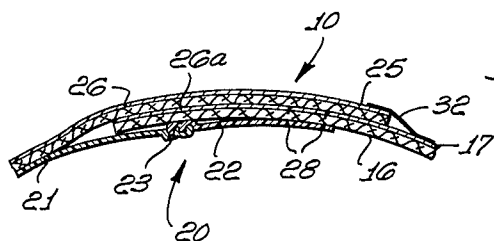
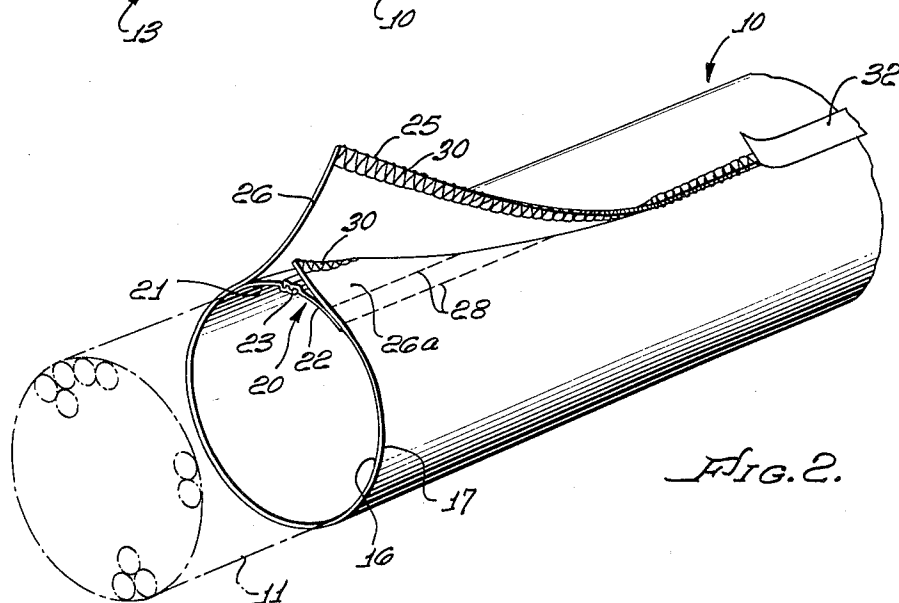
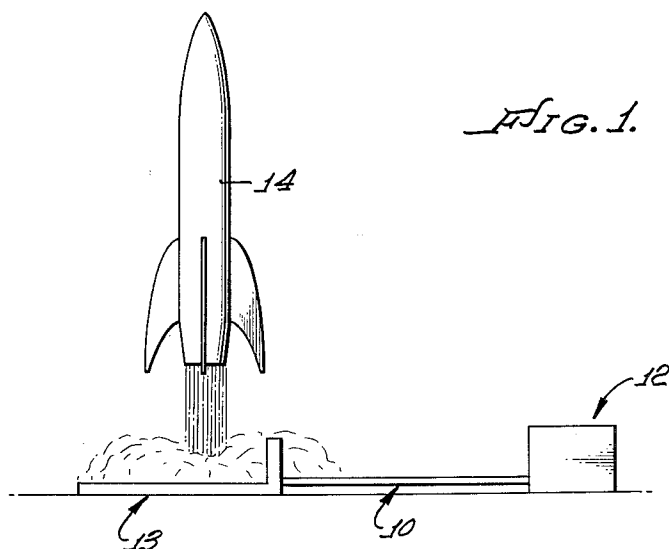


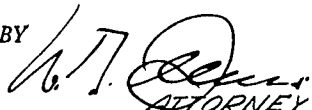
June 4, 1963

W. A. PLUMMER
HEAT PROTECTIVE SHEATHING

3,092,530

Filed Sept. 21, 1959



INVENTOR.
WALTER A. PLUMMER
BY 
ATTORNEY

1

3,092,530

HEAT PROTECTIVE SHEATHING

Walter A. Plummer, 3546 Crownridge Drive,
Sherman Oaks, Calif.

