United States Patent [19]

Ray

[11] **3,792,230**

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[54] **GAS-COOLED TORCH LAMP**

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[73] Assignee: **Industrial Innovations Inc.**, Denison, Tex.

[22] Filed: **Mar. 30, 1972**

[21] Appl. No.: **239,692**

[52] **U.S. Cl.** ..... **219/343**, 200/81.9 M, 240/47, 250/88, 219/347, 219/358, 219/377, 219/354

[51] **Int. Cl.** **H05b 1/02**, H05b 3/00, F21v 29/00

[58] **Field of Search**.... 219/339, 340, 343, 346–358, 219/460, 461, 377; 240/47, 41.35; 128/395, 396; 250/88, 89, 86; 200/81.9 M

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[57] **ABSTRACT**

An infrared heating device includes a pistol grip handle carrying a lamp and a reflector spaced therefrom for focusing infrared radiation upon work to be heated. A filter is positioned over the front of the reflector for passing only infrared radiation to the work. Means are provided to establish a flow of cooling gas over the exterior and interior of the reflector and over in inner and outer faces of the filter. A flow-responsive switch is provided in the handle for detecting the flow of cooling gas. A solid state switching device (Triac) is connected in circuit with the lamp and actuated by the flow-responsive for energizing the lamp only when a flow of cooling gas is established.

3 Claims, 3 Drawing Figures

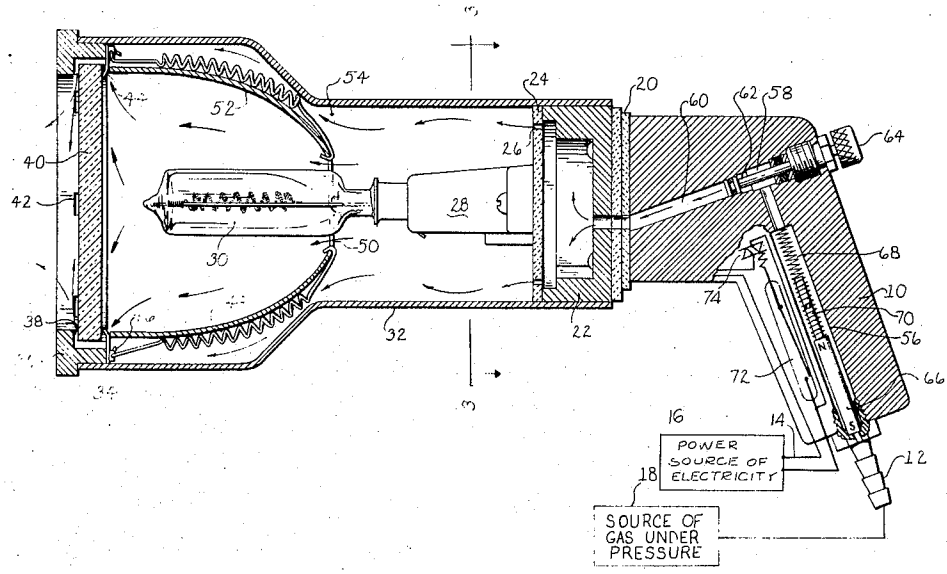
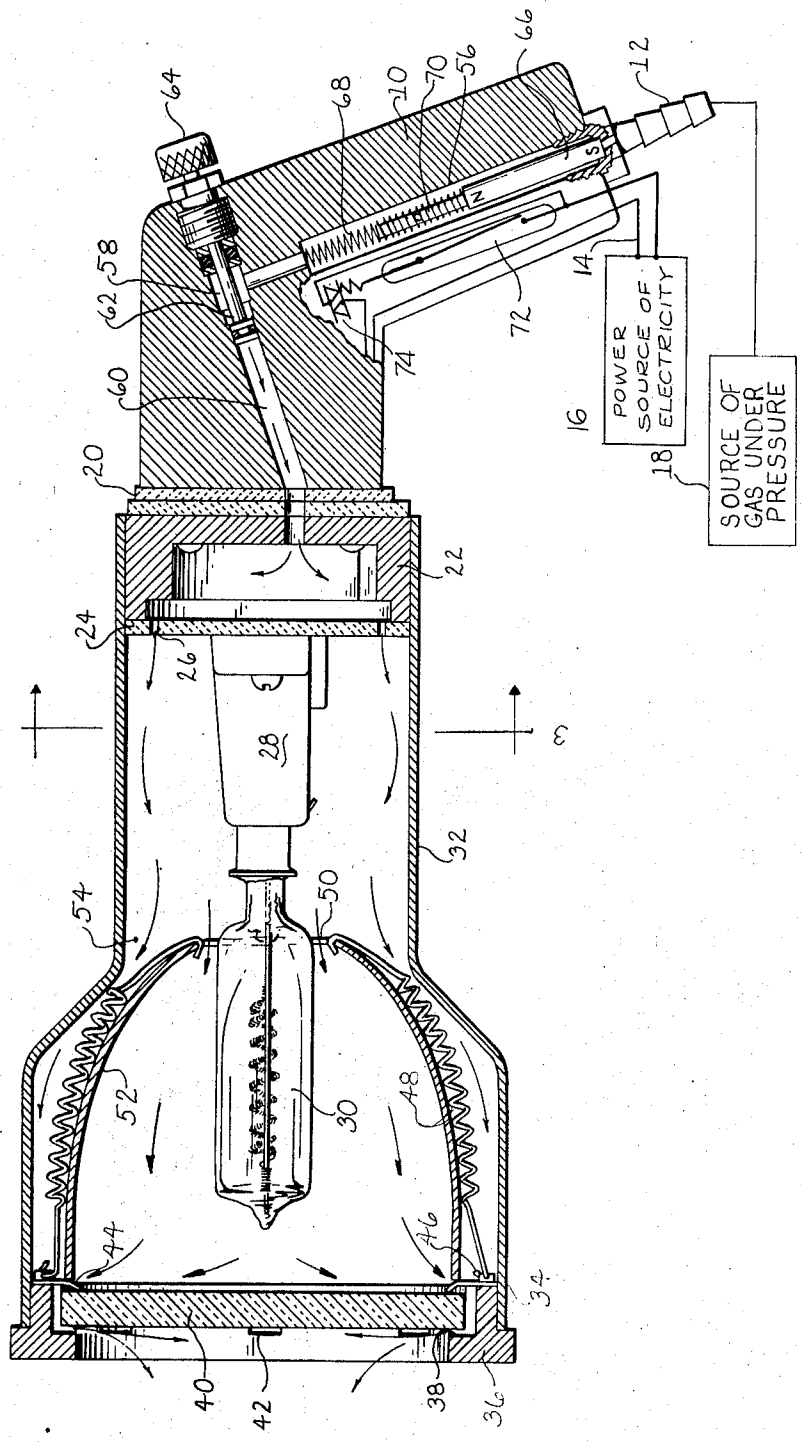


