

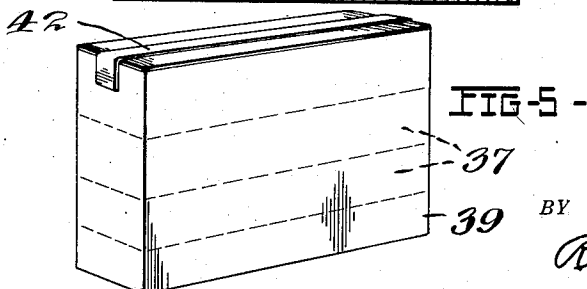
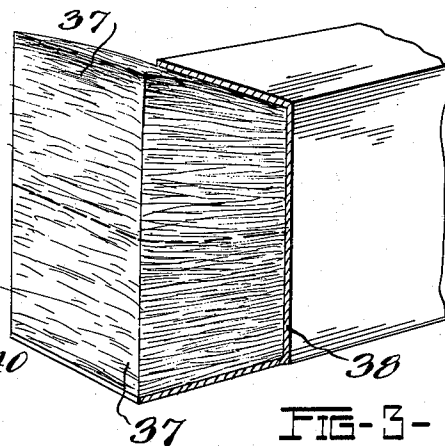
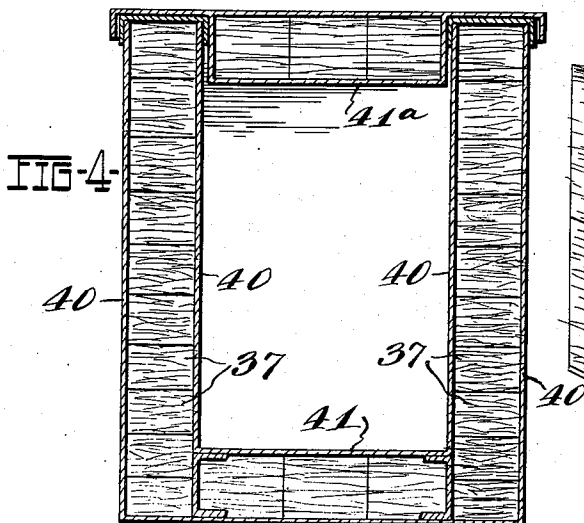
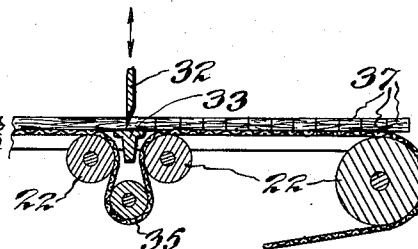
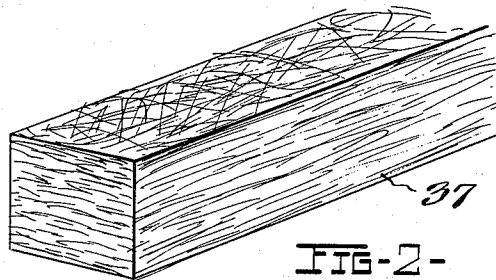
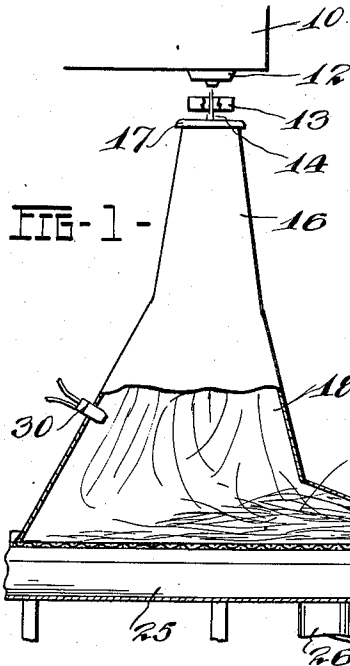
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GLASS WOOL PACKING

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## UNITED STATES PATENT OFFICE

2,160,001

## GLASS WOOL PACKING

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## 4 Claims. (Cl. 20—4)

The present invention relates to a novel mode of packing glass wool into an insulating panel to utilize most advantageously the elasticity of the pack, to the end that the insulation will not settle or produce voids at the top of the insulation panel, particularly when the panel is subjected to jolting, vibration or jarring movements.

