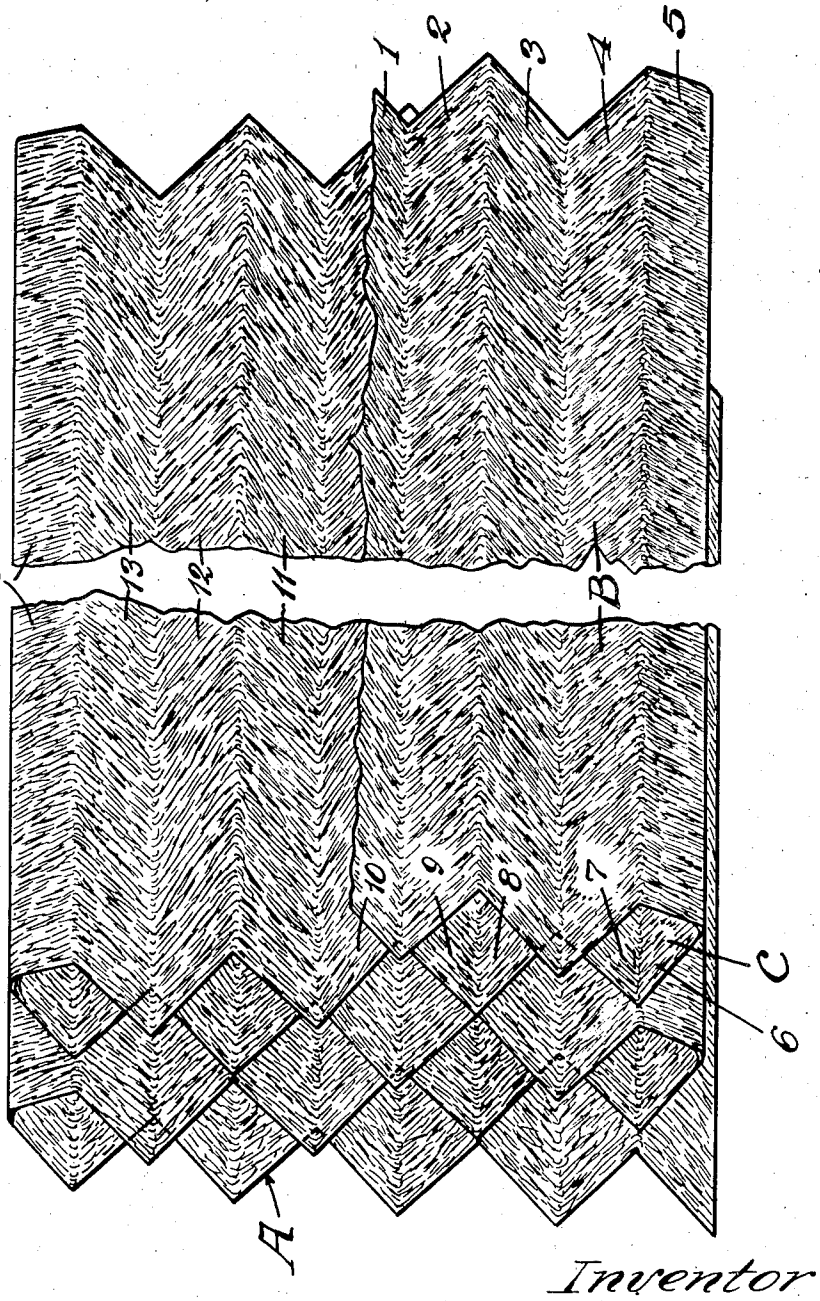
Nov. 16, 1948. R. F. HLAVATY 2,454,175

MULTILAYERED FIBROUS BATTING

Original Filed Sept. 29, 1941 2 Sheets-Sheet 1

Fig. 1



Inventor
Rudolph F. Hlavaty
by Parker & Carter
Attorneys

Nov. 16, 1948. R. F. HLAVATY 2,454,175

MULTILAYERED FIBROUS BATTING

Original Filed Sept. 29, 1941 2 Sheets-Sheet 2

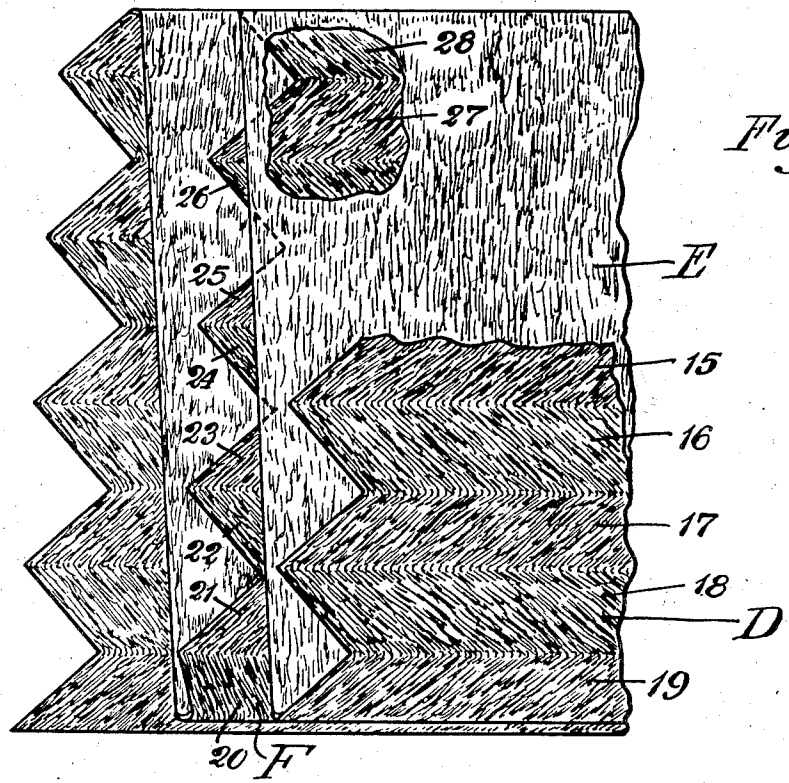


Fig. 2

Fig. 3

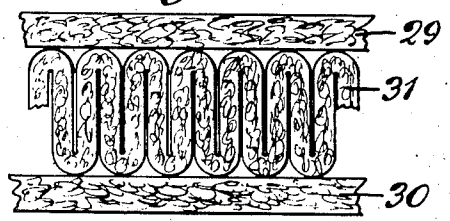


Fig. 4

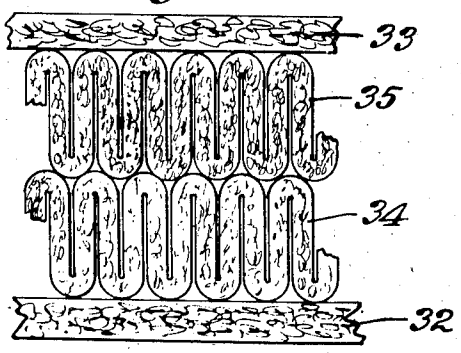
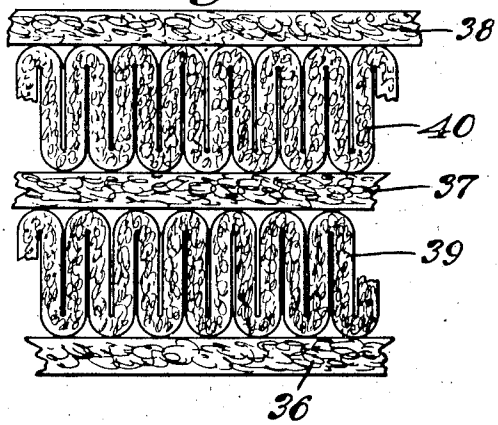


Fig. 5



Inventor
Rudolph F. Hlavaty
by Pender & Carter.
Attorneys.

Patented Nov. 16, 1948

2,454,175

UNITED STATES PATENT OFFICE

2,454,175

MULTILAYERED FIBROUS BATTING

Rudolph F. Hlavaty, Cicero, Ill.

Original application September 29, 1941, Serial No. 412,815. Divided and this application April 7, 1945, Serial No. 587,042

10 Claims. (Cl. 154—54)

1

This invention relates to a multi-layer article and to a method of making the same. It has for one object to provide a batt characterized by the arrangement of the parts of which it is made, this arrangement being such as to increase the strength as compared to batts of present manufacture.

It has for another object to provide a batt or layer of the type indicated, which may be formed of sheet material or fibrous material or mixtures including sheets, loose fibrous material, powdered material, liquid material, fluid material or any of the materials mentioned, separately or in any combination.

Another object is to provide a batt or layer of the type indicated in which synthetic fibers or strands are used. In any of the batts indicated I might use any of the materials mentioned. Where fibrous material is used, the fibers may be of any nature, such as vegetable, animal, mineral, metallic or synthetic, as stated. Adhesives, cements or glues of any nature may also be used.

