June 29, 1954 F. A. NICHOLSON 2,682,254

GLUE APPLICATOR FOR LUMBER STOCK

Filed Dec. 7, 1948 5 Sheets-Sheet 1

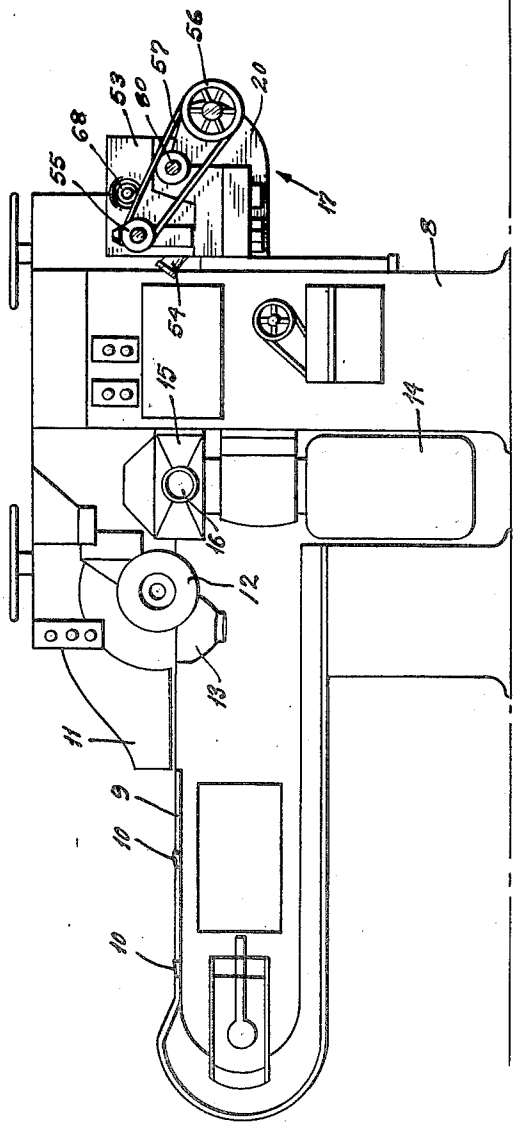


Fig. 1.

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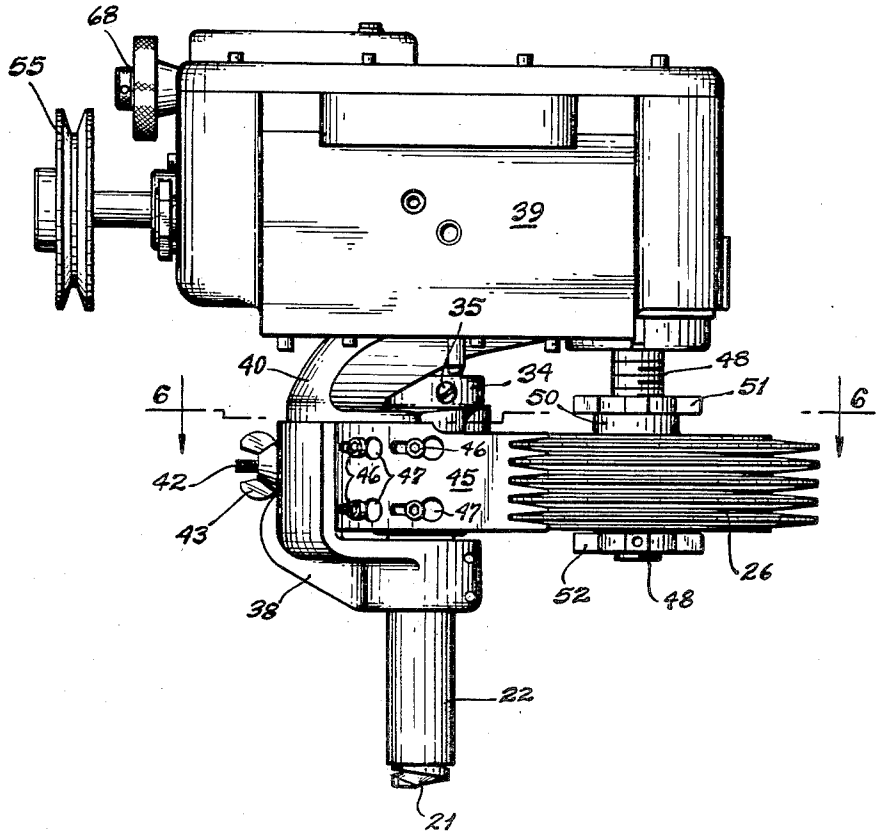


Fig. 2.