Fig. 1.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POWER SOURCE OF ELECTRICITY
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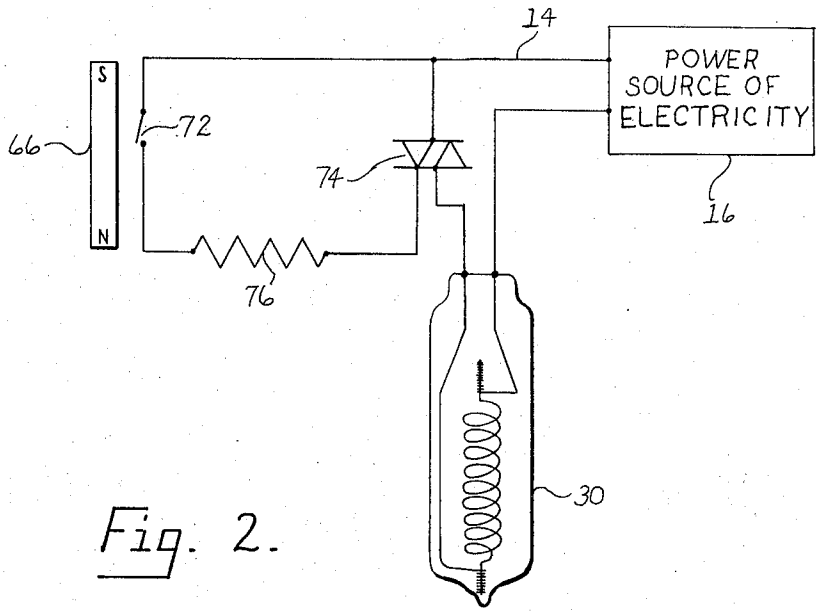

Fig. 2.

