The invention relates to molding trays formed of a core of wood with a sheet covering bonded to both faces thereof.

In molding trays having a rim, a bottom and a sloping portion between the bottom and the rim with a core of wood and a prefinished sheet covering, such as paper on which decorations have been lithographed, it is desirable to subject the wood in the rim and the sloping portion to a crushing pressure for stiffening purposes. When the core of wood in the bottom of the tray is subjected to crushing pressure, wrinkles or waves are produced in the bottom of the tray as the result of different densities in different portions of the wood in the bottom, and the grain in the wood in the bottom will be impressed in the paper, all of which mar the appearance of the tray. It is also advantageous, for economy in manufacture, to avoid carefully a surface, by sanding, the sheet of wood used as a core and the use of selected wood or wood of even grain, which is high in cost.

One object of the invention is to provide an improved method for molding trays of this type from a blank of wood with a finished sheet covering, such as lithographed paper, and thermosetting the glue between the wood and the covering, which densifies or crushes the wood in the rim and the sloping portion between the rim and the bottom for stiffening purposes while the bottom of the tray will be subjected to yielding pressure, whereby warping or wrinkling will be avoided, the transfer of the impression of the grain in the core to the cover sheet will be prevented, and varying density in the wood in the bottom will not affect the evenness of the top face of the finished bottom.

Another object of the invention is to provide improved apparatus for molding trays having a rim, a sloping portion inside of the rim and a bottom, all formed of a wood core and a sheet covering on both faces thereof which is bonded to the core, and whereby the core of the tray will be subjected to yielding pressure for preventing wrinkles in or warping of the bottom, transfer of an impression of the grain in the core to the cover sheet, and the unevenness on the top face of the bottom.

Other objects of the invention will appear from the detailed description.

The invention consists in the several novel features hereinafter set forth and more particularly defined by claims at the conclusion hereof.

In the drawing:
Fig. 1 is a vertical transverse section of the dies for molding the tray, showing them in separate relation, and a blank of wood and a sheet of covering interleaved with glue, between the dies.
Fig. 2 is a similar section illustrating the dies after they have been operated to mold the tray.
Fig. 3 is a plan of the female die.
Fig. 4 is a perspective of the finished tray.

In carrying out the invention, a sheet a of suitable paper on which has been lithographed the decoration or ornamentation d desired on the top face of the bottom of the finished tray, is folded around a sheet or blank b of wood which forms a core, and a sheet of glue c is folded between the paper and both faces of the wood blank. The tray is molded to its finished shape in a single operation during which the wood and paper cover are shaped and bonded together by thermosetting of the glue.

The invention is exemplified for molding a tray d having a generally rectangular and circumferential rim d', a flat centrally formed bottom d2 and a sloping portion d3 between and integral with the bottom and the rim, all with a core of wood and a finishing cover of paper.

The molding apparatus comprises a male die 10 and a female die 11 which can be used in a press of any suitable construction and which is provided with suitable heating means for thermostatic-setting the glue while the tray is being shaped and molded. The female die 11 is supported on a bed 12 of the press, and any suitable mechanism may be used for reciprocating the ram to operate the male die 10 to and from the female die.

The male die 10 is rigid throughout and is provided with a flat, rectangular or marginal rim-shaping face 13, an inclined rectangular or marginal face 14 around the inside of the face 13 for shaping the sloping portion d2, a flat bottom-forming face 15, offset from the face 13, and which may be provided with ribs for forming grooves or depressions d' at the beveled corners of the face 14 in the top of the tray.

The female die 11 comprises a rectangular frame 16 which is provided with a flat generally rectangular circumferential top-face 17 which coacts with the face 13 of the male die to shape the rim d' of the tray, an inclined generally rectangular face 18 substantially parallel to the face 14 of the male die for shaping the sloping portion d2 in the tray, and a flexible pad which coacts with the flat face 18 of the male die in shaping the bottom d3 in the tray. This pad comprises a shell or container 20 of thin flexible...
metal, such as 20 gauge steel, and is loaded with a quantity of oil which is not normally under pressure, and sufficient air to render its top face sufficiently resilient and flexible while the tray is being molded to uniformly distribute the pressure throughout the bottom of the tray. The sides of the shell 20 extend into a recess 23 and the margins of the pad overlap the face 18 of the frame 16. The dies are designed to subject the rim and sloping portion 2 of the tray to a crushing pressure usually about 500 lbs. p. s. i. and the pad is designed so that a lower pressure of approximately 65 lbs. p. s. i. will be applied to the bottom of the tray. The top face of the shell is sufficiently flexible and resilient, when subjected to this lower pressure, to shape the top face of the tray against the flat rigid face 18 of the male die, and the flexible face on the female die will yield to any irregularities in the wood of the core and uniformly distribute the lower pressure throughout the bottom of the tray. Any irregularities or defects which result from the varying density in different portions of the wood will be in the under face of the bottom while its top face will be entirely flat. This reduced evenly distributed pressure against the bottom of the tray also prevents the grain of the wood from being visibly impressed in the paper on the top face of the bottom of the tray. As a result, no defects caused by the quality, varying densities of, or grain in, the wood in the core will be visible on the top face of the bottom of the tray, and such defects as result are visible only on the underside of the tray. Hereofore, considerable loss was entailed from the defects which were apparent in the top face of the tray, and these are eliminated by the use of the flexible pad which produces flatness and uniformity, and avoids impressions of the grain of the wood in the top covering on the top face of the tray. The female die 11 is provided with dowels 24 which are adapted to enter recesses 25 in the male die for guiding the assembly between the rigid face 18 of the female die and the rigid coating face 17 of the male die and also between the sloping forming face 14 of the male die and the coating face 18 of the female die. This pressure to which the wood or core in the rim and sloping portion of the tray is subjected is sufficient to crush the core of wood between the paper covering in the rim 2 and the sloping portion 2 of the tray, and the heat from the dies will thermo-set the interlaced glue. The indentations 21 will be simultaneously impressed in the corners of the sloping portion of the tray 14 on the male die will yield so that the wood in the bottom of the tray will be subjected to a pressure ranging from approximately 65 lbs. p. s. i. The flexible top face of the pad distributes this reduced pressure evenly against the underside of the bottom of the tray and yields to any irregularities in thickness or due to different densities in the different portions of the wood in the bottom, while the paper on the top face of the bottom of the tray will be pressed flat and devoid of defects. The transfer of impressions of the grain to the paper on the top of the bottom 2 of the tray will be avoided. Variations in the grain of the core of wood in the bottom 2 under the lower pressure will not result in any imperfection on the covering on the top face of the bottom of the tray and only on the underside of the bottom where they do not affect the appearance of the tray. The pressure and heat to which the bottom of the tray is subjected is sufficient for thermo-setting the glue between the core and the paper cover. After the tray has been molded, the margin of the rim is usually trimmed to a finished edge.