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GLUE APPLICATOR FOR LUMBER STOCK

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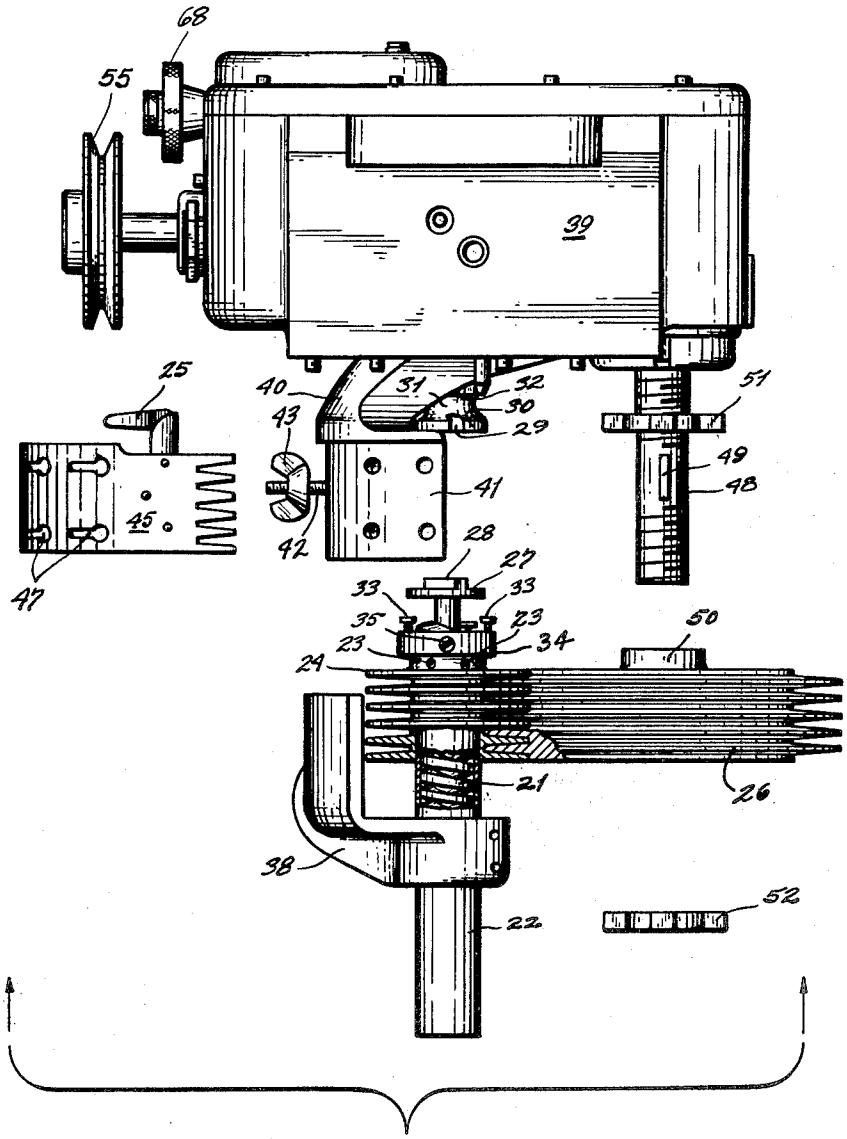


Fig. 3.

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GLUE APPLICATOR FOR LUMBER STOCK

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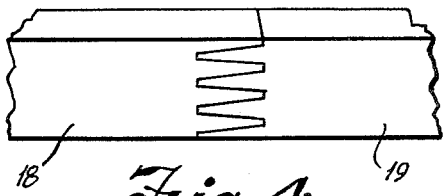


Fig. 4.



Fig. 5.