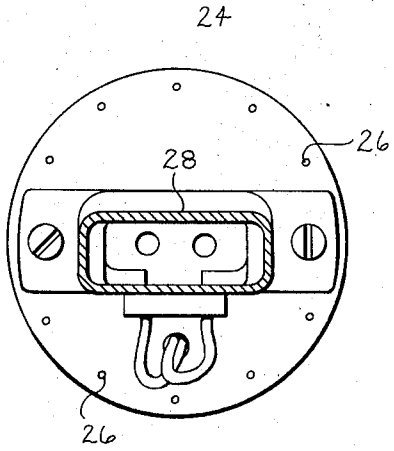

Fig. 3.

GAS-COOLED TORCH LAMP

CROSS-REFERENCE TO RELATED APPLICATIONS

This application shows mechanism for operating a gas-cooled torch lamp. I filed a design application showing a manually operated switch and no cooling gas on Jan. 27, 1971, Ser. No. D-110,381 which issued as U.S. Pat. No. D-225,960 on Jan. 16, 1973. No claim for priority is made.

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to radiant-type electrical heating with an infrared heating element having a reflector therefor.

Description of the Prior Art

Prior to my invention in this field, known devices of which I am aware include an iodine quartz lamp which produces brilliant light and infrared heat waves. These lamps are well known and are commercially available on the market. Also, it is known that filters may be used with these lamps which are basically partially silvered mirrors. These filters will pass the heat waves and reflect the visible light rays. If the lamp is being used for a light source, the light can be reflected to its desired location and the illuminated object is not also heated. It was known to use the filters with reflectors and to shield the work from the visible light when using the lamp as a heat source. Otherwise the lamp illuminates the object so brillinatly the workman is blinded by the light upon the object and cannot as readily see the progress of his work. Before my invention in the field, the common electrical elements which I use, such as the magnetic responsive switch and the "Traic" power relay, were well known and commercially available on the market.

However, with the prior art devices, the intense heat produced by the lamp tends to destroy normal reflectors. The heat produced by the lamp tends to heat the surface of the reflectors to an extremely high temperature so the reflectors are destroyed. A great deal of work has been done to provide reflectors which are not destroyed by the heat. For example see U.S. Pat. No. 3,284,225.

SUMMARY OF THE INVENTION

New and Different Function

I have discovered that the most efficient way to make heat lamps for soldering and the like with an intensely focused heat ray is to cool the reflector rather than attempt to make the reflector heat resistant. I accomplished this by flowing cooling gas around the reflector. The cooling gas may be either air or an inert gas such as nitrogen.

It is important that the lamp not be energized unless there is a flow of cooling gas. If the lamp operates without the flow of cooling gas, the heat from the lamp will destroy the reflector. These devices are often used by telephone installation men in underground tuunels or manholes where there is sometimes an explosive atmosphere of methane, acetylene, propane or the like. Where this situation exists, it is essential that the temperature be kept below the ignition point of the atmosphere.

I have solved the probelm by switching on the lamp responsive to cooling gas flow. Although this switching on could be done by a simple flap valve in the conduits having the glas flow and have the movement of the flap valve actuate a microswitch, this is not the system I have illustrated. The preferred system which is illustrated is to place a magnet in the cooling gas conduit. Therefore, a flow of cooling gas in the conduit will move the magnet. The movement of the magnet is detected by a magnetic switch. However they usually do not have a sufficient current carrying capability; therefore, it is necessary to use a relay or a triac to switch on the lamp responsive to the closing of the magnetic switch. This has the additional advantage of the magnetic switch and the triac being within hermetically sealed containers so there is no danger of the production of a spark from them.

OBJECTS OF THIS INVENTION

An object of this invention is to provide a lamp to concentrate heat upon a small area of an object.

Another object is to make such a lamp usable in an explosive atmosphere.

Further objects are to achieve the above with a device that is sturdy, compact, durable, lightweight, simple, safe, efficient, versatile, and reliable, yet inexpensive and easy to manufacture, operate, and maintain.

Still further objects are to achieve the above with a method that is versatile, rapid, efficient, and inexpensive, and does not require skilled people to adjust, operate, and maintain.

The specific nature of the invention, as well as other objects, uses, and advantages thereof, will clearly appear from the following description and from the accompanying drawing, the different views of which are not necessarily to the same scale.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a longitudinal sectional view of an apparatus according to this invention with some parts shown schematically for clarity and with arrows showing the flow of cooling gas through the apparatus.

FIG. **2** is a schematic representation of the electrical circuits as used therein.

