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LAMINATED BOWLING PIN

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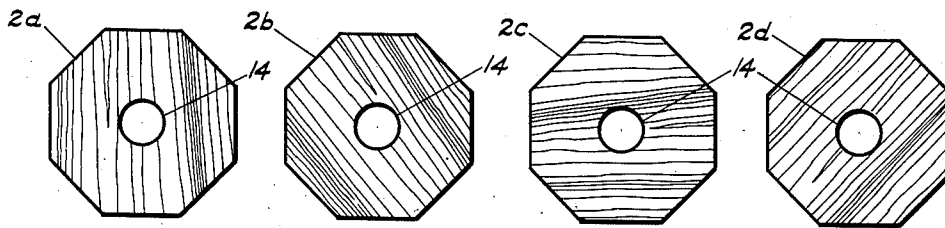
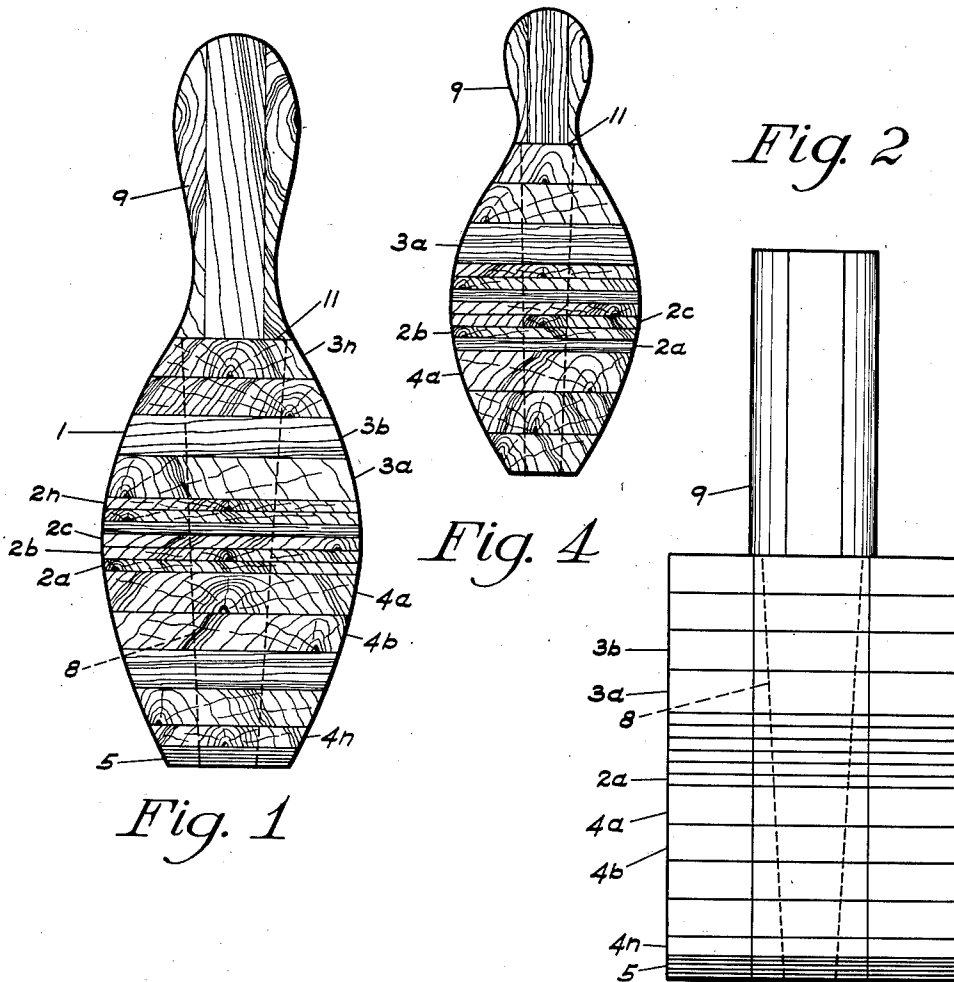


Fig. 3

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LAMINATED BOWLING PIN

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5-Claims. (Cl. 273-82)

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This invention relates to new, improved bowling pins.

Heretofore, bowling pins have been constructed of solid selected wood, or of laminations in which the fiber or grain of the wood runs vertically. The making of a bowling pin from a solid log requires careful selection and slow seasoning of the log, which is expensive, and various built-up constructions heretofore have been proposed to overcome these difficulties and to reduce the cost of bowling pins. End grain wood is more resistant to wear than side or radial grain wood, but because of the greater tendency of end grain wood to split under impact, prior constructions exposing end grain to impact have not been successful.

In accordance with the present invention, a bowling pin is constructed of a plurality of horizontal laminations of a suitable wood glued together around a core with the grain or fibers in the laminate running horizontally, the various laminations being angularly disposed to expose end grain in thin laminations around the impact band of the pin. In the wood core the grain runs lengthwise of the pin, and the upper end of the core may be formed as the handle for the pin. Although thin laminations are essential in the impact zone of the bowling pin, considerable latitude is permissible in the selection of the thickness of the laminations in the other parts of the bowling pin. For example, the thicker laminations may be made from one inch nominal thickness of wood which runs about $\frac{1}{8}$ inch planed, and the thin laminations in the impact band may be about one quarter inch in thickness, or thinner. Thus, in some instances sawn veneer about $\frac{1}{16}$ inch thick may be used in the impact band.

