May 31, 1960 D. C. McCUTCHEON ET AL 2,938,988

ELECTRICAL IGNITOR DEVICE FOR SOLID FUELS

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FIG. 1.

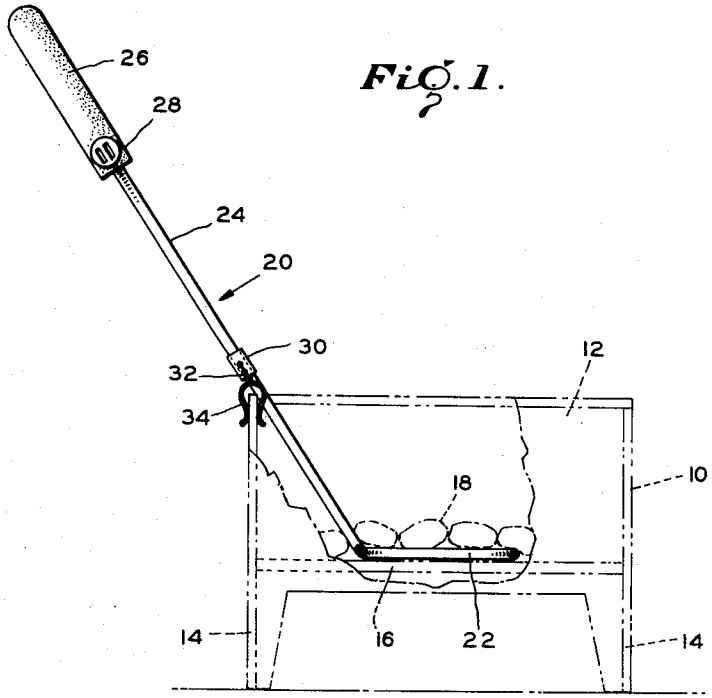
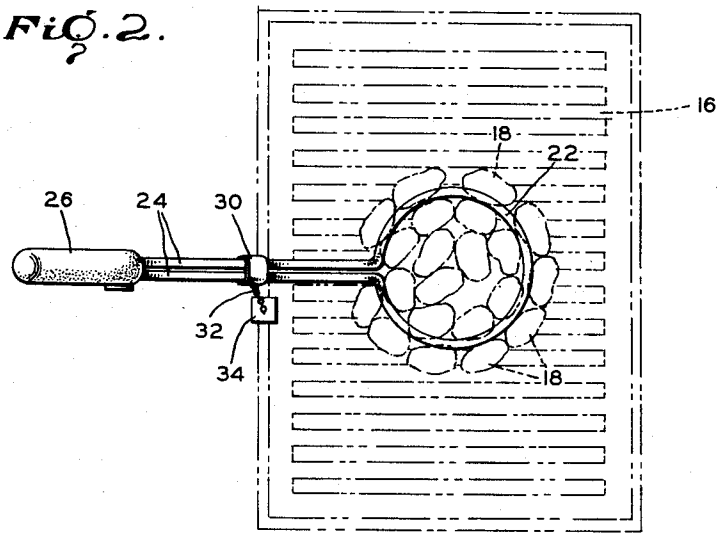


FIG. 2.



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Fig. 3.

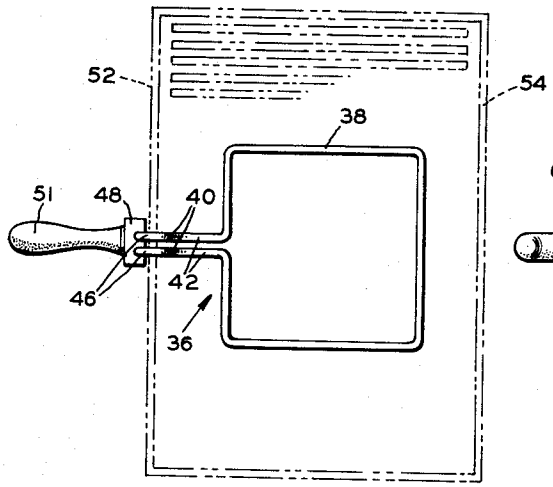


Fig. 5.

