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SPACE HEATER

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Fig. 1

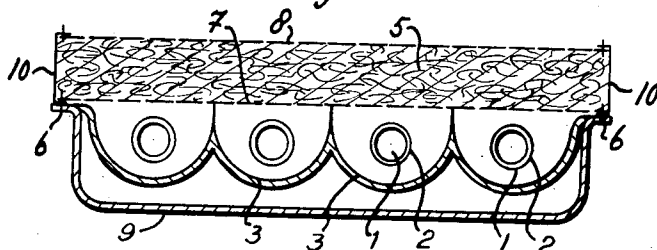


Fig. 2

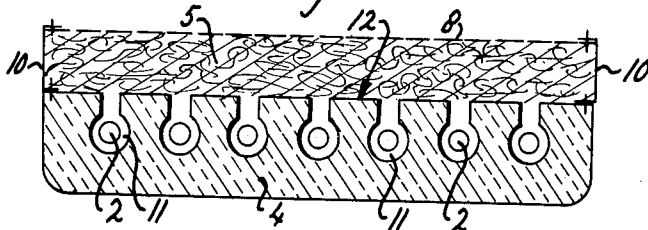


Fig. 3

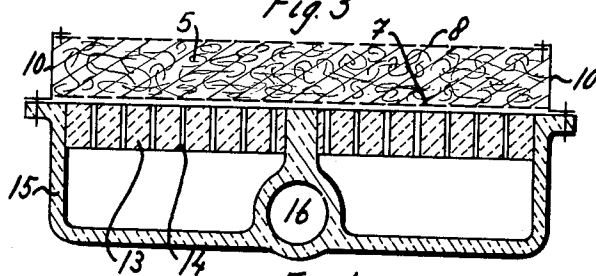
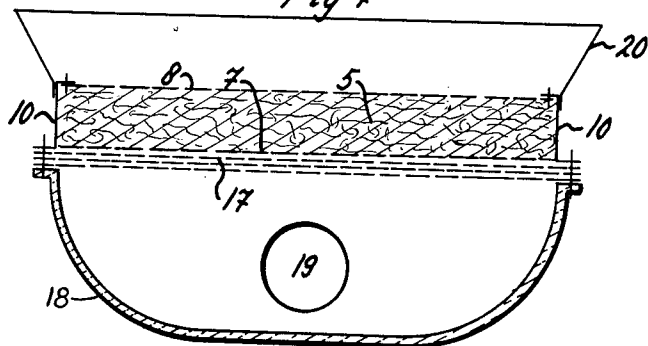


Fig 4



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SPACE HEATER

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5 Claims. (Cl. 219—34)

This invention relates to space heaters.

A disadvantage inherent in radiators having electrical filaments and similar electrical heating elements and also in gas stoves such as the so-called infra-red radiators, which, like electrical stoves, do not function with a clearly visible flame, is that they cannot be used in spaces in which there is any danger of explosions or fire.

Spaces in which there are or may be inflammable or explosive liquids, vapours or gases include, for example, garages and workshops, lacquer spraying plants, various chemical plants, drying installations as well as spaces in which powdery substances are stored and processed and in which there may be air-and-dust mixtures that could give rise to explosions. On account of the danger of fire and explosion it is impossible in such spaces to use an open fire, even in the form of electric filaments or incandescent ceramic surfaces.

The object of the present invention is to provide a heating apparatus that can be used in such spaces without danger of fire or explosion.

According to the invention the glowing or incandescent element or the flame is isolated from the surrounding atmosphere by means of a layer of loose quartz wool or wool made from glass having a very high melting point, said layer being at some distance from the incandescent element and/or the flame.

It is of course known that combustion may take place in a layer of fine fibrous quartz wool in which a catalyst has been placed. In that case the aim is to bring the quartz wool to the state of incandescence. In accordance with the present invention, however, no combustion takes place in the layer of quartz wool or glass wool, which consequently does not glow and which is arranged at some distance from the heating source.

The invention is based on some surprising observations. If a metal wire is placed at some distance from an electrical filament or an infra-red radiator at high temperature the metal wire will become incandescent. Obviously such an incandescent surface cannot come into contact with an explosive atmosphere. This incandescence occurs both when heat is applied without any flame, as is the case with electrical filaments, and when the heating element is a glowing ceramic mass provided with pores or channels, over which there may further be provided gas flames. If, on the other hand, a thin film of quartz wool or glass wool is placed for instance on the spirals of an electric heater, then it will not glow even after a longer period. The heating source is, however, visible through the glass film or through the quartz film, thus possibly giving the impression that the film is glowing, which is actually not the case. As the film does not glow, it is possible for dangerously explosive air or even dangerously inflammable liquid to come into contact with said film without any explosion occurring. Owing to the structure of a layer of glass wool or quartz wool a most surprising visual effect is obtained, thereby creating the impression of a completely incandescent surface emitting infra-red rays. Since glass wool and quartz wool consist of very fine threads having a thickness of the order of 1–100 microns and the apparent specific weight of such wool is very low, the infra-red rays are capable of pene-

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trating virtually unhindered through a layer of such wool, whereby the heat efficiency of the heating apparatus according to the invention is adversely affected only to a very minor extent. The threads themselves are incombustible and fireproof and resist temperatures of 800–900° C. of the customary infra-red radiators. Experiments have shown that heat rays having a wavelength of about 4–2.5 microns pass practically unhindered through a film of glass wool. Quartz wool and glass wool have low heat conductivity and in addition a low capacity for accumulating heat and a high specific heat, so that the material is particularly suitable for isolating the heating elements from the surrounding atmosphere. In this respect quartz wool is preferable to glass wool.

