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(54) HEATABLE ICE PERFORATION DEVICE

(76) Inventor: **Lee Robert Periard**, Blanchard, MI (US)

Correspondence Address:
MCKELLAR IP LAW, PLLC
784 SOUTH POSEYVILLE ROAD
MIDLAND, MI 48640 (US)

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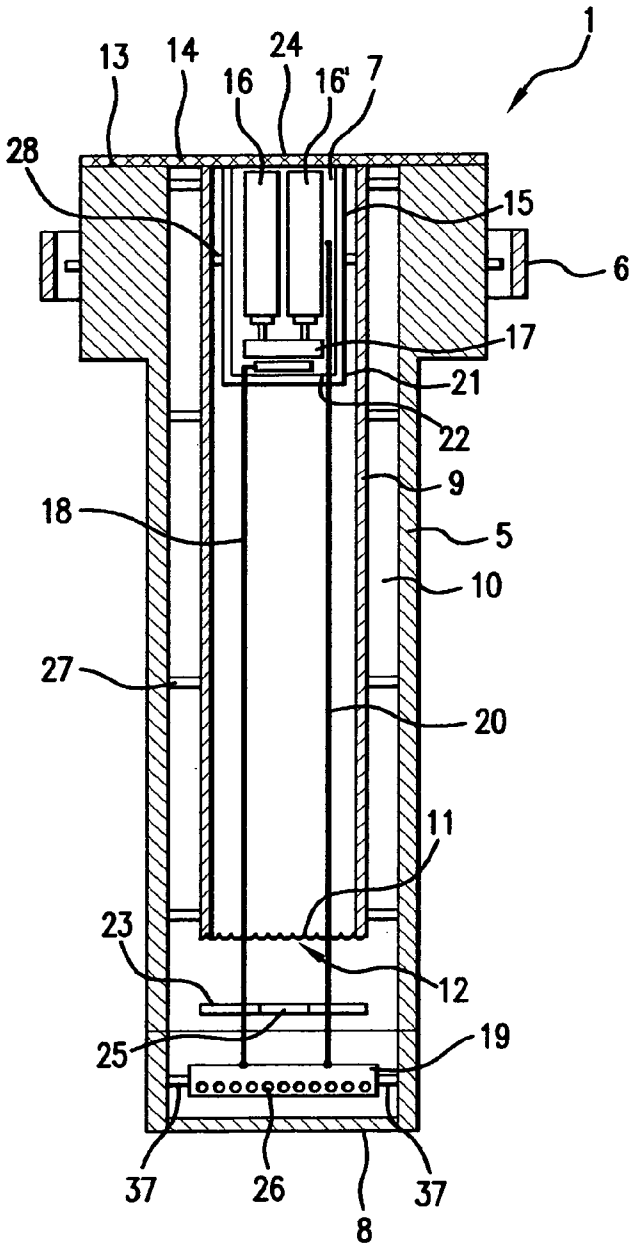
(57) **ABSTRACT**

A heatable ice perforation device that is intended to provide for placing holes in ice in relatively quick time comprising a controllable heat source for heating a power head for melting ice.



