April 23, 1963 E. A. LAURING 3,086,878

PROCESS FOR FISSURING ACOUSTICAL FIBERBOARDS

Filed Nov. 1, 1960 2 Sheets-Sheet 1

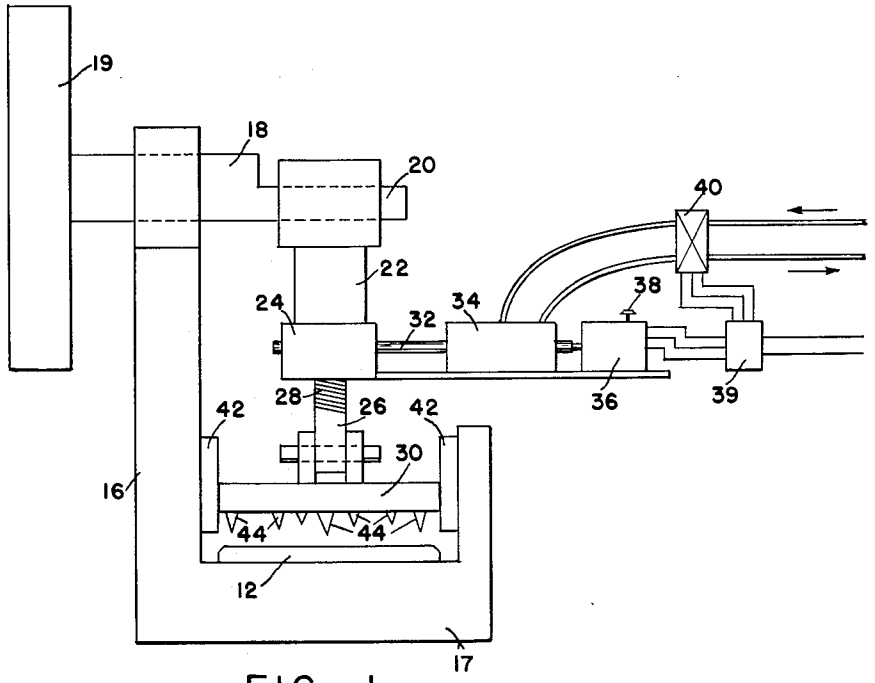

FIG. 1

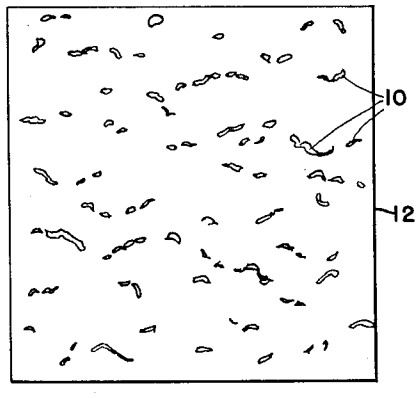

FIG. 2

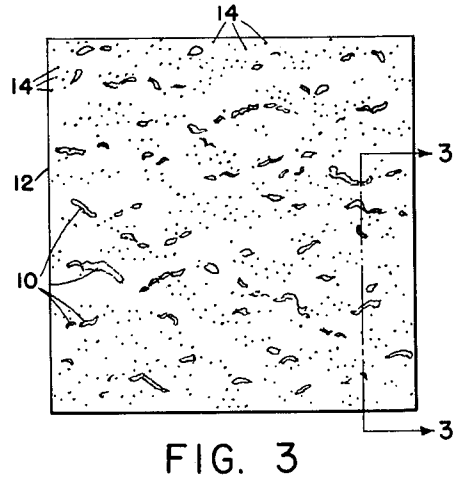

FIG. 3

INVENTOR.
EDGAR A. LAURING

BY H. F. Woodward
Atty.