Whilst by arranging a plate of quartz wool or glass wool in front of the heating elements the latter are isolated from the surrounding atmosphere, care should of course be exercised that an explosive gas mixture is prevented from coming near the heating elements in any other way than through the plane of radiation. This means that in practice the heating apparatus must be constructed in such a way that any access of air from the atmosphere to the heating elements along any other path than through the glass wool or quartz wool is rendered impossible. Therefore, an electrical ignition will preferably be provided, so that in order to ignite the gas it is not necessary to open the space in which the heating elements are disposed behind the glass wool or quartz wool plate. With a gas apparatus the aforesaid screen by means of quartz wool or glass wool may be effected in such a way that this screen is effective not only at the side of radiation, but also at the side where an air-and-gas mixture is supplied, so that along this path also it is impossible for an explosive mixture to come into contact with the source of heating.

It is noted that for preventing explosions in mines a so-called Davy lamp is used, in which a fine mesh metal tissue is applied. This principle cannot be applied to heat radiators, since in that case too many heat rays would be prevented from passing.

In order that the invention may be more clearly understood various embodiments will now be described by way of example with reference to the accompanying drawings in which:

FIGURE 1 is a diagrammatic cross-section illustrating the application of the invention to an electrical space heater,

FIGURE 2 is a similar view of a modified electrical space heater, and

FIGURES 3 and 4 are similar views illustrating the applications of the invention to gas operated space heaters.

The heating apparatus according to FIGURE 1 comprises a number of heating elements formed by an insulating core 1 made for instance from porcelain or steatite around which electric filaments 2 are wound. Behind each filament is mounted a reflector 3, the unit as a whole being encased in a housing 9. According to the invention the front side of this housing is closed off by a plate of loose glass wool or quartz wool 5. This plate is encased at its edges in a fire-proof frame 10, which is joined to the housing of the electrical radiator. As glass wool has little rigidity, the front and rear side of the plate of wool are preferably covered with a metal gauze or a gauze made from another incombustible material. This gauze may be of coarse mesh size and serves merely to keep the glass wool in position. The glass wool plate can for instance be mounted in such a way that its side closest to the filament spirals rests against a gauze or grid 7 which is connected at 6 with the housing 9 or with the frame 10. The gauze

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or grid 8 may in that case rest on the other side of the wool plate and may be connected at the front with the frame 10.

According to the embodiment shown in FIGURE 2 an electric filament 2 is mounted as a continuous spiral in a continuous channel 11 in an insulating supporting member 4. The channel 11 may be shaped in a zig-zag fashion or in the form of a spiral. The filament is in this case situated rearwardly in respect of the surfaces 12 of the parts between the channels. The plate of glass wool or quartz wool 5 may in this way rest directly on the surfaces 12 of the supporting member 4 without any stiffening grid or gauze. In this case also, the plate 5 is encased in a frame 10, whilst at the front is provided the grid or gauze 8 which is connected with the frame 10.

In addition to electrically heated heating elements the invention can also be applied to gas operated so-called infra-red radiators as in FIGURE 3. The plate of glass wool or quartz wool 5 is also in this case encased in a frame 10 and is provided with stiffening grids 7 and 8. Such a plate is mounted over a ceramic burner plate 13 which is provided with the usual bores 14. This burner plate 13 is encased in a metal housing 15 which is provided with an injector system 16. The plate 5 together with the frame 10 is mounted gas-tight on the housing 15.

A similar heating apparatus is shown in FIGURE 4. In this case the glowing element 17 consists of a metal wire tissue or wickerwork fixed to a housing 18 into which a gas-and-air mixture is supplied through an injector 19. Above the glowing element 17 a plate 5 of glass or quartz wool according to the invention is fixed to the supporting grids 7 and 8 and a frame 10. A reflector 20 may be connected to the plate 5. As already stated above, an electrical ignition device is preferably used with the devices according to FIGURES 3 and 4, so that the interior of the apparatus need not be opened for igniting the gas flame.

Since the danger of fire and explosion is completely eliminated in the apparatus according to the invention, the filaments in electrical heating apparatus may be very heavily charged, namely with temperatures exceeding 1000° C. The consumption of energy can thereby be reduced, whilst it is also possible to save material.

I claim:

1. A space heater comprising an incandescent source of heat; and an enclosure surrounding said source and completely separating it from the external atmosphere, at least one wall of said enclosure comprising a layer composed of a material selected from the group consisting of glass wool and quartz wool spaced apart from

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said source said wall being substantially transparent to heat radiations from said source.

2. A space heater comprising an incandescent source of heat; and an enclosure surrounding said source and completely separating it from the external atmosphere, at least one wall of said enclosure comprising a layer composed of a material selected from the group consisting of glass wool and quartz wool spaced apart from said source, said wall being substantially transparent to heat radiations from said source, and a metal screen in contact with said material and attached to said enclosure to hold said material in place.

3. A space heater comprising an incandescent source of heat; an enclosure partially surrounding said source, said enclosure having an open side; and a cover fitting over said open side to cooperate with said enclosure to separate said source completely from atmosphere external to said enclosure, said cover being substantially transparent to heat radiations from said source and comprising a pair of wire gauze screens, a layer composed of a material selected from the group consisting of glass wool and quartz wool between said screens, and a frame holding said screens and said material together.

4. A space heater comprising an incandescent electrical filament, an insulating supporting member for said filament; an enclosure surrounding said filament and completely separating it from the external atmosphere, at least one wall of said enclosure comprising a layer composed of a material selected from the group consisting of glass wool and quartz wool separated from said filament, said wall being substantially transparent to heat radiations from said filament, and a pair of wire gauze screens on either side of said material and in contact therewith, said screens being attached to said enclosure.

5. A space heater according to claim 4 comprising in addition a reflector on the opposite side of said filament from said material and between said filament and said enclosure to reflect heat from said filament through said material.

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