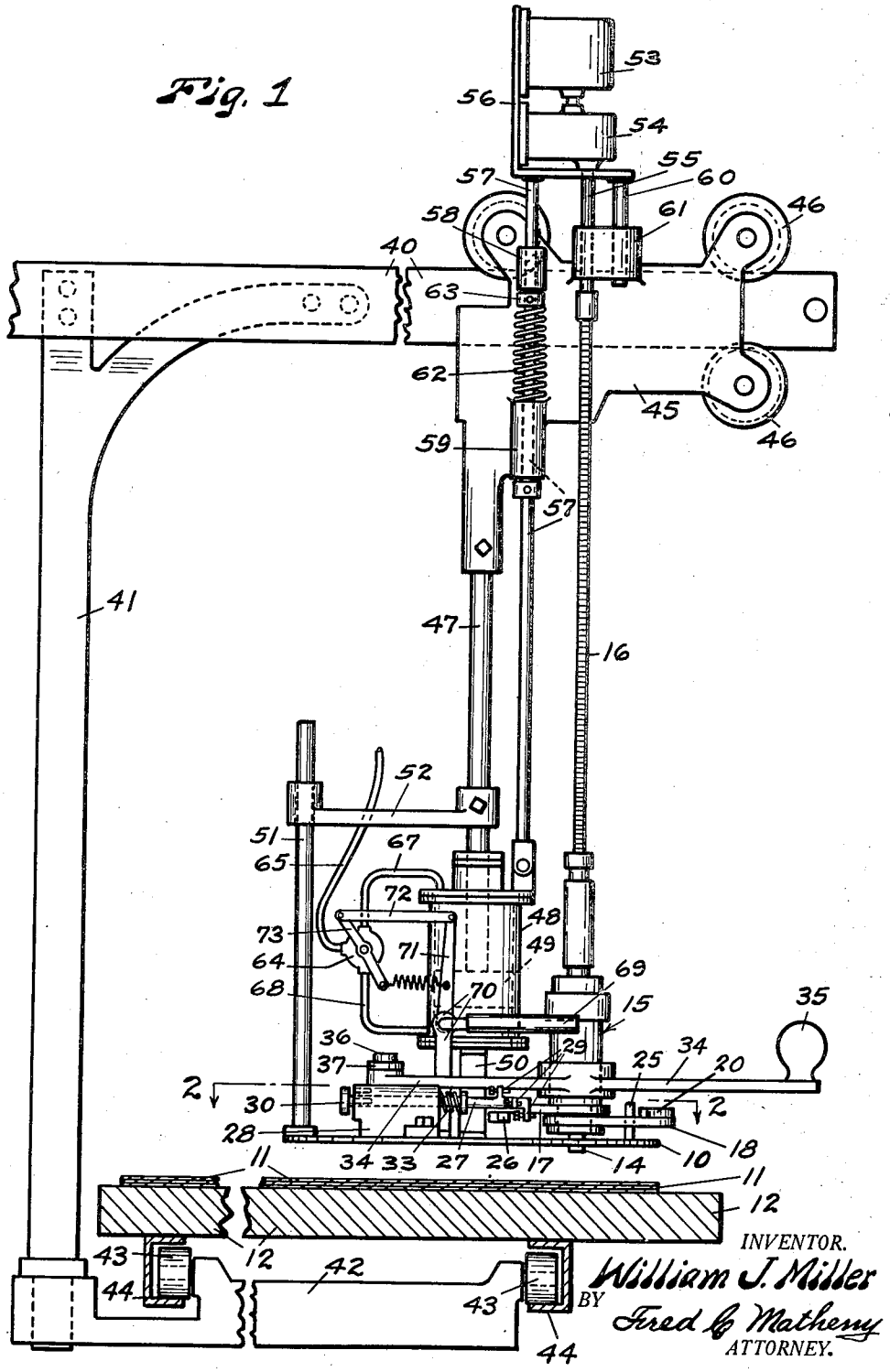
Aug. 31, 1937. W. J. MILLER 2,091,450

PLYWOOD PATCHING MACHINE

Filed March 20, 1936 2 Sheets-Sheet 1

Fig. 1



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Fig. 2

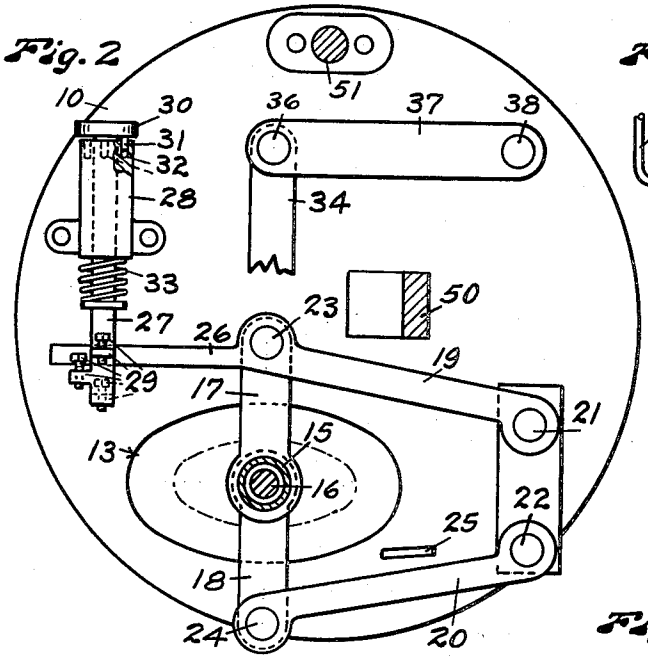


Fig. 3

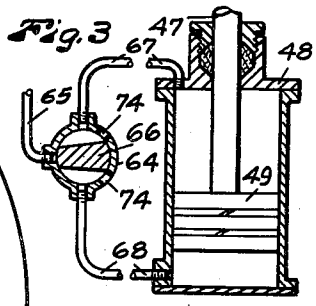




Fig. 4

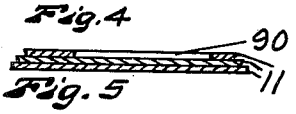
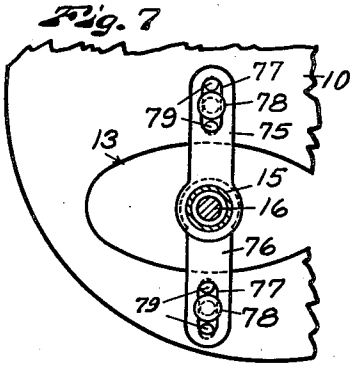


Fig. 5



Fig. 6

Fig. 7



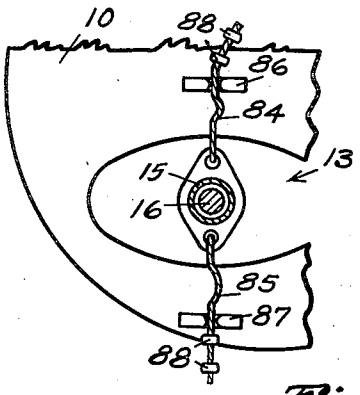


Fig. 9

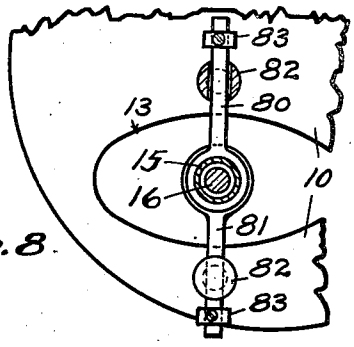


Fig. 8

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Patented Aug. 31, 1937 2,091,450

UNITED STATES PATENT OFFICE

2,091,450

PLYWOOD PATCHING MACHINE

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Application March 20, 1936, Serial No. 69,788

12 Claims. (Cl. 144—2)

This invention relates to apparatus for patching plywood and the general object of this invention is to provide simple and efficient means for quickly and easily routing out imperfect spots in the outer or surface ply of wood veneer or plywood preparatory to patching the same.

