment, various operating parameters are periodically shown on the display **120** according to a preprogrammed or otherwise pre-selected routine. The display **120** can also be used to display any other pertinent information to the user.

[0041] As noted above, the controls **125** allow the user to select and/or make adjustments to various operating parameters by manipulating the controls **125** using either of his hands and/or the fingers thereon. As a result, the hand control **105** is capable of controlling an operating parameter, such as welding current, over a range of values.

[0042] In one exemplary embodiment, the controls **125** include additional controls such as buttons **218** and **220**, which can each be associated with a profile. A profile is a preset configuration of operating parameters suitable for a particular welding process

and/or set of welding conditions. In this manner, the user need only manipulate a particular one of the additional controls **218** and **220** to select a desired profile. In one exemplary embodiment, the hand control **105** and its control logic **206** allows the user to program and store one or more profiles for later retrieval using the hand control **105**. The profiles can either be stored on the welding device or the hand control **105** itself. In one exemplary embodiment, if profiles are to be stored on the hand control **105**, the hand control **105** includes internal memory **222** for doing so. In one exemplary embodiment, the hand control **105** includes a port (e.g., a USB port **224**) for interfacing with an external storage device (e.g., a USB flash drive) for accessing and/or storing one or more profiles.

[0043] The foot control **110** of the wireless control system includes an upper housing **130** and a lower housing **135**. The foot control **110** (including the upper housing **130** and the lower housing **135**) is sized to be readily portable. The foot control is also sized and/or shaped to be operable by a foot of a typical user. In one exemplary embodiment, the foot control **110** has dimensions of approximately 11" x 5" x 3".

[0044] At least a portion of the upper housing **130** is movable relative to the lower housing **135** between a rest or minimum position and a maximum position. The user can place either of his feet on the foot control **110** and by exerting increased pressure thereon move the upper housing **130** from its rest position toward its maximum position. Conversely, because the upper housing **130** is normally urged toward the rest position, such as by a spring, the user can simply exert decreased pressure on the foot control **110** to allow it to move from its current position toward its rest position. In this manner,

the foot control **110** provides a pedal-like action which is capable of controlling an operating parameter, such as welding current, over a range of values.

[0045] The foot control **110** may also include one or more controls **140**. The controls **140** may take any form suitable for manipulation by the user's foot. For example, the controls **140** could take the form of one or more buttons, switches, sliding members, rockers, etc. In one exemplary embodiment, the upper housing **130** can tilt to the left and/or right relative to the lower housing **135**, wherein the tilting of the upper housing **130** functions as such a control **140**. In one exemplary embodiment, the controls **140** could employ voice or sound recognition.

[0046] The foot control **110** also includes a cavity **145** that is sized and/or shaped to accommodate the hand control **105** therein. As described herein, the foot control **110** is not fully functional unless the hand control **105** is situated within the cavity **145** of the foot control **110**.

[0047] The foot control **110** does not include its own transmission means. Instead, the foot control **110** uses the transmission means **204** enclosed within the housing **115** of the hand control **105** to send information to the welding device and receive information from the welding device. Thus, as with the hand control **105**, communications between the foot control **110** and the welding device are wireless.

[0048] The foot control **110** uses the transmission means **204** enclosed in the hand control **105** (and, thus, is operable) only when the hand control **105** is interfaced with the foot control **110**. Likewise, the hand control **105** ceases functioning as a remote control and instead serves only as a transmission means when the hand control **105** is interfaced with the foot control **110**.

[0049] The hand control **105** interfaces with the foot control **110** by being snapped, placed, fitted, or otherwise situated within the cavity **145** of the upper housing **130** of the foot control **110**. Detecting that the hand control **105** and the foot control **110** are interfaced can be carried out in any suitable manner, such as by electrical means (e.g., detecting abutment of corresponding metal contacts on each of the controls), mechanical means (e.g., having a projection on one of the controls depress a corresponding member on the other one of the controls), etc. In one exemplary embodiment, the control logic **206** and/or the control logic **304** detects when the hand control **105** and the foot control **110** are interfaced.

[0050] Once the hand control **105** is located within the cavity **145** of the foot control **110**, the foot control **110** becomes the active remote control within the wireless control system **100**. Thereafter, the user can manipulate the foot control **110** including any of its controls **140** using either of his feet to select and/or make adjustments to various operating parameters of the welding device or parameters otherwise associated with a current welding process.

[0051] Decoupling the remote controls from one another (i.e., removing the hand control **105** from the cavity **145** of the foot control) essentially deactivates the foot control **110** and renders the hand control **105** the active remote control within the wireless control system **100**.

[0052] The housing (i.e., the upper housing **130** and/or the lower housing **135**) of the foot control **110** may include a power source **302**. Any power source suitable for powering the functionality of the foot control **110** can be used. For example, the power source could be one or more batteries (e.g., AAA batteries). The batteries could be dis-

posable or rechargeable. In one exemplary embodiment, the foot control **110** does not include its own power source but instead uses the power source enclosed within the housing **115** of the hand control **105**, when the hand control **105** is interfaced with the foot control **110**.

