

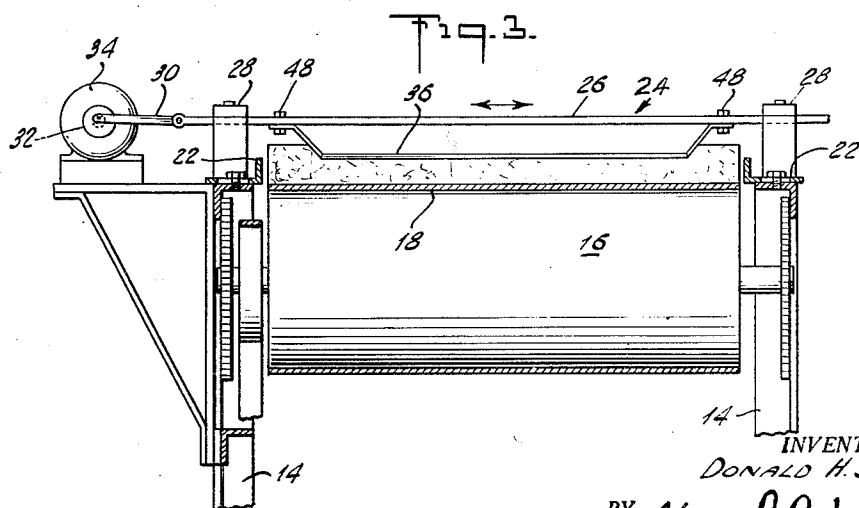
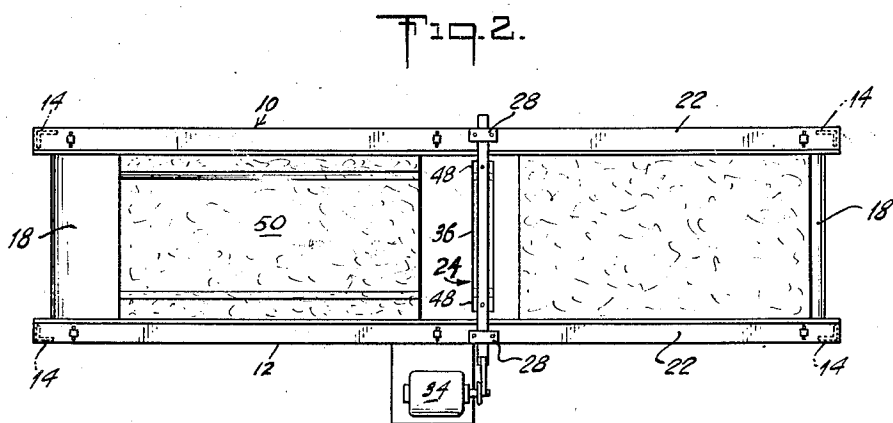
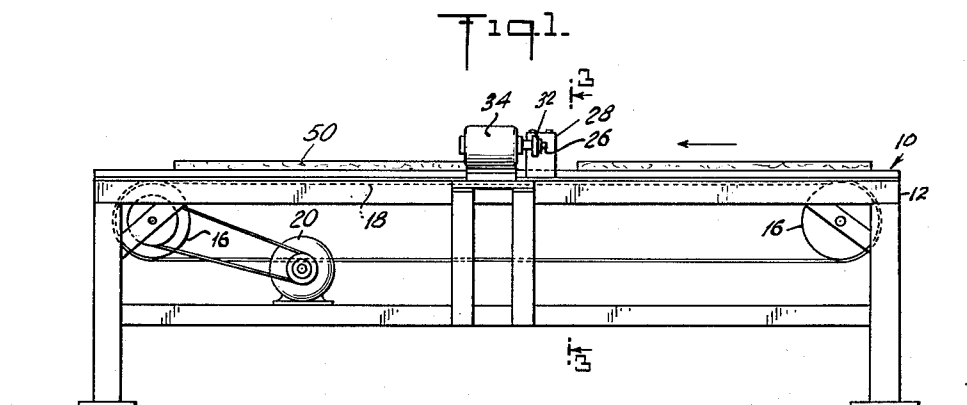
Aug. 21, 1951

D. H. SKEOCH
METHOD AND APPARATUS FOR SEVERING SECTIONS
FROM COMPRESSIBLE MATERIALS

2,565,400

Filed Aug. 7, 1946

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

Fig. 4.