Wood veneer, usually called plywood, often has imperfect spots, as knots, pitch pockets, and the like in the surface ply. In some commercial grades of plywood an average of from five to ten imperfect spots will be found in a surface ply of each four by eight foot panel after the panel has been glued up. These imperfect spots are usually relatively small and are eliminated by routing out the imperfect spot and inserting and gluing in of a patch formed of the same material as the surface ply of the panel. It has been found that a patch of this nature, when correctly fitted, glued in and sanded is very inconspicuous, and that a patch of generally elliptical shape is less conspicuous than if the patch is made of other shapes. It is therefore desirable, in eliminating a defective spot from a surface panel, to first provide a recess of generally elliptical shape in the panel and then secure a patch of similar shape in the recess.

It is an object of this invention to provide simple and efficient means for routing out recesses of generally elliptical shape in the surface plys of plywood panels and to further provide means by which these recesses are made of uniform shape and size so that patches of predetermined shape and size will fit the recesses snugly and correctly and will not be noticeable on the finished panel.

Another object of this invention is to provide means by which recesses of generally elliptical shape can be very rapidly and easily routed out of the surface plies of veneer panels thus reducing the time and labor necessary to do this patching work and avoiding unnecessary delays in the manufacture of plywood in veneer plants.

Other and more specific objects of the invention will be apparent from the following description taken in connection with the accompanying drawings.

In the drawings Fig. 1 is an elevation of plywood patching apparatus constructed in accordance with this invention.

Fig. 2 is a plan view on a larger scale of the same with parts shown in section substantially on broken line 2—2 of Fig. 1.

Fig. 3 is a detached sectional view of a pneumatic cylinder and control valve therefor.

Fig. 4 is a plan view of a fragment of a plywood panel having a recess of generally cylindrical shape routed out of an outside ply thereof in accordance with this invention.

Fig. 5 is a sectional view on broken line 5—5 of Fig. 4.

Fig. 6 is a perspective view of a patch adapted for use as an insert in the recess in the panel shown in Figs. 4 and 5.

Figs. 7, 8 and 9 are fragmentary plan views of modified forms of the invention.

Like reference numerals designate like parts throughout the several views.

In accordance with my invention I provide a plate 10, which may be of dislike shape as shown in Fig. 2. This plate 10 is adapted to be pressed against or raised clear of a plywood panel 11 which rests on a table 12. The plate 10 is provided with an opening 13 which is larger than the maximum size of recess which the machine is designed to rout out. This opening 13 provides clearance through which a router bit or tool 14 may operate. The router bit 14 is supported in a chuck means 15 which is connected with a flexible driven shaft 16. The use of the flexible driven shaft 16 makes it possible to move the router bit sidewise freely within certain limits as hereinafter set forth.

Means for limiting and governing the sidewise movement of the router bit 14, see Figs. 1 and 2, is provided in the nature of two radius links 17 and 18, each having one end pivotally connected with the chuck means 15 which receives the router bit 14. The radius links 17 and 18 extend in opposite directions from the chuck means 15.

Two link members 19 and 20 have their respective rear end portions pivotally connected with pivot members 21 and 22, which pivot members are rigidly secured to the plate 10 at points to the rear of the opening 13. The link members 19 and 20 extend forwardly on opposite sides of the chuck means 15 and are respectively connected by pivots 23 and 24 with the radius links 17 and 18. A fixed stop member 25 on the plate 10 limits the swinging movement of link 20 toward the opening 13 in the plate 10. An extension 26 is provided on the forward end of the link 19. This extension 26 is adapted to engage with, preferably adjustable, stop means to limit the swinging movement of the link 19. The adjustable stop means shown in the drawings consists of a stop bar 27 mounted for rotative movement in a bracket 28. Bracket 28 is rigidly secured to plate 10. One end of stop bar 27 protrudes from bracket 28 and has preferably

three stop members 29 provided thereon at longitudinal and angular intervals. Each stop member 29 may consist of a lug on bar 27 with a set screw therein. By adjusting the stop bar 27 angularly any selected one of the three stop members 29 may be positioned in the path of the extension 26 to serve as a stop for the link 19 and mechanism connected therewith. An enlarged head or finger piece 30 on one end of the stop bar 27 is provided with a pin 31 adapted to fit within suitably spaced holes 32 in the adjacent end portion of the bracket 28 providing means for holding the stop bar 27 in different angular positions to selectively position any desired one of the stop members 29 in the path of the extension 26. A spring 33 on the stop bar 27 yieldingly holds the head member 30 against the end of the bracket 28 permitting endwise movement of the stop bar for the purpose of disengaging the pin 31 from the holes 32 when adjusting said stop bar.