[0053] The housing (i.e., the upper housing **130** and/or the lower housing **135**) of the foot control **110** may include control logic **304**. The control logic **304** includes all internal components and related circuitry and wiring needed for operation of the foot control **110**. For example, the control logic **304** interfaces with the power source **302**.

[0054] The control logic **304** manages the controls **140** of the foot control **110**. For example, the control logic **304** can detect a state change in a switch (e.g., an on/off switch **306**) amongst the controls **140**. Likewise, the control logic **304** includes a potentiometer that is used to detect magnitude adjustments being made to an operating parameter (e.g., welding current) by the foot control **110**. In one exemplary embodiment, the control logic **304** includes a "switchpot," which is a potentiometer and a switch tied together, such that manipulation of a single control amongst the controls **140** by the user can control both the potentiometer and the switch. In one exemplary embodiment, the control logic **304** includes one or more programmable components (e.g., an EPROM **308**) and can be configured and/or updated to change or augment the functionality of the foot control **110**. In one exemplary embodiment, the foot control **110** does not include its own control logic but instead uses the control logic **206** embedded within the hand control **105** when the hand control **105** is interfaced with the foot control **105**.

[0055] As noted above, the controls **140** allow the user to select and/or make adjustments to various operating parameters by manipulating the controls **140** using either

of his feet. In one exemplary embodiment, the controls **140** include additional controls such as buttons **310** and **312**, which can each be associated with a profile. A profile is a preset configuration of operating parameters suitable for a particular welding process and/or set of welding conditions. In this manner, the user need only manipulate a particular one of the additional controls **310** and **312** to select a desired profile.

[0056] In one exemplary embodiment, the foot control **110** can be “pumped” as a type of additional control. Pumping refers to quickly depressing the foot control **110** and then releasing it. For example, the user could pump the foot control **110** three times to select a third preset profile.

[0057] In one exemplary embodiment, the foot control **110** can be tilted to the left, right, or both as a type of additional control. For example, the user could tilt the foot control **110** to cycle through the profiles and/or select a particular profile.

[0058] In one exemplary embodiment, the foot control **110** and its control logic **304** allows the user to program and store one or more profiles for later retrieval using the foot control **110**. The profiles can either be stored on the welding device or the foot control **110** itself. In one exemplary embodiment, if profiles are to be stored on the foot control **110**, the foot control **110** includes internal memory **314** for doing so. In one exemplary embodiment, the foot control **110** includes a port (e.g., a USB port **316**) for interfacing with an external storage device (e.g., a USB flash drive) for storing one or more profiles.

[0059] In one exemplary embodiment, the foot control **110** is a passive device that does not include any power source, transmission means, or control logic. In this case, the foot control **110** includes a mechanical means (not shown), such as a gear or

notched dial, that interfaces with a corresponding mechanical means (not shown) on the hand control **105**. When the hand control **105** is interfaced with the foot control **110**, communication between the mechanical means on the on the hand control **105** and the foot control **110** allows the hand control **105** to determine an approximate amount of displacement of the upper housing **130** relative to the lower housing **135** on the foot control **110**. Consequently, the foot control **110** is able to function as an active remote control through its interface with the hand control **105** which does include a power source (e.g., the power source **202**), a transmission means (e.g., the transmission means **204**), and control logic (e.g., the control logic **206**).

[0060] Although the processing of instructions from the hand control **105** and/or the foot control **110** will typically occur at the welding device, other devices may include processing means (e.g., one or more microprocessors or the like) and associated logic for communicating with the hand control **105** and/or the foot control **110**. Accordingly, the hand control **105** and/or the foot control **110** can be thought of as intelligent devices with expanded or expandable functionality. Additionally, the hand control **105** and/or the foot control **110** could themselves include processing means to further increase their respective functionality.

[0061] In one exemplary embodiment, the control logic **206** and/or processing means of the hand control **105** renders the hand control **105** suitable for plug-and-play operation. In this manner, the hand control **105** is able to automatically detect when it is being interfaced with another piece of equipment, as well as automatically detecting the equipment type. Furthermore, the hand control **105** can interface with the other equipment with little or no configuration thereof required.

[0062] When the hand control **105** is not interfaced with any other equipment, it knows to function as an active remote control for the welding device. When the hand control **105** is interfaced with the foot control **110**, such as described herein, the hand control **105** knows to subjugate itself to assisting the foot control **110** in its role as the active remote control for the welding device. When the hand control **105** is interfaced with another piece of equipment, it can be programmed or otherwise designed to know its role relative to that equipment.

[0063] For example, in one exemplary embodiment, the hand control **105** is able to attach to or otherwise interface with a helmet worn by the user. In this embodiment, a switch (e.g., the switch **208**) amongst the controls **125** on the hand control **105** that may have functioned as an on/off switch in a different context will function to determine if a visor on the helmet is opened or closed. If the switch determines that the visor is opened, the hand control **105** communicates with the welding device to prevent welding from commencing until the visor is closed. Thus, the hand control **105** as an intelligent device can increase safety during a welding operation.