I have found that an insulating bat, built up in a conventional manner as, for example, that disclosed and described in the British patent to Slayter and Thomas, applied for by Triggs, Patent No. 428,720, in which the long, fine fibers may be forcefully blown by the attenuating blast against a reticulated belt and caused to build up into a mat formation thereon; such a bat is highly elastic in the direction of the thickness of the bat, but is relatively inelastic in the direction of the plane of the belt upon which the fibers are formed. For example, if a bat is compressed in the direction of the thickness of the bat and then released, the bat will immediately spring up to substantially its original thickness. Such bats may actually be compressed to about one-half or even one-fifth of their original thickness and when released they will spring up to their normal original size. Moreover, upon jolting or vibrating such a bat, particularly after it has been compressed, it will continue to expand and grow in the direction of the thickness of the bat.

On the other hand, if the bat is compressed in a direction lying in the plane of the belt upon which the mat was formed, the bat will be very slow to reestablish its original thickness, and, as a matter of fact, the bat will tend to remain deformed.

Heretofore it has been customary to insert mineral wool bats into various panels lying both vertically and horizontally, these panels having relatively large surface areas compared to the thickness of the bat. In the prior art, however, it has been conventional to insert these bats so that the principal plane of the bat was laid parallel to the insulating panel. When vertical panels, which were thus filled, were subjected to vibration and jolting, there was a tendency for the bat in certain applications to be compressed gradually and deformed permanently and to settle down away from the upper wall or roof of the panel. In such cases the load on the bat was in the direction of the principal plane of the bat, or parallel to the plane of the belt on which the mat had been formed. As a result the vibration caused a void to exist in the upper portion of the panel, which resulted in a serious reduction in the insulating value of the bat.

The present invention contemplates utilizing the inherent springiness of a bat when in use as insulating material in a panel, particularly one which is subjected to frequent jolting and jarring such as automobile panels, trucks, railroad cars, refrigerator panels, bottle coolers, dry ice boxes, or the like. Instead of packing the bats with their largest plane or major surface coincident with the plane of the panel as was done heretofore, I propose to pack the insulation in such a manner that the direction of maximum elasticity of the bat when packed in a vertically disposed panel, is in a vertical direction. Thus, as the panel is subjected to jolting or jarring, the insulation will have a strong tendency to expand and fill up the panel.

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

Fig. 1 is a diagrammatic elevational view, shown partly in section, of an apparatus capable of forming bats in accordance with the present invention;

Fig. 2 is a diagrammatic perspective view of a bat illustrating in a general way the inherent arrangement of the fibers composing the bat;

Fig. 3 is a perspective view of a plurality of my bats built up in accordance with the present invention and arranged in a carton or container, part of which has been broken away to illustrate the elasticity and flexibility of a bat formed in accordance with the present invention;

Fig. 4 is a cross-sectional elevational view of a box comprising insulating panels which have been insulated in accordance with the present invention; and

Fig. 5 is a perspective view of a carton filled with wool in accordance with the invention.

Referring more particularly to Fig. 1, a glass melting or refining tank 10 is provided with feeders 12 in the floor thereof adapted to eject a multiplicity of small streams of glass which are acted upon by blowers 13. The issuing streams of glass are enveloped in the downward blast of steam or other gas supplied by the blowers and are thereby continuously drawn out into fine fibers or filaments 14. Electrical current may be supplied to the feeders 12 to electrically heat the individual feeders.