A lever member 34 is pivotally connected with the chuck 15 and extends in two directions therefrom. One end of the lever member 34 has a hand hold 35 thereon. The other end of the lever member 34 is connected by a pivot 36 with one end portion of a link 37. The other end portion of the link 37 is pivoted on a pivot member 38 which is fixedly secured to the base plate 10. By moving the lever 34 it is possible to move the router bit 14 and chuck 15 freely within certain limits of movement permitted by the fixed stop means 25 and adjustable stop means 29. This makes it possible to traverse with the router bit an elliptical area the sides of which are arcs described from the centers of pivots 23 and 24 when said pivots are in the innermost positions which they are permitted to assume by the respective stop means 29 and 25. The ends of the elliptical area traversed by the router bit are determined by the circumference of the router bit.

The plate 10 is provided with the opening 13 through which the router bit 14 operates. This opening 13 may be of generally elliptical shape as shown in Fig. 2, and is substantially larger than the largest recess which is to be routed out of the plywood and is also large enough to preclude all possibility of the router bit contacting the plate 10.

The frame plate 10 together with the mechanism assembled thereon is vertically movable and is supported from an overhead transverse track bar 40. The track bar 40 is supported by an upright member 41 which extends upwardly at one side of the table. The upright member 41 is secured to a carrier member 42 having wheels 43 operatively disposed in track members 44 positioned below and extending longitudinally of the table 12. This provides a supporting means which may be moved in one direction relative to the table 12 while the mechanism supported on the overhead track bar 40 may be moved relative to the table in a direction at right angles to the direction of movement of the supporting means. The upright member 41 may be offset as respects the plate 10 and track member 40 far enough to permit the plate 10 to be moved over the edge of the table past which the member 41 protrudes.

A carriage 45 having wheels 46 is movable on the track bar 40. A supporting post 47 is fixedly secured to the carriage 45 and extends downwardly therefrom to form a support for the plate 10 and mechanism thereon. The post 47 projects into the upper end of a pneumatic cylinder 48 and is fixedly secured to a piston 49 which is operatively disposed within said cylinder. The cylinder 48 is rigidly connected with the plate 10 by support means 50. This provides devices by which the plate 10 may be moved downwardly by admitting compressed air into the lower end portion of the cylinder 48 below the relatively fixed piston 49 and upwardly by admitting compressed air into the upper end portion of the cylinder 48 above the relatively fixed piston 49.

Angular movement of the plate member 10 relative to the depending support 47 is prevented by an upright post 51 which is rigid with the plate 10 and slidable vertically in a guide arm 52. The guide arm 52 is rigid with the support 47.

The driving means for the router bit is preferably a motor 53 connected through a suitable transmission 54 and shaft 55 with the flexible shaft 16. The motor 53 and transmission 54 are mounted on a bracket 56 which is supported by an upright rod 57. The rod 57 extends downwardly through guides 58 and 59 on the carriage 45 and is secured to the vertically movable cylinder 48 thus providing supporting means by which the motor and transmission are moved vertically along with the plate 10 and mechanism thereon. A guide pin 60 on the bracket 56 is vertically movable in a guide member 61 which is rigid with the carriage 45. This guide pin helps to guide and support the bracket 56 and prevents angular displacement of the same.

Preferably a compression spring 62 is provided on the upright rod 57 between the upper end of the guide member 59 and a collar 63 which is secured to said rod 57. This spring 62 is strong enough to lift the plate 10 and mechanism thereon together with the bracket 56 and driving means carried thereby and to hold the same in an elevated position except when these parts are moved downwardly by the admission of air under pressure to the lower position of the cylinder 48.

