Aug. 14, 1928. 1,680,646

G. E. SMITH

MOLDED ARTICLE AND METHOD OF MAKING THE SAME

Original Filed Sept. 26. 1922 2 Sheets-Sheet 1

Fig. 1.

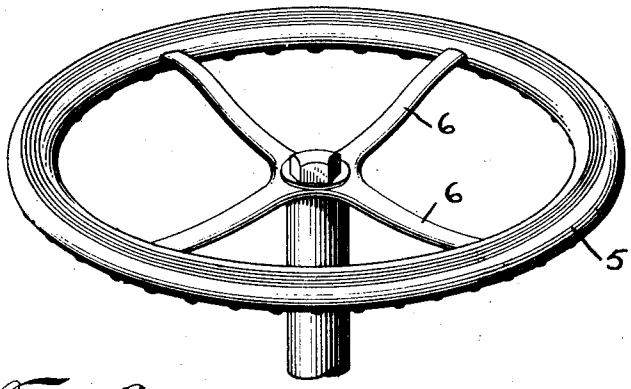


Fig. 2.

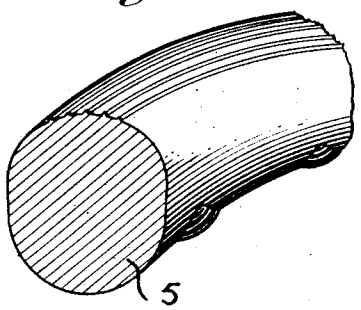


Fig. 3.

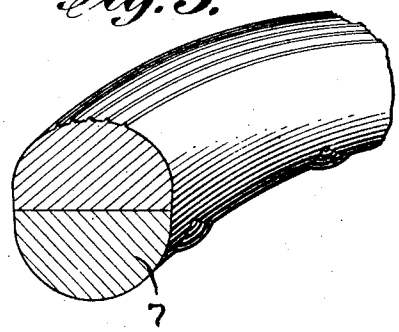


Fig. 4.

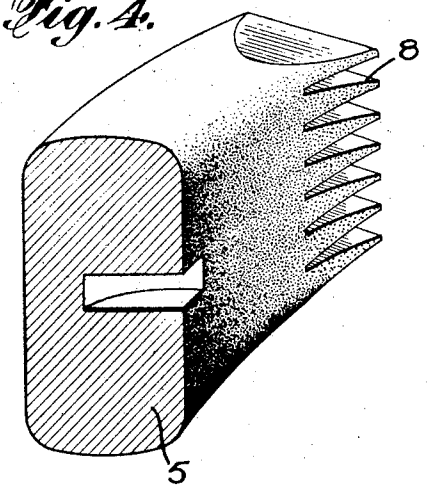
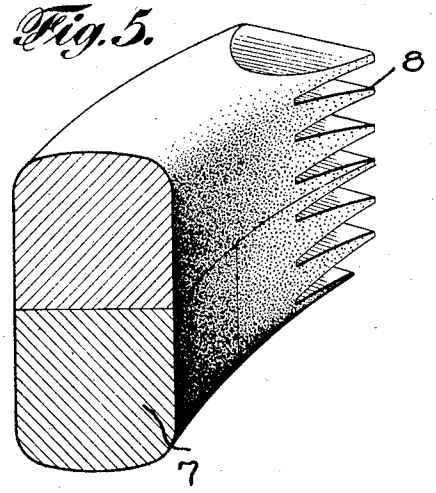


Fig. 5.



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Fig. 6.

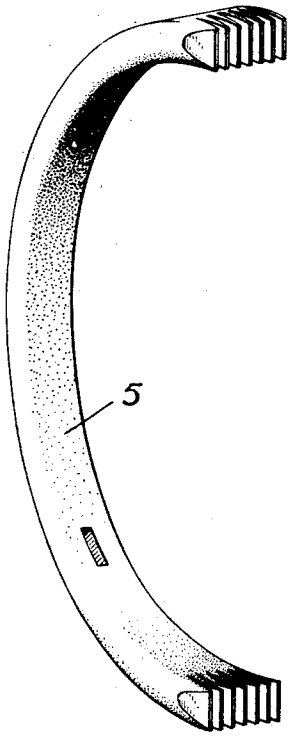


Fig. 7.