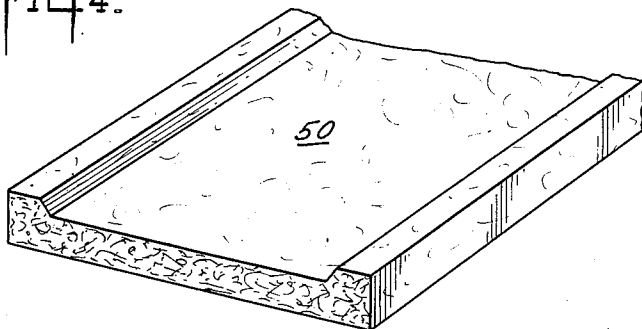


Fig. 5.

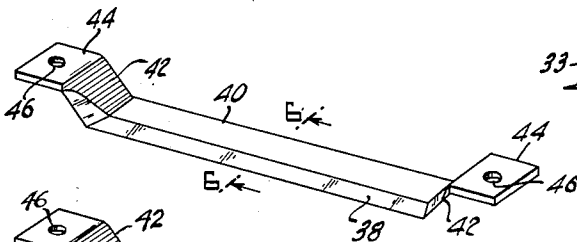


Fig. 6.

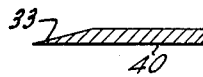


Fig. 7.

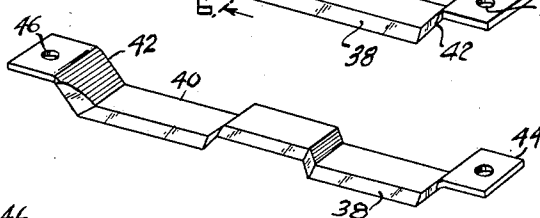


Fig. 8.

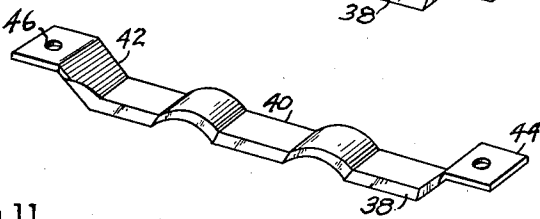


Fig. 11.

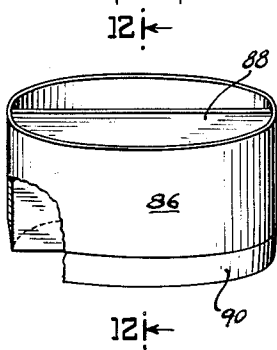
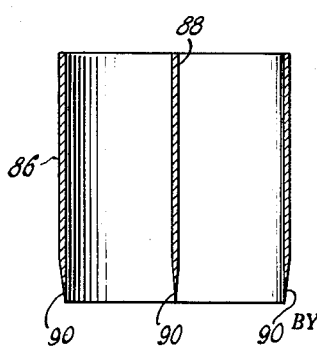


Fig. 12.



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Fig. 14.

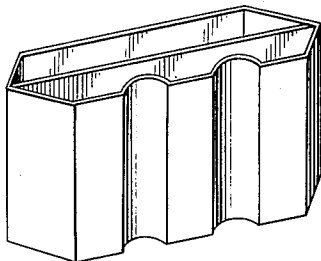


Fig. 13.

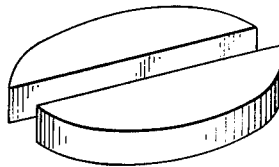


Fig. 10.

