Dec. 27, 1949 D. E. MASON 2,492,705

COKE IGNITION DEVICE

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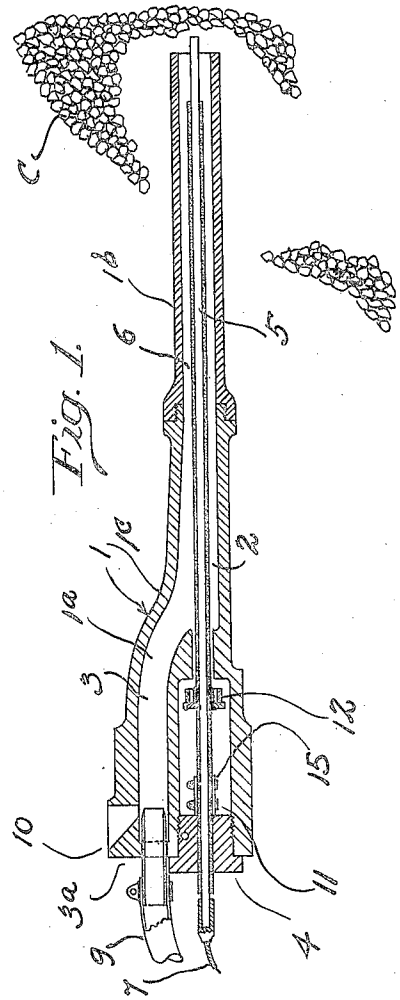


Fig. 1.

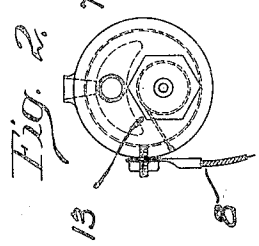


Fig. 2.

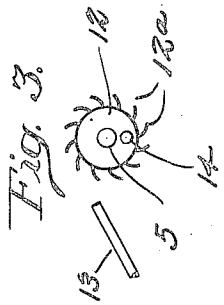


Fig. 3.

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COKE IGNITION DEVICE

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5 Claims. (Cl. 219—32)

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This invention relates to portable devices for igniting solid fuels, such as coke, and is primarily intended for starting fires in the cupola furnaces of metal foundries, although it manifestly is capable of a wider application.

An important object of my invention is to provide a fuel igniting device of the above character in which a metal gun containing an electrode is adapted to be buried in a bed or pile of fuel and an electric arc is generated at the buried end of the gun to ignite the fuel simultaneously with the discharge of a current of air in the vicinity of the arc to accelerate the combustion of the fuel.

Another object of my invention is to provide a fuel igniting device of the above character in which means are provided for introducing a supply of highly inflammable material—such as ground coke, for example—into the air stream to facilitate the starting of the fire.

Still another object of my invention is to provide a fuel igniting device of the above character having means for vibrating the electrode so as to agitate and loosen the charge of fuel in the vicinity of the electrode and improve the arcing effect during the fire-starting operation.

Other objects and advantages will be apparent from the following detailed description of a preferred embodiment of the invention, reference being had to the annexed drawing in which:

Figure 1 is a longitudinal cross-sectional view through a fuel igniting device embodying the invention;

Figure 2 is an end view of the fuel igniting device of Figure 1; and

Figure 3 is a diagrammatic view of a spinner for imparting vibration to the electrode during operation of the fuel igniting device.

The fuel igniting device shown in the drawing comprises a cast iron gun 1 made up of a butt section 1*a* and a barrel section 1*b* threadedly secured together in substantial alignment. Both gun sections are hollow and generally cylindrical in shape, the butt section being of larger diameter than the barrel section, and the two diameters merging through a short transition portion 1*c*. The butt section is formed with two longitudinal and parallel extending passageways 2 and 3. The passageway 2 is located in alignment with the bore of the barrel and is closed at its external end by a plug 4 screwed into the end of this opening, while the air duct or passageway 3 constitutes a branch which communicates with the passageway 2 and is closed at the same end as passageway 2 by a wall 3*a*.

