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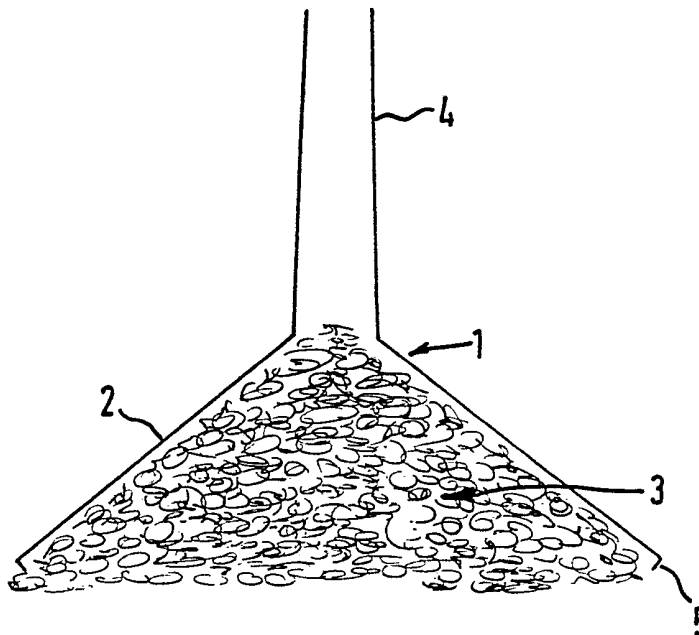
(56) Documents cited  
GB 2074309 A GB 2060162 A GB 0587073 A  
GB 0562995 A US 4531507 A

(58) Field of search  
UK CL (Edition J) A4D, B1X, F4W  
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(54) Lighting solid fuel fires

(57) A device 1 for assisting the initiation of combustion of a bed of combustible material 3 so as to substantially enclose the combustible material, and additionally a fluid outlet 4 of cross sectional area substantially less than that of the base of the main element. The fluid outlet is, when the device is in use, located directly above the combustible material. The main element of the device is additionally so shaped and dimensioned that fluids may enter at its base and be drawn through the main body of the combustible material enclosed therein towards the fluid outlet.

FIG. 1



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

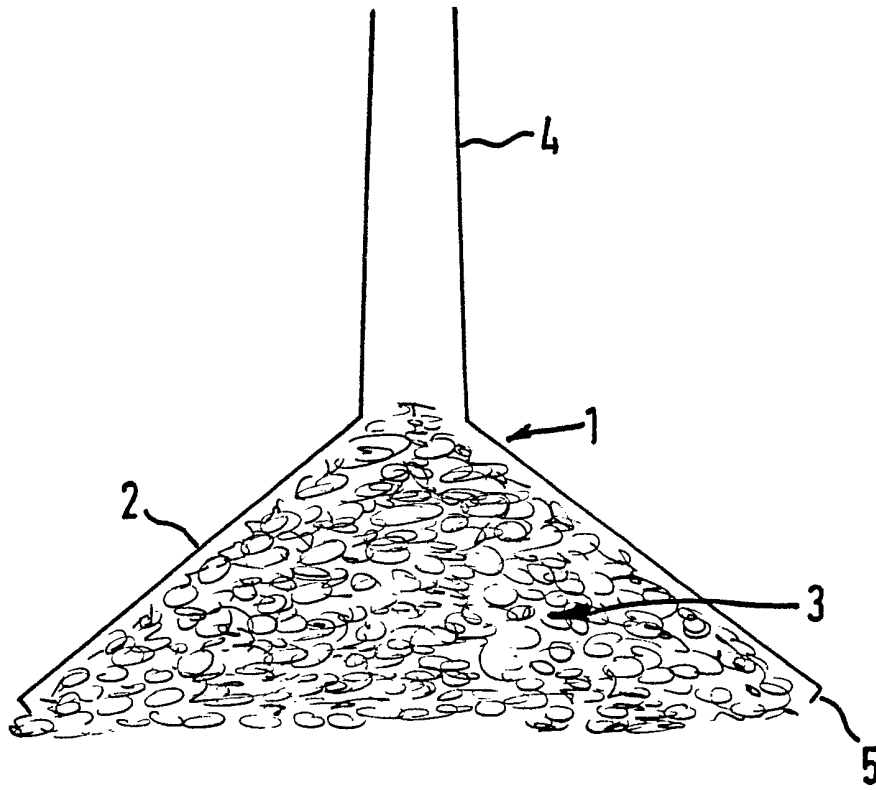


FIG. 1

### COMBUSTION INITIATING DEVICE

The present invention relates to devices for assisting the initiation of combustion of a bed of combustible material, for instance, coal, wood or other material used to create fires in domestic or outdoor situations and also charcoal, a fuel commonly used with barbecues.

