March 12, 1940. W. F. ASTLEY 2,193,546

HEAT INSULATING MATERIALS

Filed Dec. 3, 1938

Fig. 1

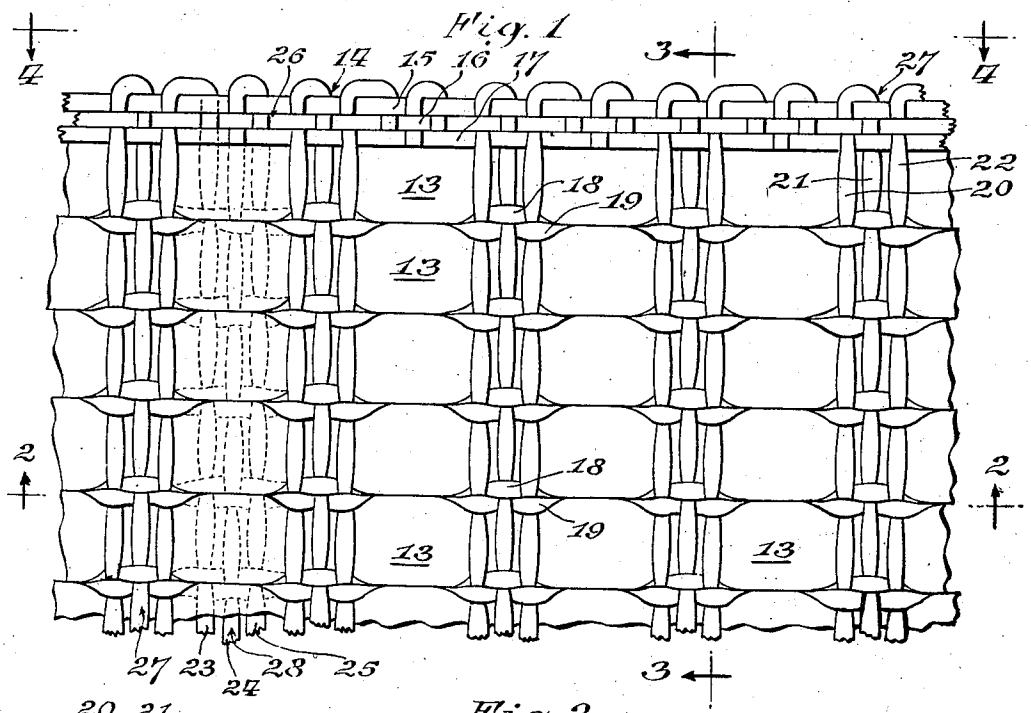


Fig. 2

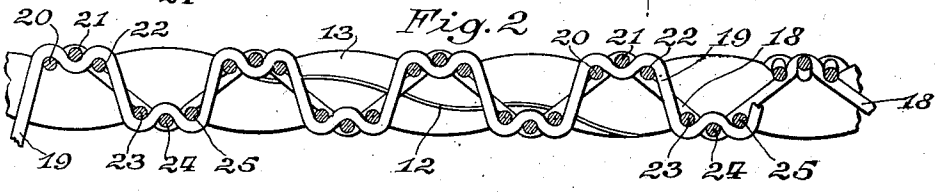


Fig. 3

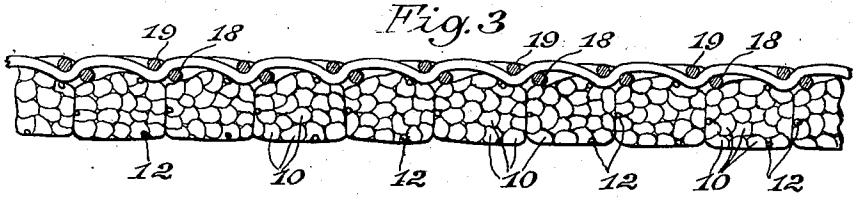
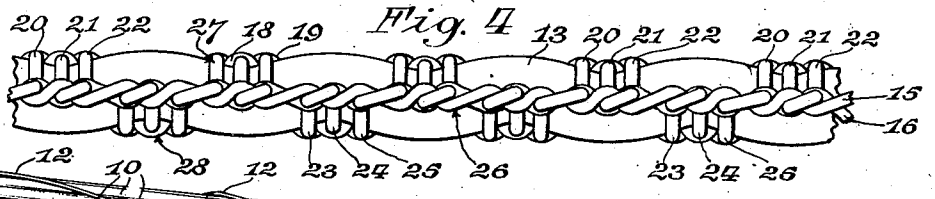


Fig. 4



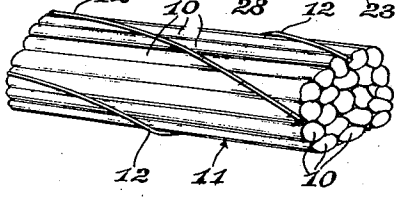


Fig. 5

Inventor:
William F. Astley
By Williams, Bradbury,
McCaleb & Hinkle.
Attys.