[0064] In one exemplary embodiment, when the hand control **105** is interfaced with the helmet of the user, the display **120** of the hand control **105** may be projected on or transferred to the visor of the helmet. In this manner, the user can better see the relevant information being displayed without having to look away from the weld. Thus, the hand control **105** as an intelligent device can increase the functionality of welding equipment (e.g., a helmet).

[0065] In one exemplary embodiment, the controls **125** of the hand control **105** and/or the controls **140** of the foot control **110** can be used to control equipment related

to a welding operation. For example, in one exemplary embodiment, the controls **125** or **140** are used to toggle a fume control (i.e., exhaust) system on and off.

[0066] In one exemplary embodiment, the hand control **105** is interfaced with equipment that would already be held in the user's hand, such as a welding gun, to provide increased functionality to the user using only a single hand.

[0067] A wireless control method **400** for a welding device, according to one exemplary embodiment encompassed by the general inventive concepts, is shown in FIG. 4. The wireless control method **400** allows a user to remotely control a welding process by allowing the user to select and/or adjust one or more operating parameters of the welding device or parameters otherwise associated with the welding process. These parameters could include, for example, an electrode delivery rate, a shielding gas delivery rate, a beginning and end of a welding cycle, various characteristics of the welding arc (e.g., current or amperage, voltage, pulse frequency, initial slope, final slope), etc.

[0068] The wireless control method **400** may be used across diverse methods of welding including, but not limited to, shielded metal arc welding (SMAW) or "STICK" welding, gas metal arc welding (GMAW) also known as metal inert gas (MIG) or "wire feed" welding, and gas tungsten arc welding (GTAW) or "TIG" welding. One skilled in the art will appreciate that the wireless control method **400** may also apply to other welding methods and their associated welding devices.

[0069] According to the wireless control method **400**, a hand control (e.g., the hand control **105**) is provided in step **402**. Additionally, a foot control (e.g., the foot control **110**) is provided in step **404**. The hand control and the foot control are remote controls, i.e., controls that are separate from and not physically part of the welding device

itself. Furthermore, the hand control and the foot control are wireless devices that are readily portable by the user.

[0070] In the wireless control method **400**, whether the hand control and the foot control are interfaced is periodically or continually checked in step **406**. In one exemplary embodiment, an interface between the hand control and one or more other pieces of equipment (in addition to the foot control) is checked in step **406**.

[0071] If the hand control and the foot control are interfaced, then the hand control is determined to be an inactive control while the foot control is determined to be an active control in step **408**.

[0072] If the hand control and the foot control are not interfaced, then the hand control is determined to be an active control while the foot control is determined to be an inactive control in step **410**.

[0073] In the wireless control method **400**, only one of the hand control and the foot control is active as a remote control for the welding device at any given time. Thus, the user is able to selectively choose which type of remote control to employ at any given time. Furthermore, the user is able to readily transition from one type of remote control to the other.

[0074] The specific embodiments of wireless control systems and methods, as shown and described herein, are provided as examples of the general inventive concepts. The exemplary embodiments can readily support remote operation of a welding device by either a hand or a foot of the user through the sharing of components. From the disclosure given, those skilled in the art will not only understand the general inventive concepts and attendant advantages, but will also find apparent various changes

and modifications to the structures and methods disclosed. It is sought, therefore, to cover all such changes and modifications as fall within the spirit and scope of the general inventive concepts, as defined by the appended claims, and equivalents thereof.

REFERENCE NUMBERS

		214	dial
100	control system	216	EPROM
105	hand control	218	button
115	housing	220	button
110	foot control	222	internal memory
120	display	224	USB port
125	control	302	power source
130	upper housing	304	control logic
135	lower housing	310	button
140	control	312	button
145	cavity	314	internal memory
202	power source	316	USB port
204	transmission means	400	control method
206	control logic	402	step
208	on/off switch	404	step
210	up buttons	406	step
212	down buttons	408	step
		410	step

Claims:

1. A system (100) for controlling a welder, the system (100) comprising:
a hand control (105) including first means for remotely adjusting an operating parameter of the welder;
a foot control (110) including second means for remotely adjusting an operating parameter of the welder; and
logic (206,304) for detecting if the hand control (105) is interfaced with the foot control (110),
wherein the foot control (110) is active and the hand control (105) is inactive if the hand control (105) is interfaced with the foot control (110).
2. The system (100) of claim 1, wherein the foot control (110) is inactive and the hand control (105) is active if the hand control (105) is not interfaced with the foot control (110).
3. The system (100) of claim 1 or 2, wherein the hand control (105) is sized to fit in a hand of the user so that the user can manipulate the first means using one or more fingers on the hand.
4. The system (100) of any of the claims 1 to 3, wherein the foot control (110) includes an upper housing (130) and a lower housing (135), and
wherein the upper housing (130) is movable relative to the lower housing (135).

The system (100) of any of the claims 1 to 4, wherein the second means includes movement of the upper housing (130) relative to the lower housing (135).

The system (100) of any of the claims 1 to 5, wherein the upper housing (130) of the foot control includes a cavity (145), and wherein the hand control (105) interfaces with the foot control (110) by placement of at least a portion of the hand control (105) within the cavity (145).