Difficulties are often experienced in lighting a fire or barbecue even when highly combustible materials such as paper, dry twigs or firelighters are used. Sometimes, petrol or other liquid fuel is poured over the bed of combustible material but even this is not always effective in initiating and maintaining the combustion. It is also known to assist the initiation of combustion by providing more air to the combustible material, for instance, by blowing, fanning and even making use of bellow devices.

Special devices for assisting the initiation of combustion of a bed of combustible material are already known. In particular, US patent application No. 3957455 discloses a device which is essentially a hollow cylinder of constant cross sectional area which can be wholly or partially filled with the combustible material. The material is supported on a base which allows the passage of fluids such as air from below the device up through the cylinder and the combustible material contained therein. To assist the flow of air, the device is supported above the ground on legs so as to allow access of large quantities of air. It is intended that the method of use of this device involves lighting the combustible material at some point along the base, following which the flow of air up through the cylinder will assist the flow of heat through the combustible material and hence allow combustion to spread

through the material. The sides of the device are insulated so as to reduce heat loss to the atmosphere.

The disadvantages of the device provided by US-3957455 are that compared with the total volume of combustible material, the surface area which can initially be lit is only small. Since hot air travels essentially upwards, heat will spread from a lit part of the combustible material only in the upwards direction and not throughout the whole body of the combustible material. For the same reason, a great deal of heat loss occurs through the open top of the cylinder despite the insulated sides. Thus, the relative surface areas of the base and the open top of the device of US-3957455 give a poor balance between volume of the combustible material through which heat can easily spread and amount of heat loss to the atmosphere.

It is an aim of the present invention to provide a means for assisting the initiation of combustion of a bed of combustible material, which is easy to handle, safe in operation, simple and cheap to manufacture and which does not require constant attention whilst being used. It is also an aim of the present invention to provide such means wherein a large quantity of air can flow rapidly through a large volume of combustible material in order to spread heat through that material, whilst also minimizing heat losses to the atmosphere. In particular it is an aim to ignite charcoal and similar combustible materials as quickly and as simply as possible using the minimum of fuels or firelighters in order to avoid smells and reduce costs.

According to the present invention there is provided a device for assisting the initiation of combustion of a bed

of combustible material, the device including a main element which is so shaped and dimensioned that it may be located on the combustible material or on a bed supporting the combustible material with its base resting on the combustible material or bed support, so as substantially to enclose the combustible material, said device including a fluid outlet of cross-sectional area substantially less than that of the base of the main element, said fluid outlet being located, in use, directly above the combustible material, said main element additionally being so shaped and dimensioned that fluids may enter the main element at its base and be drawn through the main body of the combustible material enclosed towards the said fluid outlet.

The main element of the device preferably comprises an open ended hollow cone of circular cross section, of which the narrowest end is located, in use, directly above the combustible material. The sides of this cone preferably slope at an angle to the longitudinal axis of the cone of between  $70^\circ$  and  $45^\circ$ . More preferably, this angle is between  $65^\circ$  and  $50^\circ$ , more preferably still between  $60^\circ$  and  $55^\circ$  and most preferably the angle is  $55^\circ$ .

The main element of the device may alternatively take a variety of different shapes, for instance it may be dome shaped with one or more curved or flat surfaces, or it may be substantially in the shape of a pyramid with either a triangular or a rectangular base. The shape of the main element is intended to be such that the device provides essentially a combustion chamber within which is located the combustible material. If the device is to be placed on a bed supporting combustible material, then it is preferable that the shape and size of the base of the main

element closely corresponds to the peripheral shape and size of the bed support so that the device and bed support together form a combustion chamber. In such a case, the base of the main element must be provided with or include one or more fluid inlets such that fluid may be drawn into the chamber so formed.

Preferably, the base of the main element is of circular cross section with a diameter of between 6 and 18 inches. More preferably, the diameter is of between 8 and 12 inches, more preferably still between 8 and 11 inches and most preferably 10 inches.

Ideally, the edge of the base of the main element is provided with or includes an inward-facing flange around its perimeter, such that fluids entering the main element at its base are directed away from the sides of the main element and towards the main body of the combustible material contained therein. This flange is preferably of width between 1 and 30 millimetres, more preferably between 4 and 15 millimetres and most preferably 10 millimetres. The angle between the flange and the sides of the main element is preferably between 60 and 150°, more preferably between 80 and 130°, more preferably still between 90 and 125° and most preferably 90°.