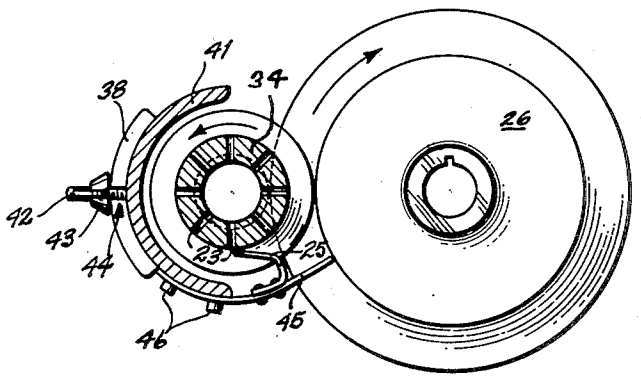


Fig. 6.

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GLUE APPLICATOR FOR LUMBER STOCK

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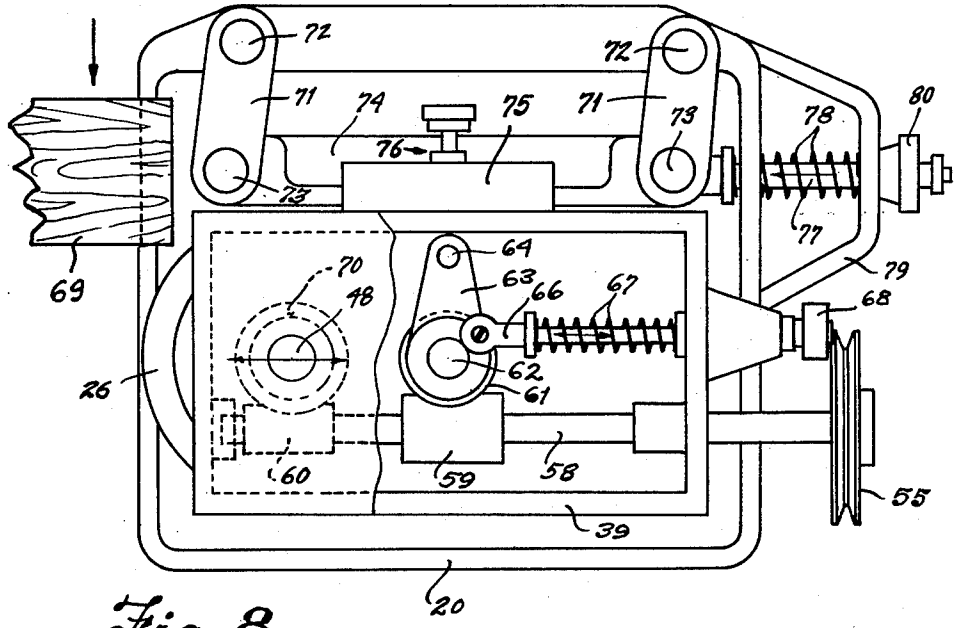


Fig. 8

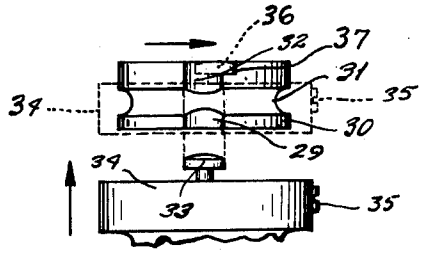


Fig. 7.

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Patented June 29, 1954

2,682,254

UNITED STATES PATENT OFFICE

2,682,254

GLUE APPLICATOR FOR LUMBER STOCK

Frederick A. Nicholson, Seattle, Wash.

Application December 7, 1948, Serial No. 63,889

7 Claims. (Cl. 118—244)

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This invention relates to a glue applicator. More particularly, this invention relates to an edge glue applicator designed particularly to apply a glue or adhesive to a patterned surface, such as the pattern employed when pieces of lumber stock have mating surfaces on the end portion of each piece of the stock and the pieces of stock are to be end spliced.

Any suitable adhesive may be applied by the device of this invention, and as illustrations but not as limitations, the types of adhesives commonly employed will be thermosetting adhesives, thermo-plastic adhesives, and adhesives which are set by the evaporation of volatiles therefrom.

As this invention is particularly applicable to applying an adhesive to the end portions of lumber stock which are to be end spliced and glued together, the invention is generally illustrated in connection with a conventional end splicer (a device to cut the desired pattern on the end of pieces of lumber stock) and parts of such a conventional end splicer are generally indicated in Fig. 1 of the drawings.

