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PATCH GLUER UTILIZING HIGH-FREQUENCY ELECTRICITY

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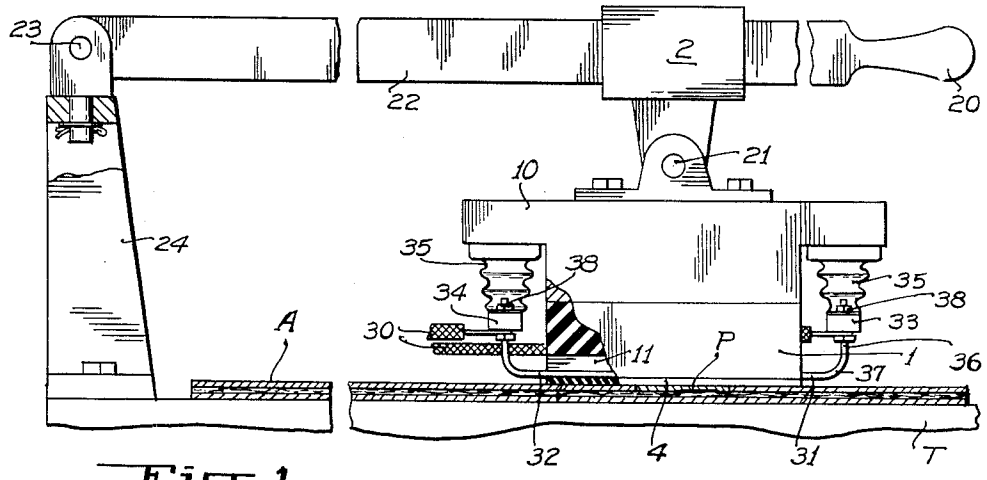

