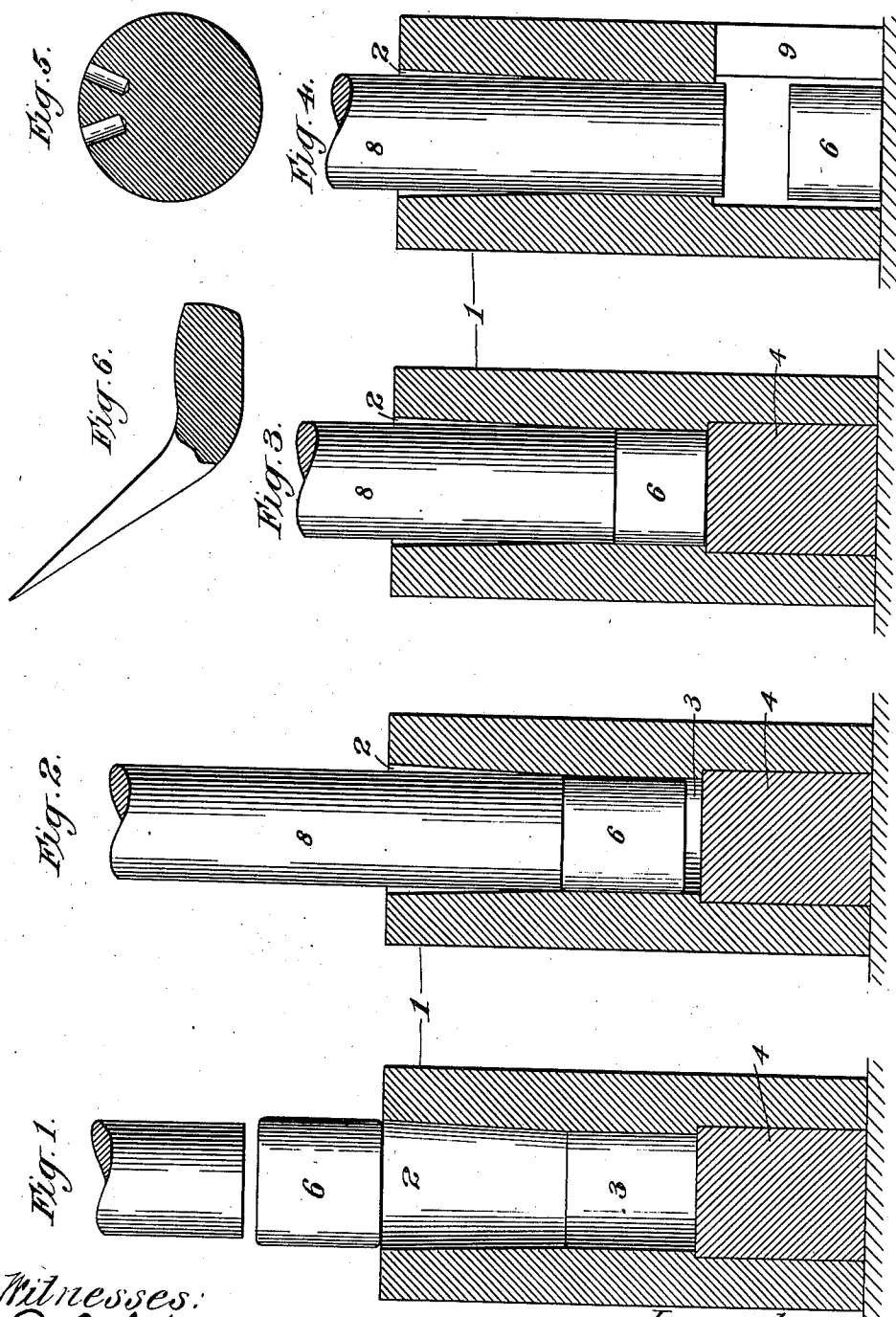


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 COMPRESSED WOODEN ARTICLE AND METHOD OF PRODUCING THE SAME.
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UNITED STATES PATENT OFFICE.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, JOHN W. HYATT, a citizen of the United States, residing at Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Compressed Wooden Articles and Method of Producing the Same, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to a method of producing compressed wooden articles and to articles produced thereby.