Compressed air for vertically moving the plate 10 and mechanism carried thereby is supplied to a valve housing 64 through a compressed air supply conduit 65. The valve housing 64 has a rotary valve member 66 and is connected by one conduit 67 with the upper end portion of the cylinder 48 and by another conduit 68 with the lower end portion of the cylinder 48. The valve member 66 is operated by a valve operating handle 69 pivoted for oscillation in bearing means 70. The valve operating handle 69 is connected by a lever 71, a link 72 and a lever 73 with the valve member 66. Downward movement of the valve operating handle 69 will admit compressed air to the lower end of the cylinder 48 and move the plate 10 down onto the plywood panel 11. Upward movement of said valve operating handle 69 will admit compressed air to the upper end of the cylinder 48 and move the plate 10 upwardly clear of the plywood panel into a position as shown in Fig. 1. Upward movement of the plate 10 and parts carried thereby may be limited by engagement of the collar 63 on rod 57 with the guide member 58.

When the valve operating handle 69 is in the neutral position shown in Fig. 1, the top and bottom ends of the cylinder will both have pressure relief communication with the atmosphere through relief ports 74 and opening of air inlet pipe 65 will be closed.

The router bit is held down by the weight of the several parts connected therewith and by pressure exerted by the operator on the control lever 34 during the routing operation.

In Fig. 7, I disclose a modified form of the invention in which the links 19 and 20 are dispensed with and the radius links 17 and 18 are replaced by other radius links 75 and 76 having, in their outer ends, slots 77 which fit slidably over fixed studs or pins 78 on the main plate 10. In this construction engagement of the outer ends of the slots 77 with the fixed studs or pins 78 stops or limits the movement of the router tool and determines the arcs forming the sides of the recesses which are routed out of the plywood panel, the ends of said recesses having the same curvature as the circumference of the router bit. By providing for the adjustment of one or both of the pins 78 it is possible to vary the size of the recess which will be routed out of the plywood panel. This may be done by providing a plurality of holes 79 in the main plate 10 for receiving the pins 78.

In Fig. 8, I have shown another modified form of the invention which consists in slidably mounting the outer ends of radius links 80 and 81 in fixed stop means 82 pivotally mounted on the main plate 10. An adjustable stop member 83 is provided on the outer end portion of one or both of the radius links 80 and 81 to engage the stop means 82 and limit the movement of the router bit.

In Fig. 9, I have shown still another modified form of the invention in which flexible connecters 84 and 85 are used as radius means instead of the hereinbefore described radius links. The flexible connecters 84 and 85 are anchored at the ends to anchor means 86 and 87. A plurality of spaced apart stops 88 are provided on at least one of the flexible connecters providing means to vary the size of the recess which is to be routed out.

In the operation of this device plywood panels 11 are preferably fed or moved over the table 12 either manually or mechanically. An operator standing at the side of the table 12 spots the defects in the top ply of these panels, lowers the plate 10 onto the panel with the opening 39 in said plate positioned over the defect and, by moving the handle 34, causes the driven router bit to traverse or cover a limited area of generally elliptical shape thus routing out of the panel an elliptical recess 90 which includes the defective spot. As soon as the defective spot has been routed out the plate 10 and mechanism thereon is raised by manipulation of the valve operating handle permitting movement of the panel or movement of the routing mechanism to another location over the panel. Preferably two of the units shown in Fig. 1, will be provided over each table to permit two operators to work on the same panels on opposite sides of the table.

When the plate 10 is lowered onto a plywood panel the pressure of the air will hold the plate very firmly in engagement with the panel thus holding the panel immovable.

The device is very rapid and very accurate in operation and leaves the panels in condition to have previously prepared conical shaped patches 91 glued therein. The elliptical recesses 90 extend lengthwise of the grain of the wood, as indicated in Fig. 4, and the curved markings of the grain harmonize with the edges of the recesses so that the patches are very inconspicuous on the finished panel.

The carriage 45 and mechanism carried thereby is movable along track bar 40 transversely of the table and the said track bar is movable longitudinally of the table thus providing for quick and easy movement of the plate 10 to any desired location over the panel 11.