The aforementioned general objects of my invention, together with others inherent in the same, are attained by the device illustrated in the accompanying drawings, throughout which like reference numerals indicate like parts:

Figure 1 is a view in elevation illustrating an application of the present invention to and as a part of an end splicing device for lumber;

Fig. 2 is a detached elevational view on larger scale than Fig. 1 of a glue applicator of this invention;

Fig. 3 is an exploded elevational view of the construction shown in Fig. 2 of the drawings;

Fig. 4 is a fragmentary perspective view showing two fragments of pieces of stock each having a patterned end portion to form a type of splice joint in connection with which glue may be applied in accordance with the construction of this invention;

Fig. 5 is a view similar to Fig. 4 showing the pieces partially urged together;

Fig. 6 is a view partially in plan and partially in section taken substantially on broken line 6—6 of Fig. 2;

Fig. 7 is a detached view of coupling member which may be employed in this invention; and

Fig. 8 is a view in plan with parts broken away showing a portion of the assembly illustrated in Fig. 2 of the drawings and adjustable supporting means therefor.

Referring to said Fig. 1 of the drawings, the end splicer is provided with a framework 8 for supporting various parts. The conveyor mechanism for conveying pieces of stock, such as 2 x 4's, comprises a deck 9 and traveling cleats or lugs 10 protruding therethrough. The stock is moved transversely of its length by said traveling cleats 10 and under hold-down means 11. A motor 12 functions as a prime mover for driving a cut-off or trim saw and sawdust is removed by a conduit 13. A motor 14 drives an edge cutting cutter head which is enclosed within the housing 15 and material removed by the cutter head is driven off through a conduit 16. The cutter head may have a pattern thereon to provide a pattern on an end of a piece of lumber stock, such as that illustrated in Figs. 4 and 5 of the drawings. As viewed in Fig. 1 of the drawings, a piece of lumber stock will be traveling transversely of its length and with the surface on which glue is to be applied facing the viewer. Thus the machine will be what is termed in the art as a right-hand feed and it is common to produce either right or left-hand feed machines. The subject-matter of this invention is indicated generally by 17 in Fig. 1 and the parts 8 to 16 inclusive thus illustrate one form of a traveling conveyor on which are provided pieces of lumber stock 18 and 19 (Figs. 4 and 5) which are traveling transversely of their length and with a pattern on an end portion to which a film of adhesive is to be applied.

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Referring now to Figs. 2 and 3, some of the parts of a device embodying this invention are shown in assembled relation in Fig. 2 and in exploded relation in Fig. 3. The said parts shown in Figs. 2 and 3 are removed from the glue pot 20 and shield or cover 53 which are shown in Fig. 1. If a thermo-plastic or heated type of glue is employed, then the glue pot or housing 20 will be appropriately insulated to more readily maintain desired temperatures. Glue may be pumped upwardly from the glue pot 20 by means of the screw type pump employing screw 21 within tubular member 22. A plurality of openings 23 (see Figs. 3 and 6) are provided in the coupling portion 34 of the doctor roll 24 and are preferably uniformly spaced around the periphery thereof. These openings 23 are shown in elevation in Fig. 3 and appear in the sectional parts of Fig. 6. Glue that is pumped by screw 21 and out through openings 23 rests on the top of the doctor roll 24 and is caused to move outwardly and downwardly on the surface of the doctor roll 24 by auxiliary scraper 25 (see detached in Fig. 3 and in scraping position in Fig. 6). The doctor roll 24 has a pattern thereon which will match the pattern at the end of the lumber stock such as that indicated in Figs. 4 and 5 of the drawings. The doctor roll 24 is driven by means hereinafter described and meshes with a glue applicator roll 26. Glue applicator roll 26 is also a driven roll and is relatively movable toward and away from the doctor roll 24 by mounting the doctor roll 24 for movement toward and away from the glue applicator roll 26. As the glue is scraped off the top surface of doctor roll 24, it moves downwardly following the periphery of the doctor roll 24. The glue applied on applicator roll 26 depends upon the distance separating the doctor roll 24 and the

glue applicator roll 26. In other words, the closer the rolls are together, the less glue film will be deposited on the glue applicator roll 26. The peripheral design of the glue applicator roll 26 is such as will mesh with the pattern on the end of the material to which glue is to be applied, and at the same time the patterns of the peripheral surfaces of the doctor roll 24 and the glue applicator roll 26 match.

