Jan. 1, 1963 M. L. BURELBACH ETAL 3,071,106

PLYWOOD EDGE FILLER

Filed Dec. 13. 1960 3 Sheets-Sheet 1

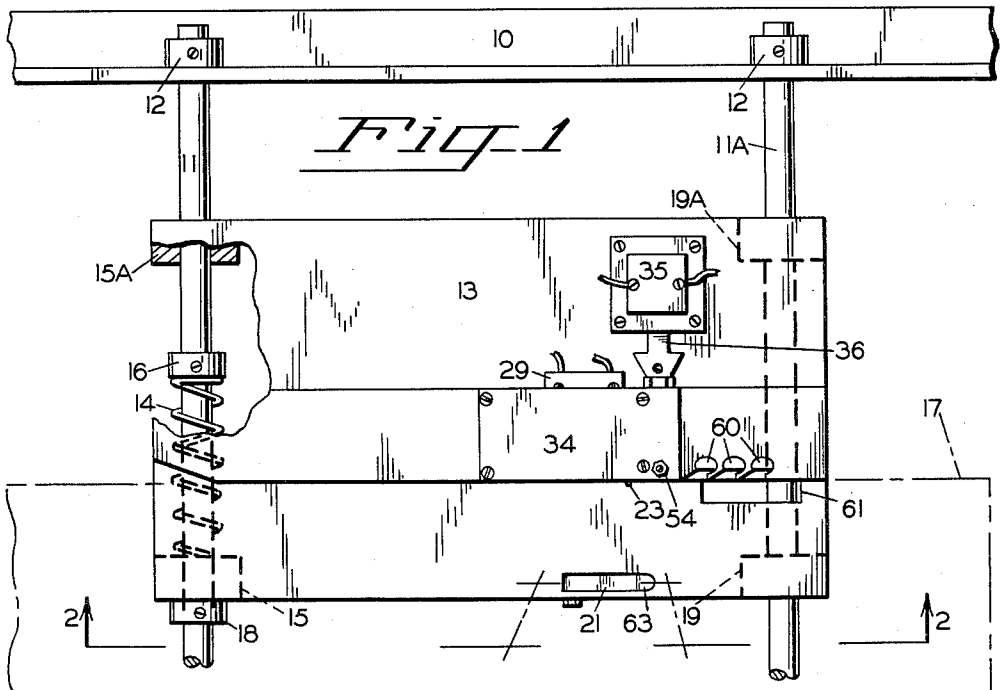


Fig 1

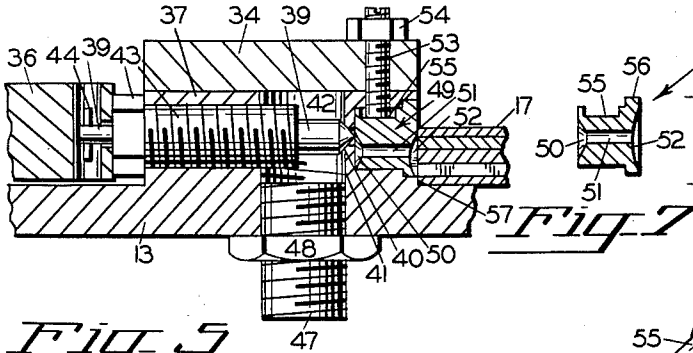


Fig 4

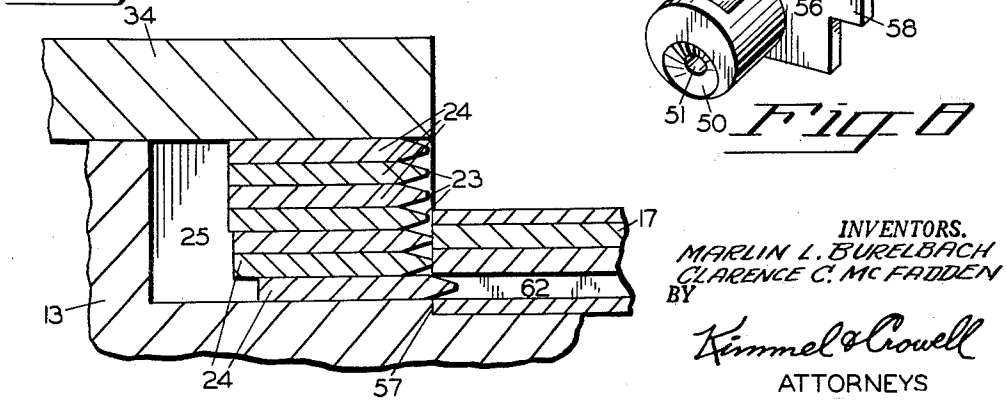


Fig 5

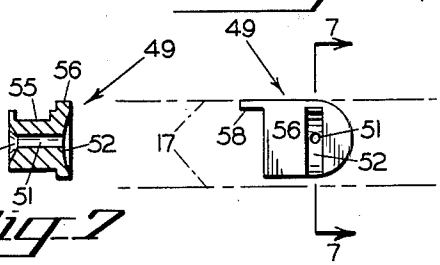


Fig 7

Fig 8

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Filed Dec. 13. 1960 3 Sheets-Sheet 2