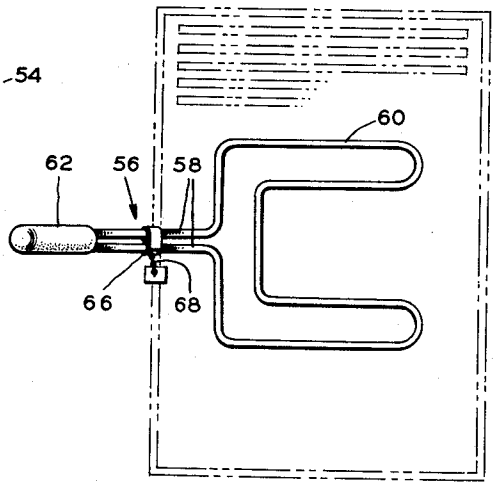


Fig. 4.

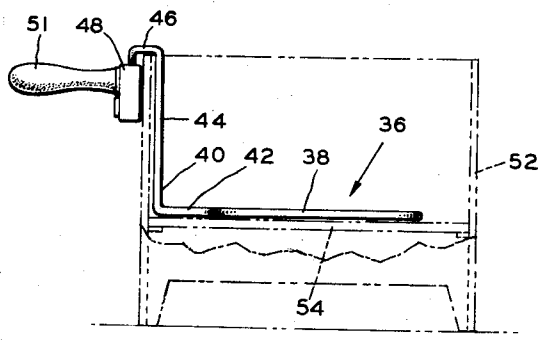
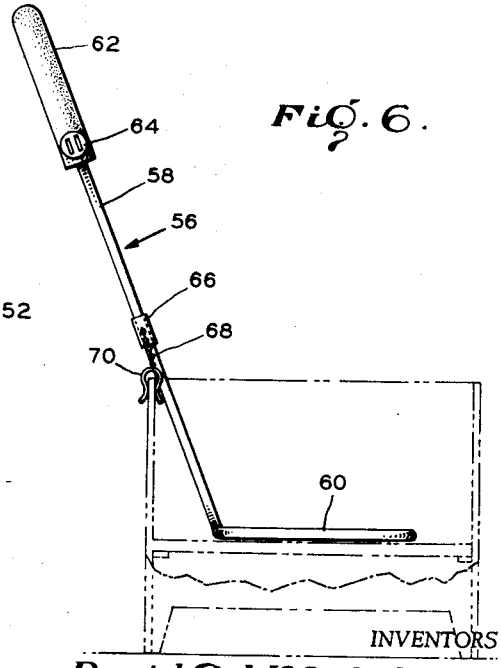


Fig. 6.



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Fig. 7.

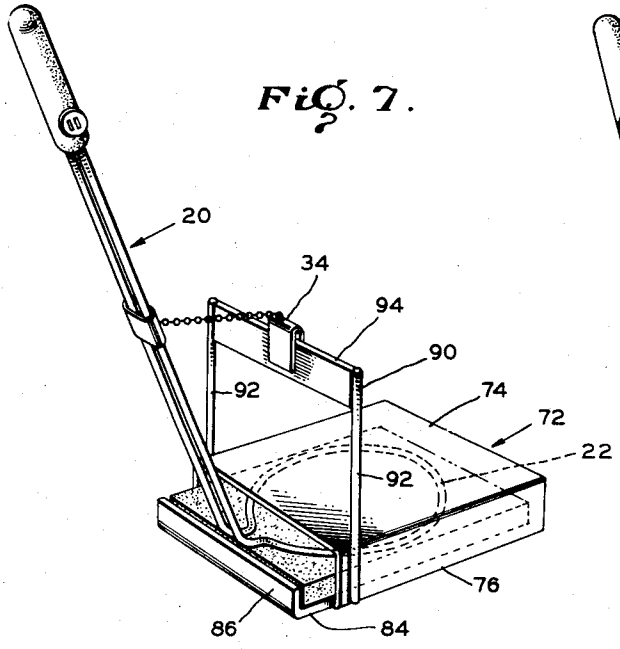


Fig. 8.