By means hereinafter described, the glue applicator roll 26 is movable toward and away from the work to provide a desired spacing between the work and the peripheral surface of the glue applicator roll 26. The larger the opening therebetween, the more glue that can be deposited on the work. If the adjustment between the doctor roll 24 and the glue applicator roll 26 is such that large amounts of glue are being deposited on the glue applicator roll 26, then appropriate adjustment should be made between the glue applicator roll 26 and the work to permit the deposit of such glue. If the glue applicator roll 26 is too close to the work, it tends to squeeze glue away from the surface on which glue is to be deposited or tends to squeeze the glue away from the surface and into the wood, either of which is undesirable. When smaller amounts of glue are being fed on to the peripheral surface of the glue applicator roll 26, then an appropriate adjustment should be made between the work and the peripheral surface of the glue applicator roll 26 to ensure that this smaller amount of glue is appropriately spread. The means for adjusting the glue applicator roll 26 toward and away from the work may be in the form of a construction whereby the assembly, mounting roll 26, is movable toward and away from the work.

As most glues have a predetermined pot life, it is necessary to provide a structure which can be readily assembled or dis-assembled to provide for periodic cleaning of the various parts such as is incidental to shutting down after completion of a shift with a lay-off period occurring before the next shift. In my invention, I have provided a construction which is extremely practical in that it provides for ready assembly and dis-assembly and thus details of my invention are likewise important.

The screw 21 is provided with a flange 27 toward the upper end thereof and said flange 27 carries a tongue 28. The tongue 28 can be moved to interfit with the groove 29 in the face of coupling 30. The coupling 30 is a driven coupling and has a peripheral groove 31 therein. Also the coupling 30 is provided with two diametrically opposed grooves 32 which are aligned with the end portions of the groove 29. The doctor roll 24 carries button head screws 33 in the coupling portion 34 thereof. Also the said coupling portion 34 carries set screw 35. In order to connect the screw 21 and the doctor roll 24 to coupling 30, the tongue 28 is inserted into the groove 29. As the coupling portion 34 is moved upwardly, the heads of button head screws 33 will pass through the end portion of groove 29 and through the grooves 32 and into the groove 36 in the top portion of coupling 30 (see also Fig. 7). As the shanks of button head screws 33 are external of the periphery of coupling 30, the coupling portion 34 may be angularly moved and the button head screws 33 will move in groove 36 and be supported by the flange forming said groove 36 to prevent the coupling portion 34 from dropping. The groove

36 is only a portion of the distance around coupling 30 and thus stop portions 37 can thrust against the heads of button head screws 33. Then if set screw 35 is tightened, the inner end portion thereof will nest in the groove 31 and the parts will be held in this position. The coupling portion 34 carries a flange which fits against and supports the flange 27 and thus the flange 27 is limited in its downward movement relative to coupling portion 34 and the tubular member 22, but the screw 21 can be moved upwardly when the parts are in dis-assembled relation to remove said screw 21 from the tubular member 22. As the coupling 30 is a driven member, its rotating motion will be imparted to the screw 21 via groove 29 and tongue 28 and to the doctor roll 24 via button head screws 33 and stop portions 37 of the groove 36.

In order to remove screw 21 and tubular member 22, it is only necessary to loosen set screw 35, angularly move coupling portion 34 until the button head screws 33 are aligned with grooves 32, and the outer portions of groove 29 and said two parts may be lowered, providing of course that provision is made to release glue applicator roll 26 by means hereinafter discussed, and also to release the bracket 38 which supports the tubular member 22. The doctor roll 24 is mounted for rotary movement about the tubular member 22, and the doctor roll 24 can be moved longitudinally of the tube 22. However, once the coupling portion 34 is secured to the coupling 30, then the doctor roll 24 is carried by such coupling 30 and at the same time rotates about the tubular member 22.