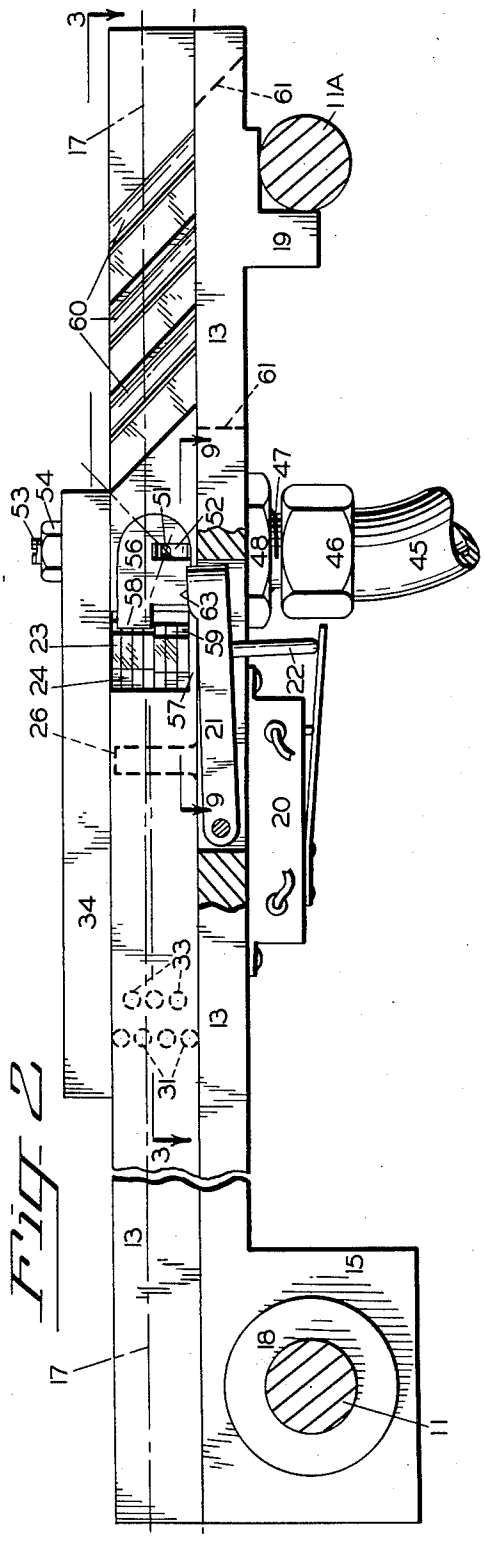


Fig 2

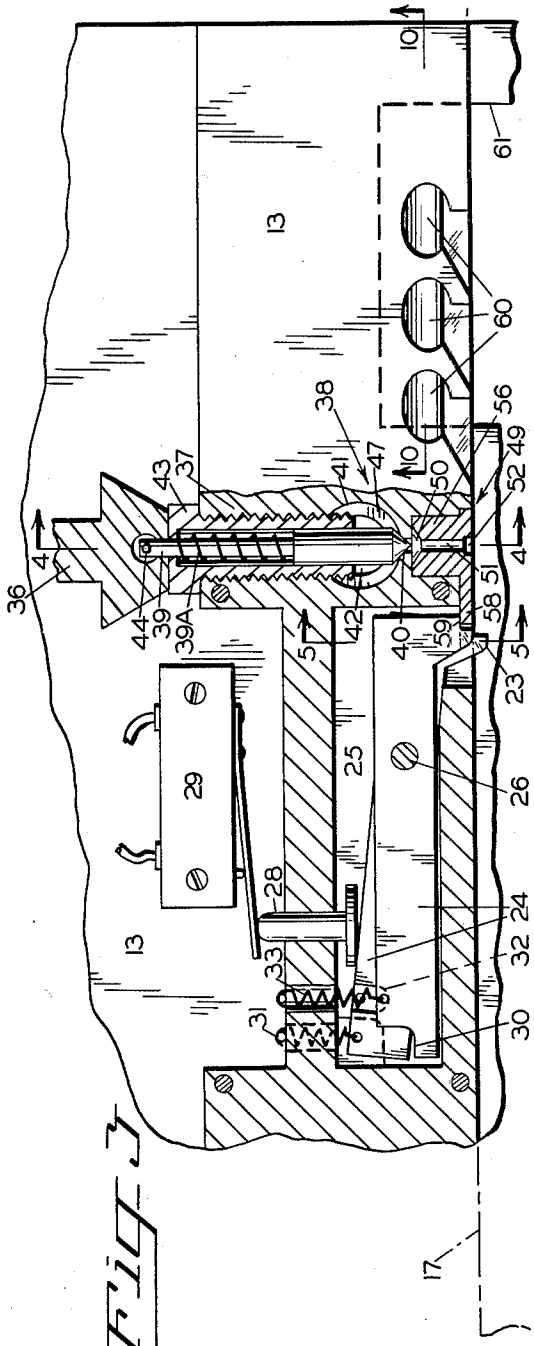


Fig 3