By arranging each lamination with its longitudinal grain lines extending horizontally and at an angle other than a right angle to the longitudinal grain lines of the next adjacent laminations so that each lamination is flanked on at least one side by laminations having transverse fibers, the tendency of the lamination to split, upon impact at its end grain areas, is greatly reduced, and at the same time the greater resistance to wear of end grain wood is utilized.

It is known that the weakest glued joint in timber is obtained where the grain lines are disposed at a ninety-degree angle, and the strongest glued joint is obtained where the grain lines are substantially parallel. Where the wood layers are joined with the grain lines disposed at an angle other than a right angle, the strength

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of the joint will lie somewhere between the maximum and minimum, depending on the particular angle selected. This is disclosed and claimed in my Patent No. 2,413,912, issued January 7, 1947, for Angular Glued Wood Joint. In the present invention, by employing thin laminations in the impact zone and arranging them substantially symmetrically with the grain lines at an angle less than ninety degrees, I provide exposed end grain areas extending around the impact zone of the bowling pin, and the thin laminations mutually strengthen each other to prevent splitting under impact. When a pin is struck by the bowling ball in the impact band, the tendency of the end grain of a particular lamination to split is resisted by the adjacent transverse grain laminations which are strongly bonded thereto.

The thicker laminations bordering the impact zone also are disposed relative to the impact zone laminations and to each other so as to obtain a grain angle other than ninety degrees. Using laminations one quarter inch thick, a grain angle of about 45° is preferred although, by employing more thinner laminations in the impact zone, a correspondingly smaller grain angle may be employed with a correspondingly improved bond between laminations and consequent improved resistance to splitting. However, the cost of construction rises with an increase in the number of laminations. In any specific case the thinness of the laminations in the impact zone and their number can be balanced against the increased cost of making the bowling pin to obtain maximum life at minimum cost. The bottom of the bowling pin also is subject to impact, and, if desired, the bottom band may also be composed of a plurality of thin layers like the impact band.

The arrangement of the laminae with the grain fibers at a 45° angle in successive layers is simplified by forming each laminate as an octagon. Or, other angular formations desired may be easily made by cutting the laminae in the shape of the corresponding regular polygon. After gluing and bonding the laminations and core together, the resulting blank may be turned to shape, sanded, and finished with a suitable varnish.

Although heretofore maple has been considered almost the only wood suitable for bowling pins, pins constructed according to the present invention may be made from other kinds of tough hard woods. Furthermore, the laminated construction enables the use of standard sawn sea-

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soned boards or veneers in the manufacture of the pins, thereby reducing the cost of material in the manufacture. It is also possible to govern the weight and balance of the pins by selecting and arranging the layers in accordance with the desired natural density of each layer, or by impregnating the pin with a suitable varnish or resin, which also increases the hardness of the pin.

The invention will be described in greater detail in connection with the accompanying drawing showing preferred embodiments of the invention by way of illustration, and wherein:

Figure 1 is a side elevation of a bowling pin embodying the invention.

Figure 2 is a side elevation of an assembled blank for making the bowling pin shown in Figure 1,

Figure 3 shows in plan a set of laminae blanks, and

Figure 4 is a side elevation of a duck pin.

Referring to the drawing, the bowling pin, designated generally by the numeral 1, is composed of a plurality of thin wood laminae 2a, 2b, 2c, etc.—2n in the belly or impact zone, the grain or fibers in each lamina running horizontally, and the laminae being arranged so that each layer has its grain running at an angle of about 45° to the grain of the flanking layer. Any desired number of such layers or laminae may be employed depending on the thickness selected. For example, the standard bowling pin for use with a nine-inch ball is fifteen inches high, and the impact zone center is about 4½ inches from the base. The thin impact zone laminations in such a pin may occupy about 1½ inches and preferably is made up of laminae about one-fourth inch thick securely glued together. At least one full layer is positioned on either side of the mid-point of the impact zone, the layer 2c including the middle of the impact zone. On either side of the impact zone thicker glued laminations 3a, 3b, etc., 3n and 4a, 4b, etc., 4n may be employed, if desired. For example, as illustrated the upper laminations 3a, etc. are composed of nominal one inch planed lumber, which is about 13/16 inch thick, four laminae glued together being used, and similar lower laminations 4a, etc. are used. If desired, the lowermost zone of the pin may be composed of one or more laminae 5 of reduced thickness, such as, for example 1/8 inch sawn veneer, the layers of veneer being glued together so that the grain of each layer is transverse to the next adjacent layer. This increases the impact strength at the end.