As a means of adjustably suspending bracket 38 from gear box 39, I provide a bracket 40 having preferably a depending arcuate bracket 41 (see Figs. 2, 3, and 6) with a machined surface thereon. The bracket 41 carries bolt 42 having a wing nut 43 threaded thereon. Bolt 42 slidingly receives a groove 44 (see Fig. 6) in bracket 38 so that upon loosening of the wing nut 43 the bracket 38 is slidable relative to the arcuate bracket 41, and upon tightening of the wing nut 43 a desired adjusted relation between the brackets 38 and 41 obtains.

It is desired that a scraper be provided for the peripheral surface of the glue applicator roll 26 after the said applicator roll has contacted the surface of the wood on which glue is to be applied. If sawdust should be picked up on the glue applicator roll 26, such as a scraper will remove the same so that it will not accumulate in sharp corners on the periphery of the glue applicator roll 26, and the sawdust, if any, can be delivered back to the glue pot 20 and there screened out or permitted to settle if desired. Such a scraper, as scraper 45, can be supported by the bracket 41. The bracket 41 is shown as having four cap screws 46 threaded therein (see Fig. 2) and the scraper 45 is provided with matching key hole slots 47 so that the scraper 45 can be inserted in place, after the cap screws 46 have been loosened, and then the scraper 45 held in any desired adjusted position by tightening the cap screws 46. The scraper portion of the scraper 45 is provided with a pattern matching the peripheral pattern of the glue applicator roll 26. Also the scraper 45 forms a convenient and suitably located support for the auxiliary scraper 25 which scrapes the top surface of the doctor roll 24.

The glue applicator roll 26 is supported on driven shaft 48 and suitable gear ratio obtains

between the driven shaft 48 and the driven coupling 30 so that the glue applicator roll 26 and the doctor roll 24 have the same peripheral speed. The driven shaft 48 is provided with a key 49 which is slidable into a suitable groove in the hub 50 of the applicator roll 26. The shaft 48 is provided with threaded portions on which are mounted nuts 51 and 52. Upon angular movement of the nut 51, a stop is provided to determine the vertical position of the glue applicator roll 26, and upon tightening of nut 52 the glue applicator roll 26 is held in a desired adjusted elevational position.

In order to remove the parts which will be contacted by the glue and from which it is desired to remove all glue, the bracket 45 can be removed after loosening cap screws 46. Then the bracket 38 and the tubular member 22 can be removed upon loosening wing nut 43. Then nut 52 can be unscrewed and thereafter the set screw 35 is loosened. Then upon angular movement of the coupling portion 34, the button head screws 33 can be moved until their head portions register with grooves 32. Then as the heads of button head screws 33 will register with both grooves 32 and the end portions of groove 29, the doctor roll 24 and the glue applicator roll 26 can be moved downwardly together. Thus upon removal of these parts, they can be readily treated with suitable cleaning solutions or cleaning apparatus and the parts will have any glue residue removed therefrom.

Referring now to Fig. 1 of the drawings, the glue pot 20 is preferably provided with a protective shield 53 in order to prevent sawdust or the like entering the glue pot 20. A covered fill spout 54 for the glue pot 20 is at any suitable location. The sheave 55 may be a separately driven sheave but is preferably a sheave connected with the conveyor mechanism as by sheave 56 and V-belt means 57.

Referring now to Fig. 8, which is a plan view looking directly downwardly into the glue pot and having portions broken away, the driven sheave 55 is keyed on cross shaft 58. The cross shaft 58 rigidly carries worms 59 and 60. Worm 59 meshes with worm wheel 61 which is fixed on shaft 62. Shaft 62 is the shaft supporting the coupling 30 driving doctor roll 24. Arm means 63 is pivoted by pivot means 64 to the gear case 39. A link or eyebolt 66 has one end portion pivoted to the arm means 63 and said link 66 extends outwardly through the gear case 39 and through the glue pot 20 and is mounted for relative sliding movement through openings in said gear case and said glue pot. As a means to provide adjustable longitudinal movement of the link 66 and in turn angular movement of the shaft 62 about pivot means 64, I have indicated a compression spring 67 mounted on said link 66 and abutting the gear case 39 and a suitable flange on the link 66. Thus the said spring 67 tends to angularly move the arm means 63 in clockwise direction as viewed in Fig. 8 or toward the left as viewed in said figure. The outer portion of the link 66 is threaded and an adjusting wheel 68 is threaded on said threaded portion of the link 66. Thus upon loosening of the wheel 68, the spring 67 will angularly move the arm means 63 in a clockwise direction as viewed in Fig. 8, and upon tightening of said wheel 68, the arm means 63 will be moved in the other direction, as a counter-clockwise direction as viewed in Fig. 8.