Another object is to provide means for forming a composite article which may be formed of batts or layers of the type indicated above or may be formed of standard or well-known types of batts or layers. An object of that form of the invention is to provide a member formed of a plurality of batts or layers of generally identical construction and to arrange some of the batts in a manner different from the other batts.

Another object of this form of the invention is to provide a composite article formed of a plurality of batts in which a batt is arranged generally longitudinally of the total article and in which one or more additional batts may be arranged transversely of the composite article by folding or otherwise. Sheet material of any nature may be laid down in the manner described herewith in connection with the batts or layers, and reinforcing may be included in the sheets, the batts, the layers or otherwise.

Other objects will appear from time to time throughout the specification and claims.

This invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:

Figure 1 is a plan view of the batt of this invention;

Figure 2 illustrates a modified form of batt;

Figure 3 is a side elevation of one form of the composite article;

Figure 4 is a side elevation of a modified form of the composite article; and

Figure 5 is a side elevation of a further modified form.

Like parts are indicated by like characters throughout the specification and the drawings.

The batt as shown in Figure 1 will ordinarily be made on a lapper. One such lapper is illustrated in my Patent No. 2,428,709, filed September 29, 1941, and issued October 7, 1947. The batt might possibly be made of other sorts of lappers and a standard or conventional lapper might be modified by the addition of controls suitable for producing the batt shown. The batt might even be made by hand.

2

In general, the batt is formed of a plurality of layers of material. This material is laid back and forth so that a number of layers are superimposed upon each other. If a substantial quantity of the material is to be made, which is often the case, the batt as it is built up is moved in one direction, while the web of which it is formed is continually laid transversely. The batt illustrated in Figure 1 is produced as a part of such a continuous process in which the finished batt is carried away toward the left, while the web continues to be moved back and forth and deposited progressively upon the batt as it builds up.

The batt is formed of superimposed layers of a web A. As the web is deposited to form the batt and is fed transversely, it is arranged so that the material of which it is formed is deposited in a series of zones which are disposed at an angle to each other. Thus the topmost layer B of the web is arranged in a series of angularly disposed zones 1, 2, 3, 4, and 5. The particular form of batt illustrated may be considered as formed of fibrous material loosely arranged and compacted. For example, a web of hair, cotton or any natural or vegetable or synthetic or other fibrous or stranded material may be used. It will be convenient to describe the material as fibrous in the first instance and to describe it otherwise later.

As shown, the fibers are indicated diagrammatically as lying more or less in a uniform manner across the zones in which they are deposited. The fibers of zone 1 are at an angle to the fibers of zone 2 and the fibers of zone 3 are at an angle to the fibers of zones 2 and 4. As shown, the fibers of each zone are approximately at right angles to the fibers of an adjacent zone, but almost any angular relationship might be used, and it may be varied throughout a batt, and many different relationships might be used in a single batt. It is not intended to suggest that the fibers are strictly or accurately parallel with each other in any given zone. In general, they lie across the zone, and if that is accomplished the purpose of this form of the invention is realized.

It is recognized that in dealing with fibrous material, and particularly light fibrous material, the fibers may not be uniform in size or shape, and they may be knurled or kinked or otherwise irregularly shaped.

As successive layers of web are deposited, they are so arranged that the fibers of each zone are

arranged at an angle to the fibers of corresponding zones of layers above and below. Thus in the second layer C, as shown in Figure 1, the fibers are arranged in zones 6, 7, 8, 9, 10, 11, 12, 13 and 14 within the layer C, and the fibers of each zone are at an angle to the fibers of adjacent zones in the same layer and the fibers of each zone of the layer C are also at an angle to the fibers of corresponding zones in the layers above and below them. The fibers of zone 7 cross or intersect the fibers of zone 4. The same is true throughout the other zones.

It will not be necessary to renumber and redescribe the layers below layer C. As shown, five layers appear in one part of the batt and four in the other. The above description, however, makes it clear that in each layer the fibers are preferably arranged in zones disposed at an angle to each other and that the layers are superimposed on each other in such manner that the fibers of each zone of each layer are at an angle to the fibers of corresponding zones above and below them.

In the modified form of Figure 2 a batt is shown in which some layers have their fibers arranged in the angularly disposed zones above mentioned and in which other layers are formed without this angular and zone arrangement of fibers. Thus the uppermost layer D of Figure 2 has its fibers arranged in zones 15, 16, 17, 18 and 19. The next layer E does not have fibers arranged in angularly disposed zones, and the third layer F has fibers arranged in angularly disposed zones 20, 21, 22, 23, 24, 25, 26, 27 and 28. The remaining layers of the batt are similarly arranged and need not be redescribed.