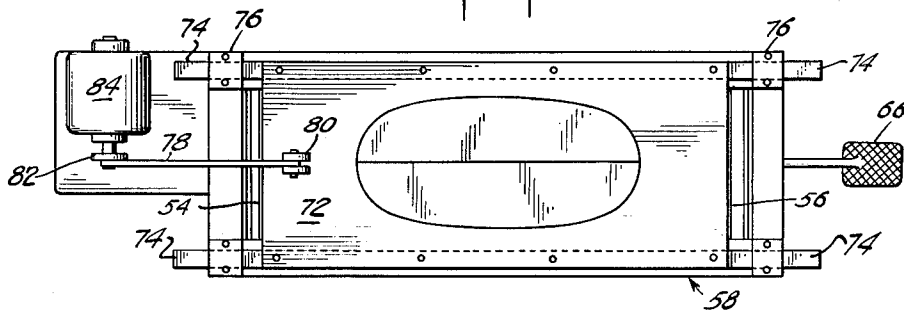
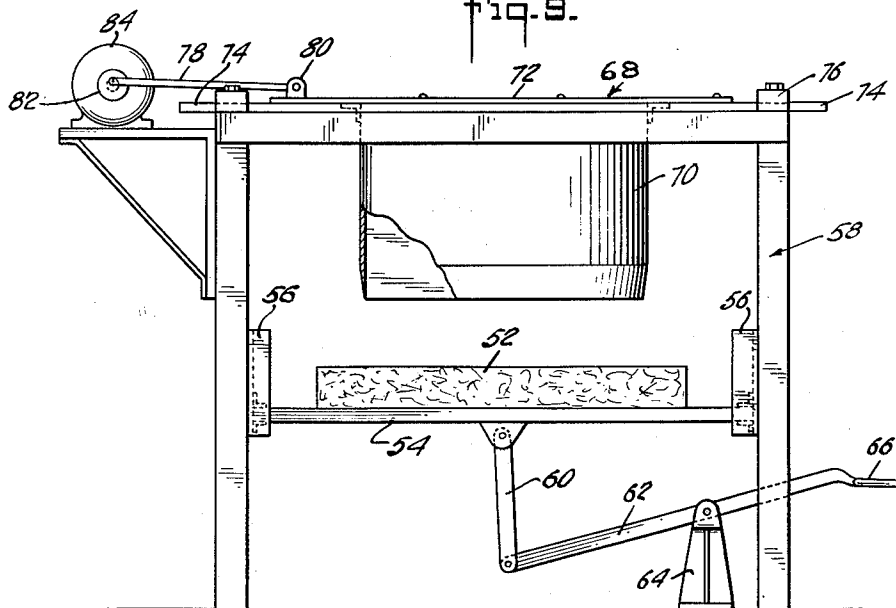


Fig. 9.



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2,565,400

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Application August 7, 1946, Serial No. 688,811

7 Claims. (Cl. 164—38)

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This instant invention relates to the formation of sections of special shape from resilient, compressible materials, such as blocks or pads of mineral wool fiber. The term "mineral wool" is used herein in a broad sense to include fibrous products formed of rock, slag, glass, mixtures thereof and other like raw materials. Mineral wool blocks or pads of the type referred to are composed of interfelted fibers maintained in their interfelted relationship by a minor proportion of a suitable binder such as an asphalt, resin, drying oil or the like, as is well known in the art, reference being made to reissue patent to E. R. Powell, Re. 22,090, issued May 5, 1942, for the disclosure of a known material of this type and method of making the same. The material finds a principal field of use as a thermal insulating media in many types of structures including refrigerators and the like.

The invention is particularly concerned with the provision of a method and means for subdividing such blocks and pads into irregular or unusual shapes which will make them available for special uses such as for the insulating filling of the wall spaces of modern refrigerator cabinets and the like. Due to the resilient, compressible nature of the material, the preparation of specially shaped pieces by the ordinary cutting or shaping operations is unsatisfactory.

Accordingly, a principal object of the invention is the provision of an apparatus and method which will operate successfully to sub-divide a preformed, compressible, resilient block or pad into pieces of special shapes.

Another object of the invention is the provision of a method and apparatus which can be employed to remove a section inwardly of the edges of a flat block or pad without disruption of the interfelted structure of the material.

A further object of the invention is the provision of a method and apparatus of the type referred to involving a cutter blade mounted for reciprocation or vibration at high frequencies in a direction transverse to the direction of movement of the material against the blade.

A still further object of the invention is the provision of an apparatus as described above which may be used with blades of different contours to secure the selected shape of the block.

My invention will be more fully understood and further objects and advantages will become apparent when reference is made to the more detailed description of a preferred embodiment of the invention which is to follow and to the accompanying drawings in which:

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Fig. 1 is an elevational view of an apparatus embodying the instant invention;

Fig. 2 is a top plan view of the apparatus of Fig. 1;

Fig. 3 is a sectional view, on an enlarged scale, taken on the line 3—3 of Fig. 1;

Fig. 4 is a perspective view illustrating a product as produced by the apparatus of Figs. 1-3;

Fig. 5 is a perspective view of a cutting element of the apparatus of Figs. 1-3;

Fig. 6 is a sectional view, on an enlarged scale, taken on the line 6—6 of Fig. 5;

Fig. 7 is a view similar to Fig. 5 of a modified form of the cutting element;

Fig. 8 is a view similar to Fig. 5 of a further modification of the cutting element;

Fig. 9 is an elevational view with parts in section of another form of apparatus embodying the invention;

Fig. 10 is a top plan view of the apparatus of Fig. 9;

Fig. 11 is a perspective view, with parts broken away for clearness of illustration, of the cutting apparatus of Figs. 9 and 10;

Fig. 12 is a sectional view, on an enlarged scale, taken on the line 12—12 of Fig. 11;

Fig. 13 is a perspective view of the product obtained from the operation of the apparatus of Figs. 9 and 10; and,

Fig. 14 is a view similar to Fig. 11 showing a modified form of the cutting element.

