

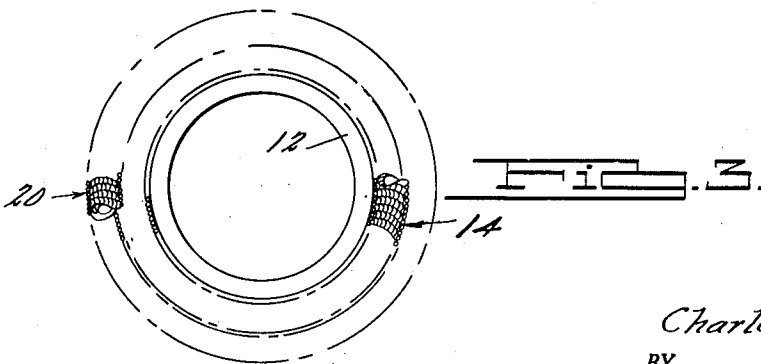
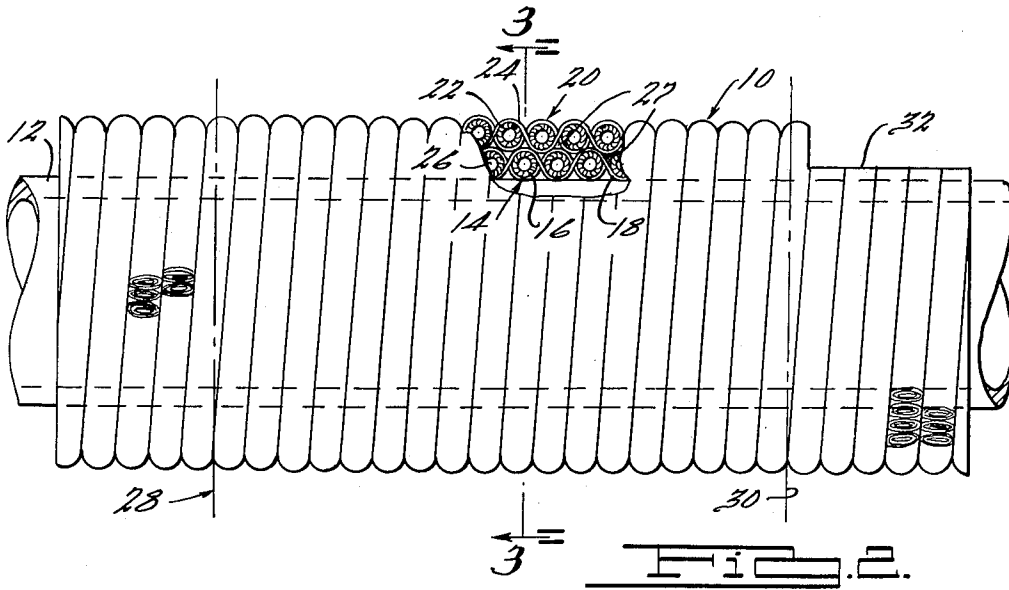
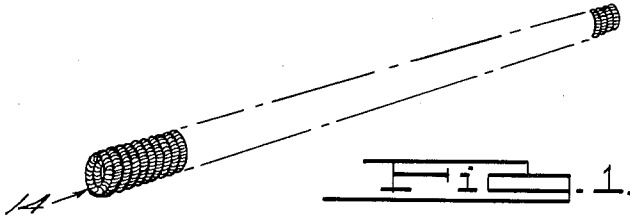
Jan. 31, 1956

C. B. BALIS

2,733,176

INSULATING SHIELD

Filed July 23, 1953



INVENTOR.
Charles B. Balis.

BY

Harness, Dickey & Perie.
ATTORNEYS

1

2,733,176

INSULATING SHIELD

Charles B. Balis, Birmingham, Mich., assignor to
Frank D. Saylor & Son, a partnership

Application July 23, 1953, Serial No. 369,855

4 Claims. (Cl. 154—45)

This invention relates to insulating shields and, particularly, to an insulating shield capable of withstanding very high temperatures over long periods of operation.