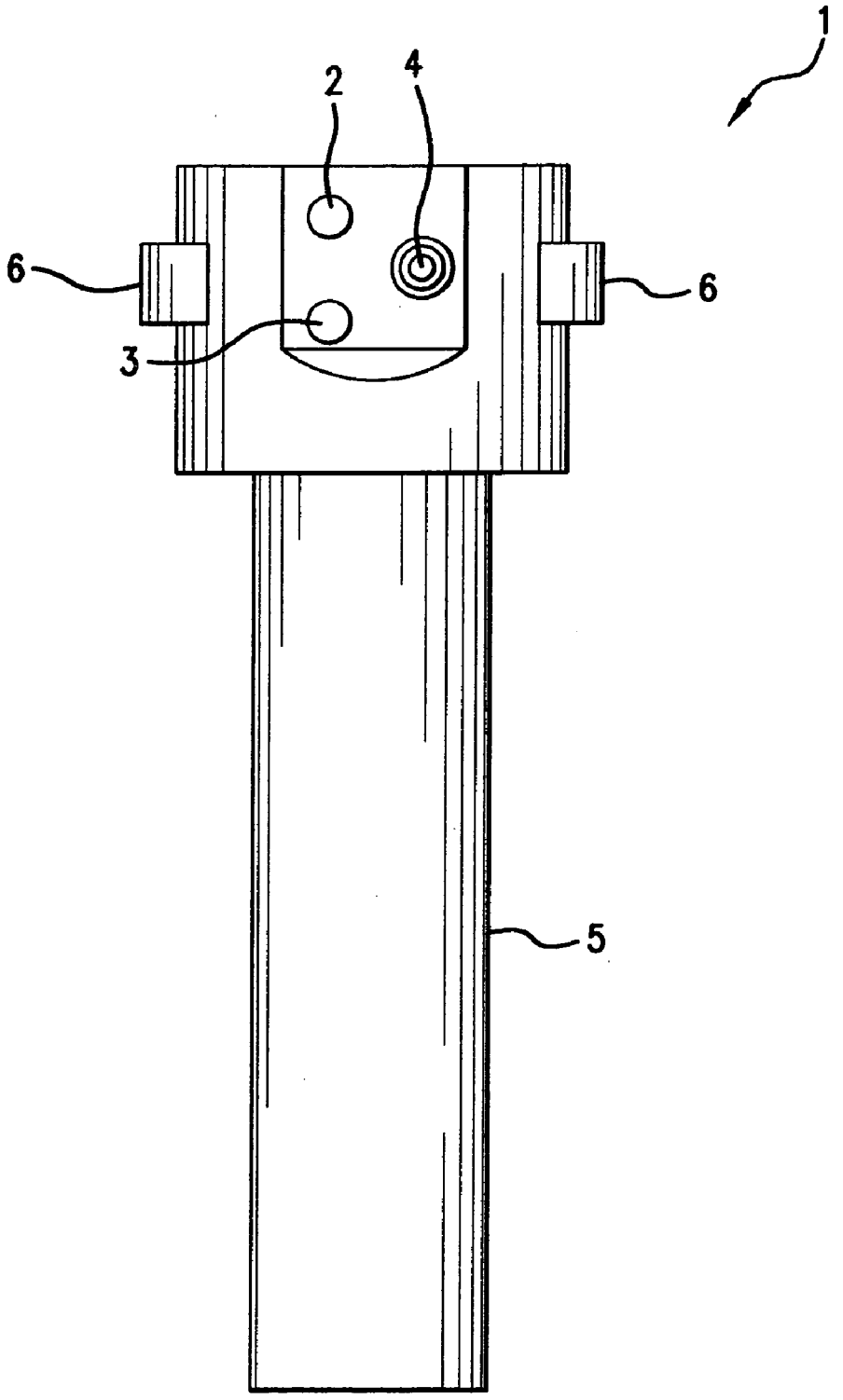
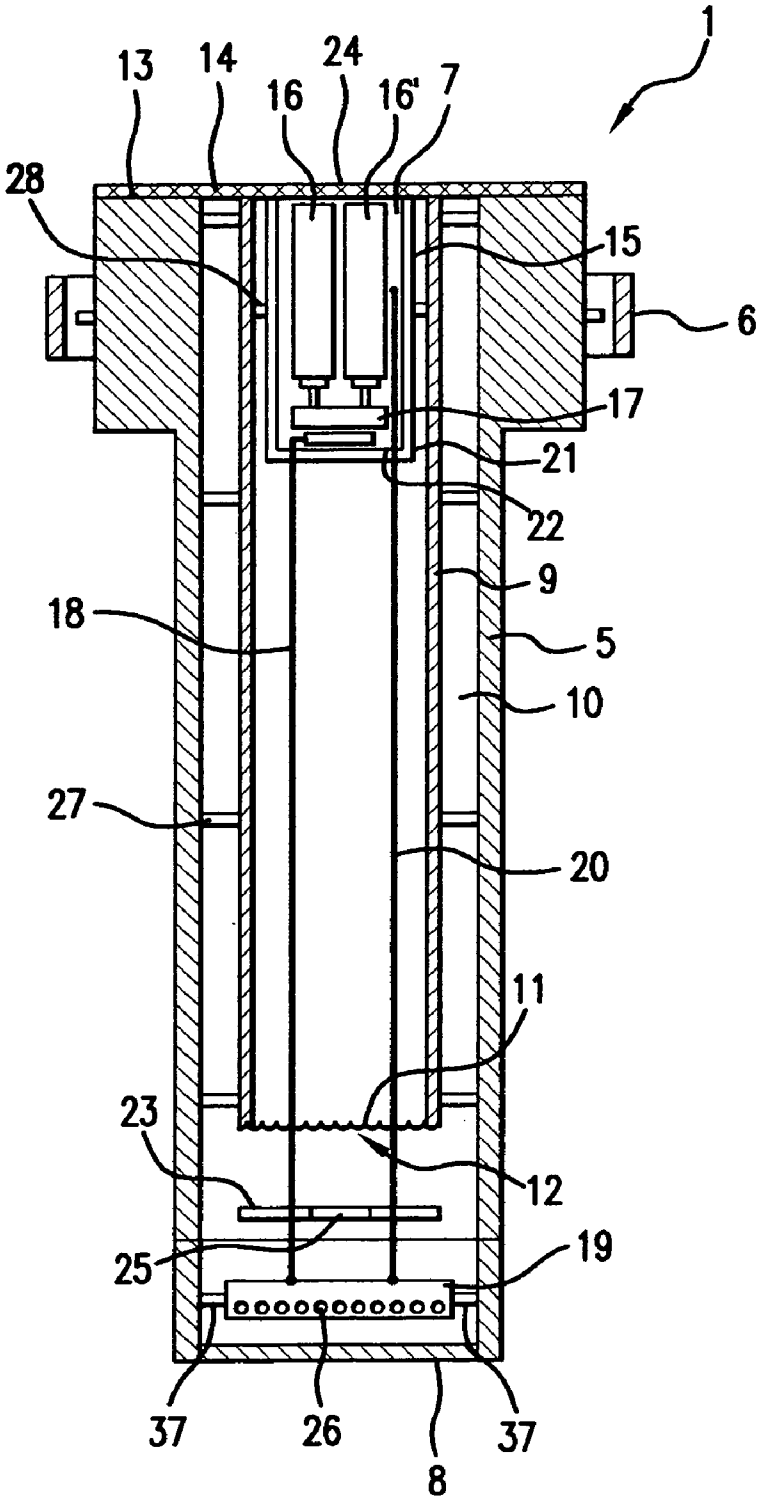