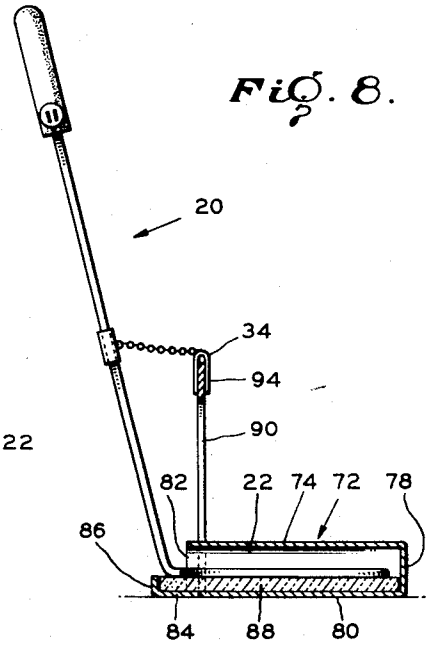


Fig. 9.

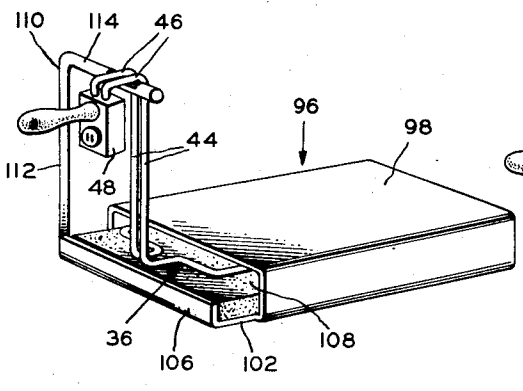
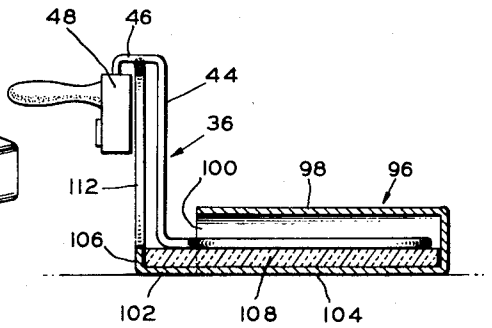


Fig. 10.



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FIG. 11.

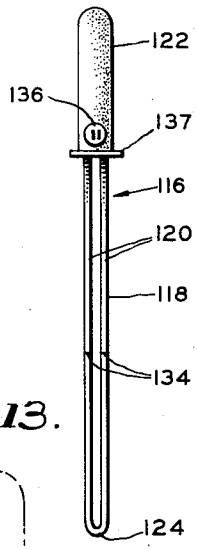


FIG. 12.

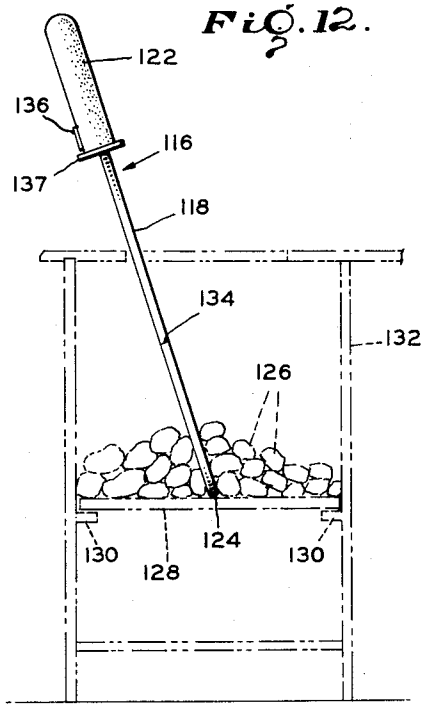


FIG. 13.

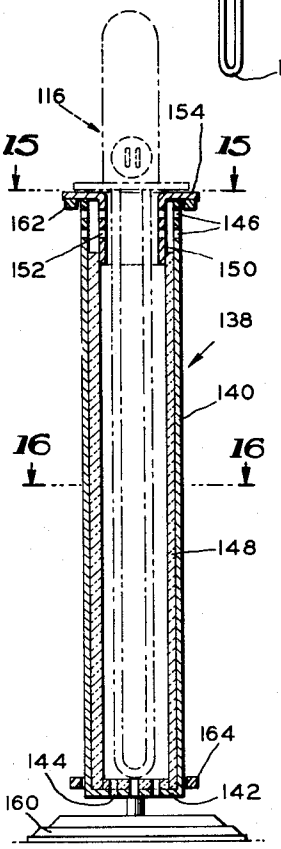


FIG. 14.