April 23, 1963 E. A. LAURING 3,086,878

PROCESS FOR FISSURING ACOUSTICAL FIBERBOARDS

Filed Nov. 1, 1960 2 Sheets-Sheet 2

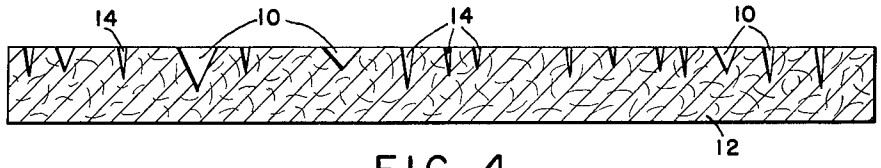

FIG. 4

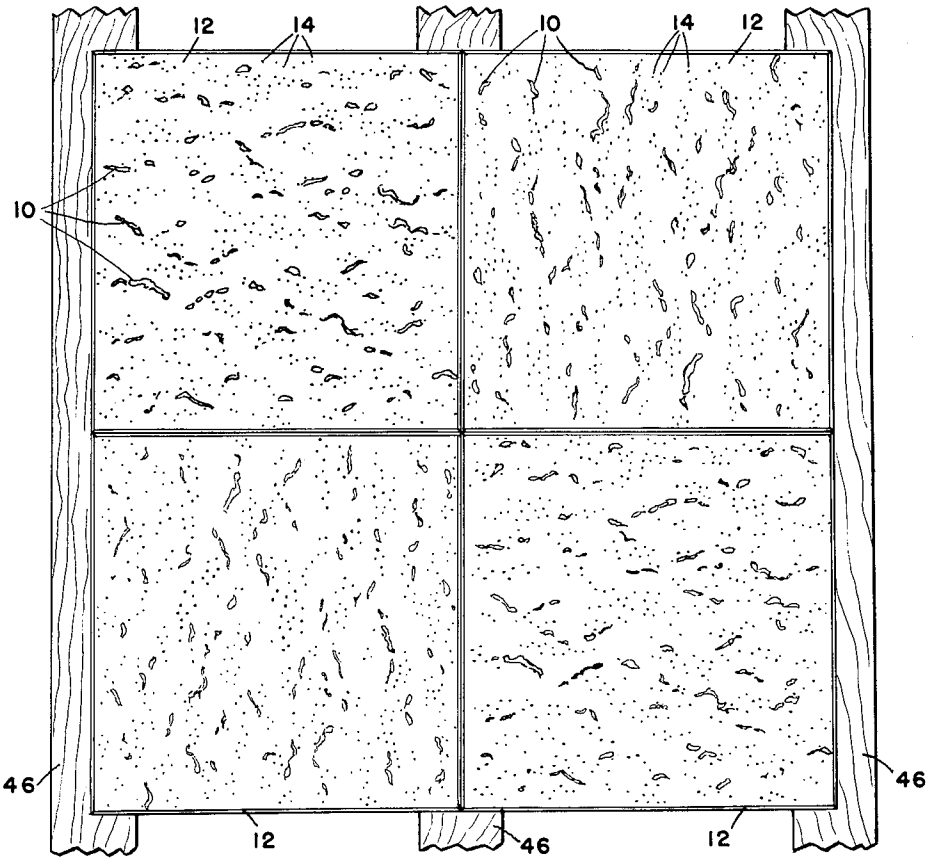

FIG. 5

INVENTOR.
EDGAR A. LAURING

BY H. J. Woodward
Atty

United States Patent Office 3,086,878 Patented Apr. 23, 1963

3,086,878
PROCESS FOR FISSURING ACOUSTICAL FIBERBOARDS

Edgar A. Lauring, International Falls, Minn., assignor to Minnesota and Ontario Paper Company, Minneapolis, Minn.

Filed Nov. 1, 1960, Ser. No. 66,459
2 Claims. (Cl. 117—8)

This invention relates to a method of imparting certain desirable characteristics to a board form material from fibers.

One of the objects of this invention is the method of treating fiberboard to provide a decorative surface and at the same time provide improved sound-absorbing units.

It is a further object of the invention to produce a fissured board or tile by a method which is simple, economical, and practical.

Other objects and advantages of the invention will become apparent as the description of the same proceeds, and the invention will be understood from a consideration of the following description taken in connection with the accompanying drawings forming a part of the specification, that the invention is not to be limited to the exact details shown and described, since obvious modifications will occur to a person skilled in the art.

In the drawings:

FIGURE 1 is a diagrammatic view illustrating equipment useful in carrying out certain steps of the method;

FIGURE 2 is a plan view of a tile blank which has been treated to provide random arranged fissures;

FIGURE 3 is a plan view of a tile blank which has been treated as indicated in FIGURE 1, but has been further treated to provide random needlelike openings;

FIGURE 4 is a sectional view on an enlarged scale, taken along line 3—3 of FIGURE 3; and

FIGURE 5 is a view of a ceiling showing the arrangement of four tile units.

A variety of materials may be used to form the base board from which the tile blanks are cut. The base material may be lignocellulose fiber, mineral fibers, synthetic fibers, or a combination of two or more of these fibers. It is to be understood that the tile of the invention need not necessarily be an acoustical tile, but may be merely a decorative tile and this in part will depend upon the sound-absorbing properties of the base board.

The base board of whatever type employed is coated with any suitable materials, such as that shown in U.S. Patent No. 2,813,046. Whatever coating is applied to the base board it is preferred that at least two coats be applied and three coatings as shown in the patent referred to is highly desirable.

After the coating has dried, the tile blanks have fissures **10** shown in FIGURE 2 punched into the surface of the board. The fissures' penetration into the board **12** depends in part upon the thickness of the tile blank. So that the fissures may vary in depth from tile to tile, the equipment shown in FIGURE 1 is employed.

The coated tile blanks to be processed according to this invention may be of suitable surface area and suitable depth, such as 12 inches by 12 inches and ½ of an inch thick.

Many features enter into the selection of the density of a lignocellulose sound-absorbing tileboard. A density of 14 to 18 pounds per cubic foot gives excellent results where wood fiber tileboard is to be used.