The present invention provides an insulating shield which is adapted for use on surfaces which may be heated in the order of 1000° F. and which comprises a plurality of layers of contiguously disposed hollow, flexible, ropes or tubes which are woven from fibres of a high heat-resistant material, preferably from pure glass fibres. The fibres are first woven as tightly as possible into the form of a hollow rope or tube which is then spirally wound and woven to fashion a tubular insulating shield having a multitude of dead air spaces which provide the shield with excellent insulating characteristics. That is, the shield is woven with the hollow rope or tube forming the weft and fibre threads constituting the warp interwoven with the weft. For some insulating purposes, where lower temperatures are involved, a shield having only one layer of the hollow, spiral wound rope construction would be suitable. However, for high temperature insulating purposes a shield having more than one layer may be used. A second layer, substantially identical to the first layer, may be formed on the base or first layer by winding a second hollow rope tightly around the first layer, to form a double layer tubular insulating shield. The ends of the double layer tubular shield may be sealed by suitable means such as coating them with water glass. The sealing of the ends prevents fraying and provides the shield ends with sufficient rigidity to permit them to be easily cut and shaped. The hollow rope construction of the spiral wound layers of the insulating shield, provides a plurality of dead air spaces which give the shield excellent insulating characteristics. The most preferable high heat-resistant material, adaptable to be woven and capable of withstanding very high temperatures, is pure fibre glass which has not been treated with any oil or other foreign matter and which has a melting point of approximately 2000° F. In the illustrative embodiment, an insulating shield embodying the features of the invention is shown as applied to a pipe, but it will be understood that the insulating shield is adaptable for application to other shaped articles and for many other purposes.

The main objects of the invention are: to provide an insulating shield which will not burn or deteriorate when used on surfaces which are heated to a temperature in the order of 1000° F.; to provide an insulating shield woven from a fibrous high heat-resistant material such as pure fibre glass and which is adapted for use on objects having high surface temperatures which are beyond the insulating limits of the ordinary available insulating materials; to provide an insulating shield composed of a plurality of layers of spirally wound hollow ropes which have been woven from a high heat-resistant material and which provide the shield with a plurality of dead air spaces having excellent insulating characteristics; to provide an insulating shield which may be used on surfaces heated to a very high temperature and which is flexible and may be adapted to conform to any desirable shape; to provide a

2

high heat-insulating shield which may be pre-formed or formed directly on the surface to be insulated; to provide an insulating shield which is simple and compact in construction and economical to manufacture.

Other objects, features and advantages of the present invention will become apparent from the following detailed description taken in conjunction with the accompanying drawing, in which:

Figure 1 is a perspective view of a single layer insulating shield made in accordance with the principles of the invention;

Fig. 2 is a broken, elevational view of a double layer insulating shield embodying the features of the invention and shown as applied on a pipe; and

Fig. 3 is a sectional view of the structure illustrated in Fig. 2, taken along the line 3—3 thereof.

Referring now to the drawing, the numeral 10 designates a tubular insulating shield made in accordance with the principles of the invention and mounted on a pipe 12. The pipe 12 may be a heater tube, such as employed in a military tank engine heater, which may attain a temperature of 1000° F. or more when in use. Such heater tubes must be efficiently insulated to protect the tank personnel from excessive heat, and prior to this invention no suitable insulating shield has been available. The insulating shield 10 includes an inner layer 14 composed of a plurality of contiguously disposed hollow rope loops or coils 16 which are formed by spirally winding about the pipe 12 a flexible, hollow rope or cord which has been woven from the fibres of a high heat-resistant material, preferably from pure glass fibres. The contiguously disposed hollow rope coils 16 are woven tightly together by a plurality of longitudinally disposed threads 18 which are of the same high heat-resistant material as the member 16. An outer layer 20 is disposed around the inner layer 14 and is composed of a plurality of contiguously disposed hollow rope loops or coils 22 which are formed by spirally winding about the inner layer 14 a second flexible, hollow high heat-resistant rope. The contiguously disposed hollow rope coils 22 are woven tightly together by a plurality of longitudinally disposed threads 24 which are also made from the same high heat-resistant material as the members 22.