Fig. 1

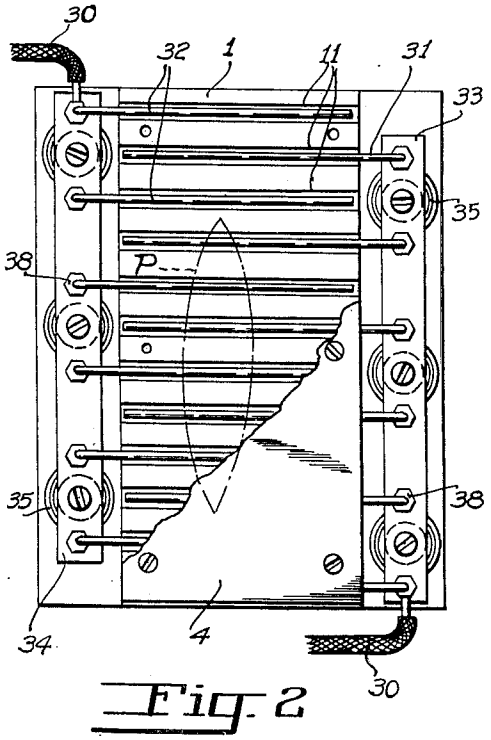

Fig. 2

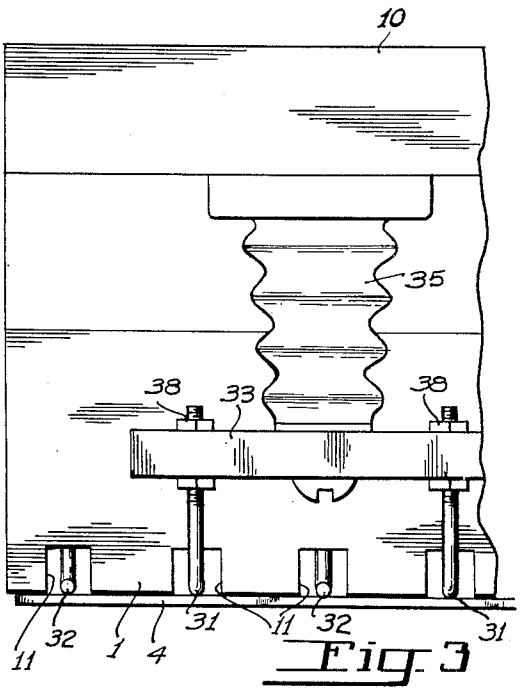

Fig. 3

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PATCH GLUER UTILIZING HIGH-FREQUENCY ELECTRICITY

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Manufacturers of veneer attempt, by clipping out defects and splicing veneer strips, to eliminate blemishes or defects that will show up in the face plies of the plywood wherein the veneer is later incorporated. For one reason or another this ideal is not attained completely, and after the panels have been laid up and completed blemishes or defects sometimes appear, and they may be located in any part of the area of a large panel. It is common practice in the plywood industry to cut out such defects, to the depth of the face ply only, frequently by two elongated opposed arcuate cuts which bracket the defect, and then to insert in the opening thus left in the face ply a patch cut to the precise size and shape of the recess. Some patches must be glued in place, and should be firmly pressed into the recess in order that the glue will set properly and will hold the patch tight, not only about its inner or lower surface but also about its edges. The operation has heretofore required some thirty seconds for each patch. The present device pertains to the pressing and gluing of such patches, and has for its primary object the provision of a tool by which not only may the patch be pressed firmly into place, but which at the same time will serve to effect the setting of the glue, all within a space of a few seconds, to the end that the patch will not only be located properly, but will simultaneously be fixed in that location.

Patch gluing devices and methods as employed before have usually involved the use of a hot plate of appreciable area, which is pressed with some little force down upon the patch and the surrounding panel surface, to dry the glue beneath the patch by heat transmitted through the thin patch from the hot plate. Sometimes this heating progresses to the point of scorching or altering the color of the panel surface beneath the hot plate, and this downgrades the panel or makes it unusable for some purposes. It is a further object of this invention to produce the necessary heat but to confine the heating almost entirely to the glue beneath and about the margins of the patch, and so to avoid overheating or defacement of the panels' surface.

To attain the ends indicated a high frequency discharge is employed at the time of the patch pressing operation, the heating effect whereof is localized almost wholly within the glue, and which is negligible with relation to the area and vicinity of the patch, and to the patched face ply, and produced by means of a small shiftable patcher head, suitably supported. While in general the idea of employing a high frequency discharge to heat and set glue quickly is known in various woodworking operations, ordinarily such applications involve the use of fixed and relatively cumbersome machinery, the opposite electrodes whereof are located at opposite faces of the work, the use whereof would tend to heat through the entire panel area exposed to the discharge to an undesirable degree, and then only by employment of an excessive amount of energy. Among the objects of the present invention are to provide means for employing such a high frequency discharge in the setting of veneer patches, by means of a simple tool, such as may be governed or applied readily in the usual way by a workman, and by a tool the opposite electrodes whereof are applied to the same face of the work, yet in such manner as will efficiently heat the glue to set it, without materially heating the surrounding wood.

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It is, likewise, a further object of the invention to provide such a tool adapted to the purpose indicated, wherein special provisions are made to assure widely distributed, effective disposition of the patch and surrounding area with relation to the high frequency discharge terminals, for even distribution of the heating effect, and at the same time to bring about an adequate degree of mechanical pressure of the pressing block upon the face of the panel and patch, and adequate area and distribution of contact between the block and the work, for even distribution of that pressure, with no appreciable reliance upon the electrode terminals to produce mechanical pressure.

In employing high frequency discharge for glue-setting operations and the like, it is not uncommon to employ interdigitated fingers as the terminals of the high frequency discharge, but these are usually in automatic machines for quantity production, such as may be employed, for example, in the gluing of soles upon shoes, and frequently are employed in conjunction with an intermediate or neutral plate common to all the fingers, located at the opposite side of the sole, so that the discharge must pass through the sole. It is an object of the present invention to provide such inter-digitated sets of fingers, but adapted in form to employment in such a small flexible tool as has been indicated above, and lacking any means tending to cause or requiring that the discharge pass through the work from one face to another, but rather inducing discharge solely in the glue line between the plane of the patched face ply and the next inner core ply.