FIG. 1


1
13
14
24
16
16'
7
28
15
6
17
21
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18
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27
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12
25
19
37
26
8
37

FIG.2

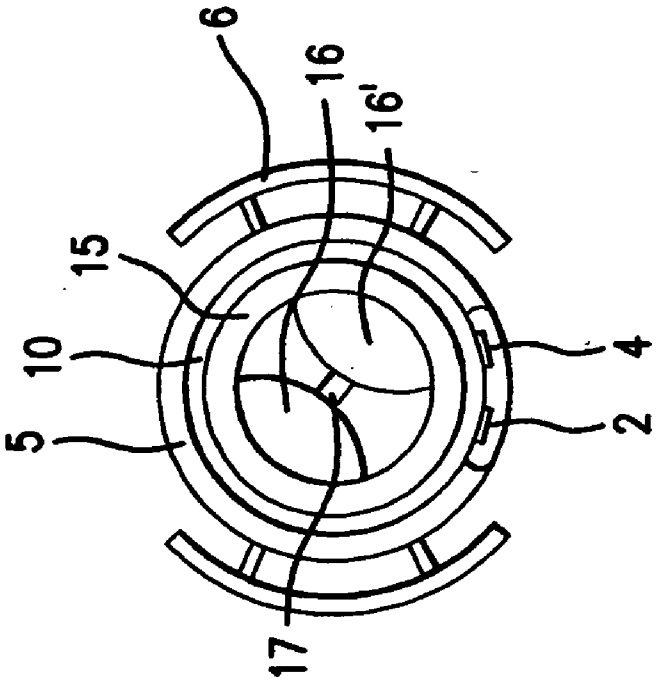


FIG.4

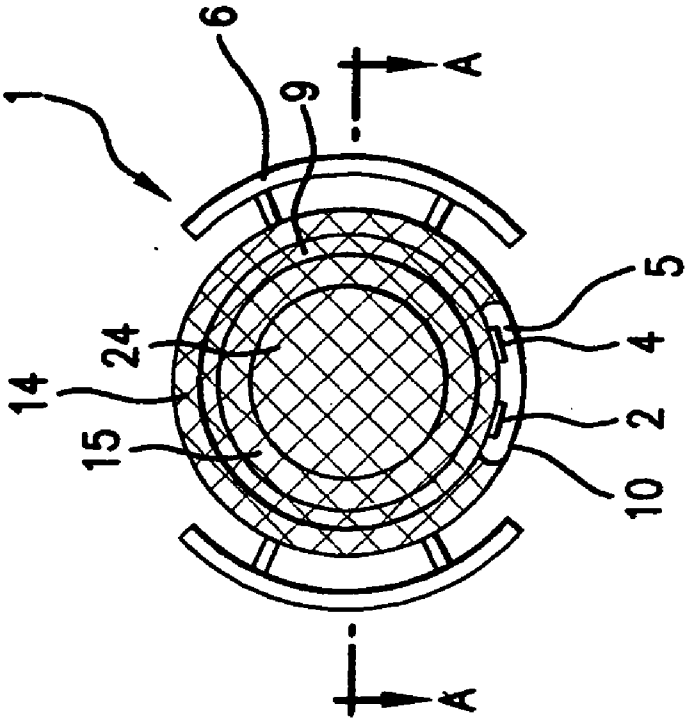


FIG.3

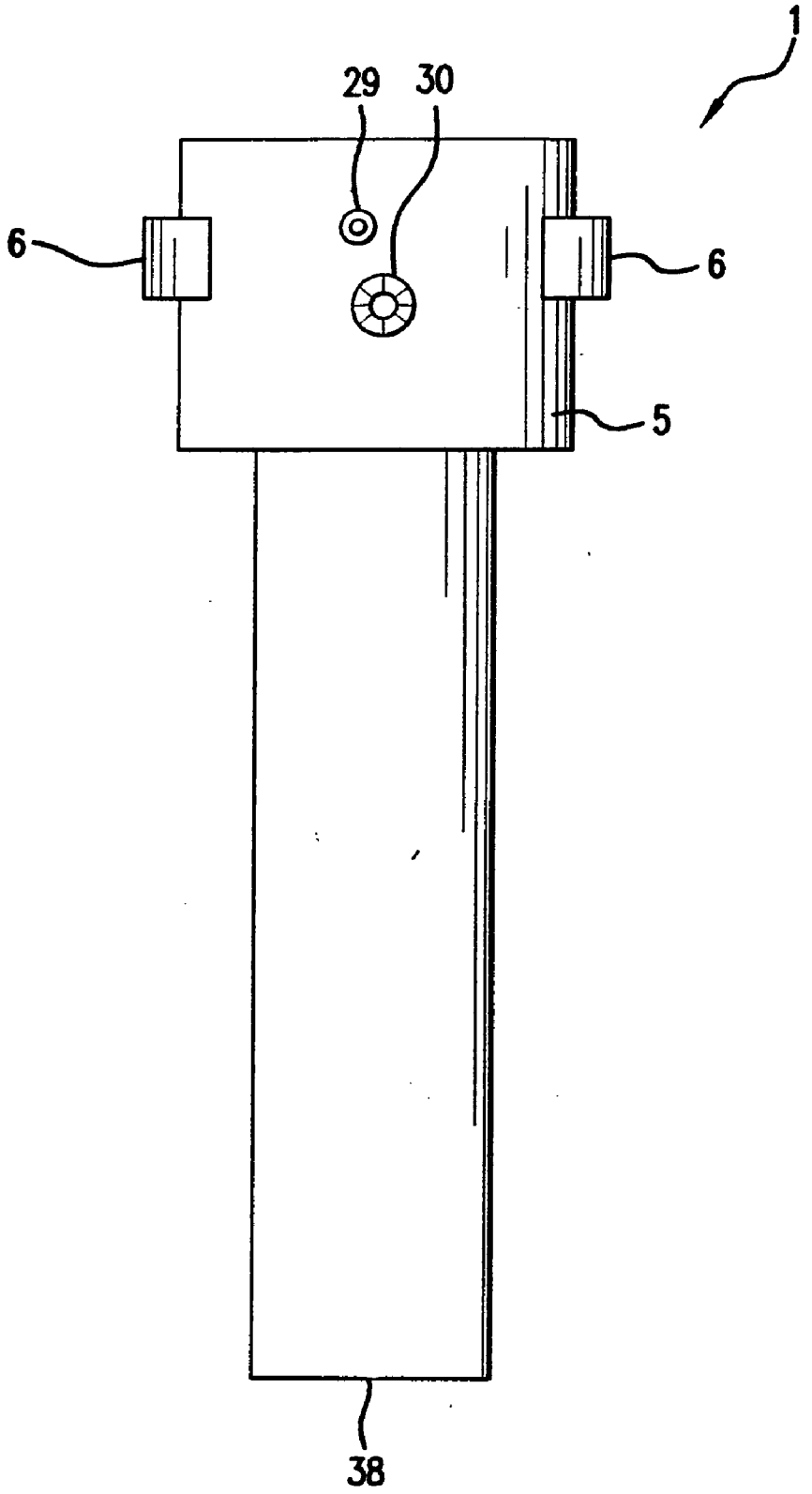
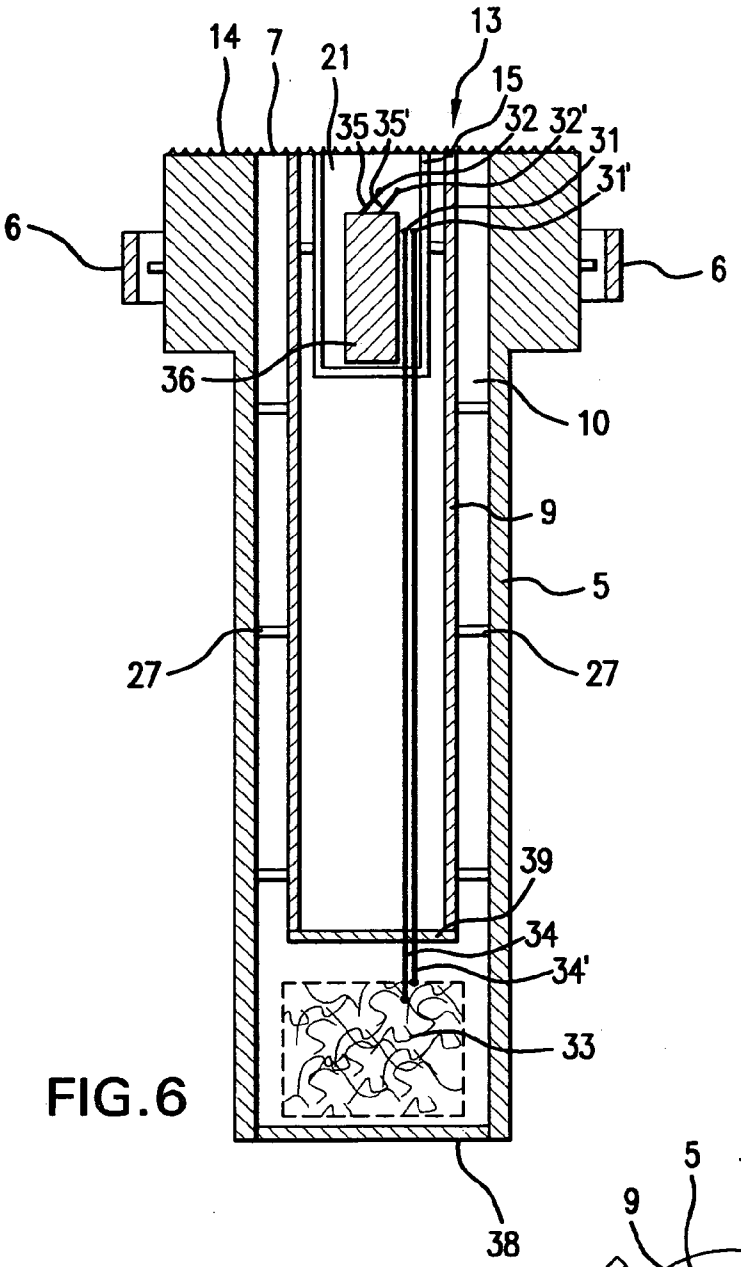