The board after being coated, dried, and divided into tile blanks is placed in the apparatus shown in FIGURE 1 and the random arranged fissures **10** are pressed into the board **12**. The depth of the fissures **10** vary in each tile as the embossing plate **30** with punches **44** relative position is varied by screw **28** on connecting rod **26**. The depth of fissures from tile to tile differ in depth due to

relative position of the embossing plate which is continuously changed. After the coated tile has been treated as shown in FIGURE 2, there is punched into the coated surface random arranged openings. The openings are of an order of 1/16" to 1/8" cross-sectionally considered and extend from the front of the board about half way to the back of the board. It is to be understood that the openings may extend inwardly of the board as far as possible without completely perforating the board through the back. The tile as shown in FIGURE 3 has the surface spray coated. The sprayed coating covers the board surface and bottom of the fissures but not the sides thereof.

The openings **14** may be formed by apparatus similar to that shown in U.S. Patent No. 2,355,454, but in a random arrangement.

Coated tileboard blanks are fed, by any suitable means, to the apparatus shown in FIGURE 1, where the fissures **10** are punched into the boards **12**. The depth of fissure penetration from the surface of the board depends in part on the sizes of the punches, the thickness of the tile blank, and the position of the punching head. The equipment shown in FIGURE 1 includes frame member **16** with tile supporting base **17**. Supported by frame **16** is shaft **18**, carrying fly wheel **19** at one end and eccentric crank **20** at the other end. Carried by eccentric crank **20** is upper part of ram **22**. To the upper part of ram **22** is attached gear reducer **24** which is operatively connected to the lower ram part **26**. The lower ram part **26** is screw threaded at **28** so that the position of the press head can be varied.

To permit continuous change in the position of press head **30** there is provided a shaft **32** connected to the gear reducer and to a hydraulic motor **34**. The direction of rotation of the shaft **32** is controlled by the direction of rotation of the motor **34**. A timing switch **36** is operatively connected to the hydraulic motor **34** so that at a predetermined number of revolutions the direction of rotation of motor **34** is reversed. An adjusting screw **38** permits the controlling of the time of reversal of the motor **34**. The timing switch **36** operating through relay switch **39** controls through hydraulic reversing valve **40** the direction of hydraulic fluid to motor **34** and thus the direction of rotation.

This may be accomplished through a relay switch which is electrically connected to the timing switch and to a source of power (not shown). Relay switch is in turn connected to the reversing valve **40**. By way of example, the timing switch is said to reverse the hydraulic motor after a definite number of revolutions. If the hydraulic motor is arranged to lower the head for 15 turns of the shaft **32** and the hydraulic motor is running at 30 r.p.m., the motor would make a complete cycle every minute. If the press is pressing 30 tile per minute the 30 tile would be punched with 15 variation depths of depression, and since the punching heads have different lengths of punches, many variations in tile appearance are provided.

Pressing head **30** which move upwardly and downwardly in guides **42** has random arranged fissuring punches **44** thereon. The punches **44** are of varying length so that on each tile the depth of fissures vary.

In FIGURE 5 is shown a part of a ceiling with tileboard suitably secured to members **46**. The fissures **10** are of varying depth on each tile and the direction as regards a given edge, in which the fissures extend vary from tile to tile. Fissue depth and direction in which they extend combine to provide a decorative ceiling having good sound-absorbing qualities.

What is claimed:

1. In a method of fabricating a series of lignocellulose sound-absorbing units having decorative surfaces, consisting of applying a film forming coating composition to a

series of lignocellulose fiberboards, drying the coating composition, mechanically punching openings through the coating and into the fiberboards, continuously varying the position of the mechanical punching means relatively to consecutive fiberboards of the series to vary the depth of the openings in the said consecutive fiberboards of the series and thereafter applying a coating composition to the fiberboard surface and to the bottom of the openings.

2. In a method of fissuring a series of lignocellulose fiberboards to provide decorative and sound-absorbing units having varying depth of fissures, consisting of coating a series of lignocellulose fiberboards with at least two separate applications of film forming coating composition, drying each application of coating composition applied to the fiberboard prior to the next application of the coating composition, mechanically punching openings through the coatings and into the fiberboards, continuously varying the position of the mechanical punching means relative to the consecutive fiberboard of the series to vary the depth of the openings in said consecutive fiberboards of the series and thereafter applying a coating composition to the fiberboard surfaces and to the bottom of the said openings by spraying with a coating composition whereby the sides of the fissures are left uncoated.

References Cited in the file of this patent

UNITED STATES PATENTS

2,791,289	Proudfoot et al.	May 7, 1957
2,813,046	Lauring	Nov. 12, 1957
2,874,796	Eckert	Feb. 24, 1959
3,008,257	Landgraf	Nov. 14, 1961
3,013,937	Brown et al.	Dec. 19, 1961

OTHER REFERENCES

Armstrong: "Acoustical Ceilings," 1959, page 7.