Feb. 2, 1937. L. LEHNER 2,069,531

BARREL STAVE

Filed Oct. 23, 1933

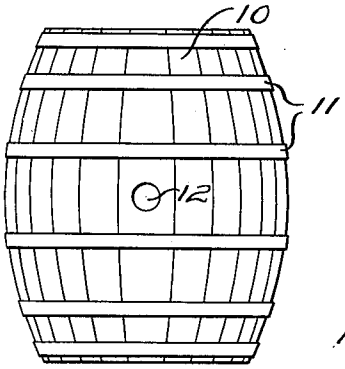


Fig. 1.

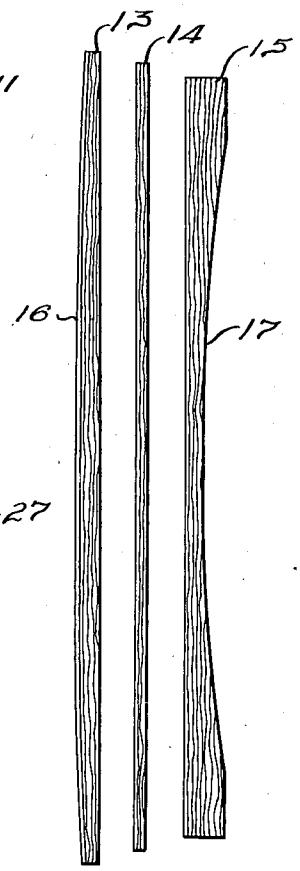


Fig. 2.

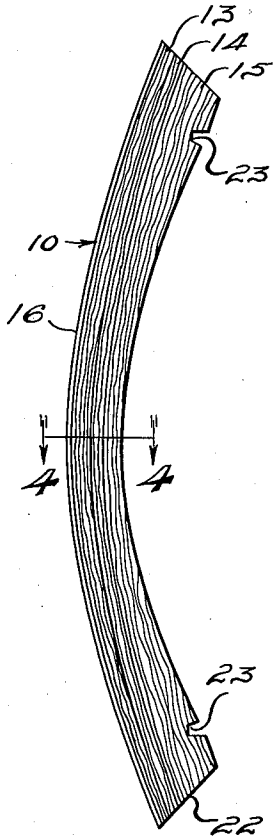
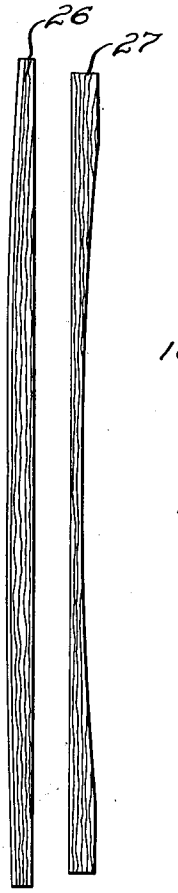


Fig. 3.



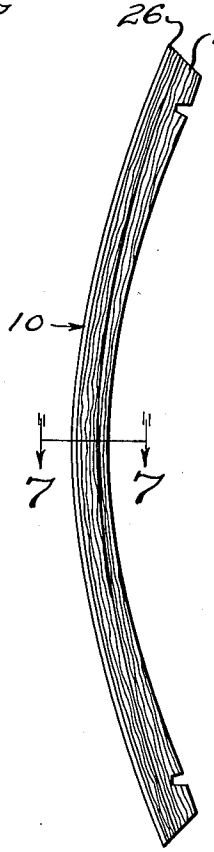


Fig. 5. Fig. 6.

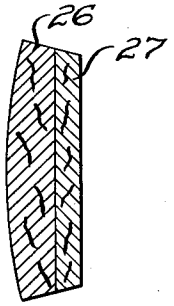


Fig. 7.

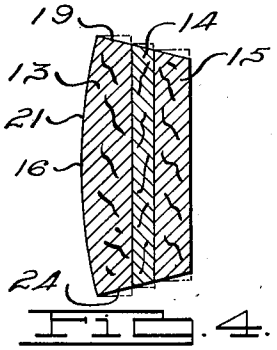


Fig. 4.