It has been heretofore proposed to produce compressed wooden articles by first shaping an article out of a block of wood and then compressing it in a mold. In the compressing operation as it is thus carried out the wooden article is subjected to pressure substantially in one direction only and this pressure may take place either lengthwise of the grain of the wood or laterally of the grain, according to the article to be produced. Thus, for instance, a wooden hub for vehicles has been produced by forcing a substantially cylindrical wooden block into a metallic ring which is smaller in diameter than the diameter of the block. While, of course, in this operation some pressure must be employed to force the block into the ring, the only substantial compressing pressure or pressure which affects the condition of the fibers of the wood is the lateral pressure produced by the ring as the block is forced into it. Other articles, such as checkers or draughts have been produced by subjecting wooden blanks to endwise pressure, the articles being held in a mold while the endwise pressure is applied, the purpose being to produce an article with an embossed surface more cheaply than it could be produced by turning. In the operation of thus making draughts or checkers, the pressure is applied to the blanks in a line with or longitudinally of the grain or fibers of the wooden blank, but the molds simply confine the blanks against lateral extension and do not exercise any substantial compacting pressure on the blank. Further, the longitudinal pressure is not sufficiently heavy to produce any substantial shortening of the blanks or any substantial change in the condition of the fibers.

The object of this invention is to enable the production of wooden articles to be effected, the wood being compressed in a novel

manner so that the articles formed therefrom shall have much greater density, toughness, hardness and elasticity than would characterize them if they were formed from the wood in its natural state.

In carrying out the invention a block of wood of proper size and form is selected. This block which may be of any desired cross-section is subjected to very heavy pressures both laterally and longitudinally. When the invention is practiced in what is regarded as the best way the block will first be subjected to very heavy pressure laterally, that is, laterally of the grain or fibers. This lateral pressure should be sufficient to considerably reduce the lateral dimensions of the block, say, from five to ten per cent., the amount of reduction, however, varying according to the natural characteristics of the wood and the article it is desired to produce; a heavy close grained wood, such as hickory, would need less compression than a more open grained wood, such, for instance, as pine. After the block has been subjected to the lateral compression referred to and its lateral dimensions thus reduced, as stated, the block is subjected to a very heavy pressure lengthwise of the grain or fibers of the block. This pressure can best be applied while the block is still within the control of the agencies employed for producing the lateral pressure and should be sufficient to reduce the lengthwise dimension of the block from twenty to forty per cent., according to the character of wood employed or the article to be produced. As has been indicated, the pressures to which the block must be subjected are very heavy, that is, several tons to the square inch. The effect produced by these heavy pressures applied in the manner described to a wooden block is to greatly condense the fibers of the block and to increase the hardness and toughness as well as the elasticity of the wood as compared with these characteristics of the same wood in its natural or uncompressed condition.

Blocks compressed in the manner described are adapted for the manufacture of wooden articles of various descriptions, as, for instance, ten-pin balls, golf club heads, mallet heads, or other articles where toughness and hardness or resistance to splitting is required, and they are particularly adapted for the manufacture of such articles which besides the qualities above men-

tioned must also possess considerable resilience, as a block of wood treated in the manner described has the natural resilience of the wood greatly increased.

5 While it is obvious that the method which has been described may be carried out by mechanisms varying widely in form and construction, the apparatus illustrated in the accompanying drawings is regarded as an
10 effective one for carrying the process into effect.

Referring to said drawings—Figure 1 represents in sectional side elevation an apparatus adapted for carrying out the method
15 above referred to. Fig. 2 is a view similar to Fig. 1 showing the parts in a position they occupy after the lateral compression of the block has been completed. Fig. 3 is a view similar to Fig. 1 showing the position which
20 the parts occupy after the entire compressing operation has been completed. Fig. 4 is a view similar to Fig. 1, the plane of section being, however, substantially at right angles to the plane of section of Fig. 1. Fig. 5 is a
25 sectional view of a ten-pin ball made from the compressed wooden block referred to. Fig. 6 is a side view of a golf club head which may be made from the compressed block.