Filed Sept. 21, 1959, Ser. No. 841,297

3 Claims. (Cl. 154-44)

This invention relates to heat insulating coverings and more particularly to an improved lightweight inexpensive tubular jacket or sheathing particularly suitable and effective in protecting an object temporarily against transient high temperature conditions. The novel heat insulating sheathing of this invention is also suitable for use under continuing high temperature conditions especially where compactness, light weight, and flexibility of the sheathing are important factors.

Developments in recent years have given rise to the need for single use protective jackets suitable for isolating components against transient high temperature conditions although the effectiveness of the protective jacket for repeated use be substantially destroyed or reduced to the point of unreliability. For example, in the launching of rockets and guided missiles, very high temperatures are generated for brief intervals, the direct and radiant heat from which is very destructive as respects objects within proximity to these high temperatures. This is particularly true as respects numerous instrumentation and associated components, electrical cabling, fluid conveying ducting and the like, required to be within the immediate vicinity of the firing operator.

Numerous expedients have been resorted to in efforts to protect such equipment from damage by heat. However, no satisfactory solution has been found and very costly damage continues to ensue from each firing operation.

The invention here proposed provides a highly effective and satisfactory solution to the problem and is bottomed on the premise that the high temperature conditions to be guarded against are of a rather short transient nature. The present concept involves the provision of very thin lightweight flexible inexpensive strip laminate of non-combustible material having secured along its opposite lateral edges readily separable seam means by which the sheathing may be easily and quickly assembled about an object to be protected and easily removed for replacement as well as opened if need be for inspection and servicing of the parts enclosed. Essentially the construction comprises a main body layer of asbestos having bonded to its exterior side a highly polished metallic layer, as aluminum foil, highly effective in reflecting radiant heat energy.

A preferred form of seam closure means for the jacket comprises interlocking tapes of slide fastener material adapted to be heat fused, sewn or otherwise secured to the edges of the laminate stripping. Preferably, the seam means is so attached to the edges of the strip as to leave at least one free flap of laminate wide enough to overlie, conceal and protect the seam material from the high temperatures and additionally effective to preclude the passage of fluids.

Accordingly, it is a primary object of this invention to provide an improved heat insulating jacket adapted to be detachably assembled about an object to be protected.

Another object of the invention is the provision of heat

2

protective sheathing characterized by its light weight, flexibility, compactness, efficiency and ability to protect objects concealed therewithin temporarily from very high temperatures.

Another object of the invention is the provision of a tubular jacket of laminate material having secured along its opposite lateral edges readily mateable and separable seam means by which the jacket can be quickly assembled about cabling, conduits and objects in need of protection against transient high temperatures without need for disconnecting existing connections.

Another object of the invention is the provision of heat protective sheathing which, although extremely lightweight thin material, is nevertheless so constructed as to be highly effective in protecting an enclosed object momentarily against damages from very high temperature conditions.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawing to which they relate.

Referring now to the drawing in which a preferred embodiment of the invention is illustrated.

FIGURE 1 is a view of a missile launching wherein certain equipment adjacent the launching site is protected against heat damage by protective sheathing embodying principles of this invention;

FIGURE 2 is a perspective view on enlarged scale of the protective tubular jacket made according to the present invention; and

FIGURE 3 is a fragmentary cross-sectional view on enlarged scale through the seam and adjacent body portions of the protective sheathing.

Referring to FIGURES 1 to 3, there is shown by way of example a typical application of the heat protective sheathing constituting the present invention. This tubular sheathing, designated generally 10, is shown assembled about cabling 11 extending between control instruments in a blockhouse 12 and a launching platform 13 useful in the launching of a guided missile indicated at 14. Heretofore, attempts have been made to protect sections of the expensive cabling 11 unavoidably exposed to extremely high temperatures, high velocity blasts incorporating very abrasive molten particles during the firing of a missile by various expedients, all of which expedients leave much to be desired, and are subject to numerous disadvantages and shortcomings. For example, as high as 2000° F. and 3000° F. prevail briefly at and immediately adjacent launching platform 13 during takeoff of a missile 14. Such high-temperature high-velocity blasts, even though existing for an extremely brief interval, have tremendous destructive potentials as respects material employed in constructing critical cabling and instrumentation exposed to the high firing temperatures.