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Fig 9

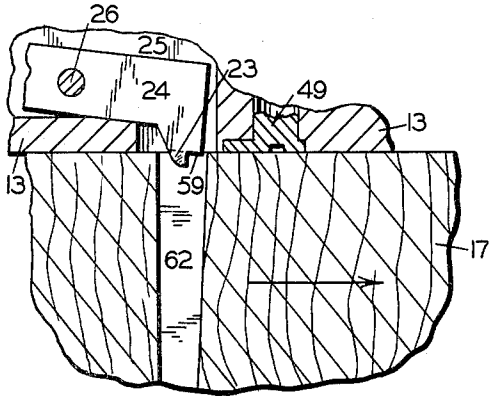
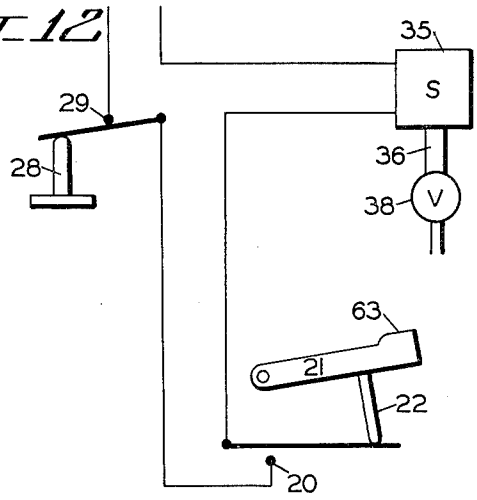


