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INSPIRATOR IGNITERS AND WIRING SYSTEMS

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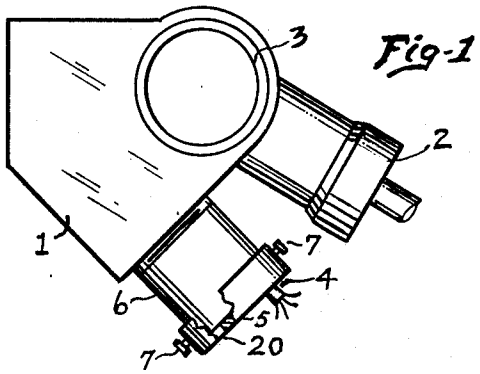

Fig-1

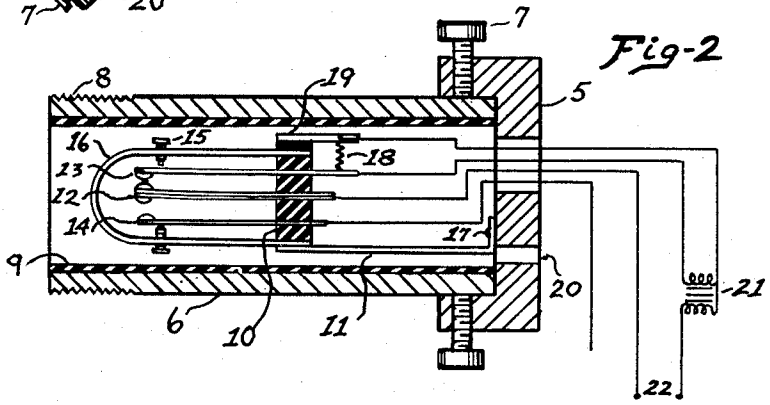

Fig-2

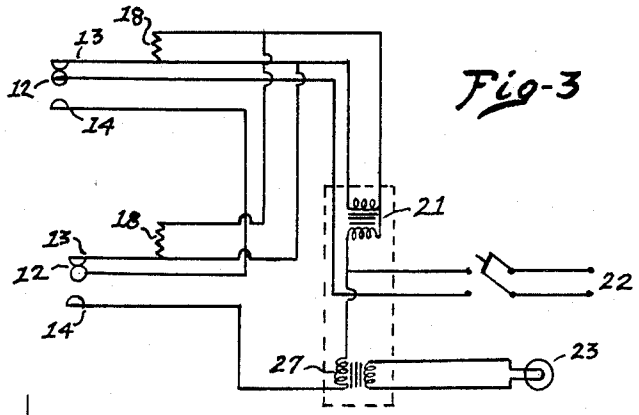

Fig-3

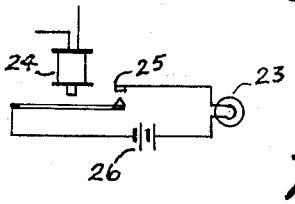

Fig-4

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INSPIRATOR IGNITERS AND WIRING SYSTEMS

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5 Claims. (Cl. 158—122)

My invention relates to inspirator igniters and wiring systems for rail heaters with the particular object of supplying simple, easily handled and inspected, self-contained igniters for use with inspirators and an economical, flexible and easily installed wiring system including safe and effective indicating means to permit supervision at any control station.

In general a rail heater consists of a heater pipe with flame orifices which lies along a rail to be heated. Spaced along the heater are a series of inspirators supplying the air and gas mixture required. According to my present invention, each inspirator casting is provided with a threaded opening for the attachment of a unitary igniter device including a hot wire coil igniter, a thermo-responsive switch to de-energize the hot wire coil when the gas is ignited and relay the energy to another igniter, if desired, but normally to activate a signal system to indicate at the control station that the heater is functioning.

Aside from the action of the bi-metallic element within the igniter device, there are no moving parts to stick or get out of line or to be affected by weather conditions. Moreover, by my preferred wiring system, the hot wire elements are in a circuit apart from the primary current supply and, likewise, are not in the signal circuit, thus permitting great flexibility in voltage supply and current characteristics as well as other advantages in the matter of safety, insulation, and economy of wiring.

With the foregoing and other objects in view, as will be apparent to those skilled in the art as the description proceeds, my invention resides in the combination and arrangement of parts and in the details of construction described in this specification and particularly pointed out in the apended claims, it being understood that changes may be made in the particular embodiment of my invention within the scope of what is claimed without departing from the spirit of the invention. I intend no limitation other than those of the claims when fairly interpreted in the light of the full disclosure and the present state of the art.

In the drawing, Fig. 1 is a side elevation of an inspirator and igniter combination; Fig. 2 illustrates the preferred construction of my igniter and its power circuit; Fig. 3 is illustrative of a system of cascading two or more igniters including relay and signalling circuits; Fig. 4 is the detail of an alternate signal system activator.

Similar reference characters refer to similar parts in all the views.

In Fig. 1 an inspirator **1** is provided with a fuel intake **2** and a heater pipe connection **3** and a threaded opening into which an igniter device **4** may be placed in position to drain, the igniter body comprising a base **5** having one or more drainage openings **20**. An open ended tubular sleeve **6** is removably supported at one end in the base **5** and clamped in position as by set screws **7, 7**, the other end of the sleeve **6** having an external thread **8** for detachable connection to the inspirator. An insulation lining **9** is provided. Loosening the set screws **7, 7**, permits ready removal of the base **5** to get at the contacts.

A contact assembly **10** (Fig. 2) is mounted on a support **11** affixed to base **5** as at **17**. It comprises contact members insulated from each other, including a central bi-metallic, heat responsive member **12** and on opposite sides thereof flexible upper and lower members consisting of an upper or live contact member **13** and a lower or relay contact member **14**. These flexible contacts may be adjusted towards and away from the central bi-metallic member by screws **15, 15**, which are carried by a protective shield **16** insulated from the contact members and extending around the ends of the contact members.