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BARREL STAVE

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9 Claims. (Cl. 217—88)

This invention relates to wood barrels of the liquid tight type and particularly to the staves therefor and to their method of manufacture.

Heavy staves employed in barrels for storing beer, ale and like liquids have usually been made from oak lumber which is at least two inches in thickness. The lumber is quarter sawed in sizes from which a stave can be shaped and is seasoned from one and one-half to two years in air to be thoroughly dried. When the stave is not properly seasoned the fibers readily break on forming and the staves shrink which results in defective and leaky barrels.

In view of the great demands for beer barrels and the like at the present time, a shortage of seasoned lumber and staves prevents the manufacture of properly constructed barrels. At the present time some attempt is being made to force the seasoning of the boards through a kiln drying process as soon as the staves have been cut from the lumber. This has proven very unsatisfactory because of the impossibility of kiln drying lumber which is two inches in thickness. As a result the staves fail to withstand the strains to which they are subjected and considerable shinkage has been noted which renders such barrels substantially useless.

In practicing this invention advantage is taken of the present large supply of well seasoned oak lumber of 1 and 1½ inches in thickness, which is available. This air seasoned lumber is secured together in a manner explained more fully hereinafter by the plywood process and is employed in forming staves which are found to equal if not be superior to the solid oak stave which is properly air seasoned. In view of the scarcity of the two inch seasoned lumber and its accompanying high price and the availability of the 1 and 1½ inch well seasoned lumber at a much reduced cost, it is possible to produce the plywood stave at less and at least at no greater cost than the solid oak stave heretofore employed.

In constructing the stave for the barrel, a central board is employed between the inner and outer oak portions which is made of elm or a similar wood which is softer than oak to provide a cushion between the inner and outer stave portions which materially reduces the possibility of bursting the barrel when dropped or otherwise subjected to shock and which has the further advantage of providing a better bonding with the glue than would occur between the two oak boards direct. The center board also protects the inner staves when the outer staves become damaged, and will tend to prevent warping, buckling, shrinking, open joints, and leaks as it more readily swells in the presence of moisture to provide a perfect seal.

Accordingly, the main objects of the invention are to construct a barrel stave out of a number of layers of different kinds of wood; to construct a stave of an inner and outer oak portion and a central portion of much softer material; to construct a stave for a barrel by employing that thickness of oak lumber which is well seasoned and readily obtainable in combination with a central board cut from a wood other than oak; to form the inner and outer stave elements of substantial size and shape which are glued together and bent to a form in which they are retained until dried; and, in general, to fabricate a stave which is exceedingly durable, which will withstand shock and which is completely seasoned and constructed from the choicest of lumber.

Other objects and features of novelty of this invention will be either more specifically pointed out or will become apparent hereinafter when referring, for a better understanding of this invention, to the following description taken in conjunction with the accompanying drawing, wherein:

Figure 1 is a view in elevation of a barrel embodying features of this invention,

Fig. 2 is an exploded view of a stave employed in the construction of the barrel illustrated in Fig. 1 showing the elements thereof.

Fig. 3 is a side view in elevation of a completed stave made up of the elements illustrated in Fig. 2,

Fig. 4 is an enlarged sectional view of the structure illustrated in Fig. 3, taken on the line 4—4 thereof,

Fig. 5 is an exploded view, in elevation, of a stave similar to that illustrated in Fig. 2 showing a modified form thereof,

Fig. 6 is a view of a stave made up of the elements illustrated in Fig. 5, and

Fig. 7 is an enlarged sectional view of the structure illustrated in Fig. 6 taken on the line 7—7 thereof.

The barrel illustrated in Fig. 1 is liquid tight, that is to say, formed to hold liquid and is constructed of a plurality of staves 10 which are banded together and retained in firm, tight relation to each other by hoops 11. A bung hole 12 is provided in one of the staves at the bilge of the barrel while a similar bung hole (not shown) may be provided in the head thereof. The construction of the barrel follows the conventional

manner of constructing barrels well known in the cooperage art and will not be described in detail since the present invention relates more particularly to the method of constructing the staves therefor.