Patented Mar. 12, 1940 2,193,546

UNITED STATES PATENT OFFICE

2,193,546

HEAT INSULATING MATERIALS

William F. Astley, Cicero, Ill., assignor to Union Asbestos & Rubber Company, Chicago, Ill., a corporation of Illinois

Application December 3, 1938, Serial No. 243,729

2 Claims. (Cl. 139—420)

The present invention relates to heat insulating materials and methods of making the same, and is particularly concerned with the manufacture of heat insulating blankets.

One of the objects of the invention is the provision of an improved method by means of which heat insulating blankets of heat insulating units may be woven in a single operation so that such blankets may be constructed with a minimum amount of labor and at a minimum cost.

Another object of the invention is the provision of an improved insulating blanket of loose fiber units of asbestos and interlacing or interwoven fabric portions, which is durable, and can be cut at any point and will not unravel easily.

Another object of the invention is the provision of an improved insulating blanket of asbestos or the like, in which the major portion of the blanket consists of relatively loose fiber units of asbestos fibers and the interlacing or interwoven portions of the blanket are reduced to a minimum amount necessary for holding the blanket together and preventing unraveling when the blanket has been cut to desired shapes.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawing, in which similar characters of reference indicate similar parts throughout the several views.

Referring to the single sheet of drawings,

Fig. 1 is a fragmentary elevational view of a portion of an insulating blanket constructed according to the present invention;

Fig. 2 is a fragmentary sectional view, taken on the plane of the line 2—2 of Fig. 1, looking in the direction of the arrows;

Fig. 3 is a fragmentary sectional view, taken on the plane of the line 3—3 of Fig. 1, looking in the direction of the arrows showing the structure of a part of the weave;

Fig. 4 is an edge elevational view of the blanket, showing the weaving at the edge of the blanket;

Fig. 5 is a fragmentary view in perspective of the insulating unit which forms the body of the blanket.

Referring to the drawing, and particularly to Fig. 5, the present blankets may be woven of various types of insulating units of asbestos and other mineral and vegetable fibers. One form of insulating unit is shown in Fig. 5, and it comprises a multiplicity of strands of asbestos fibers, such as, for example, 21 strands, which are gathered together to form a bundle.

These strands, indicated by the numeral 10, are held together in a bundle 11 by a plurality of spirally extending cotton threads 12, such as, for example, three cotton threads. The same function may be performed in some cases by a lesser number of threads, and in some embodiments of the invention a single cotton or asbestos thread. The threads are tightly twisted tension members which are adapted to hold the bundles together and to give the bundle increased tensile strength, as the loose asbestos fibers have a minimum of tensile strength when arranged in loose strands.

The complete insulating unit is indicated by the numeral 13, and these insulating units 13 serve as the warp members in the blanket, which is indicated by the numeral 14. The size of such insulating units and the number of strands in the bundle may be varied considerably, depending upon the thickness of the blanket desired, and the blanket may be woven in one or two or three or more layers of the type shown in Figs. 1–4, the respective layers being bound together by having certain warp threads act as binders.

In addition to the insulating units for warp threads, the blanket preferably includes other warp threads, such as the threads 15, 16, 17 at the edge, and threads 18, 19 between the warp insulating units 13.

The weft threads of the blanket may be indicated by the numerals 20, 21, 22, above the blanket, and the numerals 23, 24, 25 below the blanket.

Referring to Figs. 1, 2, and 3, it will be noted that the large, loose, soft insulating units 13 extend generally in the same direction, whereas the threads 18, 19 extend upward and downward, and are interwoven with the insulating units.

The blanket 14 has its body composed of the insulating units 13, and they are bound together by a plurality of woven portions of fabric, such as, for example, the portion 26 at each edge, the woven fabric 27 above and the woven fabric portions 28 below in Figs. 1 and 2.

The specific form of weave may be varied considerably so that the fabric portions 26, 27, 28 may be of different appearance and characteristics, depending upon the conventional types of weave employed.

In the examples shown the weft thread 22 extends over the warp thread 15 under the warp thread 16, and over the warp thread 17. The weft thread 22 also extends over all of the insulating units 13, but it extends over the warp thread 18 and under the warp thread 19, and warp threads 18, 19 are so arranged between each of the insulating units 13.

The shuttle brings back the same thread, which reappears in the fabric as the weft thread 21, which extends under the warp thread 15, over warp thread 16, and under warp thread 17. The weft thread 21 also extends over all of the insulating units 13, but it extends under the warp thread 18 and over the warp thread 19.