The fluid outlet of the device of the present invention is to allow passage of air and/or combustion gases from within the device to the exterior. It may be in the form of a simple hole located in the main element of the device. However, preferably it is in the form of a spout or chimney which is preferably located in a central, uppermost part of the main element and with the spout or chimney extending from that side of the main element remote from

the support on which the combustible material rests. The spout or chimney may be, for instance, circular or rectangular in cross section and it may be of constant diameter or alternatively the diameter may decrease in a direction away from the main element. As a further alternative, the chimney or spout may be of generally decreasing diameter in a direction away from the main element, but widening again closer to its open end.

Preferably the said fluid outlet comprises a hollow cylinder which, in use, has its long axis substantially parallel to the vertical. This cylinder is preferably of length between 3 and 18 inches, more preferably between 6 and 12 inches and most preferably 9 inches. The cylinder may be of constant cross sectional area along its length or may taper towards the end remote from the main element. The initial diameter of the cylinder, at its end nearest to the main element of the device, is preferably between 1 and 3.5 inches, more preferably between 1.75 and 2.5 inches and most preferably 2.5 inches.

It is preferable in the device of the present invention to cover the maximum possible surface area of combustible material and allow the minimum possible space through which air and combustion gases may escape. It is therefore preferable that in a device according to the present invention, of which the main element comprises an open-ended hollow circular cone, that the outside surface area of the cone, excluding any flanges, is greater than 80% of the total outside surface area of a similar hollow circular cone of the same dimensions being open only at its widest end. More preferably, the outside surface area of the main element is greater than 90% of the total surface area of the said similar cone, more preferably still between 92 and

97% and most preferably 95%.

The device of the present invention may be made from any suitable material capable of withstanding heat, such as steel or more preferably aluminium. Preferably all or part of the device is made from a shiny material, which increases efficiency by reflecting back heat generated rather than radiating heat away as would a matt or dark coloured surface.

The device of the present invention may be provided with one or more handles allowing easy application to and removal from the combustible material or bed support. The device can be removed from the combustible material once combustion has been initiated and spread through the material, thereby allowing easy access to the burning material, on which other apparatus such as grills, roasting spits and the like can be placed.

One embodiment of the present invention will now be described by way of example only and with reference to the accompanying drawing, which is a schematic representation of a combustion initiation device in accordance with the present invention.

Referring to Figure 1, a device (1) for assisting the initiation of combustion of a combustible material is shown. The device comprises a main element (2) which substantially covers the combustible material (3) and a chimney portion (4). The main element (2) comprises an open ended hollow cone of circular cross section of which the sides are designed to slope at an angle to the horizontal which compliment the angle at which a combustible material such as charcoal is expected to form



if piled high. The combustible material (3), such as charcoal for use with a conventional barbecue, is piled high so as to substantially fill the main element (2) of the device. The device, having a wide base, covers the vast proportion of the surface area of the charcoal and thus retains as much as possible of the heat generated on lighting the charcoal and on spread of the resultant heat through the charcoal.

The wide base also allows for large volumes of air to enter the device through the base. Because of the much smaller diameter of the chimney portion (4), these large volumes of air need to travel at very high speed in order to escape again through the chimney. Thus air currents are created by the hot air rising from the already burning charcoal through the chimney, and heat generated by those parts of the charcoal already burning is spread through the main bulk of the charcoal before escaping through the chimney. This assists the spread of combustion from that portion of the charcoal originally lit through the rest of the charcoal present. Also, the acceleration of the air escaping from the device through the chimney results in low pressure under the device and hence more air is quickly drawn in through the base of the device. The base of the device is provided with an inward facing flange which prevents air drawn in through the base from simply passing up the sides of the main element and out through the chimney portion. The flange (5) directs incoming air more towards the centre of the charcoal stack so that it must pass through the main body of the charcoal before leaving via the chimney.

The longer the chimney (4), the greater the draw of air it will create. A very long chimney, however, is both

cumbersome to use and impractical to market (storage problems - devices with shorter chimneys will more easily stack one on top of another). The actual length of the chimney portion (4) is therefore a compromise between practicality and efficiency.

The device (1) shown is constructed of a shiny metal such as aluminium or steel so that heat generated is reflected back towards the burning charcoal.

In use, the device (1) is placed over a pile of charcoal (3) or other combustible material and part of the combustible material is set alight by conventional means, with or without the assistance of fire lighters and/or liquid fuels as necessary. Because of the flow of air through the device and the enclosed combustible material, the heat generated by the burning area of the combustible material quickly spreads through the rest of the material, hence assisting the spread of combustion. The complete volume of combustible material is soon alight without the need for excessive use of fire lighters or other inconvenient, unsafe or expensive combustion initiation aids.