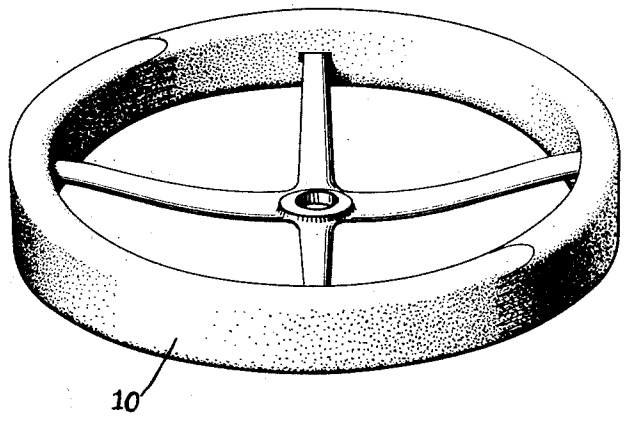


Fig. 8.

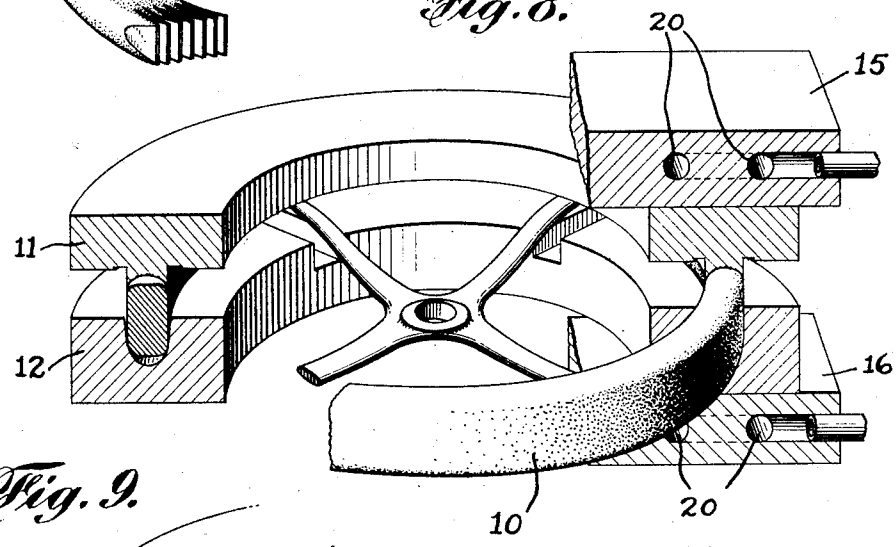
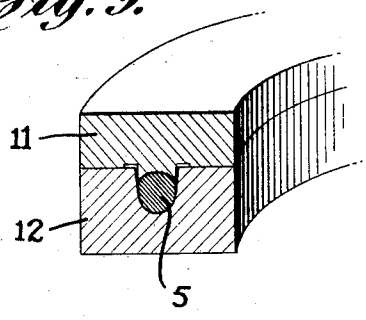


Fig. 9.



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Patented Aug. 14, 1928. 1,680,646

UNITED STATES PATENT OFFICE.

GRANT E. SMITH, OF POUGHKEEPSIE, NEW YORK.

MOLDED ARTICLE AND METHOD OF MAKING THE SAME.

Application filed September 26, 1922, Serial No. 590,604. Renewed April 30, 1927.

The present invention relates to articles made of wood or other similar fibrous material and to the manufacture thereof, this application being a continuation in part of certain earlier applications, Serial No. 186,160, filed August 14, 1917, Serial No. 198,230, filed October 24, 1917, Serial No. 234,882, filed May 16, 1918, and Serial No. 398,807, filed July 24, 1920.

Among other objects the invention is intended to provide a method of treating wood or other material and molding articles therefrom whereby the character of the wood or other material is changed to eliminate certain undesirable characteristics and form an article of improved quality. A further object of the invention is to provide an improved method of forming economically and expeditiously a hard and durable finish for certain manufactured articles. Other objects of the invention will be obvious from the following specification:

The manufacture of articles of certain types from wood or other similar fibrous material, for example, steering wheels for automobiles, or propellers for aircraft by the methods commonly employed involves considerable expense in the forming of the article and in the finishing of the same to afford the desired surface. Furthermore, articles formed of wood in the natural state especially if the wood is bent from its normal shape are subject to shrinking, warping, checking and splitting and particularly so if exposed to the weather. These disadvantages are due to the nature of the wood and in part to its tendency to dry out or to absorb moisture and are difficult to overcome if the usual methods of manufacture are followed.