I have spoken above of a fibrous web and fibrous layers and have said that the fibers which form this web may be loosely compacted. A batt corresponding to that shown could be formed of more closely joined fibers. A batt might be formed of layers of paper or woven fabric of any material. It might be formed of a mixture of fibrous material or stranded material, together with powdered material or together with powdered material and adhesive material. A composite article might be built up of powdered material and adhesive material alone in which successive layers would be deposited to form a composite article and in which one or more of the successive layers would be divided into zones angularly disposed with respect to each other. The invention, therefore, embodies broadly the idea of a composite article formed of successive layers of material of almost any nature superimposed upon each other and in which some or all of the layers are formed of zones angularly disposed with respect to each other. Preferably, also, the successive layers are so arranged with respect to each other that the zones of one layer are angularly disposed with respect to the corresponding zones of layers above and below them.

Experience has shown that such an arrangement of materials produces a much stronger batt or composite article than one which can be produced if the layers are merely superimposed upon each other without the addition of the angularly disposed zone arrangement.

Where I have used the word "batt" it is to be taken generally as meaning a composite article formed of superimposed masses or layers of material. Its meaning is not limited to its narrower use in the textile arts, and as applied herewith it refers to an article which may be soft, flexible and compressible or may be substantially hard, rigid and relatively non-compressible. The batt or layer referred to throughout the specification might be, as above mentioned, of any material. It might be formed of rubber or a synthetic rubber sheet, as well as of the synthetic, plastic, fibrous materials referred to, and it may include clay, asbestos, silica, ceramic material and any other suitable material. In general, this invention contemplates the use of any materials which can be arranged generally as shown in Figures 1 and 2.

The structure shown in Figures 3, 4 and 5 may be made of almost any material and may be made of batts such as those shown in Figures 1 or 2. They may also be made of batts of any other nature. Since the batt of Figures 1 and 2 and the articles of Figures 3, 4 and 5 lend themselves to use as insulation material, they may be made of relatively light, flexible and compressible material, but the invention is not limited to material of that nature.

The device of Figure 3 is formed of two relatively plane layers or batts 29 and 30. Between these is positioned a folded layer or batt 31. As shown, this layer is produced by forming folds within a relatively long layer or batt and the batt, when so folded, is positioned between the layers 29 and 30. Preferably the three layers are secured together by adhesive material, or otherwise.

The composite article of Figure 4 includes four layers of material—a bottom relatively plane layer 32 and an upper relatively plane layer 33; between these layers there are positioned two layers 34 and 35. These are generally similar to the layer 31 of Figure 3 and preferably consist of substantial lengths of unbroken material, this material being in each length folded upon itself to produce the form shown in Figure 4. The several layers of the form of that figure may be secured together by adhesives, binders or otherwise.

In the form of Figure 5 five layers are used—a bottom layer 36, an intermediate layer 37 and a top layer 38 are preferably relatively plane, and between each pair of these layers is positioned a folded layer 39 and 40. These layers are generally similar to the layers 31, 34 and 35.

In the devices of Figures 3, 4 and 5 the several layers or batts are preferably secured together. Adhesives or mechanical fastening means may be used. In the description of Figures 3, 4 and 5 where the word "layer" has been used, it is to be taken as referring to a unit such as the members 29, 30 or 31. It is to be remembered that these layers may themselves be formed of a batt such as that shown in Figures 1 and 2. In the description of the last three figures the word "layer" refers to an entire batt or its equivalent, while in the description of Figures 1 and 2 the word "layer" has been used to describe a part of a batt.

The devices of the last three figures may be formed of fibrous material or non-fibrous material or mixtures of any such materials. Ordinarily the folded layers, at least, will be made of relatively soft material. They may be made of material which is initially soft enough to permit folding but later becomes more rigid or harder. Similarly, any of the layers may be made of material which is initially soft and hardens or stiffens later or remain flexible or pliable.

This application is a division of my Patent No. 2,428,709, issued October 7, 1947.

I claim:

1. In combination in a multi-layer article, a plurality of superimposed layers of fibrous material, each such layer having the fiber thereof disposed in a plurality of generally parallel zones,

the fibers of the material of each such zone being disposed at an angle to the fibers of the material of adjacent zones of said layer, and the fibers of the material of each zone of an intermediate layer being disposed at an angle to the fibers of the material of corresponding zones of layers above and below it.