At the same time, it is an object so to locate

such fingers with relation to one another, to the pressing face of the block and its grooves, and to the work to which they will be applied, that sufficient field density to produce leakage through the block or across its pressing face is always unlikely, yet the field density will be sufficient, and sufficiently concentrated along the path afforded by the glue line, that leakage or discharge, and the consequent heating effect, will be largely confined within the glue line, including in the latter term not only the patch margin but also its under surface.

With such objects in mind, and others as will appear hereinafter, the present invention comprises the novel patch gluing tool and the novel combination and arrangement of the parts thereof relative to one another, such as is shown in the accompanying drawings, as will be described in this specification, and as will be defined more fully in the claims at the end hereof.

In the accompanying drawings the invention is shown embodied in a typical or representative form, but it will be understood that the principles thereof, as more fully brought out in the claims, may be embodied in forms which vary therefrom.

Figure 1 is an end elevation, in parts broken away, illustrating such a patch gluer in actual operation.

Figure 2 is a bottom plan view of the pressing face of such a tool.

Figure 3 is an enlarged side elevation of one end of such a tool.

A presser block is formed of or includes a block 1, the entire lower face of which might contact the face of a plywood panel A which rests upon a table T, although preferably contact is by way of an intermediate plate 4. The block 1 should be of dielectric material capable of withstanding to a high degree the intense high frequency discharge between electrode terminals to be described shortly. For reasons of ruggedness, simplicity, and economy, the block 1 may constitute the lower face of a composite block, the upper portion 10 of which may be the foundation or support for other members, and the means by which the block as a whole may be supported. It might be supported, for instance, by a simple handle, or, as herein shown, the portion 10 is pivotally mounted at 21 upon a slide 2 which is slidable lengthwise of an arm 22 pivoted at 23 upon a support such as the bracket 24 that is mounted upon the table T. By means of a handle 20 the block 1, 10 can be raised from contact with the panel A and lowered and pressed into contact with the latter.

The lower face of the block 1 is groved at intervals, as may be seen in Figures 2 and 3, the precise patern of the grooving and the number of grooves being largely immaterial, but as herein shown, the several grooves 11 are straight and arranged in parallelism transversely of the block. They are spaced sufficiently apart that in conjunction with the dielectric qualities of the block 1 and of the air gap across the grooves discharge directly through the air gap or along the surface of or through the block, between electrodes within adjacent grooves, is unlikely.

In each groove is received a terminal electrode 31 or 32. These electrodes, which preferably take the form of rods or stiff wires, are connected in sets or groups, the electrodes 31 to a bus 33 at one side of the block 1 and the electrodes 32 to a bus 34 at the opposite side of the block. The busses 33 and 34 are, therefore, well separated, and each is connected, as by the leads 30, to the opposite terminals of any suitable source of high frequency discharge, the source being not herein illustrated.

The two sets of fingers 31 and 32 are interdigitated; each such finger is supported in its individual groove 11, well spaced throughout its length from the sides and bottom of the groove, and stopping short of the end of its groove, to leave an air gap which precludes the likelihood of leakage, even with the greatest field density near the finger, and in consequence the fingers 31 and 32 do not contact the block 1 at any point, but are held from contact therewith. Neither do the busses 33 and 34 contact the block. They are supported by insulators 35. The entire arrangement is such as to minimize the probability of leakage or other undesirable discharge.