A piece of material to have glue applied on its

end portion is indicated by the fragment 69 in Fig. 8 and the piece is moved in the direction of the arrow by conveyor means and past the glue applicator roll 26, a fragment of which is also shown in said Fig. 8. Thus, as the shaft 62 and the doctor roll 24 carried thereby move toward the left as viewed in Fig. 8, the orifice between the doctor roll 24 and the glue applicator roll 26 is decreased and the same is increased by movement of the shaft 62 in the opposite direction. The worm wheel 61 may move with the arm means 63 a sufficient amount for adjusting purposes without unmeshing worm wheel 61 and worm 59.

Worm 60 carried by cross shaft 58 meshes with a worm wheel 70 and worm wheel 70 is mounted on shaft 48 which shaft carries glue applicator roll 26. As glue applicator roll 26 is of a larger diameter than doctor roll 24 and as it is desired to have the same peripheral speed for the doctor roll 24 and the glue applicator roll 26, a suitable gear ratio is selected between the worms 59 and 60 and their driven worm wheels 61 and 70.

The glue pot 20 is fixed to the main framework 8. The glue pot 20 may be open at its top as the shield 53 is provided. The gear box 39 and the parts connected therewith which are substantially all shown in Fig. 3 of the drawings are mounted for movement as a unit with the gear box 39. Preferably, a readily adjustable assembly is provided which may include arm means 71 pivoted by spaced pivot means 72 to the glue pot 20 and by spaced pivot means 73 to a cross arm 74. We thus have a parallelogram and the arms 71 will remain parallel as they are angularly moved and the cross arm 74 may be moved to the right or to the left as viewed in Fig. 8, and it will remain parallel to the adjacent wall of the glue pot 20. A hook-like flange 75 is carried by the gear case 39 and is detachably secured to a ledge on the cross arm 74 as by set screw and nut means 76. Upon loosening of the set screw and nut means 76, the gear case 39 and parts carried thereby can be readily removed as a unit.

In order to provide for movement of the gear case 39 toward and away from piece 69 and in turn movement of the glue applicator roll 26 toward and away from said piece, a link or eyebolt 77 is pivoted by the pivot means 73 to one of the arms 71. The compression spring 78 is carried by said link 77 and has its ends abutted against the arms 71 and a bracket 79 carried by the glue pot 20. The outer end portion of the link 77 threadedly carries wheel 80. Upon angular movement of the wheel 80 in one direction, the spring 78 urges the gear case 39 and in turn the parts carried thereby, as glue applicator roll 26, toward a piece 69 and angular movement of the wheel 80 in the other direction causes said glue applicator roll 26 to be withdrawn away from the work 69.

In order to get a desired spread of glue on a surface, the wheel 68 is adjusted so that a desired orifice is provided between the doctor roll 24 and the glue applicator roll 26. Regardless of the amount of glue that is being pumped by the screw 21, the amount of glue which will be delivered onto the periphery of the glue applicator roll 26 depends upon this adjusted orifice. Any excess over the amount determined by the orifice will simply flow down and be returned to the glue pot 20. Obviously, the glue pot should have a sufficient open top to receive such returning glue. After an adjustment has been made to deter-

mine the glue to be applied on a glue applicator roll **26** and in turn to the piece **69**, then the wheel **80** should be adjusted so that the glue is not being squeezed off by contact between the glue applicator roll **26** and the surface of the piece **69** which is being coated with glue. Too small an opening between the surface of the piece **69** and the glue applicator roll **26**, tends to squeeze glue off of the glue applicator roll **26** so it cannot be applied to the wood, and further tends to compress the glue into the wood and away from a desired glue line.

After two surfaces have had their end portions coated with glue, as is illustrated by pieces **18** and **19** in Fig. 5, then the pieces can be urged endwise together and caused to remain in such position until the glue has set or has been cured.