The preferred embodiment of the invention includes a method of treating wood whereby its character is changed to eliminate shrinking, warping and the like, and whereby the surface is given a hard, durable and weather-proof finish.

The nature and objects of the invention will more fully appear from the description of an illustrative embodiment thereof. Inasmuch as the invention has been developed more particularly in connection with the manufacture of steering wheels for automobiles I have selected for specific description a steering wheel having a molded rim and a preferred method of making this article in accordance with the invention.

In the drawings forming a part hereof

Figure 1 is a perspective view of an automobile steering wheel made in accordance with the invention;

Figure 2 is a perspective view partly in section of a portion of the steering wheel rim;

Figure 3 is a similar view showing a portion of a steering wheel rim formed from a laminated blank;

Figure 4 is a perspective view partly in section of a portion of the rim blank from which the rim shown in Figure 2 was made, showing the shape and relative size of the same before the compressing and molding operation;

Figure 5 is a similar perspective view of a rim blank in which the blank is built up of sections to form a laminated rim section such as that shown in Figure 3;

Figure 6 is a perspective view of a semicircular wood rim blank preliminarily shaped and coated;

Figure 7 is a perspective view showing a pair of such blanks assembled with the spider ready to be compressed and molded to form the steering wheel shown in Figure 1;

Figure 8 is a perspective view somewhat diagrammatic in character and partly in section illustrating a suitable mold equipment which may be used in carrying out the method of manufacture showing the assembled rim parts in the mold and the mold in partially closed position ready for the compressing and molding operation;

Figure 9 is a sectional view similar to the sectional portion of Figure 8 but showing the rim blank in the mold after the mold has closed to form the rim.

Referring to the drawings, the steering wheel shown consists of a prepared wood rim 5 molded on to the arms 6 of a spider of usual design and construction. The preferred method of making the wheel shown involves applying a suitable coating to a previously prepared roughly shaped wood blank and molding the blank to form the finished rim.

The preliminary treatment of the rim blank to form the same and to prepare it for the compressing and molding operation may vary considerably. In the structure il-

lustrated the rim blank sections are made from straight pieces of a suitable wood such, for example, as maple, hickory, beech, birch, ash, gum, etc., by steaming and bending, and they are roughly pre-formed to correspond in a measure with the shape of the desired finished article. The edges of the blank are preferably rounded so that no sharp corners will come in contact with the mold surfaces during the molding operation.

If it is desired to form the blank from smaller pieces of material, this may be done by forming a built-up or laminated blank 7 as shown in Figure 5, the finished structure after molding being indicated in Figure 3. The sections may be serrated at their ends as indicated at 8 in Figures 4 and 5 to facilitate connecting the sections. By this arrangement when the assembled blanks are compressed, the sections will be firmly secured together the coating serving as an adhesive, and the interengaging teeth forming an interlock.

Preferably, but not necessarily, the formed blank sections are kiln dried for several days and then a coating preferably with adhesive properties is applied in any suitable way. I prefer to use a coating material which will be plastic under the conditions existing when the blank is compressed and molded and which without any separate treatment will become cured to form a permanent, hard, wear-resisting surface. Various compounds of phenolic condensation products or synthetic resins are suitable for this purpose.

I find it convenient to dissolve the phenolic condensation product in a suitable solvent, such as methyl alcohol, making the solution of a consistency similar to that of varnish and to apply the same to the sections by dipping them in the solution and allowing them to dry. If an insufficient amount of the coating is applied to the sections by one dipping operation, they may be re-dipped or a similar material in dry powdered form may be added by dusting on after the first dipping operation and while the solution is still wet or tacky.

The coating may be forced into the blank sections under pressure instead of being merely superficially applied by dipping or the like. If desired, the sections may be roughened to facilitate adherence of the coating but ordinarily this is not necessary. The coating is indicated by stippling in Figures 4 to 8.