Fig 12



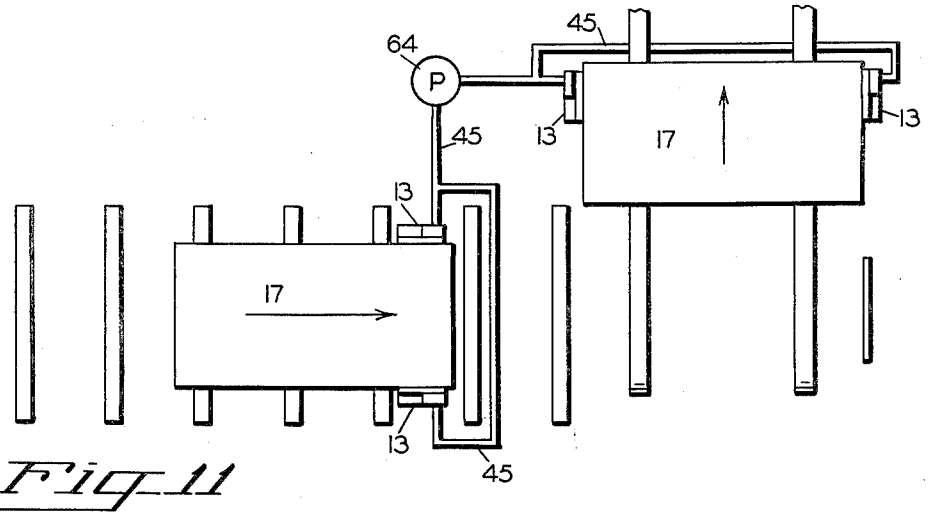


Fig 11

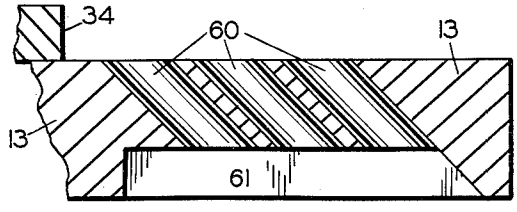


Fig 10

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PLYWOOD EDGE FILLER

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6 Claims. (Cl. 118—2)

This invention relates to a plywood edge filler designed to fill the routine depressions, chipped out places, and crevices that appear in the edge of the inner layers of core stock of plyboard. At the present time these holes are filled, after the plyboard has been taken from the conveying system and stacked by hand guns and the surplus is then scraped from the edges of the boards. This process is obviously time consuming and wasteful of both manpower and materials.

With these factors in mind, the present invention was designed to overcome these shortcomings, so that the waste of material is reduced to a minimum and, since it is performed automatically, the need for manpower is likewise reduced. The device of this invention fills the holes automatically. The device is located on a conveyer system in the production line after the trimmer saws have cut the plyboards to their proper sizes.

Referring specifically to the drawing:

FIGURE 1 is a plan view of one of the two units used to accomplish the results of the invention.

FIGURE 2 is a side elevation of the invention taken along lines 2—2 of FIG. 1, as viewed in the direction of the arrows.

FIGURE 3 is a sectional plan view taken along line 3—3 of FIG. 2, as viewed in the direction of the arrows.

FIGURE 4 is a cross-sectional view of the injection nozzle and valve of the filling injector unit of this device, taken along line 4—4 of FIG. 3, as viewed in the direction of the arrows.

FIGURE 5 is a view in cross-section of the activating or sensitizing fingers taken along line 5—5 of FIG. 3, as viewed in the direction of the arrows.

FIGURE 6 is a side elevation of a different injector nozzle to be used with the device of this invention to accommodate different thicknesses of wood.

FIGURE 7 is a view in cross-section of FIG. 6, taken along line 7—7 thereof, that shows the passageway of the injector nozzle as viewed in the direction of the arrows.

FIGURE 8 is a perspective view of one of the changeable injector nozzles.

FIGURE 9 is a plan view of one of the sensitizing or activating fingers taken along line 9—9 of FIG. 2 viewing it in the direction of the arrows.