Obviously changes may be made in the forms, dimensions, and arrangement of the parts of my invention, the above setting forth only a preferred form of embodiment thereof.

I claim:

1. A glue applicator device comprising a driven glue doctor roll mounted on a vertical shaft; a driven glue applicator roll mounted on a vertical shaft, the peripheries of said two rolls being positioned in close glue spreading controlling proximity whereby the degree of opening between said rolls determines the glue spread; glue delivery means for the top surface of said glue doctor roll; and scraper means scraping glue off of said top surface and permitting the same to flow downwardly over the peripheral surface of the glue doctor roll, whereby it will be removed from said doctor roll and deposited on the applicator roll and may be applied on the surface of material relatively passing in close proximity to the periphery of the applicator roll.

2. A glue applicator device comprising a driven glue doctor roll mounted on a vertical shaft; a driven glue applicator roll mounted on a vertical shaft, the peripheries of said two rolls being positioned in close glue spreading controlling proximity whereby the degree of opening between said rolls determines the glue spread; means to deliver glue downwardly over the peripheral surface of the glue doctor roll; an object transferring means on which object glue is to be applied said means being located in close proximity to the periphery of the glue applicator roll; and scraper means for said glue applicator roll contacting a portion of the periphery of the same which is relatively past said object on which glue is being applied.

3. A glue applicator device comprising a driven cross shaft; longitudinally spaced first and second worm and worm wheel means operatively connected with said cross shaft, said first and second worm and worm wheel means being relatively adjustable toward and away from each other; a first vertical shaft connected with said first worm and worm wheel means; a driven glue doctor roll mounted on said first vertical shaft; a second driven vertical shaft connected with said second worm and worm wheel means; a driven glue applicator roll mounted on said second vertical shaft, the peripheries of said two rolls being positioned in close proximity to each other whereby a glue spread controlling opening between said rolls is provided, and downwardly glue delivering means for the peripheral surface of the glue doctor roll.

4. A glue applicator device comprising a gear case; a driven cross shaft supported by said gear case; longitudinally spaced first and second worm and worm wheel means operatively connected with said cross shaft, said first and second worm and worm wheel means being relatively adjustable toward and away from each other; a first vertical shaft connected with said first worm and worm wheel means and supported by said gear case; a driven glue doctor roll mounted on said first vertical shaft; a second driven vertical shaft connected with said second worm and worm wheel means and supported by said gear case; a driven glue applicator roll mounted on said second vertical shaft, the peripheries of said two rolls being positioned in close proximity to each other whereby a glue spread controlling opening between said rolls is provided; downwardly glue delivering means for the peripheral surface of the glue doctor roll; an object transferring means on which object glue is to be applied said means being located in close proximity to the periphery of the glue applicator roll; and means relatively moving said gear case and, in turn, said glue applicator roll relatively toward and away from the object on which glue is to be applied.

5. The combination of claim 4 wherein adjusting means operable externally of said gear case move said first and second worm and worm wheel means relatively toward and away from each other and wherein adjusting means operable externally of said gear case move said gear case and, in turn, said glue applicator roll relatively toward and away from the object on which glue is to be applied.

6. In a glue applicator device a housing; a gear case; a cross shaft mounted in said casing; a first and second worm mounted on said shaft; a rocker pivotal mounting means mounting said gear casing on said housing; means connected to said rocker pivotal mounting means providing a forward and back movement for said casing; a first and second shaft mounting worm wheels which wheels engage said worms of said cross shaft, one of said shafts and its worm wheel being pivotally mounted on said gear casing; means connected to said pivotally mounted worm wheel whereby said shaft may be relatively moved with respect to said other shaft; a doctor roll mounted on said pivotally mounted shaft; and a glue applicator roll mounted on said other shaft.

7. In a glue applicator device comprising a housing; a gear casing mounted on said housing; a glue applicator roll rotatably mounted in said casing having a peripheral design matching the pattern of the material to which glue is to be applied; a bracket mounted on said casing; a scraper mounted on said bracket having edge pattern matching the peripheral pattern of said applicator roll and intermeshing with said peripheral portion of the applicator roll whereby sawdust and shavings are removed from the interior portions of the pattern of said applicator roll; and an auxiliary scraper mounted on the edge of said first mentioned scraper in a selected proximity to the end surface of the doctor roll.

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