The system (100) of any of the claims 1 to 7, wherein the hand control (105) includes transmission means (204) for enabling wireless communication between the hand control (105) and the welder.

The system (100) of any of the claims 1 to 6, wherein if the foot control (110) is active, the foot control (110) uses the transmission means (204) of the hand control (105) to communicate with the welder.

The system (100) of any of the claims 1 to 8, wherein the hand control (105) includes a power source (202, 302), and wherein the foot control (110) does not include a power source.

The system (100) of any of the claims 1 to 9, wherein the first means includes a plurality of buttons (210, 220), and/or

wherein the hand control includes a potentiometer, and/or
wherein the foot control (110) includes a potentiometer.

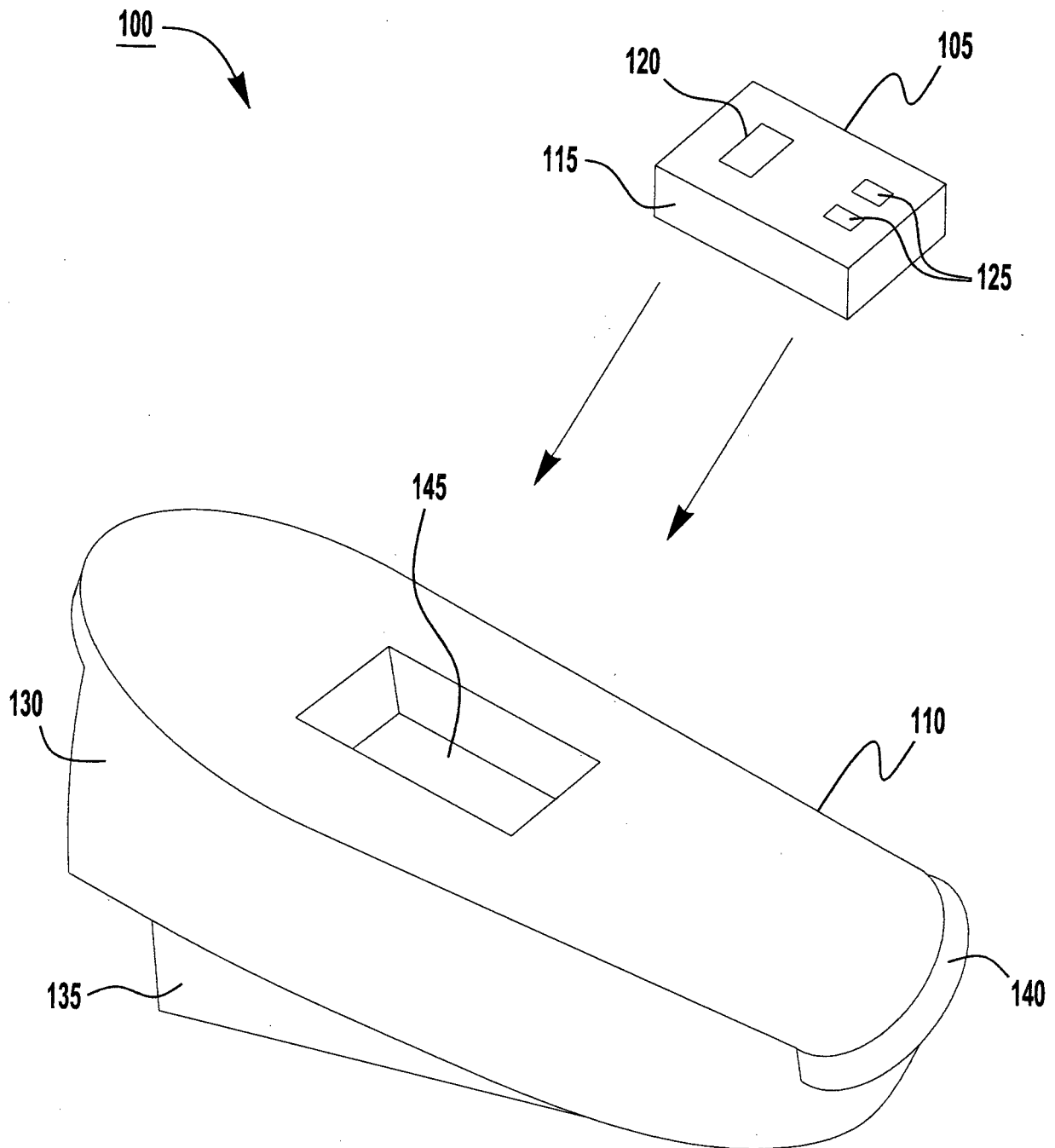
A method of controlling a welder, the method comprising:
providing a hand control including first means for remotely adjusting an operating parameter of the welder;
providing a foot control including second means for remotely adjusting an operating parameter of the welder;
detecting if the hand control is interfaced with the foot control;
activating the hand control for control of the welder if the hand control is not interfaced with the foot control; and
activating the foot control for control of the welder if the hand control is interfaced with the foot control.