FIGURE 10 is a cross-sectional view of the scrapers, taken along line 10—10 of FIG. 3 as viewed in the direction of the arrows.

FIGURE 11 is a diagrammatical view of the invention device and process in relation to the conveying line of the plyboard manufacturing unit.

FIGURE 12 is a schematical diagram of the electrical circuitry needed to operate the device of the invention.

The device of the invention is used in cooperation with a plyboard manufacturing unit and is secured to the conveyor which carries the plyboard through its manufacturing stages.

Referring specially to the drawings, the particular device of this invention is mounted to the conveyor support frame 10 by mounting rods 11 which extend from one support frame to a corresponding frame on the opposite side of the conveyor. Only one conveyor support frame is shown in the drawings. However, the invention does require the use of two support frames of like construction, opposite each other, because two filling devices

are required to fill both side edges of the plyboard necessitating the use of two supporting frames 10. Both of the filling devices, one of which is generally represented by numeral 13, are identical in design and function except for one feature which will be described later. The ends of rods 11 and 11*a* are suitably attached to frame 10 by collars and set screws 12. As can best be seen by FIG. 1, the body 13 of the device is slidably mounted on rod 11 and the opposing end thereof is merely being supported by rod 11*a* so that the end of the body 13 may be lifted upward from rod 11*a* while body 13 pivots about rod 11. One of the main reasons for the pivoting versatility of body 13 is to provide ready access for cleaning and repairing to the parts of the device beneath body 13. By viewing FIG. 1, it can be observed that the inward pressure of this unit for the edge filler is exerted by means of an expanding spring 14 which works against the bored lug 15 and an adjustable collar 16. Collar 16 is adjustable on rod 11 and thereby dictates the inward pressure of the filler unit against the plyboard 17. A stop member or collar 18 is provided for the purpose of limiting the inward movement of the filler device. Merely by adjusting collars 16 and 18 different widths of wood can be accommodated.

As previously stated, the unattached end of body 13 merely rests on rod 11*a* and is guided at all times by guide lugs 19 and 19*a* which are integrated with body 13. As can be seen by FIG. 1, the filler device pivots on rod 11 by bored lugs 15 and 15*a* and the opposing filler device pivots about rod 11*a* and rests on rod 11. For best results, the edge fillers of this invention are located in two places in the production line of the plyboard. It has been found best to have a set of fillers behind the edge trimmer saws (not shown), one device on each of the two sides of the plywood and another set behind the end trimming saws, one on each end, to fill the holes in the ends of the plyboard.

The actual filler device consists of the aforementioned parts in addition to the component parts about to be described. A master activating switch 20 is actuated by the plyboard 17 as it travels over it at a high rate of speed along the conveying system.

When the machine is not in operation, switch 20 is in the off position, and of course, the device will not operate. Thus, when a piece of plyboard 17 passes over the activating arm 21, the arm 21 is depressed so that it pushes a plunger rod 22 downward ahead of it, which in turn operates the switch 20 and closes it, so that the filler device will then be in operation. The operation is effected because fingers 23 on the finger arms 24 come in contact with the fast moving plyboard 17 and are pushed back into the finger arm cavity 25, thus causing the finger arm 24 to pivot about shaft 26 so that the opposite end of the arm 24 will be moved in the opposite direction to the position shown in FIG. 3. In FIG. 3, the effect is illustrated by the fact that the top arm 24 causes the sensitizing finger switch plunger 28 to be forced into the finger arm cavity 25 so that the sensitizing switch 29 can open.

It should be noted that sensitizing fingers and arms 24 are vertically stacked, one upon another, as shown in FIG. 5.