The coating and dried sections are assembled with the spider as indicated in Figure 7 and the blank is compressed and molded about the spider arms and re-shaped to form the finished rim. Preferably this pressing and molding operation is performed while the blank is maintained in heated condition and the compressed blank is cooled while held under compression. In the method selected for description the assembled spider and rim blank 10 is placed in the previously heated two-part mold 11, 12, and the mold placed in a press between heated pressure heads 15, 16. The pressure heads of the press are then brought against the mold parts to press the same against the rim with a light pressure. The blank is allowed to absorb heat from the mold and the mold to absorb heat from the pressure heads for a predetermined time, for example, for five minutes, until the blank becomes heated, and then the extreme pressure is applied to close the mold and compress the rim blank to form the finished rim 5 as shown in Figure 9. When the mold is closed and the blank fully compressed it is cooled while still maintaining the pressure or a part of the pressure. During the compressing and molding operation the wood will flow to conform to the shape of the mold, that is to say, the fibres of the wood will move relatively and adjust themselves to the configuration of the mold in which the blank is compressed.

The heat of the mold first softens and makes plastic the coating and then during the compressing operation the coating is forced into the pores of the wood along the surface thereof and simultaneously cured to form a hard wear-resisting surface. The coating also acts as a lubricant between the mold and the blank.

The pressure employed may range, for example, from 500 to 5,000 pounds per square inch of the rim to be compressed depending upon the amount of compression desired, the material compressed, the size of the desired resultant article, and other particular features characteristic of the material, finish or mold. The temperature at which the operation is performed may vary considerably. Successful results have been obtained in compressing wood block blanks at temperatures which approximate 300° F. I find it convenient to heat the pressure heads by steam under a pressure of about 85 pounds per square inch circulating in suitable passages 20 therein. The molds may be cooled when the pressing operation is finished by circulating water in these same passages. The preliminary heating of the molds prior to inserting the blank may be accomplished in any suitable way. I find it convenient to provide steam tables heated by steam at 85 pounds pressure on which the molds are laid until they become heated before the blank is inserted.

The invention provides an exceptionally strong article by reason of the compressing and molding, which increases the density of the wood or other material of the blank and increases the coordination of the fibers. The operation of compressing the wood and combining the phenolic condensation product or other equivalent material with the sur-

face thereof produces an article which will not warp or shrink but holds a permanent set condition and has a low coefficient of expansion. The material is a good insulator and can therefore be used for various electrical insulating articles which require great tensible strength as well as effective insulation.

The invention herein described may be variously embodied within the scope of the subjoined claims.

I claim as my invention:

1. A molded article formed of sections of light permeable material separately coated with adhesive and assembled with portions of adjacent sections in interfitting relation, and then reshaped under pressure.

2. A molded article comprising a portion formed of sections separately coated with a phenolic condensation product and assembled with portions of adjacent sections in staggered relation, and then reshaped under pressure.

3. A steering wheel comprising a rim formed of sections coated with adhesive and assembled together with spider arms, and then reshaped under pressure.

4. A steering wheel comprising a rim formed of sections separately coated with adhesive and assembled in staggered relation, and then reshaped under pressure.

5. A steering wheel comprising a rim formed of sections of light permeable material separately coated with adhesive and assembled in staggered relation together with spider arms, and then reshaped under pressure.

6. A steering wheel comprising a rim formed of sections of light permeable material separately coated with synthetic resin and then reshaped under pressure, and with spider arms secured to said rim.

7. A steering wheel comprising a rim formed of sections of light permeable material separately coated with synthetic resin and then reshaped under pressure, and spider arms molded to the rim.

8. A steering wheel comprising a rim formed of sections separately coated with synthetic resin and assembled in staggered relation, and then reshaped under pressure.

9. A steering wheel comprising a rim formed of sections of light permeable material separately coated with a phenolic condensation product and assembled in staggered relation together with spider arms, and then reshaped under pressure.

10. A steering wheel comprising a rim and a waterproof coating molded under pressure to deform the rim and to shape the coating to the contour of the deformed rim, and a spider having its arms held in said rim.

11. The method of making a steering wheel which comprises roughening the rim sections, covering the sections with an adhesive, assembling a spider and the sections with the spider arms positioned in recesses in the sections, and molding the sections into a rim and hardening the adhesive, the spider arms being molded to the rim by the molding of the sections.