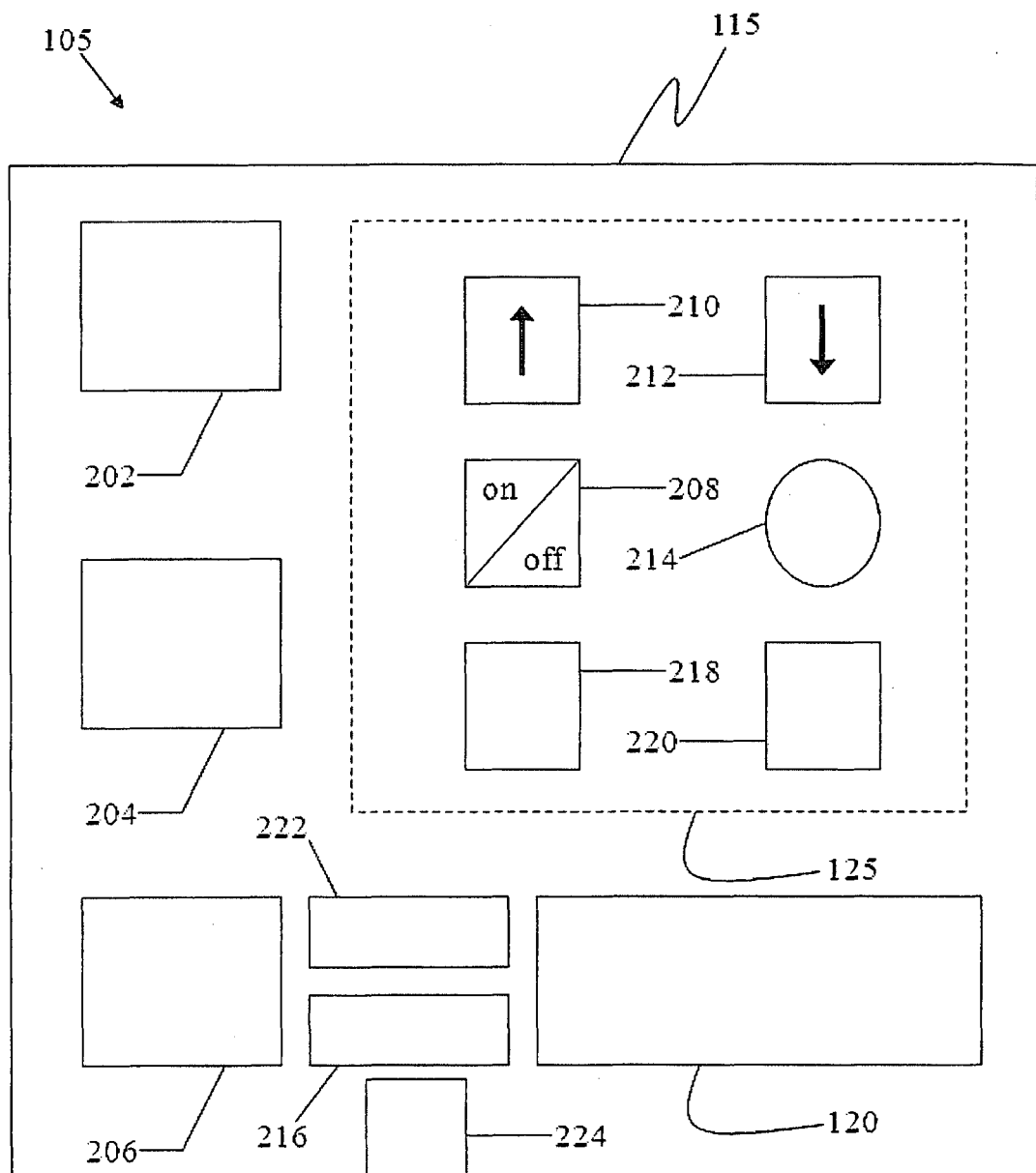
The method of claim 11, further comprising:
detecting if the hand control is interfaced with a piece of equipment,
wherein if the hand control is interfaced with the piece of equipment, the piece of equipment uses a transmission means within the hand control to communicate with the welder.