Protective jacket 10 found so effective in safeguarding objects enclosed thereby from adverse effects by these high temperatures preferably comprises an inner main body layer 16 of asbestos having suitably bonded to the side exposed to the high temperatures a heat reflective metal layer, as polished aluminum foil vacuum deposited aluminum 17. A particularly durable and rugged laminate of this character is formed using a closely woven asbestos fabric, although it will be understood that sheet asbestos consisting of matted asbestos fibers may be used where strength is not an important factor. When using

asbestos of either type, it will also be understood that a reinforcing layer may be employed. Such a layer may consist of fiber glass strands or fabric, sheet plastic or the very tough film known under the trademark name of Mylar, a product of the Du Pont Company, Wilmington, Delaware, or other suitable heat resisting material. Such film not only increases the strength of the laminate but protects the very soft and low strength asbestos against damage by abrasion, sharp instruments, and the like, and the penetration of moisture, chemicals, and fluids generally.

To facilitate assembly of the laminate layer as well as to permit disassembly of jacket 10 for removal or the servicing or inspection of enclosed elements, the laminate stripping preferably includes readily separable seam means 20 extending lengthwise along its lateral edge portions. As here shown, seam means 20 comprises identical extruded plastic tapes 21, 22 having interlocking tongues and grooves 23 extending continuously along the free edges of each tape and readily engageable with one another to provide a strong fluid-tight seam. It will be understood that the slide fastener seam 20 may be formed in accordance with principles well known to those skilled in the slide fastener art. Desirably seam 20 is formed of plastic material having one or more closely interfitting tongues and grooves capable, when assembled, to hold the seam together as well as to exclude moisture and the like fluids.

As here shown, tape 21 is secured to the sheathing laminate along a line spaced inwardly from one lateral edge 25 thereby providing a guard flap 26 sufficiently wide to overlie the closed seam and provide a jacket of laminate completely encircling cabling 11 or other object to be protected. As will be recognized, guard flap 26 is highly effective in protecting seam-forming tapes 21 and 22 from the high temperatures to the end that these tapes may not be destroyed or rendered ineffective in holding the jacket closed during the critical high temperature period.

Desirably, tape 22 is likewise secured to the other lateral edge of the laminate inwardly of its edge to provide a somewhat narrower guard flap 26a adapted to underlie the wider flap 26. Inner guard flap 26a preferably substantially bridges the closed seam 20 and outer flap 26 then forms a second protective layer thereby assuring more than ample heat protection for those types of closure tapes made of heat sensitive plastics. It is also pointed out that the edges of both guard flaps are preferably provided with a reinforcing binding 30, 30. As here shown, such binding comprises closely spaced loops of stitching embracing the edges and effective in preventing the fragile asbestos and foil covering from fraying and being damaged in the handling of the sheathing and in opening and closing the closure seam 20. A layer of plastic, varnish, shellac or the like embracing the edges of the guard flaps could be used since the function of the layer or binding is to provide protection before and during assembly of the sheathing. Hence, its ability to withstand operating conditions is not of particular importance.

Tapes 21 and 22 may be heat fused to the asbestos fabric or secured thereto in other manner, as by stitching 28, using thread resistant to high temperatures.

In use it will be understood that jacket 10 is made of a size encircling the object to be protected rather loosely, if desired. Not uncommonly the object to be protected will already be provided with a covering intended as adequate to safeguard it against transient high temperatures but actually found ineffective for this purpose. In either event, protective sheathing 10 is quickly assembled about cabling 11 or any other object having need for heat protection by placing the laminate stripping thereabout and pressing the interlocking tongues and grooves 23 together lengthwise of the jacket. Thereafter, guard flap 26 is pressed snugly across the seam

and is secured in place if need be as by applying pressure sensitive tape 32 across edge 25 of the guard flap and pressing it against the adjacent exterior surface of the jacket.