FIG.5


14
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21
13
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35
35'
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9
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39
34
34'
33
38

FIG.6

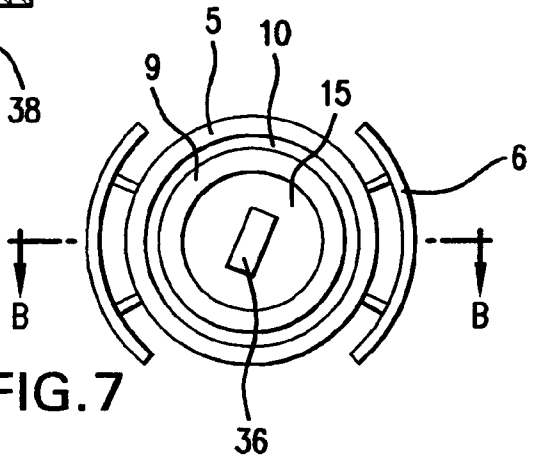
5
10
9
15
6
B
B
36

FIG.7

HEATABLE ICE PERFORATION DEVICE

[0001] The invention disclosed and claimed herein deals with a heatable ice perforation device that is intended to provide for placing holes in ice in relatively quick time.

BACKGROUND OF THE INVENTION

[0002] There are many advantages to being able to place holes through ice. Some are business oriented, such as drilling for various minerals and oils, placement of defense devices under the ice, and for pleasure, for example, ice fishing.

[0003] Many methods have been devised for placing holes in ice, among them, ice spuds that are manufactured from metals such as iron and steel that have one end sharpened for chopping the ice. Using one of these devices is very laborious and takes a fair amount of time to create an ice hole.

[0004] Eventually, ice augers were developed that were manipulated by hand, in that, the devices had lower ends sharpened to a cutting edge, such as blades, and the upper end was provided with a handle that was rotatable to rotate the sharp end through the ice. Using these devices is also laborious and the cutting edges need to be sharpened from time to time in order to be somewhat efficient.

[0005] A fairly significant solution to provide a less laborious device came in the form of a powered ice auger that was equipped with a sharpened lower end, but the rotatable handle was replaced with a motor, usually gas driven.

[0006] Early attempts at providing more efficient ice augers without the labor came in the form of an ice cutting device that is disclosed in U.S. Pat. No. 2,623,149, issued to Amar on Dec. 23, 1952 in which the device comprises a substantially cylindrically shaped support form of a rigid non-conducting material, that is non-electrically conducting material. The device contains an electrical heating element that is powered by a stand-alone battery.

[0007] U.S. Pat. No. 5,484,027, that issued to Greenlaw, et al on Jan. 16, 1996 deals with a device for producing a small, that is, a one-inch diameter penetration through ice quickly. The device has a conical shape made of a ceramic cone having spiral grooves that house a high resistance wire. The wire supplies heat upon being energized, the patent being silent on the source of the voltage being applied to the device in order for it to operate.

[0008] The device disclosed in U.S. Pat. No. 4,651,834, that issued Mar. 24, 1987 to Eninger, et al, deals with a chemical device for penetrating ice. The device comprises utilizing thermochemical heating by exothermic reaction between water supplied at least in part, by melting ice and a thermochemical reactant, preferable lithium and/or other alkali metal or alkali metal alloys.

[0009] Another thermochemical ice melting method can be found in U.S. Pat. No. 5,176,210, that issued on Jan. 5, 1993 to Gammon. The method directly contacts the material to be melted with a melting agent comprising at least one compound selected from the hydroxides, monoxides, methoxides and amides of the alkali metals, lithium, sodium, potassium, rubidium and cesium, or mixtures thereof.

[0010] A very complex method for penetrating ice can be found in U.S. Pat. No. 5,002,470, that issued on Jun. 11, 1991 to Andersen, et al in which an ice penetrator is delivered to the ice after having been launched from a parent vehicle. The rocket propellant of the device is the heat source for penetrating the ice.

[0011] None of the methods or devices of the above-mentioned prior art have the advantages of the instant invention device.

THE INVENTION

[0012] The invention disclosed and claimed herein deals with a heatable ice perforation device that is intended to provide for placing holes in ice in relatively quick time. The device is portable, including the required energy source and is highly efficient in perforating ice. The devices of this invention have a quiet running operation, a cleaner operation, a safer operation and an easy and efficient operation. The devices are lightweight and are therefore easier to transport than typical gas powered augers. The devices do not have gasoline engine related problems, such as messy gasoline, oil, and exhaust fumes, gas flooding, recoil rope problems or spring recoil problems, choke sticking and/or freezing, and no difficulty with spark plugs.