12. The method of making a steering wheel which comprises covering a set of rim sections with synthetic resin and reshaping the sections under pressure to harden the synthetic resin and form the rim, and securing the arms of a spider to the rim during the reshaping.

13. The method of making a steering wheel, which comprises applying synthetic resin to a plurality of rim sections, assembling said sections with spider arms fitted into said sections, molding the sections with heat and under pressure, the synthetic resin on adjoining faces of the sections and on the portions of the sections adjacent the spider arms uniting the sections to each other and to the spider arms, and the synthetic resin on the outer faces of the sections forming a hardened weatherproof surface for the wheel.

14. The method of making a steering wheel which comprises coating complementary wood rim sections with an adhesive, assembling said sections and a spider in a mold with the spider arms extended into recesses in the rim sections, and closing the mold to condense the rim sections and shape the same to form a rim, the sections being molded against the spider arms and being compressed to about one half their original volume.

15. The method of making a steering wheel which comprises assembling a spider and a block wood wheel rim blank, heating the blank to a temperature at which the blank becomes moldable, compressing the blank to about one half its original volume to mold the same about the spider and to form the wheel rim, and cooling the molded rim under pressure.

16. The method of making a molded article which comprises applying to a wood block blank a coating of liquid adhesive, applying thereon a coating of adhesive in powdered form, and applying heat and pressure to mold the wood and to cause the adhesive to set.

17. The method of making a molded article which comprises applying to a wood block blank adhesive in solution, applying dry adhesive of a similar character while the adhesive in solution is still tacky, applying heat and pressure to compress the blank to substantially reduce the size thereof and to mold the adhesive, and allowing the blank to cool under pressure.

18. The method of making a molded article which comprises applying to comple-

mentary sections a coating adapted to harden, placing the coated sections in abutting relationship and compressing them in such position while the coating is in a plastic condition to cause the combined sections to assume a desired shape, and subsequently allowing the coating to harden to secure together the sections.

19. The method of making a molded article which comprises completely coating complementary wood sections with a coating adapted to harden, assembling the sections in juxtaposition in a heated mold to heat them, closing the mold to compress the heated sections and to cause the same to flow to conform to the mold.

20. The method of making a molded article which comprises completely coating complementary wood sections with a coating adapted to harden, assembling the sections in juxtaposition in a heated mold to heat them, closing the mold to compress the heated sections and to cause the same to flow to conform to the mold, and cooling the molds to cool the formed article while retaining the same under pressure in the molds.

21. The method of making a molded article which comprises completely coating complementary sections with a coating adapted to harden, assembling the coated sections in abutting relationship and compressing them in such position to cause the combined article to assume a desired shape, and allowing the coating to harden to secure together the sections and to form an exterior wear-resisting surface thereon.

22. The method of making a steering wheel which comprises coating complementary sections with an adhesive, assembling said sections and a spider with the spider arms extending into recesses in the assembled sections, and compressing the sections to mold the same about the spider arms to form the wheel rim.

23. The method of making a steering wheel which comprises coating complementary rim sections with an adhesive, assembling said sections and a spider in a mold with the spider arms extending into recesses in the assembled article, and closing the mold to condense the sections and shape the same to form a rim, the sections being molded against the spider arms by the compression of the closing mold.

24. The method of making a molded article which comprises applying to a plurality of sections of light, permeable material liquid adhesive, applying powdered adhesive to the sections while the adhesive coating is moist, assembling the sections and molding them under pressure to reshape them to the form desired.

25. The method of making a steering wheel which comprises assembling a spider and a plurality of rim sections, coating with a phenolic condensation product, and molding the sections under pressure to harden the phenolic condensation product and to cause it to impregnate the sections, the pressure being greatest in a direction to unite the sections to each other and the rim sections having a dimension in this direction greater initially than finally and having a dimension transversely of this direction less initially than finally to permit the flowing of the rim sections during molding.

26. The method of making an article which comprises dipping a plurality of sections of light permeable material in a synthetic resin solution, applying synthetic resin powder while the synthetic resin coating is moist, assembling the sections and molding them under pressure to reshape them to the form desired.

In testimony whereof, I have signed my name to this specification this 13th day of September, 1922.

GRANT E. SMITH.