Spaced below the individual feeders 12 are vertically disposed spouts 16. The steam blasts from the blowers are thus directed downwardly through the spouts 16, carrying with them the attenuated fibers 14. The spouts 16 are pref-

erably of streamlined formation, the walls of each spout being downwardly divergent and having their upper marginal portions 17 curved to provide a flared mouth. The spouts 16 are of the

- 5 Venturi type, the shape and arrangement being such that a draft of air is induced from the drawing force of the steam blast so that a considerable volume of air is blown into and intermixed with the steam.
- 10 The lower ends of the spouts 16 open into an expansion hood or chamber 18 which is also of streamlined construction and forms an accumulating chamber in which the fibers from the several spouts 16 are laid upon a reticulated conveyor belt 20 to form a mat 21. The blast is thus
- 15 permitted to expand a predetermined degree, thereby gradually reducing its velocity and avoiding excess turbulence. The conveyor belt is supported on rollers 22 and continually advances carrying the mate 21 forward as it is formed. At the front end of the hood is a skirt 23 which overlies the mat 21 and tends to compact it to a predetermined degree as the mat emerges from the hood 18.

- 25 Arranged below the belt 20 and in register with the hood 18 is an exhaust chamber 25 which communicates with an exhaust outlet 26 for the steam and other gases emerging from the hood 18. If it is desired, suction may be applied to the outlet 26.

- 30 Mounted at the back end of the hood 18 are one or more spray gun nozzles 30 which are aimed at that portion of the belt on which the mat 21 is being formed and adapted to spray a suitable coating material or lubricant on the fibers.

- 35 After the mat 21 has emerged from the forming hood 18, it may be cut into strips having widths substantially equal to the thickness of the vertical panel into which the insulation is to be installed. For this purpose chopping means are provided comprising a reciprocating knife blade 32 acting in conjunction with a chopping block 33. The belt 20 is led over the rolls 22 and under a roll 35 underneath the chopping block 33 to provide room for the chopping mechanism. The knife 32 may be actuated by any suitable means at predetermined periodic intervals, as one skilled in the art would readily understand.

- 40 In the formation of mats of this type, the fibers 13 may be made long and fine, the actual length being of many inches, feet or even miles, in accordance with the conditions of operation. Moreover, the fibers may be of any desired fineness, ranging down from a few hundredths of an inch to less than .0001 inch, more or less, as desired. As the fibers descend in the hood 18 they are arrested upon the belt 20 where they are deposited in such a manner that they lie substantially parallel to the face of the belt. Thus
- 45 as the mat is formed, the fibers criss-cross upon one another and build up to form a mat in which substantially all of the fibers are parallel or approximately parallel to the face of the mat. This is diagrammatically illustrated in Fig. 2 in which the elevational sections of the mat have been depicted to show fibers running parallel or substantially parallel to the horizontal surface thereof. As may be noted from the top surface
- 50 of the mat, however, the fibers lie criss-cross with one another in all directions.

- 75 A mat of this character may be made to possess an extremely light density ranging from about one pound per cubic foot to about twelve pounds per cubic foot in accordance with the

degree to which the mat has been compressed. Ordinarily, however, a mat of this type possesses a light density of about one and one-half to about six pounds per cubic foot.

As illustrated in Figs. 3 and 5, a plurality of individual strips 37 which have been chopped from the mat 21, may be mounted on top of one another to build up a mat in a vertical direction. These may then be installed in a suitable carton or covering material or container 38 (see Fig. 3) or container 39 (see Fig. 5). These containers may be made of any suitable material such as cardboard, paper, cloth, sheet metal foil, tar paper, or the like, although an inexpensive construction is preferred.

A portion of the container 38 shown in Fig. 3 has been broken away to expose the strips 37 and illustrate the inherent characteristic of self-expansion of the mat in the vertical direction or in the direction transverse to the plane of deposition of the fibers. Within obvious limits, the mat will continue to expand in the vertical direction as it is being jolted or jarred, and as a result the bat or strips 37 continually cause the carton 38 to be completely filled with fibrous material. In Fig. 5 a corrugated cardboard carton or similar container has been shown in which a stack of strips has been packed into position as shown with the bottom strips more densely packed than the ones above. A sealing tape 42 may be provided to close the container and seal it from the atmosphere. In installing these strips into a tall carton or container, it has been found advantageous to jolt the carton and thus permit the strips to fluff out and attain a maximum distribution throughout the carton. Any desirable number of strips 37 may be mounted upon one another to build up the mat to the required height. For example, when panels three feet high are to be filled, as many as twenty to twenty-eight "four inch bats" may be laid on top of one another to make up the requisite height. This may give an average density of about four and one-half pounds.