As pointed out hereinabove, the scarcity of seasoned oak lumber of two inch thickness required for the manufacture of beer barrels and the like has resulted in a scarcity of barrels or in the production of barrels which are of questionable sturdiness and life because of the employment of green lumber. In view of the large quantity of well seasoned oak lumber of 1 and 1½ inch thickness, which is more favorably priced than the well seasoned two inch lumber, the practicability of the present invention is not only made possible but results in a barrel stave and a barrel which is exceedingly strong and gives promise of long life.

Referring to Fig. 2, an exploded view of a plywood stave is illustrated wherein an outer oak board **13** has an inner board **14** adjacent thereto which is made from a softer wood than oak, such as elm. The inside portion of the stave **15** is made of well seasoned oak and is disposed adjacent to the inner surface of the board **14**. The lumber must be straight grained and must be dried to a moisture content of about 9 per cent or less. The lumber is cut to substantially the lengths illustrated in Fig. 2 and is ripped to the desired widths as illustrated in dotted line in Fig. 4. The outer board **13** is made from ¾ oak. The board **13** is then faced to straighten the sides and ends and the outer side is rounded to a thickness of $\frac{9}{16}$ of an inch to fit the diameter of the barrel at the bilge. The outer surface **16** of the board is then run through a planer on a sweep form so that the ends will be about $\frac{3}{16}$ of an inch thinner than the center. This provides a thicker central portion to the outer stave board and requires less bending of the board as will be explained hereinafter. The central board **14**, which is preferably of elm, is dressed to a thickness of ⅜ of an inch and forms a cushion and a bonding means for the inner and outer boards **13** and **15**.

The inner board **15** is dressed somewhat similar to the board **13**, being faced to straighten the edges and surfaced to a thickness of substantially $1\frac{3}{16}$ of an inch. A band saw on a sweep-form cuts out an arcuate portion **17** leaving the center of the board about $\frac{9}{16}$ of an inch thick with the ends left the original $1\frac{3}{16}$ of an inch thick down about 3½ inches from each end. The arcuate portion may be planed on a sweep if desired and the ends provide ample thickness for the crozing operation to produce a groove in which the barrel head is retained. The thin center of the board permits it to be readily bent which will be less than ordinarily required as will be explained hereinafter.

In Fig. 3, the finished stave is illustrated, made up of the boards **13**, **14** and **15**. The boards are glued together with a hide or waterproof casein glue and placed in a special built bending form to give the desired bilge to the stave. Pressure is applied for bending the mated boards to the desired curvature and for retaining them in surface contact under pressure until thoroughly dried. It will be noted in the figure that the outer curvature of the sides **16** of the staves **13** is struck from a smaller radius than that of the curvature of the middle board **14** which is the actual bend applied to all of the boards. By dressing the boards in the manner above explained to have the outer board of greater thickness at the center and the inner board of less thickness, the stave is produced having the proper bilge without the necessity of bending the wood to that curvature which substantially occurs when a solid stave is employed cut from a straight piece of lumber.

One side **19** of the stave, illustrated in Fig. 4, is then jointed or properly beveled and the outside surface **16** is properly shaped to form the exact bilge **21** of the barrel. The ends are beveled at **22** after being cut to proper length and crozed at **23** to provide the groove for receiving the barrel head. After the staves are formed in this manner they are stave jointed, that is to say, the opposite bevel **24** is placed on the staves in accordance with their widths and the number employed in the barrel. The staves are then ready for the barrel assembly which will not be explained since such assembly is well known in the cooperage art.