Referring now to the drawings and particularly to Figs. 1-6 inclusive, the invention is illustrated as embodied in an apparatus for altering the cross-section of a block or pad of compressed, resilient material, such as a mineral wool block or pad of the type previously referred to, by removing a section inwardly of the face of the block, the line of severance being wholly within the lateral margins of the block. That is, the apparatus operates to hollow out a recess or depression in a face of the block. The apparatus includes a conveyor table 10 which may be either an apron or roller conveyor. In the construction shown the conveyor table consists of frame structure 12 including legs 14. At opposite ends of the frame rolls 16 are mounted in suitable bearings, the rolls supporting a traveling apron 18. At least one of the rolls is adapted to be driven by suitable means, such as motor 20, to cause the apron and the material carried thereby to travel in the direction indicated by the arrow in Fig. 1. Adjustable guides 22 may be mounted at the edge of the conveyor to accurately position the ma-

terial to be operated on with respect to the edges of the conveyor belt.

Mounted above the conveyor is a cutting device, indicated generally at 24 and including a carrier or bar 26, mounted for sliding movement in bearings 28 fixed at opposite sides of the table. One end of the bar 26 has a pivotal connection with a connecting rod 30 which in turn is pivotally mounted on a disc or arm 32 keyed to the shaft of a motor 34. The pivotal mounting of connecting rod 30 on disc 32 is eccentric to the shaft of the motor, whereby operation of the motor causes reciprocation of bar 26.

Bar 26 supports a cutting or slicing blade 36 which may take different forms, depending upon the surface contour of the product. Various illustrative forms of the cutting bar are shown in Figs. 5, 7 and 8. In each of its forms, the blade which is made of a suitable hard cutting steel or alloy is provided with a knife edge 38 pointed toward the material carried on the apron and includes depressed central portion 40 and integral, offset sections 42 and integral attaching sections 44. The latter are provided with suitable apertures 46 for the reception of bolts or studs 48 (see Fig. 3) whereby the blade is secured to arm 26 for reciprocation or vibration therewith.

In preparing the apparatus for operation a blade of the proper contour to provide the desired surface depression in the batt or block is mounted on bar 26. Guides 22 are adjusted to accurately position the block on the apron. Motors 20 and 34 are then operated and the blocks fed successively through the machine. As they come into contact with blade 36 a section is cut or sliced from them to provide a surface depression of the same contour as that of the blade. Due to the rapid reciprocation or vibration of the blade, a slicing effect is obtained which cuts cleanly through the fibrous structure without distortion of the fibers or destruction of the inter-felted nature of the material. The blade is vibrated at high speed, the motor being driven at, say, 1000-2000 R. P. M. and moving the blade through a full cycle of vibration on each revolution. The stroke of reciprocation or vibration is relatively short, say, within the range of $\frac{1}{8}$ " to $\frac{3}{8}$ ". It has been found that the high speed vibration through a stroke within the above stated range permits a continuous cutting operation to be performed without tearing of the material or displacement of the fibers, even at the offset portions of the cutter blade. Apparently the material, because of its resilient, compressible characteristics, yields under the impact of the offset portions of the knife. The operation of the apparatus on a rectangular block of the material produces a hollowed-out article 50, as illustrated in Fig. 4. The particular shape shown adapts the product for use as a main insulating slab for the door of one type of domestic refrigerator cabinet. By employing cutter blades of other shapes, the blades shown in Figs. 7 and 8 being illustrative, other special surface contours can be obtained to meet specific requirements.

Referring now particularly to Figs. 9-12, the invention is shown as embodied in an apparatus for completely severing a section of special shape from the interior of a block or pad. In this case the block 52 is carried on a platform 54 mounted for vertical reciprocation in guides 56 carried by frame 58. The platform may be moved upwardly and downwardly under the control of the operator by any suitable means as, for example,

by lever arm 60 having one end pivotally connected to the platform, and the other end pivotally connected to a lever arm 62, the latter being supported on a fulcrum 64 and carrying a foot treadle 66.