The pad 20 containing a fluid which is usable with heated dies, provides a flexible face on the female die which is preferable to an elastic material, such as rubber, because it has been found in practice that rubber develops irregularities when used with heated dies, such as are necessary for thermo-setting the glue simultaneously with the shaping of the tray.

The invention provides for molding in a single operation a tray having a core formed of a sheet of wood and covered with prefinished and decorated paper and for subjecting the core of wood in the rim and sloping portion of the tray to a sufficiently high pressure for densifying or crushing it for stiffening purposes, and for molding the flat bottom in the tray with a lower and yielding pressure which results in molding the bottom of the tray with a flat even top face of the paper without transfer of the grain in the core to the top layer of paper during each thermo-setting of the glue between the core of wood and the paper. This method effects high saving in cost by lowering the percentage of imperfect trays in rapid production and by rendering fine surfacing of the blank wood, by sanding and the use of selected wood with grain of uniform density, unnecessary.

The invention is not to be understood as restricted to the details set forth since these may be modified within the scope of the appended claims without departing from the spirit and scope of the invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent is:

1. That improvement in molding a core of wood with a sheet covering glued on both faces thereof into a tray having a rim, a bottom and a sloping portion between the rim and the bottom which comprises: subjecting the rim and the sloping portion inside of the rim to a sufficiently high pressure for crushing the portion of the core in the rim and sloping portion of the tray, and shaping the core and coating into the bottom and the paper of the tray by rigid pressure on the top face and yielding pressure on the bottom face which localizes in the bottom face of the tray any irregularities resulting from variations in density in the core, and bonding together the entire core and covering while under such pressure.

2. That improvement in molding a core of wood with a sheet covering glued on both faces thereof into a tray having a rim, a bottom and a sloping portion between the rim and the bottom which comprises: subjecting the rim and the sloping
portion inside of the rim to a pressure of about 500 lbs. p. s. i., for crushing the portion of the core in the rim and sloping portion, and shaping the core and covering in the bottom of the tray by rigid pressure on the top face and yielding pressure on the bottom face, of approximately 65 lbs. p. s. i., which localizes in the bottom of the tray any irregularities resulting from variations in density in the core, and bonding together the entire core and covering while under such pressures.

3. Apparatus for molding a tray composed of a core and a sheet-covering and having a rim, a bottom and a sloping portion between the rim and the bottom, comprising: a male die provided with a rigid face for shaping the top face of the rim, the sloping portion, and the bottom of the tray, and a female die provided with a rigid face portion for coacting with the portion of the male die for shaping the top face of the rim and sloping portion of the tray, for densifying the portion of the core in the rim and sloping portion, and with a flexible face for coacting with the bottom-forming portion of the male die in shaping the under face of the bottom of the tray to localize in the under face of the bottom any irregularities resulting from varying density in different portions of the core.

4. Apparatus for molding a tray composed of a core and a sheet-covering and having a rim, a bottom and a sloping portion between the rim and the bottom, comprising: a male die provided with a rigid face for shaping the top face of the rim, the sloping portion and the bottom of the tray, and a female die provided with a rigid face portion for coacting with the portion of the male die for shaping the top face of the rim and sloping portion of the tray and densifying the portion of the core in the rim and sloping portion, and with a flexible pad composed of a container with a fluid therein forming a flexible face for coacting with the bottom forming portion of the male die in shaping the under face of the bottom of the tray, and localizing in the under face of the bottom any irregularities resulting from varying density in different portions of the core, the dies being adapted to exert a predetermined high pressure for crushing the core in the rim and sloping portion of the tray and a relatively lower pressure in the bottom of the tray.

5. Apparatus for molding a tray composed of a core and a sheet-covering and having a rim, a bottom and a sloping portion between the rim and the bottom, comprising: a male die provided with a rigid face for shaping the top face of the rim, the sloping portion and the bottom of the tray, and a female die provided with a rigid face portion for coacting with the portion of the male die for shaping the top face of the rim and sloping portion of the tray and densifying the portion of the core in the rim and sloping portion, and with a flexible pad composed of a container with a fluid therein forming a flexible face for coacting with the bottom forming portion of the male die in shaping the under face of the bottom of the tray, and localizing in the under face of the bottom any irregularities resulting from varying density in different portions of the core, the dies being adapted to exert a predetermined high pressure for crushing the core in the rim and sloping portion of the tray and a relatively lower pressure in the bottom of the tray.

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