A bore 8, which may be tapered as shown, or cylindrical, extends through the laminations and receives a plug 9 in which the grain or fibers run lengthwise. The upper end of the plug is enlarged at 11, and upon turning the bowling pin to shape this enlarged end provides the handle portion. This plug may be of one piece, but preferably is built up of three layers to provide increased resistance to splitting.

The mode of constructing the bowling pin will now be described. Referring to Figure 3, four laminae 2a, 2b, 2c and 2d are shown, these laminae being of octagonal shape and having each a central bore 14 therethrough. These laminae are assembled so that the fibers in adjacent layers are disposed at an angle of about 45° to each other. Thus, layer 2b is interleafed between adjacent layers in which the fibers run transverse at an angle of about 45° to the interleafed layer.

Referring to Figure 2, it will be seen that six

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thin laminae, 2a, etc., are provided at the impact zone. The upper laminations 3a, 3b, etc. which do not receive as much impact are thicker, and are arranged with the fibers of adjacent layers running at an angle of 45° to each other. Also, the lower laminations 4a, 4b, etc., are thicker and are similarly arranged. The extreme end may be made up of a plurality of one sixteenth inch sawn layers 5, five such layers being shown, and the bottom thick layer 4n is suitably reduced in thickness to bring the middle impact layers 2a, etc. into the belly or impact zone. The end layers 5 are preferably arranged with the fibers in adjacent layers at about 45° to each other.

In fabricating a pin with a tapered core, the laminations, when freshly coated with glue, may be stacked one upon the other to the desired height, clamped together and held under pressure while the glue sets. Any suitable glue may be employed such as a cold-setting synthetic resinous glue which cures rapidly upon the application of heat. With this type of glue, the clamped assembly of laminations may be subjected to heat from any suitable source, although heat induced by the use of a high frequency field is preferred, because of the rapidity of its glue setting or curing action. The cylindrical bore of the cured stack is then reamed to form a tapered bore 8 and the tapered core or plug 9 is then wedged into the bore 8, clamped to hold its downwardly facing annular shoulder firmly against the upwardly facing side of the uppermost horizontal lamination, and glue bonded to the stack. The resulting blank, shown in Figure 2, may then be turned to appropriate shape, smoothed and finished or indurated with a suitable varnish.

As I have previously noted a cylindrical plug, having an enlarged upper end, may be used instead of the tapered plug 9. With a cylindrical plug, the freshly glue-coated laminations may be placed thereon, with the uppermost lamination abutting the annular shoulder presented by the enlarged upper end. When all laminations are on the plug, the entire assembly can be clamped, cured and thereafter machined and finished in the usual way.

In the modification shown in Figure 4, wherein like parts are indicated by like reference numerals, there is shown a duck pin embodying the invention. As the ball used for duck pins is 5¾ inches in diameter, the middle of the impact zone is 2⅞ inches from the base, and thin laminae 2a, 2b, etc. are disposed to form the impact zone or belly of the pin. The upper laminations 3a, etc., and the lower laminations 4a, etc. are each made of planed wood of one inch nominal thickness. In this pin, the wooden impact section is placed between the top and bottom sections and composed of a series of horizontal layers of wood arranged one over the other with each layer having its grain lines extending horizontally across the pin and with substantially all of the layers each having their grain lines extending at an angle to the horizontal grain lines of a flanking layer, as described in connection with Fig. 1.

I claim as my invention:

1. A bowling pin having an impact band at the largest diameter intermediate the ends of the pin comprising a plurality of thin laminae of wood adhesively bonded together with the fibers of each lamination running horizontally and disposed at a grain angle other than a right angle to the next adjacent lamination to provide ex-

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posed end grain around the impact band; and thicker laminations flanking the impact band and arranged with the fibers of each said thicker lamination running horizontally and disposed at a grain angle other than a right angle to the next adjacent lamination; and a central plug extending through said laminae and being adhesively secured thereto, the fibers in the plug extending lengthwise of the pin, and the upper end of the plug extending from the laminations and providing the head and neck of the pin.

2. A bowling pin as specified in claim 1 wherein said grain angle in the impact band layers is about 45°.

3. A bowling pin as specified in claim 1 wherein said central plug is tapered where it passes through said laminae.

4. A bowling pin as specified in claim 1 wherein the bottom of the pin has a band comprising a plurality of thin laminae of wood adhesively bonded together with the fibers of each lamination running horizontally and disposed at a grain angle other than a right angle to the next adjacent lamination to provide exposed end grain around said bottom band.

5. A bowling pin blank having an impact band intermediate the ends of the pin at a location corresponding to the largest diameter of the shaped pin, comprising a plurality of thin laminae of wood adhesively bonded together with the fibers

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of each lamination running horizontally and disposed at a grain angle other than a right angle to the next adjacent lamination to provide exposed end grain around the impact band; and thicker laminations flanking the impact band and arranged with the fibers of each said thicker lamination running horizontally and disposed at a grain angle other than a right angle to the next adjacent lamination; and a vertical plug extending lengthwise centrally through said laminae and being adhesively secured thereto, the fibers in the plug extending lengthwise of the pin.

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