FIG. **3** is a sectional view particularly showing some of the air passage with the shroud removed, taken substantially on line **3—3** of FIG. **1.**

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring specifically to FIG. **1** of the drawing, it may be seen that the apparatus has handle or base **10.** The handle **10** is conveniently in the form of a pistol grip so the workman can readily hold it in his hand and direct the heat rays from the device upon the work area. The overall appearance of the device is more readily seen from the drawings in my design patent application referred to above.

Gas connection **12** is at the bottom of the handle **10.** Not shown in FIG. **1** is electrical connections **41** at the bottom of the handle **10.** FIG. **2** shows the electrical connection **14** in the form of a conventional electrical power cable which connects the device to a power source of electricity **16.** The gas connection **12** is connected by conventional gas hose to a source of cooling gas under pressure **18.** The gas source **18** might well be compressed air from a conventional storage tank or

from a gas compressor it might be from a bottle of inert gas such as nitrogen.

Heating insulating discs **20** and plenum chamber **22** are attached to the handle **10** on the opposite end of the pistol grip from the gas connector **12.** Lamp holder disc **24** is attached to the plenum chamber **22.** The disc **24** has a plurality of small gas discharge holes **26** therein which are arranged along the perimeter thereof. Lamp holder socket **28** is centrally attached to the disc **24.** The lamp holder socket **28** is not shown in detail inasmuch as it is of conventional commercial design as is iodine quartz lamp **30** therein. The lamp **30** produces infrared radiation as brilliant, visible light.

Shroud **32** is circular in cross section and is telescoped over and securely attached to the outside of the plenum chamber **22.** It is made by conventional tachniques of thin walled aluminum material. As readily seen in FIG. **1,** filter end **34** of the shroud **32** is much larger in diameter than the end which connects onto the plenum chamber **22.**

Attachment ring **36** is telescoped within the shroud **32** at the filter end **34.** The filter **40** rests upon internal shoulder **38** of the ring **36.** These are a plurality of air passageways or filter openings **42** in the form of notches cut along the surface of the ring **36.**

The filter **40** is held in place by spring clips **44** which themselves are held in place by screws **46.** The screws **46** form an anchor by which one end of tension springs **48** are attached. The tension springs **48** extend from the screws **46** to a hook at opening **50** of reflector **52.** The reflector **52** is a conventional parabolic shaped reflector made of polished aluminum. Because of the cooling which I describe, it is not necessary to use a heat resistant metal nor is it necessary to take elaborate precautions to prevent the reflecting surface of the reflector from becoming dulled. As may be seen from the above description and the drawings, the reflector is held in place by the springs **48** holding them firmly against the spring clips **44.**

Air passage **54** is between the reflector **52** and the shroud **32.** If air is supplied to the interior of the plenum chamber **22,** it will pass through the holes **26** in the mounting disc **24** to within the shroud **32** and along the outside of the reflector **52** and through the openings **42** to blow along the outside surface of the filter **40.** There is another flow of gas which would be through the opening **50,** around the lamp **30,** and between the reflector **52** and the filter **40,** and then through the air passageways **42.**

The base **10** has conduit **56** for gas passage leading from the gas connection **12** to valve chamber **58.** The valve chamber **58** is axially aligned with conduit **60** which extends from the valve chamber **58** to the plenum chamber **22,** through discs **20.**

Valve **62** is mounted within the valve chamber **58** and is operated by hand knob **64** on the exterior of the handle **10.** When the valve knob **64** is pulled outward, it opens the valve **62** permitting a flow of air as seen by the arrows. The flow of air is stopped by pushing the knob **64** inward.

Bar magnet **66** is mounted within the conduit **56.** The handle **10** and the gas connection **12** and all of the elements within the handle are either aluminum or brass or copper or other non-magnetic material. The bar magnet **66** is normally in the position as seen in FIG. **1** because spring **68** works against a shoulder adjacent to the valve **62** to push it downward adjacent to the gas connection **12.** Spacer **70** is within the conduit so when the valve **62** is open and the gas pushes the magnet **66** upward, the magnet is properly positioned. The spacer **70** has a hole therein so it does not impede the flow of gas around and therethrough.

Gas flow repositions the magnet **66** relative to magnetic switch **72** so that it closes the magnetic switch. The arrangement of magnetic switches with magnets is well known to the art, however, the movement of the magnets by gas flow and also using it in this particular arrangement is considered to be invention by me.

Referring specifically to FIG. **2,** the schematic representation of the electrical circuits shows the power source of electricity **16** connected to the lamp **30.** One wire is directly connected, the other wire is connected to the source through triact **74** when the triac is closed. The triac will be recognized as a switching means or means for connecting power from the power source to the lamp **30.** The switch **72** is electrically connected between the power source **16** and the control connection of the triac **74** through resister **76.** The switch **72** activates the triac so the triac closes to energize the lamp **30.** All this will be understood by those skilled in the art.