The exterior layer of polished metal foil 17 is extremely effective in reflecting high temperature radiant energy waves incident thereon and emanating from a fired rocket 14. Even though a small percentage of this heat is absorbed by the foil, the high temperature resistance and heat gradient of asbestos layer 16 is such that heat damage to the equipment being protected does not result. It will, therefore, be apparent that the described lightweight, inexpensive protective jacket 10 serves a most important purpose and safeguards delicate and expensive equipment for repeated reuse. The effectiveness of the jacket may be substantially destroyed by a single exposure to high temperatures but this is of no consequence since the cost of the jacket is inconsequential in comparison with the value of the equipment protected.

While the particular heat protective sheathing herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. An article of manufacture comprising an inexpensive readily replaced tubular jacket-type sheath having a readily opened and closed seam extending from end to end thereof and suitable for enclosing costly cabling and the like closely adjacent firing areas of launching sites for missiles, spacecraft, rocket-engines and effective to protect such cabling from momentary high temperature rises associated with the blast of hot gases accompanying the launching operation, said jacket-type sheath comprising a thin highly flexible laminated main body strip having a width substantially wider than the circumference of cabling to be jacketed and protected thereby, said main body strip consisting of an inner layer of asbestos fabric and a fully exposed exterior layer of thin polished vacuum-deposited heat reflecting metal coextensive in size with and bonded directly to said inner layer of asbestos fabric, a pair of separable interlocking seam-forming strips of plastic extending along the opposite lateral edges of said main body strip and each having continuous interlocking tongue and groove portions mateable to provide a seam for said tubular sheath, said seam-forming strips having their remotely-spaced lateral edges secured to the asbestos fabric side of said sheath in a narrow band along both lateral edges of the sheath and spaced inwardly of at least one lateral edge thereof to provide a heat protective guard flap sufficiently wide to rest against and fully conceal said seam in the closed position thereof, whereby the cabling to be protected is completely encircled by said laminated sheath and with the integral guard flap thereof overlying the exterior side of said plastic seam to protect the same from radiant heat occurring at launching of a missile or the like from said launching site.

2. An article as defined in claim 1 characterized in that both of said seam-forming strips are secured to the inner asbestos layer of said main body strip along narrow bands spaced inwardly from the respective lateral edges of said main body strip of the sheath, and in such manner as to provide a pair of heat protective guard flaps one of which is relatively narrower than the other, the narrower guard flap being adapted to underlie the wider guard flap in snug overlapping relationship therewith when said seam is closed and to overlie the major width of said closed seam, and the wider one of said guard flaps overlying both said narrow flaps and the entire width of said plastic seam.

5

3. An article as defined in claim 1 characterized in that said seam-forming plastic strips are secured to the opposite lateral edges of said main body strip by stitching and in that said lateral edges are provided with a reinforcing protective binding extending continuously therealong to safeguard against abrasion and raveling of the strip laminate during handling and the opening and closing of said seam, and means for holding said guard flaps snugly closed together against said sheath in overlapping relationship and secured to said sheath along the adjacent free edge portion of the wider guard flap.

5

10

926,423
2,561,891
2,613,166
2,665,467
2,719,099
2,756,172
2,779,066
2,825,673
2,937,664
2,960,561

6

References Cited in the file of this patent

UNITED STATES PATENTS

Kelly	June 29, 1909
Tucker	July 24, 1951
Gronemeyer	Oct. 7, 1952
Bosomworth et al.	Jan. 12, 1954
Holbrook	Sept. 27, 1955
Kidd	July 24, 1956
Gaugler et al.	Jan. 29, 1957
Tschappu	Mar. 4, 1958
Plummer	May 24, 1960
Plummer	Nov. 15, 1960