As seen in FIG. 3, every other arm 24 has a notch 30 cut into it in such a manner that all of the arms 24 can be stacked upon each other without interfering with the operating spring 31 of the adjoining arms. The adjoining arms 24 are each provided with a notch 32 to receive and attach spring, the latter mentioned notch 32, shown in broken line, allow springs 33 to operate and allow the associated arms 24 to remain flat upon each other. Springs 31 and 33, wherein one or the other is attached to each of the finger arms 24, serve the purpose of retain-

ing arms 24 with their associated fingers 23 in such a position that the fingers 23 extend through body 13 and the opposite end of the finger arms 24 against the finger switch plunger 28. In this position switch 20 is in closed position when the filler device is not in operation and no plyboard is passing therethrough.

The purpose of sensitizing fingers 23 and their associated arms 24 is to close the sensitizing switch 29 to activate the injector nozzle, to be described later, so that wood-dough can be forced through and out the nozzle into a hole, to fill it as intended. When a plyboard having a smooth edge clear of flaws passes the point where fingers 23 extend outwardly through body 13, all of the fingers are pushed inwardly into the finger arm cavity 25, and as a consequence, all of the opposite ends of the arms 24 allow the sensitizing switch 29 to remain open as long as there is no hole in the plyboard passing by to cause one of the fingers 23 to actuate switch 29 to close it. It should be noted that accessability to the sensitizing apparatus is made by removal of the protective plate 34 so that repairs and maintenance can easily be accomplished. Plate 34 also serves to protect the apparatus from damage.

It should be noted that each finger 23 is positioned so that it corresponds to one inner layer of plyboard as best illustrated by FIG. 5. Variations of the device to fit different thicknesses of plyboard will be discussed later. The two outside layers of plyboard do not ordinarily develop flaws and holes in their sides, since they are mainly caused by the action of the trimming saws by chipping out pieces of veneer of the core layers.

Holes can also be caused because two pieces of the same layer of plyboard are not evenly abutted together and this is not usually apparent until the plyboard is trimmed, by the trimming saws, to its finished size. When one of the holes passes by the fingers 23, the corresponding finger falls into the hole because of the exerted action of the spring 31 or 33, located on the opposite end of finger arm 24, which starts the device into operation by causing said arm to exert pressure on the switch plunger 28, thereby forcing the switch 29 to close and thus complete the circuit. Fingers 23 are preferably tapered, as best shown by FIG. 5, so as to better guide them into any holes in the sides of the plyboard.

It is to be noted that the master activating switch 20 is closed when the plyboard 17 passes over it. When the circuit is closed by switches 20 and 29, a solenoid 35 is activated which causes solenoid shaft 36 to retract from body 37 of the wood-dough injecting valve, generally indicated by numeral 38. As the solenoid shaft 36 retracts, it carries with it a needle valve shaft 39 which normally seats in the outlet port 40 located in the wall 41 of the valve cavity 42 which is bored into the body 13. When the circuit is broken the solenoid 35 is inactive, and an expansion spring 39*a* causes the needle valve shaft 39 to be securely reseated and held in this position within the outlet port 40 through the wall of the valve cavity 42 thus cutting off the flow of wood and dough. The needle valve shaft 39 and the spring 39*a* are removably mounted within a housing 43 which is tapped into body 13.

Referring to FIG. 4, the injection valve is shown in detail and the construction of which includes a valve cavity 42 bored within body 13. The needle valve shaft 39 is suitably attached to the solenoid shaft by a pin 44, shown with shaft 39 passing through its retaining housing 43 and extending beyond, into, and seating within, the outlet port 40 thus closing the injection valve. When the solenoid 35 is actuated, the injection valve is opened and the wood-dough supplied to the valve under great pressure by a flexible hose 45 which is attached to the underside of body 13 by a suitable connection 46, consisting of a standard nipple 47, tapped into body 13, and a lock nut 48 is allowed to pass through the injection nozzle 49. The entrance 50 to the passageway 51 of the injection nozzle is greatly enlarged to catch the wood-dough as it leaves the outlet port 40 and thereby directs the dough into the passageway. The enlarged entrance 50 is necessary for a purpose to be described later.