It will be noted from Fig. 4 that a further material saving in lumber is effected by employing an inner board **15** which is of less width than the outer board **13** of the stave. When a solid stave is employed the same width is utilized throughout the thickness of the lumber and thereby produces a greater waste of material. By having the central core **14** made of an elm board or similar wood of materially less hardness than the oak, the boards are readily bonded by a glue and a tough and rigid stave is produced, one in which a cushioning effect is provided. By shaping the stave as specified, less bending is required of the wood and a greater thickness of material is provided on the outer stave at the bilge portion which is subjected to the greatest shock and to the end portions of the inner stave having the croze therein for supporting the head which likewise requires strength. The soft central portion of the stave readily swells in the presence of moisture and increases the sealing capacity thereof.

Referring to Figs. 5, 6 and 7, a method of constructing a stave is shown somewhat in the order of that illustrated and described in regard to Figs. 2, 3 and 4 wherein the central board **14** of elm or like material is omitted. While this construction may be employed in the forming of staves for beer barrels and the like, I preferably utilize this construction on barrels subjected to less handling and shock such as whiskey barrels. The elements **26** and **27** illustrated in Fig. 5, which are similar to the elements **13** and **15** illustrated in Fig. 2 except for length, are constructed in substantially the same manner, the element **26** having a thicker bilge portion and the element **27** having a thinner central portion.

When the two elements are united together as illustrated in Fig. 6 the joining line therebetween shows the exact amount of bending applied to the wood which, as can readily be seen, is less than would be required if the staves were made from a solid piece of flat material. This protects the fibers from being over-strained and at the same time reduces the amount of pressure required to bend the stave to form. The formation of the board after being constructed as illustrated in Fig. 6, follows that explained hereinabove in shaping the stave **3** after the elements **13**, **14** and **15** have been glued together. It is to be understood that the same method could be employed in the construction of the first mentioned stave illustrated in Figs. 2, 3 and 4, by having the element **13** increased ⅜ of an inch in thick-

ness and having it glued directly to the element 15. In either case the bending of the stave is materially less than would be required if the stave were made of a straight piece of material.

The barrel head in a like manner may be fabricated from hard and soft lumber to have a cushion centrally thereof or on one side, to provide the cushioning and sealing effects pointed out hereinabove relative to the staves.

While several embodiments of the invention have been described and illustrated, it will be understood by those skilled in the art that various changes, omissions, additions and substitutions may be made therein without departing from the spirit and scope of the invention, as set forth in the accompanying claims.

The claims:

1. A fabricated stave for a barrel made up from layers of boards formed in such manner that the line of joinder therebetween is of less curvature than the curvature of the stave.

2. A fabricated stave for a barrel made up of inner and outer boards of hard wood and at least one central board of soft wood.

3. A fabricated stave for a barrel made up of inner and outer oak boards and at least one central board of softer wood united and formed in such manner that the lines of joinder between the boards are of less curvature than the curvature of the stave.

4. A fabricated stave for a barrel made up of preformed inner and outer seasoned oak boards and at least one inner board of softer wood which are glued together and formed to the shape of the bilge of the barrel with the line of joinder between the boards of less curvature than the curvature of said bilge.

5. A fabricated stave for a barrel including, in combination, an inner board having the inner face thereof concave, an outer board having the outer face thereof convex in shape, said boards being glued together and formed in the shape of the bilge of the barrel with the line of joinder therebetween of less curvature than the curvature of said bilge.

6. A stave made up of at least two boards the inner board being thinner and the outer board being thicker in the center than at the ends thereof, said boards being glued together and formed to the shape of the bilge of the barrel with the line of joinder therebetween of less curvature than the curvature of said bilge.

7. A stave having an inner board thicker at both ends and thinner in the center and an outer board thicker in the center than at the ends, said boards being glued together and formed to the shape of the bilge of the barrel with the line of joinder therebetween of less curvature than the curvature of said bilge.

8. A stave for a barrel having between the inner and outer surfaces thereof a strip of material which more readily swells in the presence of moisture than the material forming said inner and outer surfaces.

9. A plurality of staves for a barrel having in their adjoining surfaces strips of sealing material which swell more readily than the stave material in the presence of moisture.

LOUIS LEHNER.