At the selvage or upper edge (Fig. 1) the weft

thread 21 is bent backward and re-appears as the weft thread 20 in the fabric portion 27 at the top of the blanket, and this thread 20 is arranged with respect to the other threads of the blanket in the same manner as described with respect to the weft thread 22.

The weft threads are, therefore, oppositely arranged with respect to the warp threads which they engage. The weft threads 20—22 are above the insulating units 13, while the weft threads 23—25 are below the insulating units 13. The warp threads 18 and 19, as shown in Fig. 2, also extend from the top to the bottom of the blanket between the respective fabric portions 27 and 28, and thus the fabric portions 27 above and 28 below the blanket tend to confine the loose fibers into blanket form and prevent their escape from the interlacing fabric of threads.

The blanket constructed according to the present invention may be woven upon a loom in one operation, but the loom must be reconstructed or specially constructed for the purpose of manufacturing this material, particularly in the following respects.

The insulating units 13 are not of sufficient tensile strength to be handled like ordinary threads, they cannot be permitted to chafe against each other or against adjacent threads, and must be protected during the operation of weaving in a special manner. They cannot ordinarily be wound on ordinary reels, and the insulating units are coiled loosely in barrels. Their tensile strength is sufficient so they may be lifted from the barrels and fed by means of the feed rolls. As the insulating units 13 approach the active part of the loom, they extend into metal tubes, in which they are slidably received and guided, and protected between the reeds and above and below the shuttle.

Each insulating unit 13 passes through two tubes, which are pivotally secured together so that they may be lifted at the pivotal point by means of suitable heddles to form the shed.

Furthermore, the ends of these tubes are also controlled by heddles, and at the point where the insulating unit 13 enters the tube, the tube is preferably provided with a tapered formation for smoothing out the insulating unit and shaping it to the shape shown in Fig. 3.

Another change that must be made in a loom to handle material of this type is that the heddles must be suitably arranged to control the guiding tubes for the insulating units 13, and the reed must be coarse enough and have spaces large enough to pass the tubes which guide the insulating units 13.

The method of weaving the blanket consists in drawing the insulating units from loose coils and guiding them during the process of weaving in protective tubular members which are moved in the manner in which an ordinary warp thread would be moved by means of heddles, during which time the weft threads are interwoven with the warp threads, as described, by means of an ordinary shuttle.

It will thus be observed that I have invented an improved blanket consisting of insulating units of large, loose, soft characteristics, preferably constructed of insulating material, such as asbestos fibers, in which the large, loose, soft insulating units are confined between interlacing portions of fabric above and below and at the edges of the blanket.

The weave of the fabric is close and tight enough so that the blanket will not unravel when it is cut at any particular point; yet the major portion of the blanket is constructed of the loose, soft insulating units, which are bound close together and form a continuous blanket of substantially homogeneous characteristics.

The blanket may be very economically manufactured because it may be woven all in one operation on a suitably constructed loom, according to the method described, and it is of high insulating value and adapted to withstand vibration and impact for a long period of time, without losing its insulating characteristics. It is adapted to be penetrated and shaped about irregularities or projecting parts with ease; but when engaged on a flat surface, maintains its homogeneous insulating characteristics for a long period of time.

While I have illustrated a preferred embodiment of my invention, many modifications may be made without departing from the spirit of the invention, and I do not wish to be limited to the precise details of construction set forth, but desire to avail myself of all changes within the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent of the United States, is:

1. In an insulating blanket the combination of a plurality of large, loose, soft insulating members of asbestos fibers having spirally wound cords about said members, said members being the warp members of the fabric with a plurality of groups of weft members comprising transversely extending cords arranged with groups alternately above and below said soft insulating members and a plurality of cords serving as auxiliary warp members located in groups between said soft insulating members and interwoven with said cord weft members, said blanket also having at each edge a group of cord warp members interwoven with said cord weft members, whereby the blanket is provided with a plurality of regularly spaced woven portions above and below said soft insulating members and at the outer edges of said soft insulating members to form a woven selvage and to bind said soft insulating members together into a unitary blanket.

2. In an insulating blanket the combination of a plurality of large, loose, soft insulating members of asbestos fibers having spirally wound cords about said members, said members being the warp members of the fabric with a plurality of groups of weft members comprising transversely extending cords arranged with groups alternately above and below said soft insulating members and a plurality of cords serving as auxiliary warp members located in groups between said soft insulating members and interwoven with said cord weft members, said blanket also having at each edge a group of cord warp members interwoven with said cord weft members, whereby the blanket is provided with a plurality of regularly spaced woven portions above and below said soft insulating members and at the outer edges of said soft insulating members to form a woven selvage and to bind said soft insulating members together into a unitary blanket, said soft insulating members comprising a multiplicity of strands of asbestos fibers and said cords having their major portion of fibers formed of asbestos.

WILLIAM F. ASTLEY.