The foregoing description and accompanying drawings clearly disclose a preferred embodiment of my invention but it will be understood that this disclosure is merely illustrative and that numerous changes may be made within the scope and spirit of the following claims.

I claim:

1. In apparatus of the class described, a router bit mounted for transverse movement; driving means connected with said router bit; two radius members pivotally connected with said router bit and extending in diametrically opposite directions therefrom; and anchor means positioned on opposite sides of said router bit in spaced relation therefrom and operatively connected pivotally with said radius members and extending from one side of said radius members in trapezoidal form providing for horizontal movement of said radius members, said radius members and anchor means limiting the transverse movement of said router bit.

2. In apparatus of the class described, a substantially vertical driven flexible shaft; a router bit operatively connected with the lower end portion of said flexible shaft and supported thereby; two radius members pivotally connected with said router bit and extending in diametrically opposite directions therefrom; and anchor means positioned on opposite sides of said router bit in spaced relation therefrom and pivotally connected with the outer end portions of said radius members and providing for limited horizontal movement of said radius members and cooperating with said radius members limiting transverse movement of said router bit.

3. In apparatus of the class described, a support adapted for clamping engagement with material to be recessed, said support having an opening therein; a router bit extending through said opening in said support and movable transversely within said opening; driving means connected with said router bit; radius members pivotally connected with said router bit and extending in diametrically opposite directions therefrom and anchor means connected with said support at opposite sides of said router bit and operatively connected pivotally with said radius members and providing for limited horizontal movement of said radius members, said radius members and anchor means limiting transverse movement of said router bit.

4. In apparatus of the class described, a flat work clamping plate member having a relatively large opening therein; a router bit protruding through said opening and movable freely within said opening without contacting the plate member at the edges of said opening; depending flexible shaft driving means connected with said router bit and forming a support therefor; two radius members pivotally connected with said router bit; and anchor means carried by said flat plate member positioned on opposite sides of said router bit and pivotally connected with the outer end portions of said radius members said anchor means providing for limited horizontal movement of said radius members relative to said plate member.

5. In apparatus of the class described, a work clamping plate member having an opening therein; a router bit extending through said opening and freely movable sidewise within said opening; vertically shiftable driving means connected with the shank portion of said router bit; two radius

links pivotally connected with said router bit and extending sidewise in diametrically opposite directions therefrom; pivot means movably connecting the outer end portions of said radius links with said plate member, said anchor means providing for limited horizontal movement of said radius links relative to said plate member, said pivot means and radius links cooperating to provide limited transverse movement of said router bit; and manually operated bit moving means connected with said router bit.

6. In apparatus of the class described, a work clamping plate member having an opening therein; a router bit extending through said opening and freely movable sidewise within said opening; vertically shiftable driving means connected with the shank portion of said router bit; two radius links pivotally connected with said router bit and extending sidewise in diametrically opposite directions therefrom; pivot means movably connecting the outer end portions of said radius links with said plate member and providing limited horizontal movement of said radius links relative to said plate member; said pivot means and radius links providing for transverse movement of said router bit; means limiting the transverse movement of said router bit; and handle means connected with said router bit controlling the transverse movement of said router bit.

7. In apparatus of the class described, a work clamping plate member having an opening therein; a router bit extending through said opening and freely movable sidewise within said opening; vertically shiftable driving means connected with the shank portion of said router bit; two radius links pivotally connected with said router bit and extending sidewise in diametrically opposite directions therefrom; pivot means movably connecting the outer end portions of said radius links with said plate member and providing limited horizontal movement of said radius links relative to said plate member, said pivot means and radius links cooperating to provide transverse movement of said router bit; means limiting the transverse movement of said router bit; adjusting means for said movement limiting means; and manually operated bit moving means connected with said router bit.

8. In apparatus of the class described, a plate member having an opening therein; a router bit positioned in said opening and supported for transverse movement, said opening affording clearance for the operation of said router bit; driving means connected with said router bit; two link members pivotally mounted on said plate member and extending on opposite sides of said router bit; two radius links pivotally connected with said link members and with the shank portion of said router bit; means limiting the swinging movement of said link members toward said router bit; and manually operated router bit moving means connected with said router bit.