Supported on the frame 58 above platform 54 is a cutting device indicated generally by the reference character 68 and including a cutting blade 70 fixed to a panel or slide 72. The panel 72 includes projecting bars or rods 74 slidably received in bearings 76. A connecting rod 78 has one end pivotally connected to an ear 80 carried by the panel, and the other to a disc 82 keyed to the shaft of motor 84. As in the case of the construction previously described, the pivotal connection of the connecting rod to the disc 82 is eccentric to the shaft whereby operation of the motor causes the reciprocation of plate 72 with rods 74 sliding in bearings 76.

Blade 70 may be of any desired shape or contour to enable a section of the required shape to be cut from block 52. As illustrated, the blade includes an oval section 86 and straight section 88 to cut or punch out two sections of the block material, as illustrated in Fig. 13, each having a curved edge and a straight edge. The sections shown are especially adapted for filling the upper and lower ends of refrigerator cabinet doors, but from the standpoint of the instant invention, the particular shape is entirely a matter of choice and the cutter blade may be constructed to produce pad sections of other shapes and contours. The cutter blade illustrated in Fig. 14 is representative of the variations which may be employed. The cutter blade is made of a hard steel and is sharpened to provide cutting edges 90, as illustrated particularly in Fig. 12.

In the operation of the apparatus described above, the motor is driven to vibrate the cutter blade 70 at a high frequency as before and the pivotal connection of connecting rod 78 with respect to the center of the motor shaft is arranged to provide a length of stroke of $\frac{1}{8}$ " to $\frac{3}{8}$ ". Block 52 is placed on platform 54 and is carried into contact with the blade by depressing treadle 66, elevation of the platform continuing until the knife completely penetrates the block.

The instant invention, the several embodiments of which are described above, provides a method and apparatus for readily subdividing blocks or batts of mineral wool or other similar compressible, resilient materials into sections of odd shapes to fit particular uses. The machine is simple and inexpensive to construct and operate. Due to the vibration of the knife, a clean, smooth cut is obtained, something which is impossible with stationary knives when used on materials of this type.

Although the invention has been particularly described in connection with the sub-division of mineral wool felts, it will be appreciated that it may be employed to shape blocks or pads of other compressible, resilient materials with similar advantages.

It will also be understood that although the invention has been described in some detail, these details need not be strictly adhered to, the scope of the invention being defined by the subjoined claims.

What I claim is:

1. An apparatus for severing a section from a yieldable, compressible material in block form, said apparatus comprising a cutting blade, means supporting said blade for vibratory movement, means for moving a block into contact with the

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blade, and means for vibrating said blade at high frequencies and in a direction transverse to the direction of movement of the block.

2. An apparatus for severing a section from yieldable, compressible material in block form, said apparatus comprising conveying means for the material, a cutting blade in the path of said material having straight and offset cutting portions, means supporting said blade for vibratory movement and means for vibrating said blade at high frequencies and in a direction transverse to the direction of movement of said conveying means.

3. An apparatus for severing a section from a yieldable, compressible material in block form, the line of severance extending inwardly of the block from a face thereof and lying wholly within the lateral margins of the block, said apparatus comprising conveying means to move the block forwardly, a cutting blade in the path of movement of the block and having a depressed cutting section and offset cutting sections extending therefrom, means supporting said blade for vibratory movement, and means for vibrating said blade at high frequencies and in a direction transverse to the direction of movement of said conveying means.

4. An apparatus for severing a section from a yieldable material in block form comprising a conveyor table, a knife supported transversely of and above said table in the path of movement of a block carried on said table, said knife including a depressed cutting section and offset cutting sections extending therefrom, a carrier supporting said knife, means mounting said carrier for reciprocating movement, and means for reciprocating said carrier to vibrate said knife at high frequencies and in a direction transverse to said conveyor table.

5. An apparatus for severing a section from a yieldable, compressible material in block form

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comprising a knife having a cutting edge defining a closed figure, a support for said block, means for causing relative movement of said knife and block toward each other, and means for vibrating said knife at high frequencies and in a direction transverse to the direction of said relative movement.

6. An apparatus for severing a section from a yieldable, resilient material in block or pad form comprising a knife having a cutting edge defining a closed figure, a carrier supporting said knife, means mounting said carrier for lateral reciprocating movement, means for reciprocating said carrier at high speed to vibrate said knife at high frequencies, a support for said block, and means for causing relative movement of said knife and support toward each other.

7. The method of removing a section of material from within the lateral border of a body of resilient, compressible material, comprising conveying the body against a cutting edge having a depressed section and offset sections extending therefrom to a point above said body, the portions of said cutting edge in contact with said body lying entirely inside of the lateral borders thereof, vibrating said cutting edge at high frequencies and simultaneously moving said body toward said cutting edge.

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