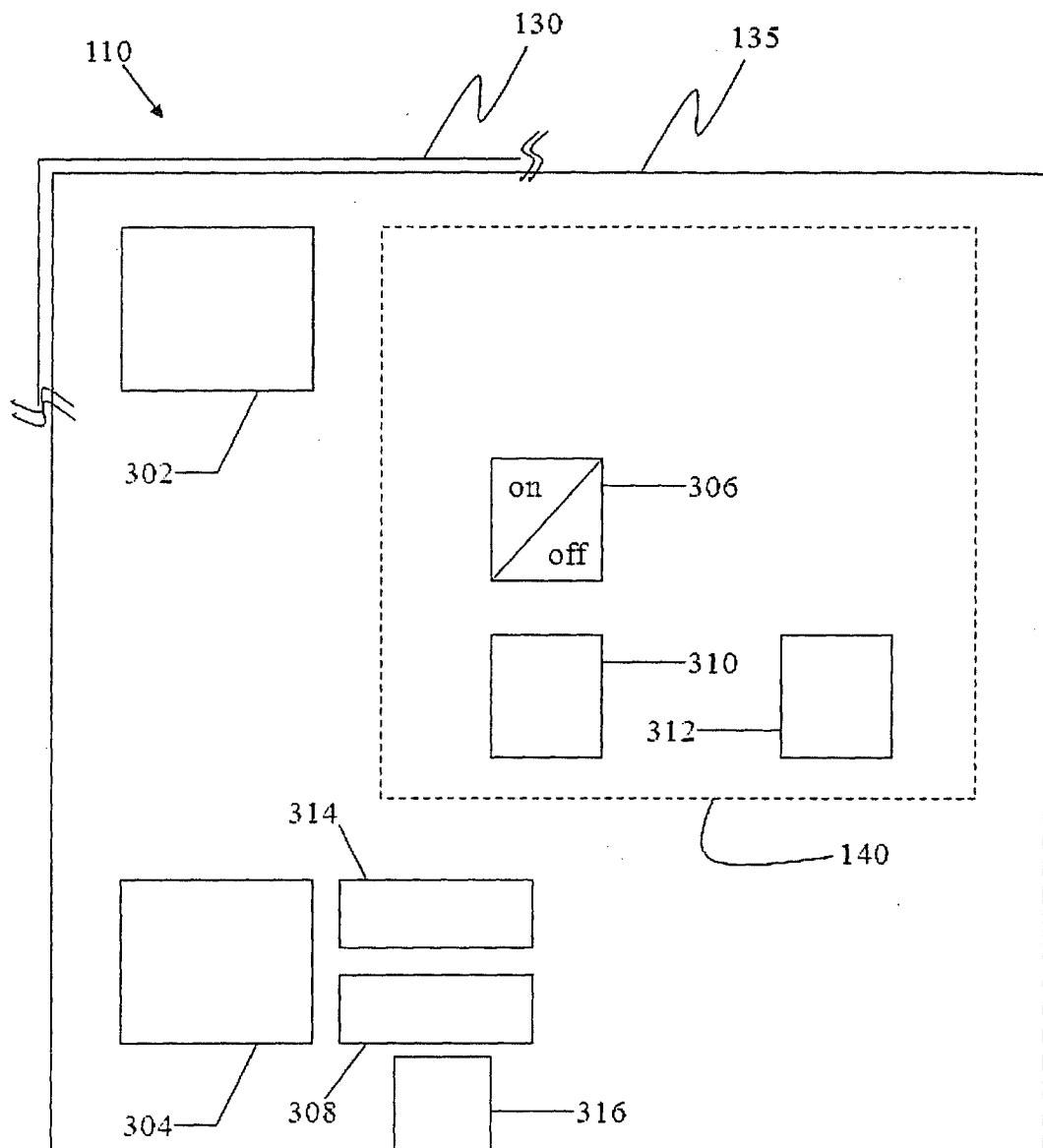
The method of claim 11 or 12, wherein the piece of equipment is a welding helmet, and
wherein the hand control disables operation of the welder if the hand control determines that a visor of the helmet is in an opened position.