As is best seen in Fig. 2, the hollow rope coils 16 and 22 of the inner and outer layers 14 and 20, respectively, provide the shield with a plurality of staggered dead air spaces 26 which give the shield excellent insulating characteristics. It will be seen, that by weaving the hollow rope coils 16 and 22 together as tightly as possible, by means of the threads 18 and 24, an excellent air-tight high-temperature insulating shield is provided which includes two layers of dead air spaces 26, as well as a plurality of smaller dead air spaces 27 which are formed between the abutting tubular layers 14 and 20. The ends of the insulating shield 10 are coated with water glass up to the lines 28 and 30, respectively, to seal the ends of the insulating shield and make them air tight. The application of the water glass to the ends of the shield also serves to prevent fraying and to make such coated portions rigid enough to be cut and shaped as at 32, to adapt such ends for interconnection with other matching parts. The outside of the insulating shield 10 may be flame treated to minimize protrusion of the ends of the glass fibres.

It will be understood that an insulating shield embodying the features of the invention may be fabricated directly on the article to be insulated or it may be prefabricated on a template or model and assembled afterwards on the article to be insulated. It will be obvious that although a tubular shaped insulating shield was employed to illustrate the invention, the principles of the invention can be applied to make insulating shields of any other desirable shape, such as a flat shield which could be easily made by disposing a plurality of the hollow high heat-resistant

3

fibre ropes in a contiguous coplanar arrangement and securing them together with threads of the same material.

While it will be apparent that the preferred embodiment of the invention herein disclosed is well calculated to fulfill the objects above stated, it will be appreciated that the invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

What is claimed is:

1. An insulating shield for use on surfaces adapted to be heated to a temperature of 1000° F., said shield comprising a plurality of contiguously disposed coils of a hollow, tightly woven pure glass fiber rope, pure glass fiber means interwoven with and securing said plurality of contiguously disposed coils in close contact with each other, and an inorganic coating on the ends of said shield sealing the end of the rope closed, said shield being capable of withstanding temperatures of 1000° F. without burning or smoking.

2. An insulating shield for use on surfaces adapted to be heated to a temperature of 1000° F., said shield comprising a first layer of hollow, rope-like elements which are woven from pure glass fibers, pure glass fiber means interwoven with and holding said rope-like elements tightly together, a second layer of said pure glass fiber rope-like elements disposed on said first layer, pure glass fiber means interwoven with and holding said second layer of rope-like elements together, an inorganic sealing means sealing the end of said layers together, said shield being capable of withstanding temperatures of 1000° F. without burning or smoking.

3. A tubular insulating shield for use on surfaces adapted to be heated to a temperature of 1000° F., said shield including an inner cylinder comprising a plurality of contiguously disposed spiral loops of hollow pure glass fiber rope, a plurality of longitudinally disposed pure glass fi-

4

bers interwoven with said spiral loops of the inner cylinder to secure the same tightly together, an outer cylinder sleeved over said inner cylinder and comprising a plurality of contiguously disposed spiral loops of hollow pure glass fiber rope which are laterally offset from the spiral loops of the inner cylinder to form a staggered relationship with a plurality of dead air spaces therebetween, a plurality of longitudinally disposed pure glass fibers interwoven with the spiral loops of the outer cylinder to secure the same tightly together, the adjoining ends of said cylinder being sealed together with water glass, said shield being capable of withstanding temperatures of 1000° F. without burning or smoking.

4. An insulating shield for use on surfaces adapted to be heated to a temperature of 1000° F., said shield comprising a plurality of contiguously disposed coils of a hollow, tightly woven pure glass fiber rope, and pure glass fiber threads interwoven with said contiguously disposed walls and extending longitudinally thereof to form a tubular shaped insulating shield having a plurality of dead air spaces therein, said shield being capable of withstanding temperatures of 1000° F. without burning or smoking.

References Cited in the file of this patent

UNITED STATES PATENTS

682,434	Sullivan	Sept. 10, 1901
2,315,837	Brown et al.	Apr. 6, 1943
2,381,003	Ryan	Aug. 7, 1945
2,397,568	Seaman	Apr. 2, 1946
2,445,624	McDermott et al.	July 20, 1948
2,584,702	Hogendobler	Feb. 5, 1952

FOREIGN PATENTS

337,072	France	Mar. 28, 1904
34,932	Switzerland	Nov. 30, 1905