## CLAIMS

1. A device for assisting the initiation of combustion of a bed of combustible material, the device including a main element which is so shaped and dimensioned that it may be located on the combustible material or on a bed supporting the combustible material with its base resting on the combustible material or bed support so as substantially to enclose the combustible material, said device including a fluid outlet of cross sectional area substantially less than that of the base of the main element, which outlet is, in use, located directly above the combustible material, said main element additionally being so shaped and dimensioned that fluids may enter the main element at its base and be drawn through the main body of the combustible material enclosed towards the said fluid outlet.
2. A device according to Claim 1, characterised in that the main element comprises an open ended hollow cone of circular cross section, of which the narrowest end is located, in use, directly above the combustible material.
3. A device according to Claim 2, characterised in that the sides of the said cone slope at an angle of between  $70^{\circ}$  and  $45^{\circ}$  to the longitudinal axis of the cone.
4. A device according to Claim 3, characterised in that the sides of the said cone slope at an angle of between  $65^{\circ}$  and  $50^{\circ}$  to the said axis.

5. A device according to Claim 4, characterised in that the sides of the said cone slope at an angle of between  $60$  and  $55^{\circ}$  to the said axis.
6. A device according to Claim 5, characterised in that the sides of the said cone slope at an angle of  $55^{\circ}$  to the said axis.
7. A device according to any of the preceding claims, characterised in that the base of the main element is of circular cross section with a diameter of between 6 and 18 inches.
8. A device according to Claim 7, characterised in that the base of the main element has a diameter of between 8 and 12 inches.
9. A device according to Claim 8, characterised in that the base of the main element has a diameter of between 8 and 11 inches.
10. A device according to Claim 9, characterised in that the base of the main element has a diameter of 10 inches.
11. A device according to any of the preceding claims, characterised in that the edge of the base of the main element is provided with or includes an inward facing flange around its perimeter, such that fluids entering the main element at its base are directed away from the sides of the main element and towards the main body of the combustible material enclosed.
12. A device according to Claim 11, characterised in that

the said flange is of width between 1 and 30 millimetres.

13. A device according to Claim 12, characterised in that the said flange is of width between 4 and 15 millimetres.
14. A device according to Claim 13, characterised in that the said flange is of width 10 millimetres.
15. A device according to any of Claims 11 to 14, characterised in that the angle between the said flange and the sides of the main element is between 60 and 150°.
16. A device according to Claim 15, characterised in that the angle between the flange and the sides of the main element is between 80 and 130°.
17. A device according to Claim 16, characterised in that the angle between the flange and the sides of the main element is between 90 and 125°.
18. A device according to Claim 17, characterised in that the angle between the flange and the sides of the main element is 90°.
19. A device according to any of the preceding claims, characterised in that the said fluid outlet comprises a hollow cylinder which extends from the center of the uppermost portion of the main element in a direction away from the main element, said fluid outlet, when the device is in use, having its long axis substantially parallel to the vertical.

20. A device according to Claim 19, characterised in that the said fluid outlet is of a length between 3 and 18 inches.
21. A device according to Claim 20, characterised in that the said fluid outlet is of a length between 6 and 12 inches.
22. A device according to Claim 21, characterised in that the said fluid outlet is of length 9 inches.
23. A device according to any of claims 19 to 22, characterised in that the said fluid outlet is of constant cross sectional area along its length.
24. A device according to any of claims 19 to 22, characterised in that the said fluid outlet tapers towards the end which is furthest from the main element of the device.
25. A device according to any of claims 19 to 24, characterised in that the initial diameter of the fluid outlet, at the end nearest to the main element of the device, is between 1 and 3.5 inches.
26. A device according to Claim 25, characterised in that the initial diameter of the fluid outlet is between 1.75 and 2.5 inches.
27. A device according to Claim 26, characterised in that the initial diameter of the fluid outlet is 2.5 inches.

28. A device according to any of the preceding claims, characterised in that the main element of the device comprises an open ended hollow circular cone, of which the outside surface area, excluding any flanges, is greater than 80% of the total outside surface area of a similar hollow circular cone of the same dimensions but being open only at its widest end and extending to an apex at the opposite end.
29. A device according to Claim 28, characterised in that the outside surface area of the said main element is greater than 90% of the total outside surface area of said similar cone.
30. A device according to Claim 29, characterised in that the outside surface area of the said main element is between 92 and 97% of the total outside surface area of the said similar cone.
31. A device according to Claim 30, characterised in that the outside surface area of the said main element is 95% of the total outside surface area of the said similar cone.
32. A device according to any of the preceding claims, characterised in that the device is wholly or partially formed from a shiny material.
33. A device according to any of the preceding claims, characterised in that the device is provided with or includes a handle or other means for safely holding said device.

34. A device according to any of the preceding claims and substantially as herein described, with reference to the accompanying drawing.