The plate 4 overlies and is secured upon this lower, grooved face of the block, and the fingers 31 and 32. It is of dielectric material, and should be of one piece, substantially coextensive in area with the block's face. While its thickness should be uniform throughout, it is relatively thin; its absolute thickness will be determined by the pattern of the high frequency field. Such a plate does not appreciably impede the passage of the discharge between electrodes, nor itself become heated materially. In deed, the heating effect of such a discharge is often lesser close to the terminals, and increases tremendously at only a short distance towards the opposite terminal, wherefore the spacing afforded by the thin plate 4 induces the heating from a point in the glue line at the panel's surface inwardly, and not merely from a submerged point inwardly, as might occur if the terminals were not so spaced from the panel's surface. Additionally, the plate is sufficiently stiff to bridge the grooves, and to distribute the pressure of the block quite uniformly over the panel's surface.

It is not implied that the patch gluer will not function quite satisfactorily without the plate 4; tests have shown that, without the plate, quite acceptable bonds can be formed with the electrodes and the block itself both resting upon the panel's surface. A somewhat better bond results, in about the same period of time—approximately four seconds—with the plate. One of the principal advantages of the use of the plate is the avoidance of arcing between electrodes. Without the plate 4 glue exuded from the patches hardens upon the electrodes, soon forms focal points for discharge, and eventually arcing results, and once the block surface is scored by such arcing, it will have to be discarded. The plate 4 spreads and flattens out exuded glue, and it will not adhere to the plate's surface. Should it build up, or should arcing occur across the plate's surface—it can not occur directly between grooves 11, for they are sealed over by the plate 4—the plate can be removed readily, and a new one applied, with little expense or delay.

It has been indicated that the fingers 31 and 32 lie in the plane of the face of the block 1, or, if that face is not planar, but instead conforms to a non-planar work surface, then the fingers lie generally coincident with the block's lower face. Preferably, each finger protrudes slightly from that face, at least sufficiently that the fingers 31 and 32 contact the plate 4 before the latter quite seats upon the block's face, or if the plate is omitted, they contact the work slightly before the block 1 itself contacts the work. However, the fingers should be sufficiently yieldable

with respect to the block as a whole, or with respect to the bus bars wherein they are mounted, that they will yield resiliently and permit the plate to seat fully upon the lower face of the block 1 while the fingers themselves are being thus resiliently pressed quite evenly against the plate itself. Conveniently the fingers themselves are inherently resilient, so that they may yield, individually, and are mounted in such way that when they yield, the yielding will not deflect their free ends away from the plate, or away from the work if the plate is omitted. To such ends, and in order to permit such adjustment as may be desirable, of the fingers with respect to the plane of the block's grooved face, each finger at one end is directed from its supporting bus at right angles to the work face, as indicated at 36, thence curves, as indicated at 37, inwardly toward the block and into the approximate plane of the grooved face of the block across which face it extends, each in its own groove, substantially coplanar with the block's face. Each such initial or supporting end is threaded or otherwise adjustably mounted in its bus bar, as is indicated at 38, and each finger is therefore individually adjustable to bring it into the proper planar relationship relative to the block's face, and to space it correctly from the walls of its groove 11.

The operation, it will be understood, does not differ appreciably from the normal patch-setting operation. A recess is cut in the veneer in the usual manner, as is indicated in dot-dash lines in Figure 2, and a patch of the same size and shape, as indicated at P, is fitted into place, with adhesive on its inside surface. Now, with the presser block 1 located to include the area of the patch and some surrounding area, it is pressed down upon the panel A, and the high frequency discharge occurs, under controls not herein shown. This discharge, entering from all of the fingers 31, for instance, which are of like potential, passes through the plate 4 and equally to the fingers 32 of the opposite set. No area has appreciably more nor appreciably less density of discharge than any other area. However, since the fingers are inevitably disposed transversely of the curved glue line which is the edge of the patch P, the discharge is concentrated along the wet glue all about this glue line, and beneath the patch. In consequence, and because of the intimate contact thus produced throughout the entire glue line, and because of the discharge principally lengthwise of the glue line, and in the plane of the patch's hidden surface, and not through the wood itself, the glue sets in a matter of a few seconds, so that what with other glues and previous methods was merely an operation of pressing the patch into place, for the glue to set later, or of heating the wood to dry and set the glue, now becomes a means to effect a completed operation, namely the pressing of the patch to its seat and the setting of the glue to hold it thus located. The interdigitated fingers provide for substantially uniform distribution of the heating effect from the high frequency discharge throughout the entire area covered by the pressing block, hence, there is no tendency to overheat or to undercure in different areas. Moreover, since patching is always accomplished in the face ply of a finished plywood panel which is of at least three plies thickness, and it would be impracticable and undesirable to effect the high frequency discharge through the entire panel, the arrangement described wherein all the terminal electrodes are at the same side of the panel, but adequately separated one from another, provides a practicable and efficient means of accomplishing the desired result, such as has not heretofore been available.