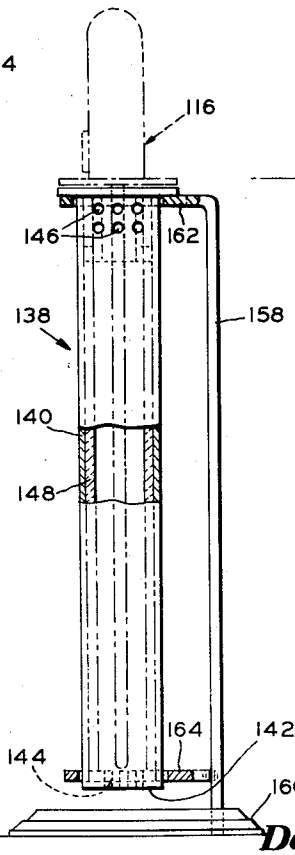


FIG. 15

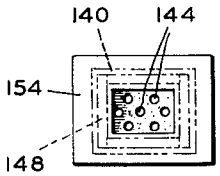
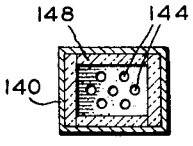


FIG. 16.



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United States Patent Office 2,938,988
Patented May 31, 1960

2,938,988

ELECTRICAL IGNITOR DEVICE FOR SOLID FUELS

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Filed Aug. 15, 1955, Ser. No. 528,402

6 Claims. (Cl. 219—32)

This invention relates to electrical ignitors for igniting solid fuel beds, and it particularly relates to quick ignitors which can be inserted into the fuel bed before ignition and immediately removed after ignition has taken place.

Although electrical ignition means have been used before this, it has been the general practice, heretofore, to make the ignition means a permanent part of the firebox. As a result of the constantly alternating wide fluctuations in temperature, the ignition means tended to become rapidly embrittled. Consequently, the bother and expense of frequent repairs and replacement was so great as to discourage any wide-spread use of this type of ignition means. However, the use of this type of electrical ignition means is accompanied by such obvious advantages, as, for example, by the elimination of kindling materials in the form of paper, wood or liquid hydrocarbons, and by the elimination of matches, lighters, and the like, that if the disadvantages noted above could be overcome, the use of such electrical equipment would undoubtedly gain wide popularity.

In view of the above, it is one object of the present invention to overcome the above noted disadvantages while retaining the noted advantages, by providing an electrical ignitor which can be inserted into the fuel bed only for the short ignition period, and can be instantly withdrawn thereafter.

Another object of the present invention is to provide an effective sheath for holding the ignitor during its periods of cooling off and of non-use.

Other objects of the present invention are to provide an improved ignition means, of the character described, that is easily and economically produced, which is sturdy in construction, and which is highly efficient in operation.

With the above and related objects in view, this invention consists in the details of construction and combination of parts, as will be more fully understood from the following description, when read in conjunction with the accompanying drawings in which:

Fig. 1 is a side elevational view of an electrical ignitor embodying the present invention, the ignitor being illustrated in operative position in the firebox of a grill unit.

Fig. 2 is a top plan view of the structure shown in Fig. 1.

Fig. 3 is a top plan view of a second embodiment of the invention.

Fig. 4 is a side elevational view of Fig. 3.

Fig. 5 is a top plan view of a third embodiment of the invention.

Fig. 6 is a side elevational view of Fig. 5.

Fig. 7 is a perspective view of the ignitor of Figs. 1 and 2 in its protective sheath.

Fig. 8 is a side view, partly in section and partly in elevation of the structure of Fig. 7.

Fig. 9 is a perspective view of the ignitor of Figs. 3 and 4 in its protective sheath.

Fig. 10 is a side view, partly in section and partly in elevation, of Fig. 9.