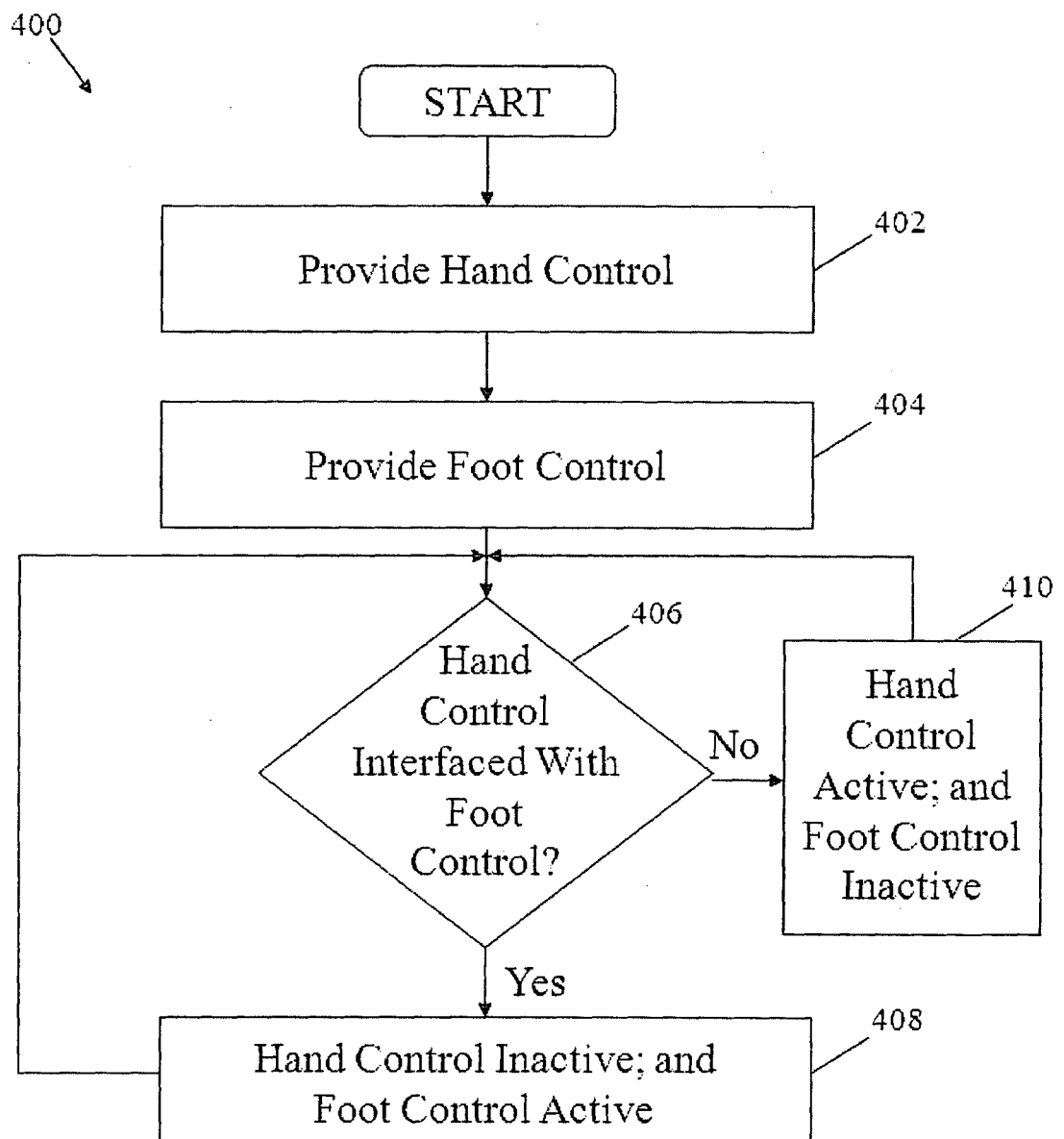
A method of controlling a welder, the method comprising:
providing a foot control for allowing a user to remotely adjust a first operating parameter of the welder using a foot; and
removing a portion of the foot control, wherein the removed portion of the foot control functions as a hand control for allowing the user to remotely adjust a second operating parameter of the welder using a hand.

The method of claim 14, wherein the first operating parameter and the second operating parameter are the same.