I claim as my invention:

1. A patch gluer or the like comprising a block of dielectric material having parallel, spaced grooves in one face, an electrode in each groove, spaced at all points from the block, but disposed substantially coincident with the surface of the block's work-opposing face, and means connecting the electrode in one such groove to one terminal and the electrode in another such groove to the opposite terminal of a high frequency discharge source.

2. The patch gluer defined in claim 1, including a plate of dielectric material overlying and isolating the grooves and enclosing the respective electrodes therein.

3. A patch gluer comprising a block to press a patch to its seat, grooved in one face, and elongated electrodes for connection to opposite terminals of a high frequency discharge source, each received in and protruding slightly from one of said grooves, generally coplanar with the block's grooved face, uniformly spaced from the groove's walls, and each of inherently resilient material supported for movement resiliently relative to the block, by their yielding to effect simultaneous contact of the electrodes with a surface whereto the block's grooved face is pressed.

4. The patch gluer defined in claim 3, wherein each inherently resilient electrode is formed as a rod bent substantially at a right angle near one end, means supporting such short bent end to resist thrust lengthwise of the short end, the long end being received in the block's groove, and yielding to pressure in the same direction as that resisted by its short end.

5. The patch gluer defined in claim 4, including means for adjustment of each short end individually, in the direction of its length.

6. A patch gluer comprising a block to press a patch to its seat, having parallel grooves spaced across one face, two bus bars supported from respectively opposite sides of the block, for connection to opposite terminals of a high frequency discharge source, a plurality of fingers mounted in each bus bar and each received in an individual one of said grooves, uniformly spaced from the groove's walls, and substantially coplanar with but protruding slightly from the grooved face, the fingers of the respective bus bars being interdigitated one set with the other, and a dielectric plate overlying the grooved face of the block, the fingers being inherently resiliently yieldable relative to the block upon contact by said plate.

7. Mechanism to secure a patch in a surface recess of a body which is resistant to passage of a high frequency discharge, comprising a dielectric block having a grooved face generally conforming to the contour of the recessed surface of such body, electrodes of opposite potential received in respective grooves, said electrodes being disposed each in but spaced at all points from its groove, and elongated to span the recess, and a plate of dielectric material overlying the grooved surface of said block and said electrodes to press evenly upon the patch in the body's recess and the surrounding surface.

8. Heating and pressing apparatus comprising a solid dielectric press block having a work opposing face, means mounted upon the block for transmitting pressure thereto for application to the work through the block's work opposing face,

said work opposing face having therein substantially parallel elongated grooves, elongated electrodes received lengthwise in each of the respective grooves and spaced appreciably from the groove surfaces at all points, and high-frequency electric energy source connecting means of opposite polarity connected respectively to alternate electrodes to produce a stray field in the work by energization of said electrodes, and thereby to heat the work as pressure is applied thereto by the press block.

9. Heating and pressing apparatus defined in claim 8, and a dielectric layer interposed between each of the electrodes and the surface of the work engaged by the block, said layer being in contact with the side of each electrode facing the work.

10. Heating and pressing apparatus defined in claim 9, wherein the sides of the electrodes facing the work are substantially coplanar with the work opposing face of the block and the interposed dielectric layer comprises a continuous plate of

dielectric material overlying the face of the press block adjacent to the work and the electrodes.

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