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Extending axially through the barrel and passageway 2 is an expendable welding rod 5 which forms the electrode of the gun, and this welding rod projects a short distance beyond the open end of the barrel and also passes through a recess in the plug 4 at the opposite closed end of the gun. A tube of insulating material 6, such as hard fiber, encircles and supports the welding rod throughout the major portion of its length but leaves the tip of the rod exposed for a short distance inwardly from the open end of the gun. The welding rod at the closed end of the gun is suitably connected to a wire or cable 7 which forms one side of an electrical circuit by which current is supplied to the electrode, the other side of the circuit being represented by the metal gun 1 which is connected to the ground via a wire or cable 8 (see Fig. 2).

A flexible air hose 9 leading from a source of superatmospheric air pressure (not shown) is arranged so as to deliver combustion air through an opening in the wall 3*a* at the closed end of passageway 3 which air flows along this air duct into the passageway 2 and thence through the barrel 1*b* of the gun in the space intermediate the welding rod and the wall of the barrel, ultimately escaping through the open or muzzle end of the barrel.

In order to allow powdered coke, or other highly inflammable material, to be introduced into the air stream, a pocket 10 is provided on the gun adjacent its closed end, a hole being provided in the bottom of this pocket which communicates with the passageway 3. Inflammable material supplied to the pocket 10 is siphoned through the hole in its bottom to uniformly feed such material to the air stream.

The passageway 2 adjacent its plugged end is enlarged to form a chamber 11 and in this chamber a spinner 12 is rotatably mounted on the hard fiber tube 6 enclosing the welding rod and is held against longitudinal displacement by snap rings or other means embracing the tube. The spinner is provided with radial vanes 12*a* against which is directed a jet of air from the nozzle end of a tube 13 leading outside of the gun and adapted to be connected to a source of air pressure (not shown). The spinner is unbalanced by a small blob of metal 14 deposited off-center of its axis of rotation so that when the spinner rotates it imparts vibration to the welding rod. The air jet and hence the rate of vibration may be controlled by regulating the supply of air to the tube 13, such as by a suitably provided valve, not shown. The tube

6 is divided into two sections and held together by a flexible sleeve 15 which allows the welding rod to vibrate about this joint.

In the use of the fuel igniting device just described, the muzzle end of the gun, without the electrode, is passed through the brest or tuyère of the cupola furnace and buried in a bed of small-lump coke C around and over which a charge of coke of normal size is deposited. The welding rod 5 is inserted into the axial bore of the tube 6 from the butt end of the gun and shoved along the tube to a point adjacent the end of the tube near the open end of the gun, after which a switch, suitably provided, is closed to allow current to flow to the welding rod. Simultaneously air is admitted to the air duct 3 by the opening of a suitable valve (not shown) on the air hose 9; air is also admitted to the tube 13 to drive the spinner 12. Continued movement of the welding rod into contact with the coke causes an electric arc to be struck between the projecting end of the welding rod and the coke, the coke being grounded through the medium of the metal barrel of the gun. At the same time ground coke placed in the pocket 10 is siphoned into the air stream and upon reaching the arc intensifies the burning of the coke. The coke is kept loose and agitated by the vibration induced in the welding rod by rotation of the spinner 12.

The air issuing from the muzzle of the gun produces a blast in the vicinity of the arc and at the point of burning of the coke. As a consequence, the combustion zone expands rapidly. The electrical current to the electrode and the air supply to the spinner are now cut off and the gun is allowed to remain in the bed of coke and continue to supply an air blast to accelerate the burning of the coke.

The air passing through the barrel of the gun will maintain the fiber tube 6 and the gun cool. The welding rods used in my gun may be those that are supplied for use in conventional welding equipment, several welding rods being secured end-to-end, and while such welding rods will be consumed at a fairly rapid rate during the operation of the gun, their cost is comparatively cheap and they are readily procurable on the market. A new welding rod 5 may be replaced by another in the tube 6 as it is consumed. The gun may be made in sufficiently small size and weight to permit it being readily carried from place to place and it is of such a relatively simple construction as to practically insure it against getting out of working order.

While a preferred specific embodiment of the fuel igniting device of my invention has been set forth, it is to be understood that the invention is not limited to the exact constructions illustrated and described, but modifications of these details may be made within the purview of the appended claims.