[0013] With more specificity, the invention deals with a heatable ice perforation device comprising in combination an elongated cylindrical housing having a top end, a bottom end, and an outside surface, wherein the elongated cylindrical housing has a second cylindrical housing supported in it. The second cylindrical housing has a top end and a bottom end and the second cylindrical housing forms a chase-way for fresh air into the device, the cylinders have a hollow opening between them forming a second chase-way for the passage of air out of the heated ice perforation device.

[0014] The bottom end of the elongated cylindrical housing has detachedly fixed thereon a power head, there being a third cylindrical housing contained within the second cylindrical housing and near the top of the second cylindrical housing.

[0015] The third cylindrical housing has a top opening and contained in the third cylindrical housing is an energy source. The energy source is connected to a heat-generating element located within the elongated cylindrical housing and near the bottom. The heat-generating element is located such that it will transfer heat contained therein to the power head.

[0016] The elongated cylindrical housing has attached to the outside surface and near the top thereof, a handle and the elongated cylindrical housing contains a control module for controlling the amount of heat generated by the energy source.

[0017] The top end of the elongated cylindrical housing and the second cylindrical housing have a common heat resistant perforated covering and the bottom end of the second cylindrical housing has a heat resistant perforated covering.

[0018] Another embodiment of this invention is a heatable ice perforation device as set forth just above wherein at least one tank is supported in the third cylindrical housing. Each tank is connected to a gas manifold regulator and the gas manifold regulator is connected to a gas transport line. The gas transport line descends to the heat-generating element. The heat-generating element is a gas ring burner. There is an

igniter wire connected to an igniter on one end and the opposite end descends and is located near the gas ring burner. There is a heat resistant plate positioned at or near the bottom of and above the gas ring burner. The control module contains the igniter ignition, a gas on and off valve and a gas ring burner on and off valve.

[0019] Yet another embodiment of this invention is a method of placing holes in ice, the method comprising bringing the heatable ice perforation device as described Supra up to a temperature sufficient to melt ice, and then, applying the heated ice perforation device to the ice and maintaining the heatable ice perforation device against the ice until a hole is formed in the ice.

[0020] It is contemplated within the scope of this invention to use at least one battery within the device as an energy source to heat the device. It is also within the scope of this invention to use at least one fuel cell within the device to provide energy for the device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] FIG. **1** is a full side view of an ice penetration device of this invention.

[0022] FIG. **2** is a full cross sectional view of the device of FIG. **1** taken through line A-A of FIG. **1**.

[0023] FIG. **3** is a full top view of the device of FIG. **1**.

[0024] FIG. **4** is a full top view of the device of FIG. **1** without a cover.

[0025] FIG. **5** is a full side view of a device of this invention.

[0026] FIG. **6** is a full cross sectional side view of the device of FIG. **5**, through line B-B.

[0027] FIG. **7** is a full top view of the device of FIG. **5**.

DETAILED DESCRIPTION OF THE INVENTION

[0028] Turning now to FIG. **1**, and for purposes of describing and illustrating the invention disclosed herein, there is shown a full side view of an ice penetration device **1** that is equipped with gas tanks (FIG. **2**) as the energy source. In FIG. **1**, there is shown an on/off valve **2** for the gas (also shown in FIG. **4**), and an on/off valve **3** for the gas burner, along with a push button igniter **4** for igniting the gas (also shown in FIG. **4**), all contained in the wall of the outside housing **5**.

[0029] The overall size of the devices of this invention may be from about 24 inches to about 48 inches in height and about 6 to fourteen inches in diameter, it being understood that the devices do not have to circular, as they may be square, rectangular, triangular, and the like.

[0030] In FIG. **1**, there is shown a gas on/off valve **2** and a burner on/off valve **3**, along with a push button igniter **4** for igniting the gas the utility of which and the interaction of which will be discussed with reference to FIG. **2**.

[0031] FIG. **2** is a full cross sectional view of the device of FIG. **1** taken through line A-A of FIG. **1**.

[0032] For purposes of setting forth the principles of the invention, the following will be making reference to a device of this invention that is heated with propane gas using small tanks.

[0033] Turning to FIG. **2**, there is shown a device **1** of this invention showing the outside housing **5**, to which is attached a handle **6** for holding the device **1**. The handle **6** may encircle the entire device, or it may be segmented as showing in FIGS. **3** and **4**. The housing **5** is shown as a hollow cylinder, but the shape or configuration of the housing does not necessarily have to be cylindrical, as it can be square, rectangular, triangular, etc., the configuration not being critical. The housing **5** has an open top **7**, and a closed bottom **8**, said closed bottom **8** being manufactured from a material that transmits heat rapidly. The closed bottom **8** is in the form of a cup, and is manufactured from thin metals such as aluminum, copper, stainless steel and the like, the preferred metals being stainless steel and aluminum, and the most preferred being stainless steel. This portion of the device is the power head (the cup) and what is critical about the closed bottom **8** in the power head is that it provides a method for transferring heat from the heat source within the device **1**, to melt ice quickly.