**FIG. 1**

**FIG. 2**

**FIG. 3**

**FIG. 4**

500

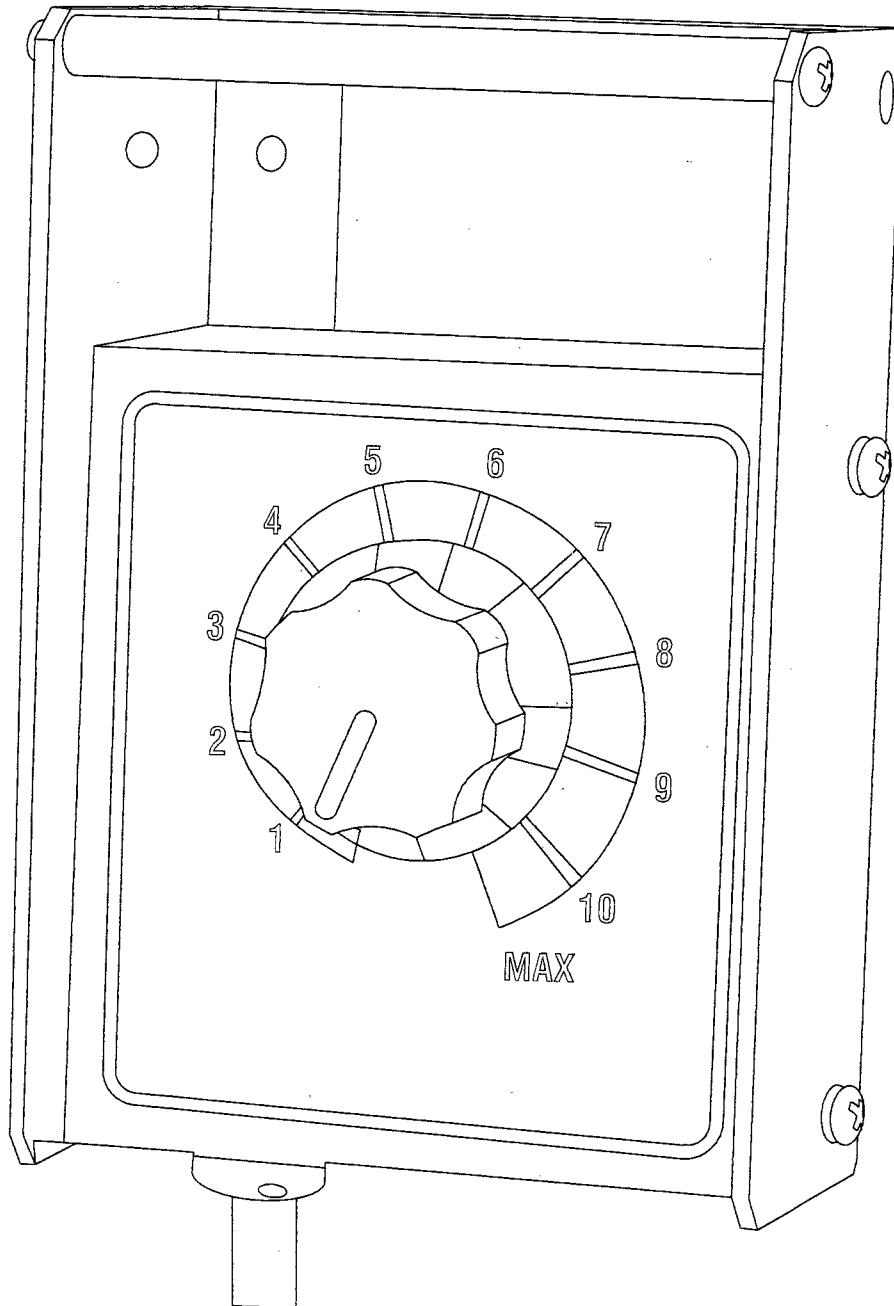


FIG. 5
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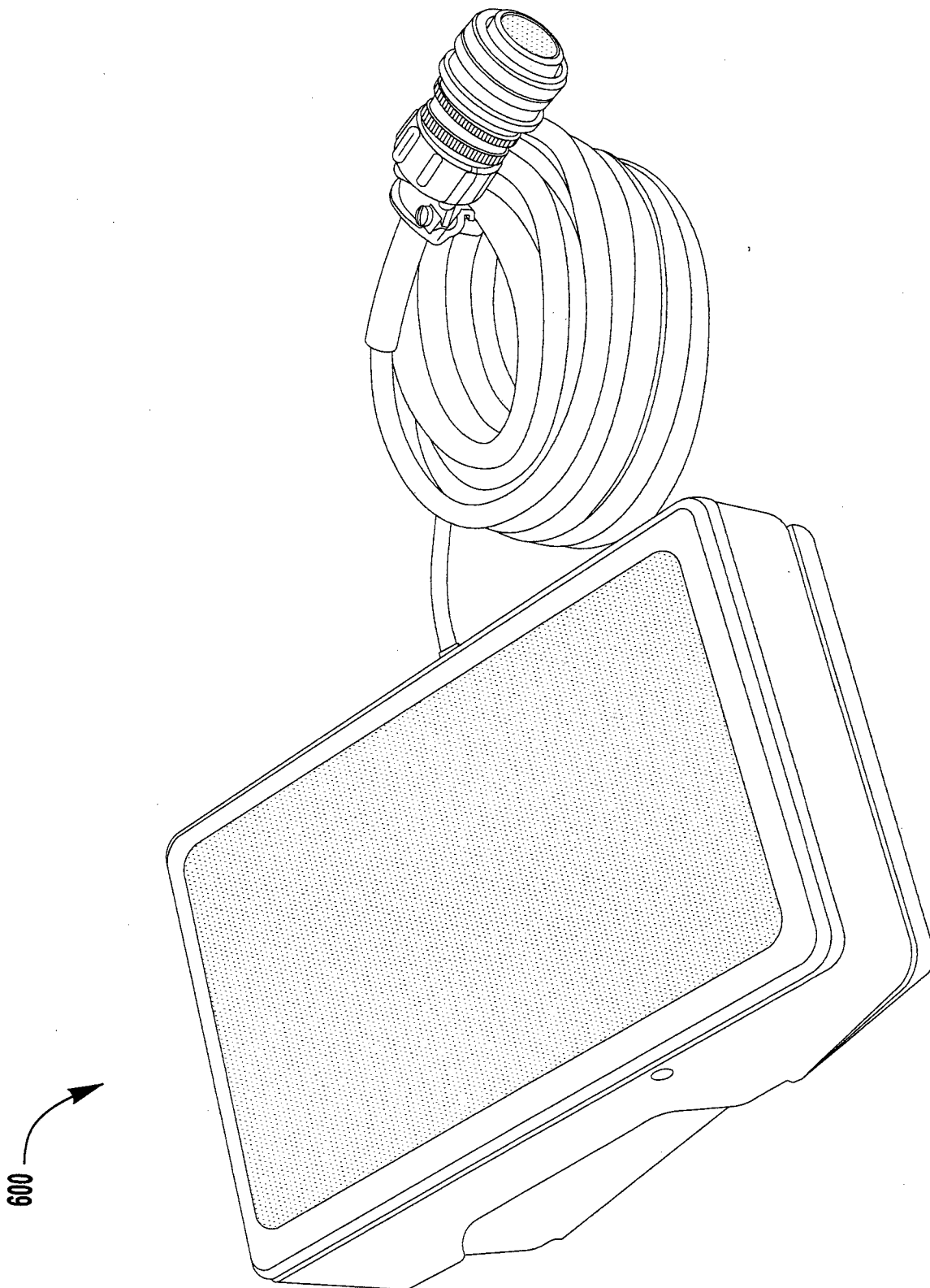


FIG. 6
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