I claim:

1. A portable electrical device for igniting a bed of solid carbonaceous fuel comprising an elongated tubular metal barrel having an open end, said barrel constituting one terminal of an electrical circuit, an electrode support of dielectric material disposed within the barrel and having an axial bore for receiving an electrode, an electrode extending within the bore of said support and constituting the other terminal of the electrical circuit, means mounting said electrode support in spaced relation to the barrel with the tip of the electrode initially projecting beyond the end of the support and the barrel into contact with the solid fuel, and means for passing air under superatmospheric pressure through the barrel between the electrode support and the barrel for discharge into the fuel bed, whereby said air is directed over an arc struck between said electrode and the solid fuel bed when an electrical potential of predetermined value is established between the electrode and the barrel.

2. A portable electrical device for igniting a bed of solid carbonaceous fuel comprising an elongated tubular metal barrel having an open end, said barrel constituting one terminal of an electrical circuit, an electrode support of dielectric material disposed within the barrel and having an axial bore for receiving an electrode, an electrode extending within the bore of said support and constituting the other terminal of the electrical circuit, means mounting said electrode support in spaced relation to the barrel with the tip of the electrode initially projecting beyond the end of the support and the barrel into contact with the solid fuel, means for passing air under superatmospheric pressure through the barrel between the electrode support and the barrel for discharge into the fuel bed, and a pocket communicating with the interior of the barrel for drawing highly inflammable material into the air passing through the barrel, whereby said air is directed over an arc struck between said electrode and the solid fuel bed when an electric potential of predetermined value is established between the electrode and the barrel.

3. A portable electrical device for igniting a bed of solid carbonaceous fuel comprising an elongated tubular metal barrel having an open end, said barrel constituting one terminal of an electrical circuit, an electrode support of dielectric material disposed within the barrel and having an axial bore for receiving an electrode, an electrode extending within the bore of said support and constituting the other terminal of the electrical circuit, means mounting said electrode support in spaced relation to the barrel with the tip of the electrode initially projecting beyond the end of the support and the barrel into contact with the solid fuel, means for passing air under superatmospheric pressure through the barrel between the electrode support and the barrel for discharge into the fuel bed, and a vibrator associated with the electrode support for imparting vibrations to said support so that the electrode is moved with respect to the fuel for maintaining the arc between the electrode and the solid fuel bed, whereby said air is directed over an arc struck between said electrode and the solid fuel bed when an electric potential of predetermined value is established between the electrode and the barrel.

4. A portable electrical device for igniting a bed of solid carbonaceous fuel comprising an elongated tubular metal barrel having an open end, said barrel constituting one terminal of an electrical circuit, an electrode support of dielectric material disposed within the barrel and having an axial bore for receiving an electrode, an electrode extending within the bore of said support and constituting the other terminal of the electrical circuit, means mounting said electrode support in spaced relation to the barrel with the tip of the electrode initially projecting beyond the end of the support and the barrel into contact with the solid fuel, means for passing air under superatmospheric pressure through

the barrel between the electrode support and the barrel for discharge into the fuel bed, and an unbalanced vaned spinner rotatably mounted upon the electrode support and a nozzle adapted to be connected to a source of air pressure for directing air against the vanes of the spinner so that the spinner is rotated and vibrations are imparted to the electrode support and to the electrode for maintaining an arc between the electrode and the solid carbonaceous fuel, whereby said air is directed over an arc struck between said electrode and the solid fuel bed when an electric potential of predetermined value is established between the electrode and the barrel.

5. A portable electrical device for igniting a bed of solid carbonaceous fuel comprising an elongated tubular metal barrel having an open end, said barrel constituting one terminal of an electrical circuit, an electrode support of dielectric material disposed within the barrel and having an axial bore for receiving an electrode, an electrode extending within the bore of said support and constituting the other terminal of the electrical circuit, means mounting said electrode support in spaced relation to the barrel with the tip of the electrode initially projecting beyond the end of the support and the barrel into contact with the solid fuel, means for passing air under superatmospheric pressure through the barrel between the electrode support and the barrel for discharge into the fuel bed, and a detachable connection for an air line for connecting the barrel to an external source of air pressure, whereby said air is directed over an arc struck between said electrode and the solid fuel bed when an electric potential of predetermined value is established between the electrode and the barrel.

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