Fig. 11 is a front view of a fourth embodiment of the present invention.

Fig. 12 is a side view of the device of Fig. 11, showing it in its operative position.

Fig. 13 is a longitudinal, sectional view of the sheath for the ignitor of Figs. 11 and 12.

Fig. 14 is a side view, partly in section and partly in elevation, of Fig. 13.

Fig. 15 is a top plan view of the sheath of Figs. 13 and 14, taken on line 15—15 of Fig. 13.

Fig. 16 is a cross-sectional view taken on line 16—16 of Fig. 13.

Referring now in greater detail to the drawings wherein similar reference characters refer to similar parts, there is shown, in Figs. 1 and 2, a grill unit **10** comprising a housing **12** having supporting legs **14**. A removable grill is adapted to be placed on top of the housing, while within the housing there is provided a firebox arrangement wherein the grate **16** acts as the fuel support.

The fuel used in this device is illustrated as lumps of coal or charcoal **18**, although any other desirable form of solid fuel may also be used.

In order to ignite the coal or charcoal **18** without having to use paper, liquid fuel, or the like, an electrical ignitor **20** is thrust into the bed of coal and electrical current is passed therethrough. The portion of the ignitor **20** adjacent the fuel, having a high electrical resistance, emits a great amount of heat which is sufficient to directly and quickly ignite the coal. The resistance element is designed to operate at incipient white heat to white heat with a temperature range of 1250° F. to 1550° F. thus being well above the glow point of anthracite coal at 1112° F., bituminous coal at 850° F., charcoal, and the like. This, of course, provides quick ignition.

The ignitor **20**, itself, comprises a generally circular portion **22** having its end portions spaced somewhat apart and extending in parallel arrangement. These end portions are elongated to form parallel arms **24** whose free ends are enclosed within an insulating handle **26**. The circular portion **22** and its extensions **24** are constructed of heat-resistant tubular material. A high resistance wire, not shown, is enclosed within the circular portion **22** and this high resistance wire is connected to a low resistance, high conducting, pair of wires which may be constructed of copper or the like. Each of these conducting wires, not shown, extends through the tubular arms **24** into the handle **26**. Here, they are connected to the two poles of an electrical receptacle **28** to which the plug of an electrical cord is adapted to be coupled.

A collar **30** is positioned on the ignitor stem, around the parallel arms **24**, and this collar is connected by a chain **32** to a clip **34**. When the ignitor is positioned in its operative position within the fuel bed, since it may take several moments or more to ignite the fuel, the clip **34** may be inserted over the top edge of housing **12** and acts to keep the ignitor from tipping over. After the fuel has been ignited, the clip is removed from its clamping position, and the ignitor is withdrawn.

Since the high resistance element is provided only in the circular portion of the ignitor, most of the electrical energy is conducted to the resistance element without undue waste.

Furthermore, because of this construction, the user cannot burn his hands if he inadvertently touches the stem portion of the ignitor.

In Figs. 3 and 4 there is illustrated an ignitor **36**, similar to ignitor **20**, except that, instead of its heating portion **38** being circular, as in the device of Figs. 1 and 2, it is of generally square or rectangular configuration. Furthermore, in this form of the invention, the parallel arms **40** extend horizontally straight out, as at **42**, and

then vertically straight up, as at 44. The top portions of the arms 40 are bent outward, as at 46, and then turn down again to become embedded in a terminal block 48. The ends of the electrical wires, not shown, within the arms 40, connected to the resistance wires, not shown, in heating portion 38, are connected to a receptacle 50 in the terminal block. The receptacle 50 is adapted to receive the plug connecting the device to a source of electrical energy, and is also provided with a handle 51.

The stem, formed by the arms 40, is so dimensioned that the portion 46 overhangs the edge of the grill housing 52, and the vertical arm portions 44 coact with the rear surface of the terminal block 48 to clamp the ignitor in position on the housing when the heating portion 38 is positioned on the fuel grate 54.

In Figs. 5 and 6 there is illustrated an ignitor 56 substantially similar to that shown in Figs. 1 and 2 in that it includes a pair of arms 58, forming a stem rising diagonally from the heating portion 60; with an insulating handle 62 provided with an electrical receptacle 64; and with a collar 66 having a chain 68 connected to a clip 70.