The containers 38 or 39 having the enclosed strips 37 may then be installed in a vertical panel such as a railroad car, icebox, refrigerator, bottle cooler, automobile panel, or the like. They may thus be installed between the inner and outer wall of a box similar to that shown in Fig. 4. In Fig. 4 a refrigerator box has been diagrammatically illustrated composed of the vertical insulating panels 40 into which my strips 37 are installed with the fibers lying substantially horizontally. The installation is preferably done by means of jolting to assist in a uniformly progressively increasing density from top to bottom as caused by the increasing load of material above.

Horizontal floor panel 41 and cover 41<sup>a</sup> are also included and these have been filled with the bat material with the fibers lying in the conventional direction for horizontal panels, that is, with the fibers lying parallel to the face of the panel 41. The strips 37 in the panel 40 may be covered with a suitable covering material such as corrugated board, paper, cloth or the like, as shown in Fig. 3 or Fig. 5, and I find it preferable to do so in order to facilitate handling of the bats when installing the same.

The vertical panels 40 being filled with fibrous material in which the fibers all lie substantially horizontally, will not settle nor fall away from the roof of the panel under vibration, jolting or jarring to which the panel may be subjected.

During the installation of the strips, the panel

is preferably jolted to the end that the strips 37 may fluff out vertically to their normal thickness. It will be noted that the bottom strips are compressed to the highest density, owing to the weight of the strips above. The strip at the top of the series, however, has the least density. The density of the insulation from top to bottom thus gradually increases in accordance with the weight of the insulation above. The insulation at the top of the panel is generally around one and one-half to one and three-quarters pounds per cubic foot and for installations which are about thirty-six inches high, the density at the bottom may be around four to six pounds per cubic foot, more or less in accordance with the type of fibers, the degree of compacting during installation and the like.

Modifications and variations may be resorted to which are within the scope and spirit of the present invention as defined in the appended claims.

I claim:

1. In a vertically disposed insulating panel having vertical side walls spaced apart from one another and having top and bottom members therefor, fibrous material composed of glass wool fibers substantially filling said insulating panel between said walls and extending between said top and bottom members, said fibrous material consisting of a vertical stack of individual strips of intermatted glass wool, all of the fibers in said strips lying substantially horizontally and criss-crossed with one another in open formation and having a compressibility and flexibility in the vertical direction.

2. In a vertically disposed insulating panel having vertical side walls spaced apart from one another and having top and bottom members therefor, fibrous material composed of glass wool fibers substantially filling said insulating panel

between said walls and extending between said top and bottom members, said fibrous material consisting of a vertical stack of individual strips of intermatted glass wool, all of the fibers in said strips lying substantially horizontally and criss-crossed with one another in open formation and having a compressibility and flexibility in the vertical direction, and an envelope enclosing said fibrous material to facilitate installation thereof.

3. In a vertically disposed insulating panel having vertical side walls spaced apart and having top and bottom members therefor, the vertical dimension of said panel being considerably greater than the distance between said walls, an insulating package in said insulating panel, said package comprising an envelope having major faces thereof spaced apart and laid parallel to the walls of said panel, and intermatted glass wool fibrous material composed of long, intermatted glass fibers substantially filling said envelope, all of said fibers lying substantially criss-crossed with one another and in planes which are horizontal or approximately horizontal and perpendicular to said faces.

4. In a vertically disposed insulating panel having vertical side walls spaced apart from one another and having top and bottom members therefor, a body of fibrous material having a predetermined thickness and major face dimensions relatively large compared to said thickness disposed within said panel, said body comprising an intermatted mass of predominantly long and fine glass wool fibers arranged criss-cross with one another and all lying in planes approximating parallelism with horizontal planes, said body having considerable compressibility and elasticity in the vertical direction and having a tendency to fluff out in said direction under the action of jolting, jarring or vibration.

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