[0034] Housed within the housing **5** is an inner housing **9**, which for most purposes, takes the same cylindrical configuration as the outside housing **5**. Connectors **27** to the outer housing **5** support the inner housing **9**. The inner housing **9** is smaller in diameter than the outside housing **5** so that an inner air space **10** is formed between the two housings. This air space **10** and its function will be addressed infra, but suffice it to know that this air space **10** provides an exhaust route for warm air that is generated by the heating elements (described infra) of the device **1**. Towards this end, the inner housing **9** does not have a closed bottom **12** to allow the intake of cold "fresh" air into the system. Warm air from the closed bottom **8** rises upwards to exhaust through the top **13** of the device **1** through the air space **10** and out through a heat resistant wire mesh screen **14** forming the top of the device **1**, that is, the entire top **13** of the device is covered by the wire screen **14**. Such a configuration allows for the exhaust of warm air out through air space **10**, creating a vacuum during operation that draws fresh air in and down through the inner cylinder for combustion at the propane gas ring burner **19**. This wire screen **14** is removable from the device, especially when the energy source has to be replaced.

[0035] Located near the top **13** of the device **1** is a third housing **15**, said housing being essentially configured according to the configuration of the inner housing **9**, although, this is not critical. The third housing **15** is secured to the inner housing **9** by connectors **28**. The third housing **15** is intended to hold, in this case, propane tanks **16** and **16'**, and although shown as double tanks, a single tank can be used. The propane tanks are also shown in FIG. **4**. The third housing **15** has a cover **24** that is used to place and remove the propane tanks **16** and **16'**. In the case of the use of propane tanks, a gas manifold or regulator **17** has to be used and it is located beneath the tanks **16** and **16'**. Emanating from the regulator **17** is a propane gas line **18** that passes from the regulator **17** through the inner housing **9** and drops downward to a propane gas ring burner **19** located in the cup portion of the closed bottom **8**. The propane gas ring burner **19** is also supported by connectors **37** to the outside housing **5**.

[0036] FIG. **3** is a full top view of the device of this invention showing the outer housing **5**, the inner housing **9**,

and the third housing **15**. Also shown are the wire screen **14** on the top, the cover **24**, and the handle **6**.

[**0037**] FIG. **4** is a full top view of the device of this invention without the cover **24** showing the propane tanks **16** and **16'**, the outer housing **5**, the inner housing **9**, and the third housing **15**. Also shown is the control module which is comprised of the igniter button **4**, and the gas on and off valve **2** and the gas regulator **17**.

[**0038**] Located adjacent the propane gas ring burner **19** is an igniter wire **20**, that passes from the push button igniter **4**, through the outside housing **5**, through the inner housing **9**, and through the wall **21** of the third housing **15** and the bottom **22** of the third housing **15** and drops to its position adjacent the propane gas ring burner **19**. This igniter wire **20** is used to ignite the propane gas from the propane gas tanks **16** and **16"** within the propane gas ring burner **19**. The propane gas ring burner **19** features a series of holes **26** located around its outside and bottom edges for flames to escape and heat the walls of the cup assembly of the bottom **8** to a temperature hot enough to rapidly melt through ice. Hot air rising up from the propane gas ring burner **19** keeps the wall of the outside housing **5** heated and ice free and no ice or water ever reach the propane gas ring burner **19**.

[**0039**] Located just above the propane gas ring burner **19** is a metal, heat resistant plate **23** that is used to concentrate heat in the device's "hot Zone" before warm air is exhausted through the air space **10**. To facilitate the concentration and correct movement of the warm air upwards, an opening **25** is located in the heat resistant plate.

[**0040**] The device of this invention is manufactured primarily from metals and preferred metals are aluminum, stainless steel, copper, and the like and aluminum and stainless steel are preferred. Most preferred is a combination of such metals to accommodate the various needs of the device **1**, such as abrasion and dent resistance, heat transfer, light weight handling, ease of painting and coloring.

[**0041**] For example, the outer housing **5** can be manufactured from stainless steel to prevent abrasion, rusting, denting, and the like, while the bottom **8** can be manufactured from copper or aluminum, both of which have a rapid heat transfer capability. The inner housing **9** can be manufactured from aluminum to keep the weight of the device **1** lower.

[**0042**] To operate the device **1**, one turns on the gas tanks **16** and **16'** using the gas on and off valve **2**. Then the burner on and off valve **3** is turned on and the igniter button **4** is depressed to light the propane gas ring burner **19**.

[**0043**] The device **1** is allowed to reach operating temperature (at least hot enough to melt ice) and the device **1** is placed on the ice with the cup portion of the bottom **8** against the ice. The device **1** is then held by the handle **6** while the device **1** penetrates the ice. When the ice hole is complete, the device **1** is lifted out of the hole and the gas and burner valves are turned off, or the operator continues to provide additional ice holes.

[**0044**] By this means, there is provided a nice smooth hole in the ice without having to remove ice shavings and chunks and the ice hole does not have any jagged edges to snag or cut fishing lines.