It will be understood that this disclosure does not go into detail upon either existing elements which are well known to the art and commercially available, nor does it go into detail on techniques which are well known to the art and therefore, are within the skill of ordinary craftsmen. E.g., FIG. **1** does not show the physical placement of the triac **74** within the handle **10** because applicant believes that any mechanic ordinarily skilled in tools of this sort would readily be able to place the triac within a cavity within the handle **10** and connect the wires from the magnetic switch **72** to the triac and to the lamp **30.**

Also, triacs are well known and commercially available on the market.

It will be understood that the gas also cools the filter **40.** The filter **40** will become the hottest part of the device. Therefore, it is important that it be cooled also. Furthermore, if the filter temperature does increase so it is above the ignition point of the atmosphere, it will still be safe because the filter will be bathed or have a gas shield around it. This will be well understood if nitrogen is used as the cooling gas. Even if compressed air is used as a cooling gas, by having the filter and the parts shielded by the compressed air, this prevents methane or other explosive mixture to be within this area.

The wiring through the handle **10** will permit some cooling gases to escape in this area. Although the triac **74** and the magnetic switch **72** are hermetically sealed, they are also bathed or shielded by the same cooling gas which flows over the lamp **30** and reflector **52.**

The cooling gas itself will reach a rather high temperature. The air ports or openings or passageways **42** are cut along the surface of the ring **36** so that the air flows evenly from the edges of the filter **40** to the center of the filter; from there the air flows out along the axis of the device which is also the main heat beam coming from the lamp **30.** The preheated gas which has been cooling the device blows upon the work. This will help in heating the work.

It is desirable to make the air valve **62** slow acting. This may be done two ways. One is to put threads upon the shank attached to the hand knob **64.** If the valve **62**

is slow acting, there will be a small gas flow, shielding the parts before there is sufficient gas flow to move the magnet **66.** When the device is turned off, the gas flow is reduced sufficiently so the electricity is turned off and thereafter there is a continuing gas flow before the valve is completely closed. Another way of achieving the slow movement of the valve **62** is to make the parts extremely tight or small clearance so it is hard to move and the hand knob moves only slowly in opening and closing.

The embodiment shown and described above is only exemplary. I do not claim to have invented all the parts, elements or steps described. Various modifications can be made in the construction, material, arrangement, and operation, and still be within the scope of my invention. The limits of the invention and the bounds of the patent protection are measured by and defined in the following claims. The restrictive description and drawing of the specific example above do not point out what an infringement of this patent would be, but are to enable the reader to make and use the invention.

I claim as my invention:

1. In an infrared heating device having

a. a base,

b. a lamp attached to the base emitting infrared rays,

c. a reflector surrounding the lamp for focusing the infrared rays upon work to be heated,

d. a filter attached to the reflector for blocking the light rays and passing the infrared rays, and

e. a power source of electricity for the lamp;

f. THE IMPROVED STRUCTURE FOR COOLING THE APPPARATUS COMPRISING:

g. switch means attached to the base for connecting the lamp to the power source,

h. a shroud surrounding the reflector,

j. a passage between the shroud and reflector for cooling gas flow,

jj. filter openings from the passage at the filter,

kk. said filter openings forming means operatively associated with the shroud for directing the gas over the outside of the filter to also cool the filter,

mm. an opening between the lamp and reflector for flow of cooling gas between the lamp and reflector,

nn. said flow of cooling gas between the lamp and reflector also flowing on the inside of the filter and said filter openings,

k. a source of cooling gas under pressure,

m. a valve attached to the base,

n. gas conduits connecting the gas source to the valve and the valve to the passage, and

o. detecting means attached to the base and associated with one of said gas conduits for detecting a flow of gas from the gas source to the passage, and

p. means responsive to said detecting means for actuating said switch means to energize said lamp when the cooling gas is flowing to the passage from the source and to de-energize said lamp when the flow of cooling gas ceases.

2. The invention as defined in claim **1** wherein said detecting means includes:

q. a magnet within one of said conduits, and

r. said magnet is mounted for movement responsive to gas flow in the conduit said switch is magnetically responsive.

3. The invention as defined in claim **1** with the additional limitation of

q. means operatively associated with the shroud for directing the gas from said passage out along the axis of the device, which is along the beam of heat as focused by said reflector.

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