The dough is forced under great pressure through the injection nozzle passageway 51 and is then dispersed by the nozzle outlet 52 so that it will span the plyboard and fill all the holes less the outermost top and bottom layers. The changeable injection nozzle 49 is held in place by a set screw 53 with its associated lock nut 54, tapped through the cover 34, thereby allowing the injection nozzle to be readily changed to accommodate various thicknesses of the plyboard. The set screw 53 registers on a flat milled surface 55, of the nozzle, for the purpose of retaining the nozzle in its proper position within the body 13.

The injection nozzle 49 serves a dual function. First, the purpose of having different changeable nozzles is to accommodate plyboards of various thicknesses or number of plies. It is to be remembered that when only one of the fingers 23 of this device is in the outward or extended position, as best shown in FIG. 5, within a void, the electrical circuit is closed, the valve opened and the wood-dough ejected. Obviously, if a thinner piece of plyboard is processed, causing a surplus of fingers, those fingers above the plyboard's upper edge would be extended. and not held back by the board, causing the nozzle to continually eject wood-dough and thereby defeat the basic purpose of this machine. It is the flat member 56 on the injection nozzle 49 that accommodates this situation and makes this device operable. As was stated before, the top and bottom outside layers of the plyboard generally are not defective, but, if there were defects, there would be nothing to retain the dough and it would spread all over, especially since the dough is under great pressure. Since the veneer layers are of a standard thickness, or close to it, a shoulder 57 on the body 13 will accommodate the bottom outside layer of the plywood, as best illustrated in FIG. 5. To take care of the top layer and all fingers above the height of the top layer, is one of the functions of the flat member 56 on the injection nozzle 49. This is done by the protrusion 58 on the flat member 56. When a specific thickness of plyboard is being made and run between two of these devices, a nozzle is selected and used that will perform the above operation. Referring to FIG. 3, the flat member 56 registers in notches 59 on the end of the finger arms 24 of those fingers which are not to be used. FIGS. 6 and 8 illustrate two different nozzles to be used with the appropriate plyboard being manufactured at that particular time. As for the enlarged entrance 50 of the nozzle, it is necessary to compensate for the various positions needed for the passageway 51. This is necessary since the height of the passageway will be different for each separate nozzle, as illustrated in FIGS. 7 and 8. FIG. 7 shows the passageway in the middle of the nozzle used for thicker plyboard and FIG. 8 shows the passageway lower than center for thinner plywood stock. By being fan shaped the entrance will direct the dough into the passageway 51. The nozzle outlet 52 opens in an elongated manner so that it will only cover the core layers of the board being run through at that time.

There will be an excess of wood-dough in each case and this must be removed. It is done by built-in surfacers or scrapers 60, which, as the board passes, scrapes any excess dough off the edge of the board. These surfacers or scrapers are open at the bottom of the body so that the excess dough will fall free and be caught in a suitable container and then be reworked and used again, thus cutting waste of dough to a minimum. FIG. 10 illustrates that these scrapers 60 are on an angle thus creating a smooth cutting surface, in effect. The area numbered as 61 merely shows that these scrapers are open at the bottom, so that the excess dough will fall free, as described above.

Now, for the more specific operation of this device, not fully covered before. The plyboard 17, as it is fed along the conveying system, first closes the master activating switch 20 by overriding the activating arm 21 closing said