30 Referring to Fig. 1, 1 indicates a compressing receiver which is cylindrical in form, as this particular apparatus is intended for the production of cylindrical blocks, as shown. This compressing receiver
35 has a tapered or contracted mouth 2 of the general shape of a frustum of a cone and this mouth terminates in a cylindrical channel 3, the bottom of which will be closed in any suitable manner, as, for instance, by a
40 heavy metal block 4. It may be here remarked that the compressing receiver employed should be capable of withstanding very heavy pressures, say, a pressure of several tons to the square inch of the wood to
45 be compressed. The block of wood to be compressed is indicated at 6, and it will be seen that the diameter of this block is substantially equal to the mouth of the receiving channel at its entrance end. In carrying
50 out the invention the block is driven into the compressing receiver by a plunger, as 8, which will be actuated by suitable power mechanism, such as hydraulic mechanism, not shown. As the block is driven through
55 the tapering mouth referred to and into the receiving channel of the receiver, it is strongly compressed laterally, the diameters of the block being reduced, say, from five to
60 ten per cent.

During the operation which has been described, while a considerable pressure is, of course, being exercised upon the block in order to drive it into the receiving channel, this pressure is not sufficient to have any
65 material effect in producing a longitudinal

compression of the block. After, however, the block has been driven into the receiving channel of the receiver and is resting against the supporting block 4, the pressure exerted through the plunger 8 is continued, the block
70 of wood being strongly compressed between the end of the plunger 8 and the metal block 4. This compression should be sufficient to reduce the length of the block, say, from twenty to forty per cent., according to the
75 character of the wood being operated upon.

While the compressed block may be removed from the compressing apparatus in any desired way, in the particular construction illustrated, the receiving channel is provided with an opening, as 9, through which
80 the temporary supporting block or base 4 may be removed. After this has been removed, the plunger 8 is caused to eject the block into the cavity occupied by the block
85 4, after which it may be readily removed through the opening 9.

Compressed blocks produced in the manner described may be sold to manufacturers for a variety of purposes. As a rule, blocks
90 after being sold will be used in the production of various articles, among which may be mentioned, ten-pin balls and golf club heads. Where such articles are to be produced, the compressed blocks will be subjected to the
95 proper shaping operations by wood shaping tools, such, for instance, as turning lathes to reduce the block to the shape desired.

Care should be taken that the blocks 6 and the articles fashioned therefrom are protected from undue moisture, as if either the blocks or the articles are permitted to absorb
100 large quantities of moisture they will reexpand and lose their shape and the qualities due to the treatment which has been given
105 them. The articles may be protected either by subjecting them to paraffin baths, or, in many cases, sufficient protection will be afforded by varnishing them with shellac.

What I claim is:—

1. The method of producing compressed wooden blocks which consists in subjecting a block of wood with its fibers in their natural
110 condition to heavy condensing pressure both transversely and longitudinally of the grain, the longitudinal pressure being applied while the wood is maintained under transverse compression and the pressures being
115 sufficient to materially reduce the dimensions of the block in both directions, whereby the elasticity and tenacity of the wood are increased.
120

2. The method of producing compressed wooden blocks which consists in first subjecting a block of wood with its fibers in their
125 natural condition to heavy condensing pressure transversely of the grain, and then applying heavy condensing pressure longitudinally of the grain, the longitudinal pressure being applied while the wood is maintained
130

under transverse compression and being
sufficient to materially reduce the longitudinal
dimensions of the block, whereby the
elasticity and tenacity of the wood are in-
creased.

3. A new article of manufacture consisting
of a wooden block compressed transversely
and longitudinally the fibers of the wood be-
ing otherwise in their natural condition, the
coherence of the fibers of the block and its
toughness, hardness and resiliency being in-
creased as compared with the wood in its un-
compressed condition.

4. A wooden article having the fibers of
the wood of which it is made compressed
transversely and longitudinally, said fibers
being otherwise in their natural condition,
the article being shaped to form after com-
pression.

In testimony whereof, I have hereunto set
my hand, in the presence of two subscribing
witnesses.

JOHN W. HYATT.

Witnesses:

A. WHITE,
JOHN J. KEARNS.