9. In apparatus of the class described, a plate member having an opening therein; a router bit positioned in said opening and supported for transverse movement, said opening affording clearance for the operation of said router bit; driving means connected with said router bit; two link members pivotally mounted on said plate member and extending on opposite sides of said router bit; two radius links pivotally connected with said link members and with the shank portion of said router bit; stop means limiting swinging movement of said link members toward each other; adjusting devices connected with said stop means whereby the position of the stop means may be varied; and bit moving means connected with said router bit.

10. In apparatus of the class described, a relatively flat plate member having a relatively large opening therein; a fluid pressure cylinder secured to said plate member; a track member positioned above said plate member; a carriage movable on said track member; a rigid support extending downwardly from said carriage; a piston fixed to the lower end portion of said support and positioned within said cylinder; means controlling the admission of fluid under pressure to the respective end portions of said cylinder whereby said cylinder and plate may be moved vertically; a bracket guided for vertical movement on said carriage; a motor mounted on said bracket; bracket supporting means connected with said bracket, said cylinder moving said bracket vertically synchronously with said cylinder; a flexible shaft depending from said motor, a router bit connected with the lower end portion of said flexible shaft and extending through the opening in said plate member and movable sidewise within said opening; two radius members pivotally connected with said router bit; anchor means carried by said plate member positioned on opposite sides of said router bit and pivotally connected with the outer end portions of said radius members providing for limited horizontal movement of said radius members relative to said plate member; and handle means connected with the lower end portion of said flexible shaft providing means for moving said router bit.

11. In apparatus of the class described, a relatively flat plate member having a relatively large opening therein; a pneumatic cylinder secured to said plate member; supporting means positioned above said plate member; a rigid support extending downwardly from said supporting means; a piston fixed to the lower end portion of said support and positioned within said pneumatic cylinder; means controlling the admission of fluid under pressure to said cylinder whereby said cylinder and plate may be moved vertically; driving means mounted on said supporting means and vertically movable with said cylinder and plate member; a flexible shaft depending from said driving means; a router bit connected with the lower end portion of said flexible shaft and extending through the opening in said plate member and movable sidewise within said opening; two radius members pivotally connected with said router bit; anchor means carried by said plate member positioned on opposite sides of said router bit and pivotally connected with the outer end portions of said radius members providing for limited horizontal movement of said radius members relative to said plate member and handle means connected with the lower portion of said flexible shaft providing means for moving said router bit.

12. In apparatus of the class described, a table; upwardly extending supporting means movable longitudinally of said table; a horizontal track member on the upper end of said supporting means extending crosswise of said table; a carriage movable on said truck member; a flat plate member having an opening therein; a fluid pressure cylinder secured to said plate member; a rigid support extending downwardly from said carriage; a piston fixed to the lower end portion of said support and positioned within said

cylinder; means controlling the admission of fluid under pressure to the respective end portions of said cylinder whereby said cylinder and plate member may be moved vertically; a bracket guided for vertical movement in said carriage; a motor mounted on said bracket; supporting means connected with said cylinder moving said bracket vertically synchronously with said cylinder; a flexible shaft depending from said motor, a router bit connected with the lower end portion of said flexible shaft and extending through the opening in said plate member and movable sidewise within said opening; two radius members pivotally connected with said router bit; anchor means carried by said plate member positioned on opposite sides of said router bit pivotally connected with the outer end portions of said radius members providing for limited horizontal movement of said radius members relative to said plate member, and handle means connected with the lower end portion of said flexible shaft providing means for moving said router bit sidewise.

WILLIAM J. MILLER.

CERTIFICATE OF CORRECTION.

Patent No. 2,091,450. August 31, 1937.

WILLIAM J. MILLER.

It is hereby certified that the name of the assignee in the above numbered patent was erroneously written and printed as "Ellicott Bay Mill Co." whereas said name should have been written and printed as Elliott Bay Mill Co., of Seattle, Washington, a corporation of Washington, as shown by the record of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 16th day of November, A. D. 1937.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)