switch, which remains closed until the plyboard 17 has completely passed over it. Throughout this operation, it must be borne in mind that the plyboard 17 is being conveyed at a rapid rate of speed and therefore each operation is performed very rapidly. In an instant before the plyboard depresses the activating arm 21, the board pushes the fingers 23 inwardly opening the sensitizing switch 29. This split second allows the sensitizing fingers 23 to act upon any holes at the extreme front end of the edge of the board. Now the master activating switch 20 is closed and the sensitizing switch 29 is open so that the valve 38 is closed and it will stay closed until one of the sensitizing fingers 23 finds a hole thus closing the switch 29 to energize the solenoid 35 which in turn opens the valve 38 which allows the dough to be forced into the holes 62, as viewed best in FIGS. 5 and 9. The injection nozzle is located at a proper distance from the sensitizing fingers 23 to compensate for the operation lag of the solenoid 35 and its associated parts. After the hole is filled, the filled hole passes the scrapers 60 and any excess dough is removed creating a smooth edge on the board again. The sensitizing fingers 23 are cleared, by the trailing end of the plyboard 17, a split second before the board clears the foot 63 of the activating arm 21 of the switch 20 so as to take care of any holes at the extreme trailing edge of the plyboard. FIG. 11 illustrates, diagrammatically, that the edges of the plyboard 17 are filled by this device, after the board 17 has gone through the edge-trimming saws, and then the ends of the board have their holes filled, after the board 17 passes the end-trimming saws. These devices can be located in relation to each other so as to be served by one wood-dough source 64, under great pressure.

As can be seen this device makes it possible to greatly increase the supply of first-grade plywood by correcting the flaws created in the manufacture of the plywood.

Other advantages and uses of the present invention will become apparent when taken in view of the following claims.

We claim:

1. An apparatus for filling void areas in the edges of plyboard panels carried by a conveyor comprising a support for at least one edge of said panel, detector means on said support to detect the presence of void spaces in the edge of said panel, filling material dispensing means adjacent said detector means in the path of travel of said panel, said dispensing means in engagement with the edge of said panel during passage of the same thereby and operable in response to said detector means when a void area is detected to dispense filling material into the said void area, and means on said support spaced from said filling material dispensing means to remove excess filling material from the edge of said panel.

2. An apparatus for filling void areas in the edges of plyboard panels carried by a conveyor comprising a body member, a support thereon for an edge of a plyboard panel, detector means in said body engageable with the edge of the panel to detect the presence of void areas therein, means on said support to sense the presence of a panel thereon and operatively connected to said detector means to effect actuation of the same, filling material dispensing means adjacent said detector means in the path of travel of said panel, said dispensing means in engagement with the edge of said panel during passage of the same thereby, a valve in said dispensing means operable in response to said detector means when a void area is detected to dispense filling material into the void area, scrapers in said body adjacent said dispensing means engageable with the edge of the panel to remove excess filling material therefrom.

3. An apparatus as defined in claim 2 wherein said support includes portions defining a generally elongated opening therein, said sensing means pivotally mounted in said opening and extending into the path of travel of a panel on said support, switch means on said support, a pin on said sensing means engageable with said switch to operate the same, portions of said body member defining a cavity therein, said pivotally mounted detector arms disposed in said cavity in vertical superposed relation, a solenoid operatively connected to said valve in said dispensing nozzle, a switch on said body member in series with the switch on said support and operated by movement of said detector arms to actuate said solenoid to open said nozzle.

4. An apparatus as defined in claim 2 which includes means on said nozzle engageable with certain of said fingers to prevent the engagement thereof with the edge of the panel on said support.

5. An apparatus as defined in claim 2 which further includes a pair of spaced support rods for said body member to support the same adjacent said conveyor upon which plyboard panels are carried, one of said rods extending through said body member adjacent one end thereof, a collar on said rod, a spring secured at one end to said collar and in engagement with said body member at its other end to bias the same into operative engagement with the edge of panels on the conveyor.

6. An apparatus for filling void areas in the edges of plyboard panels carried by a conveyor comprising a body member, a support thereon for an edge of a plyboard panel, sensing means on said support to sense the presence of a panel thereon, detector arms pivotally mounted in said body member and having fingers thereon extending into the path of travel of the panel, said fingers engageable with the edge of the panel to detect void areas therein, a filling material dispensing nozzle adjacent said fingers and in engagement with the edge of the panel, a valve normally closing said nozzle, means to move said valve to open said nozzle in response to movement of said detector arms when the fingers detect a void area in the edge of the panel, and a plurality of scrapers adjacent said nozzle engageable with the edge of said panel to remove excess filling material therefrom.

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