2. In combination in a multi-layer article, a plurality of superimposed layers of fibrous material, the fibers of each layer of fibrous material being disposed in a plurality of zones extending generally longitudinally of said layer, the fibers of the material of each such zone in any one layer being disposed at an angle to the fibers of the material of adjacent zones of said layer, and the fibers of the material of each zone in an intermediate layer being disposed at an angle to the fibers of the material of corresponding zones of layers above and below it.

3. In combination in a multi-layer article, a plurality of superimposed layers of fibrous material, each such layer having the fibers thereof disposed in a plurality of generally parallel longitudinally extending zones, the fibers of the material of each such zone being disposed at an angle to the fibers of the material of adjacent zones of said layer, and the fibers of the material of each zone being disposed at an angle to the fibers of the material of corresponding zones of layers next above and below it.

4. In combination in a composite article, a plurality of unfolded, generally plane layers of fibrous material, said layers being disposed in a plurality of generally parallel, longitudinally extending zones, the material of each zone being disposed at an angle to the material of adjacent zones of the layer within which it is disposed, and a plurality of generally plane layers of folded, fibrous material, at least one of said generally plane unfolded layers being positioned on the outside of said article, and at least one of said folded layers being positioned inside said article with the fold lines at opposite sides thereof lying, respectively, in the planes of the opposed faces of said unfolded material.

5. In combination in a composite article, a plurality of unfolded, generally plane layers of fibrous material, said layers being disposed in a plurality of generally parallel, longitudinally extending zones, the material of each zone being disposed at an angle to the material of adjacent zones of the layer within which it is disposed, and a plurality of generally plane layers of folded, fibrous material, at least one of said generally plane, unfolded layers being positioned on the outside of said article, and at least one of said folded layers being positioned inside said article, all of said layers being secured together with the fold lines at opposite sides thereof lying, respectively, in the planes of the opposed faces of said unfolded material.

6. In combination in a multi-layer article, a plurality of superimposed layers of fibrous material, the fibers of the material of at least two of said layers being disposed in a plurality of generally parallel, longitudinally extending zones, the fibrous material of each such zone being disposed at an angle to the fibrous material of adjacent zones of said layer, and the fibrous material of each zone being disposed at an angle to the fibrous material of corresponding zones of layers above and below it.

7. In combination in a multi-layer article, a plurality of superimposed layers of fibrous material, the fibers of the material of at least two of said layers being disposed in a plurality of generally parallel, longitudinally extending zones, the fibrous material of each such zone in a layer being disposed at an angle to the fibrous material of adjacent zones of said layer, and the fibrous material of each zone being disposed at an angle to the fibrous material of corresponding zones of layers above and below it, at least one layer being generally plane, the fibers of which are generally uniformly disposed and free of said longitudinally extending zones.

8. In combination in a composite article, a pair of unfolded, generally plane layers of material, said layers being disposed in a plurality of generally parallel, longitudinally extending zones, the material of each zone being disposed at an angle to the material of adjacent zones of the layer within which it is disposed, and a layer of folded material positioned between and in contact with said layers of unfolded material along the fold lines of said folded layer.

9. In combination in a composite article, a plurality of generally plane, unfolded layers of material, said layers being disposed in a plurality of generally parallel, longitudinally extending zones, the material of each zone being disposed at an angle to the material of adjacent zones of the layer within which it is disposed, and a plurality of layers of folded material positioned between said unfolded material, each of said layers of folded material being in contact with one of said layers of unfolded material along certain fold lines of said folded layers and said two layers of folded material being in contact with each other along certain other of said fold lines.

10. In combination in a composite article, three layers of unfolded, generally plane material, said layers being disposed in a plurality of generally parallel, longitudinally extending zones, the material of each zone being disposed at an angle to the material of adjacent zones of the layer within which it is disposed, and two layers of folded material, two of said unfolded layers being positioned on the outside of the composite article, and one unfolded layer being positioned within the article, each of said folded layers being positioned between and in contact with two of said layers of unfolded material along the lines of fold at opposite ends of the folded material.

RUDOLPH F. HLAVATY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
235,449	Newton	Dec. 14, 1880
725,821	Berr	Apr. 21, 1903
1,100,064	Ferres	June 16, 1914
1,405,185	Cochran	Jan. 31, 1922
1,565,267	Fowler	Dec. 15, 1925
1,860,090	Fowler	May 24, 1932
1,926,156	Lormor	Sept. 12, 1933
2,104,060	Spafford	Jan. 4, 1938
2,308,568	Rogers	Jan. 19, 1943
2,419,971	Rumpf	May 6, 1947
2,428,709	Hlavaty	Oct. 7, 1947