My invention relates to a method and means for preventing the warping of wood boards, panels, etc. as used in cabinet work, doors, wainscoting, partitions and flooring. Various methods have heretofore been employed involving the use of reinforcing ribs of wood or metal, but all such methods required considerable time and care, making the work expensive, and in the simple and inexpensive methods involving the use of reinforcing ribs pinned to the board, the pinning was ineffective in that the tendency of the wood to warp would cause it to pull away from or start the pinning and gradually loosen the reinforcing rib as to render it entirely ineffective.

The improved method of my invention consists in grooving one side of the board or panel, inserting perforated metal reinforcing strips edgewise into such grooves, and securing such strips by pins or screws driven horizontally, or nearly so, into the board or panel, that is to say, the pins are driven between the major surfaces of the board or panel as distinguished from being driven through or normal to such surfaces. To facilitate the driving of the pins in this manner, the board or panel is grooved along the grooves adjacent to the perforations in the reinforcing strips. These reinforcing strips may be made in various forms, with or without lateral stiffening wings, and such wings may be perforated for pinning.

My invention is illustrated in the accompanying drawings, in which Figure 1 is a plan view illustrating a board, either one-piece, veneered or laminated, having cross slots and metal reinforcing pieces; Figure 2 a longitudinal vertical section on the line 2—2 of Figure 1; Figure 3 a side elevation of the metal strip employed as the reinforcing strip or rib in Figure 1; Figure 3a a top edge view of the piece shown in Figure 3; Figures 4 and 4a are enlarged top and end views of the cross-block or stiffening wing employed with the metal rib of Figure 3; Figure 5 a plan view illustrating a modified form of reinforcing rib; Figure 6 a vertical section on the line 6—6 of Figure 5; and Figures 7 and 8 are perspective views of two additional forms of reinforcing ribs.

Referring to the drawings, and more particularly to Figures 1 and 2, a represents a board, either solid, laminated, veneered, jointed, inlaid, or any other piece of wood, which it is desired to hold against warping, and intended especially for panels in cabinets or other furniture, doors, partitions, wainscoting, or for flooring or any class of wood work, such as table tops, etc. Such boards or panels according to my invention are slotted crosswise on the under or unexposed side, as shown at b, and into these slots are inserted, edgewise and closely fitting, metal strips or ribs c. These ribs are secured in place by pins d driven through holes e, and for this purpose the board is groosed on opposite sides of the metal strip as shown at f, the pins being preferably driven from opposite sides of the strip, and in a plane parallel, or nearly so, to the surfaces of the board. This method of using a metal strip and pinning insures a much greater degree of rigidity to the board against warping than metal or other strips laid flat and pinned by vertically driven pins; first, because the edgewise setting of the strip will resist the bending or warping of the wood to a far greater degree; and second, the tendency of the wood to bend or warp cannot start or pull away from the pinning as would be the case if vertically driven pins were employed.

The metal ribs may be further secured by employing cross-pieces or wings g, which are secured to the board a by pins or screws h. One form of wing g is shown in Figures 1, 2 and 4, and in this form the longitudinal sides of the wings are bevelled to fit dovetailed slots i in ribs c, shown more clearly in Figure 3. These wings, if desired, instead of being separable from ribs c, may be made in other shapes and integral with ribs c as by brazing or otherwise.

In Figures 5 and 6 the metal reinforcing ribs are provided with lateral projections or fins g', preferably formed integral therewith, and projecting at right angles from both sides of the rib. The upper edges of these fins are flush with the top edge of the rib and the under edge is preferably an arc of a circle, or approximately so, meeting with the bottom or inner edge of the rib, and provided with holes for pins d as in Figure 1, but in this form, the pins project parallel to the ribs between the upper and lower surfaces of the board. For this form of reinforcing rib the board is grooved crosswise as in the arrangement of Figure 1, but gouges f are also cut crosswise of the board, or parallel with grooves b instead of per-
pendicular thereto. In this form pins \(d\) perform the functions of both pins \(d\) and \(h\) of Figure 1.

In Figures 7 and 8 are shown two similar forms of reenforcing ribs made from flexible strip metal, punched with pin-holes and cut-outs, and bent into \(T\) or \(L\) shape in cross-section. In this form the vertical sections \(c'\) of the reenforcing rib are bent close together, and pin-holes \(e\) in the two halves of sections \(c'\) are punched so as to register. In using this form of reenforcing rib the board is grooved and provided with gouges \(f\) perpendicular and adjacent to the pin-holes \(e\) as in Figure 1. The lateral or wing members \(g^2\) of ribs \(c'\) take the place of wings \(g\) of Figure 1, and are provided with pin-holes for pins \(h\). In this form of reenforcing rib the wings or flanges \(g^2\) add greatly to the rigidity of the rib. Flanges \(g^2\) are provided with cut-outs \(k\) in alignment with pin-holes \(e\) so that when the ribs are bent into form, the cut-outs will be over the pin-holes and will register with gouges \(f\) in the board to permit driving the pins \(d\).

In employing either of the forms shown in Figures 1, 7 or 8, the board may be chambered to counter-sink the wings \(g\) or flanges \(g^2\) as shown in the sectional view, Figure 2. Also when desired, or when the invention is employed with door panels, or where both sides of the board will show, the board or panel may be veneered to cover the reenforcing members as indicated by the dotted line in Figure 2.

What I claim is:

1. The method of preventing warping of boards or panels, consisting in grooving the board, inserting perforated metal strips edgewise in such grooves, gouging the board adjacent to the perforations in the metal strip, and pinning the strips in position by pins driven normal to the broad-sides of the strips.

2. The method of preventing warping of boards or panels, consisting in grooving the board, inserting edgewise into such grooves perforated metal strips having lateral projections also perforated, gouging the board adjacent to the perforations in the metal strips, and pinning the strips in position by pins driven normal to the broad-sides of the strips, and also driving pins through said lateral projections.

3. The combination with a board or panel to protect same against warping, of one or more metallic ribs adapted to be inserted edgewise into grooves in such board or panel, each such rib having spaced perforations throughout its length for pins to be driven normal to the broad-sides of such ribs and between the major surfaces of the board or panel, and cavities adjacent the grooves and rib perforations for facilitating the driving of the pins.

4. The combination with a board or panel to protect same against warping, of one or more metallic ribs adapted to be inserted edgewise into grooves in such board or panel, each such rib having spaced perforations throughout its length, lateral projections on said ribs having perforations for pins, cavities adjacent the grooves and rib perforations, and pins driven through the rib perforations normal to the broad-sides of the rib and between the major surfaces of the board or panel.

This specification signed at New York city, in the county and State of New York, this 8th day of April, 1926.

EDWARD FREUND.