[**0045**] Turning now to another embodiment of this invention, and with reference to FIG. **5**, there is shown a device **1** of this invention that is powered by batteries. Thus, there is shown the outside housing **5**, the handle **6**, the solid bottom **38**, a switch **31**, and a control **32**.

[**0046**] With reference to FIG. **6**, which is a full cross sectional side view of the device of FIG. **5**, there is shown a device **1**. There is a cylindrical outside housing **5**, containing within it a cylindrical inner housing **9**, and a third cylindrical housing **15** such that there is formed an air space **10** between the outside housing **5** and the inner housing **9**. The inner housing **9** has an open bottom **12** that is covered with a cover **11**. The air space **10** allows for the escape of heated air from the heat source in the bottom of the outside housing **5**, which heat source consists of a resistive wire mesh **33** that is connected to wire leads **34** and **34'**. The wire leads **34** and **34'** travel up through the inner housing **9** to the contacts **31** and **31'** and the contacts **31** and **31'** pass through the wall **21** of the third housing **15** and back out of the wall **21**. The contacts **31** and **31'** electrically connect to the control **30** and the switch **29**. There are leads **35** and **35'** that are electrically attached to the switch **29**, that pass to electrical contacts **32** and **32'** which pass through the wall **21**, where the leads **35** and **35'** connect respectively to the battery **36**.

[**0047**] In operation, the switch **29** is turned on and the control knob **30** is used to control the amount of electrical energy from the battery **36** that is passed to the resistive mesh **33**. The resistive mesh **33** heats the wall of the outside housing **5** that melts the ice with which it comes in contact with.

[**0048**] Turning to FIG. **7**, there is shown a full top view of the device of FIG. **5** without the cover **15** intact and it shows the outside housing **5**, the inner housing **9**, the third housing **15** and the battery **36**.

[**0049**] The advantages to the devices of this invention are many fold. It has a quiet operation as opposed to the operation of a motor driven ice auger. There are no gasoline engine noises, no grinding or vibrating of the ice, no gasoline fumes or oil or exhaust fumes, there are no sharp blades to contend with, and no recoil during its operation.

[**0050**] The devices are lightweight and therefore easier to operate and transport than typical gas powered augers. There are no gasoline engine related problems such as fouled spark plugs, loose wires, and the like, and it does not require the difficult work that a spiral manual or power driven auger requires.

What is claimed is:

1. A heatable ice perforation device comprising in combination:

an elongated cylindrical housing having a top end, a bottom end, and an outside surface, said elongated cylindrical housing having a second cylindrical housing supported therein, said second cylindrical housing having a top end and a bottom end and said second cylindrical housing forming a chase-way for fresh air, said cylinders having a hollow opening therebetween forming a second chase-way for the passage of air out of the heated ice perforation device;

the bottom end of the elongated cylindrical housing having detachedly fixed thereon a power head;

there being a third cylindrical housing contained within the second cylindrical housing and near the top of the second cylindrical housing, said third cylindrical housing having a top opening and contained in the third cylindrical housing, an energy source, said energy source being connected to a heat generating element located within the elongated cylindrical housing and near the bottom thereof, said heat generating element being located such that it will transfer heat contained therein to the power head;

said elongated cylindrical housing having attached to the outside surface and near the top thereof, a handle;

said elongated cylindrical housing containing a control module for controlling the amount of heat generated by the energy source,

said top end of the elongated cylindrical housing and the second cylindrical housing having a common heat resistant perforated covering;

said bottom end of the second cylindrical housing having a heat resistant perforated covering.

2. A heatable ice perforation device as claimed in claim 1 that has gas from tanks as the energy source.

3. A heatable ice perforation device as claimed in claim 2 wherein at least one tank is supported in the third cylindrical housing, each said tank being connected to a gas manifold regulator, said gas manifold regulator being connected to a gas transport line, said gas transport line descending to the heat generating element, said heat generating element being a gas ring burner, there being an igniter wire connected to an igniter on one end and the opposite end descending and being located near the gas ring burner, a heat resistant plate positioned at or near the bottom of and above the gas ring burner, said control module containing the igniter ignition, a gas on and off valve and a gas ring burner on and off valve.

4. A heatable ice perforation device as claimed in claim 1 wherein the energy source is at least one battery.

5. A heatable ice perforation device as claimed in claim 4 wherein any battery is supported in the third cylindrical housing, each said battery is connected to electrical leads on one end and the opposite end of the electrical leads being connected to a heat generating element, said control module containing an on and off control for controlling each battery.

6. A heatable ice perforation device as claimed in claim 5 wherein the control for controlling the battery also contains a rheostat.

7. A heatable ice perforation device as claimed in claim 1 wherein the energy source is at least one fuel cell.

8. A method of placing holes in ice, said method comprising:

(I) bringing the heatable ice perforation device as claimed in claim 1 up to a temperature sufficient to melt ice, and then,

(II) applying the heated ice perforation device to the ice,

(III) maintaining the heatable ice perforation device against the ice until a hole is formed in the ice.

* * * * *