The only real difference between the form of the invention shown in Figs. 5 and 6 and that of Figs. 1 and 2 lies in the configuration of the heating portion 60, which is here shown as a pair of concentrically positioned tubular fingers of generally U-shaped contour. This construction permits greater contact with the fuel while, at the same time, permitting easy insertion of the ignitor into the fuel bed because of the open end of the U-shaped configuration.

In Figs. 7 and 8 there is illustrated an open-ended box-like member or sheath 72 for the ignitor 20 shown in Figs. 1 and 2. The sheath 72 comprises a rectangular container having a top wall 74, side walls 76, rear wall 78 and bottom wall 80. The front of the container is open, as at 82, and the bottom wall extends beyond the open front, as at 84.

The extension 84 is provided with a turned-up flange 86. Within the container, on the bottom wall 80, is an asbestos floor pad 88.

This floor pad 88 extends beyond the open front end 82 and abuts against the flange 86 of the bottom wall, as illustrated.

A bracket 90 comprising upstanding arms 92, and supporting a cross-bar 94, is connected to the fore part of the container adjacent the open end thereof.

When the ignitor 20 has been used for its ignition function and removed from the fire, the heating ring 22, while still hot, is immediately inserted, through the opening 82, into the sheath 72 and rests on the asbestos pad 88. The clip 34 is then clamped over the cross-bar 94 to keep the stem of the ignitor from tipping over. The ignitor may be retained in its sheath 72 until again ready for use. The sheath is, of course, itself constructed of a heat resistant material.

In Figs. 9 and 10 there is illustrated a box-like member or sheath 96, substantially similar to sheath 72 in that it comprises a closed container 98 having an open front end 100, a front extension 102 on bottom wall 104, an upturned flange 106 on the extension 102, and an asbestos pad 108 on the bottom wall. However, instead of a support bracket such as shown at 90 in Figs. 7 and 8, this form of the device provides a support 110 comprising an upstanding post 112 at one corner of the front edge of the bottom wall extension 102, and in integrally formed horizontal bar 114 extending partially the width of the container.

The support 110 is so porportioned that when the ignitor 36 is inserted into the sheath 96, the portion 46 may be slid over the free end of the bar 114 and may rest thereon, as illustrated.

In Figs. 11 and 12 there is illustrated an ignitor 116 comprising a generally U-shaped tubular rod 118 having two parallel arms 120 connected by a bridge portion 124. The free ends of the arms 120 extend into the insulating handle 122 while the bridge portion 124 is adapted to be inserted into the fuel bed 126 on the grate 128; the grate 128 being supported on side brackets 130 of a grill unit 132.

A high resistance wire, not shown is enclosed in the lower U-shaped portion of the tube 118 below the position indicated at 134. Above this position, the resistance wire is connected, at each end, to a high conductive, low resistance wire, also not shown. The conductive wires extend through arms 120 into the handle 122 and are connected to electrical receptacle 136. A flange 137 is provided at the bottom of handle 122.

By the above construction, a hot ignition portion is provided at the lower end of the ignitor below position 134, whereas, above that position, the ignitor is relatively cool.

Ignitor 116, since it does not have its heating portion extending horizontally, does not contact as wide an area of the fuel bed as do the previously described ignitors. However, it is easier to insert and remove, and there is no possibility of its being jammed within the fuel bed.

The sheath for use with the ignitor 116 is shown in Figs. 13 to 16 wherein the sheath 138 is illustrated as comprising an elongated, rectangular, hollow sheath or container 140, constructed of heat resistant material. The bottom wall 142 of the sheath is perforated to provide air vents 114, while the upper portion is also perforated to provide similar air vents 146.

An asbestos lining 148 is provided around the internal side surface of the sheath, this lining extending vertically from the bottom wall to a position just below the vent openings 146. A sleeve 150 having side perforations 152, adapted to mate with perforations 146, is provided in the open end of the sheath. This sleeve is provided with a lateral flange 154.