Supported by the contact assembly, as at **19**, is a hot wire ignition coil **18**, connected at one end to the upper or live contact member **13**, the free end of the coil being connected to the low voltage tap of an auto transformer **21**, one end of the transformer and the bi-metallic member **12** being connected to opposite sides of the power supply **22**, the other end of the transformer **21** going to the upper or live contact member **13** to which an end of hot wire coil **18** is connected.

The bi-metallic element **12** is preferably biased to normally touch the live contact member **13** so that energizing the power circuit **22**, as by a switch at the control station, permits flow of current through the primary of the transformer **21** and thus energizes the low voltage secondary to thereby supply current to the hot wire coils **18** Fig. 3. Any voltage may be used in the primary circuit and suitable reduced voltage for the ignition coils. Heating of the hot wire coil ignites the gas, of course, and the bi-metallic contact **12** becomes heated by the flame, leaves the live contact **13** and contacts the relay contact member **14** and thus relays to the next igniter that the first igniter is functioning and also transfers or relays thereto the live side of the power line **22**.

Preferably the ignition coils of two or more adjacent igniters are connected in parallel (Fig. 3) to prevent burnouts on power surges as the resulting increased current is thus divided between the ignition coils. The relay contact **14** of one igniter is connected to the bi-metallic member **12** of the other igniter. Thus, when the bi-metallic members **12, 12**, are heated to a predetermined temperature, say 120° F. and leave the live contact members and contact the relay contact members **14, 14**, the relay circuit is completed through the primary of the transformer **27** direct to the power source, activating the secondary and thereby the signal indicator **23**, which may be at the control station. If any igniter in the group fails, there will be no signal.

As will be apparent, the entire system of igniter connections involves no apparatus other than a package of two transformers and connections as shown within the dotted lines of Fig. 3, and a minimum of wiring. It is apparent that the transformer **27** to activate the signal circuit may be supplanted by a relay activator **24** (Fig. 4) to actuate a switch **25** in the signal circuit which may have a separate power source **26**, either alternating or direct current, at the control station or elsewhere. As with transformer **27**, the use of relay **24** permits the use of separate relay and signal circuits.

To sum up the action of the four independent circuits, it is noted that closing the power switch to connect the power line **22** permits flow of power line current through circuit by way of the bi-metallic element **12** in the upper one of the associated igniters of Fig. 3 and the auto-transformer **21**. This energizes an independent circuit including the low voltage end of transformer **21** and the hot coils **18, 18**, in parallel, igniting the gas as it reaches the burners, one after the other. The heat of the resulting flames cause the bi-metallic elements **12, 12**, to open the live contacts **13, 13**, and make contact with the hitherto

open contacts 14, 14, closing a circuit direct from the power lines 22 through the primary of transformer 27 (or the relay 24) and energizing the signal circuit to the indicator 23. Thus, at no time are either the contacts or the bi-metallic elements in the low voltage circuits of the ignition coils or of the signal lamp.

What I claim is:

1. As an article of manufacture, an inspirator igniter comprising a body member having a base provided with drainage openings, a tubular sleeve having open ends and supported in said base, means to removably clamp one end of said sleeve in said base, the other end of said sleeve being externally threaded to affix same to an inspirator, a contact assembly support affixed to said base, a contact assembly within said sleeve, mounted on said support, and comprising contact members insulated from each other, including a central bi-metallic, thermo-responsive member and flexible live and relay contact members on opposite sides of said bi-metallic member, said bi-metallic member being biased to normally contact said live contact member when cold and to contact said relay contact member when heated to a predetermined temperature, means to adjust said flexible members with respect to said bi-metallic member, a protective shield carrying said adjusting means insulated from and extending around the ends of said contact members, a hot wire ignition coil connected at one end to said live contact member and, at the other end, to said bi-metallic member and forming a part of said contact assembly an an insulating lining in said tubular sleeve.

2. An inspirator igniter as defined in claim 1 and, in addition, a source of alternating current power and an auto-transformer, one side of said power source being connected to said bi-metallic member and the other side to said transformer primary, the other end of said primary being connected to the live contact member, the low voltage tap of said transformer being connected to the free end of said hot wire coil whereby contact of said bi-metallic member and said live contact member energizes said hot wire coil, said coil thereby being directly across the low voltage end of said transformer, and said bi-metallic member being in a separate circuit directly connected to said power source.

3. An inspirator igniter as defined in claim 1 connected as defined in claim 2 and, in addition, a transformer, a separate signal circuit including a signal element at a control station in series with said transformer secondary controlling said separate circuit and a fourth circuit directly connected to said power source including said relay contact of said igniter, said bi-metallic member, said source of power and the primary of said transformer.

4. As an article of manufacture an inspirator igniter comprising a base provided with a drainage opening, a tubular sleeve having open ends and supported in said base, means to removably fasten one end of said sleeve in said base, the other end of said sleeve being externally threaded to affix same to an inspirator, heat sensitive circuit closing means within said sleeve and having a support attached to said base, said heat sensitive closing means comprising a central bi-metallic contact member, flexible contact members on either side thereof, means to adjust said flexible members to set one in contact with said central member and the other spaced therefrom, a hot wire ignition coil within said sleeve mounted on said support and insulated therefrom, said coil being connected in series with the said flexible contact member in contact with said central member.

5. An inspirator igniter as defined in claim 4 and in addition a circuit including said spaced contacts and signal energizing means and excluding said hot wire ignition coil and a second circuit including said hot wire ignition coil and excluding said spaced contacts and a source of power to energize said first circuit when said second circuit is open.

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