The sheath 138 is supported by means of a standard 158 extending upwardly from a base 160, and having a clamping collar 162 at the top and a clamping collar 164 at the bottom. These collars clampingly embrace the upper and lower portions of the sheath. The clamping collar 163 also acts to support the flange 154 of the spacer sleeve 150.

When the ignitor 116 is not in use, it is inserted through the open top end of the sheath and, simultaneously, through the sleeve 150 until the flange 137 contacts flange 154. At this time the ignitor is supported, within the sheath, in suspended condition, by the flange 137, the sleeve 150 acting to prevent the ignitor from contacting the perforated portion of the sheath above the asbestos liner.

Although this invention has been described in considerable detail, such description is intended as being illustrative rather than limiting, since the invention may be variously embodied, and the scope of the invention is to be determined as claimed.

Having thus set forth and disclosed the nature of this invention, what is claimed is:

1. An electrical igniting device comprising a rod having an electrical heating portion and an electrical non-heating conducting portion, said non-heating conducting portion being connected to an insulating handle at one end and to said heating portion at the opposite end, said heating portion of said rod being angularly connected to said non-heating portion and being shaped and bent on itself in a plane to cover an area substantially greater than twice its own diameter, an electrical connector on said handle for connecting said conducting portion to a source of electrical energy, and a retaining means for releasably connecting said conducting portion to a support on a container while said heating portion is inserted in said container.

2. An electrical igniting device comprising a rod having an electrical heating portion and an electrical non-heating conducting portion, said non-heating conducting

portion being connected to an electrical and heat insulating handle at one end and to said heating portion at the opposite end, an electrical connector on said handle for connecting said conducting portion to a source of electrical energy, a retaining means for releasably connecting said conducting portion to a support on a container while said heating portion is inserted in said container, said retaining means comprising a collar embracing said non-heating conducting portion and a clamp connected to said collar by a flexible connection.

3. In combination, an electrical ignition device comprising a handle, a non-heating electrical conducting portion and a heating electrical conducting portion connected to said non-heating electrical conducting portion, an electrical igniting part of said device consisting of an electrical resistance wire located in a tubular metal sheath electrically insulated therefrom but heat conductive therethrough, and a container having an opening into which said heating portion is adapted to be inserted, a heat insulating flexible clamp for said heating portion in said container, said electrical igniting part being angularly connected to said non-heating electrical conducting portion, and being shaped and bent back on itself to cover an area in a common plane at least greater than twice its own diameter, and support means, externally of said container, for retaining said ignition device in a predetermined position while the heating portion is arranged in a predetermned position in said container.

4. The combination of: a grill unit adapted to receive a layer of charcoal; said grill unit having a bottom grate, side walls extending upwardly from said bottom grate a given distance, said bottom grate having a substantial center area; and a device for igniting said charcoal, said device having an electrical resistance member shaped to at least partially cover a substantial portion of said central area and lie substantially flat on said charcoal; an electrical conducting means angularly connected to said electrical resistance member and dimensioned so as to be supported on said side walls and extend upwardly and outwardly therefrom, whereby said side walls tend to stably retain said device in position; a thermally insulated handle connected to said conducting means and electrical terminal means mounted in said handle and adapted to connect said conducting means to a source of electrical energy.

5. A tool for igniting fuel in solid state, said fuel being disposed in a grill unit having a bottom pan, side walls extending upwardly from said bottom pan a given height, said bottom pan having a substantial center area, said tool comprising: a flat electrical resistance member adapted to lie on said fuel, said resistance member having a generally U-shaped construction with the apex thereof being arcuately formed and dimensioned to at

least partially encircle said central area; a rigid electrical conducting means having one end thereof connected to said resistance member, said conducting means being dimensioned to have its other end extend angularly upward radially outward from said resistance member so as to project over and be supported by said side walls; an insulated handle connected to said other end; and, electrical terminal means mounted in said handle adapted to connect said conducting means through electrical leads to a source of electrical energy.

6. A tool for lighting fuel in the solid state, according to claim 5, in which said resistance member comprises a thermally conductive tubular member and a relatively high resistance electrical conductor extending therethrough and in which said electrical conducting means comprises an integral extension of said tubular member and a relatively low resistance conductor extending therethrough.

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