Oct. 15, 1940. D. G. BIRMINGHAM 2,217,724

SPRAY COATING APPARATUS

Filed July 20, 1938 2 Sheets-Sheet 1

Fig. 1

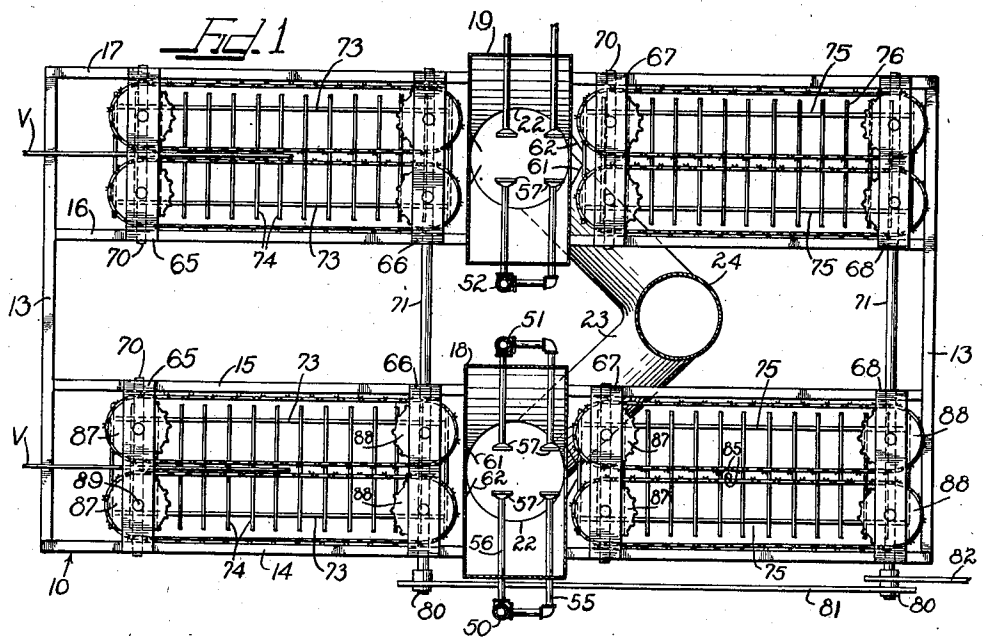


Fig. 2

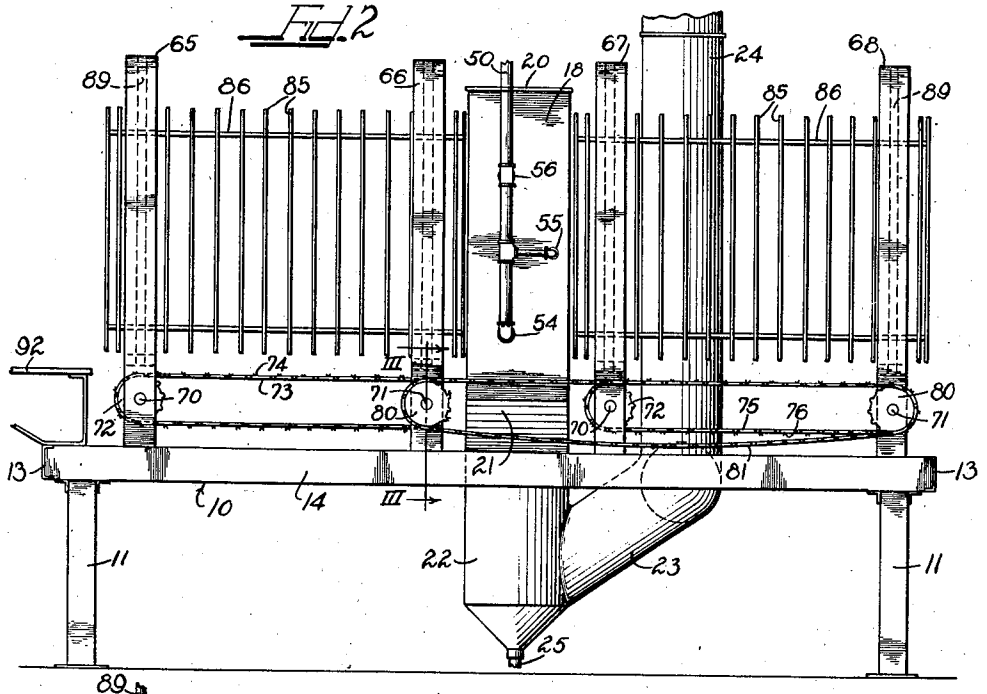
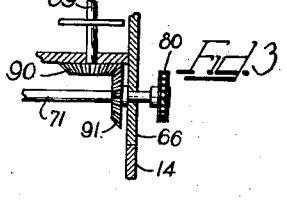


Fig. 3



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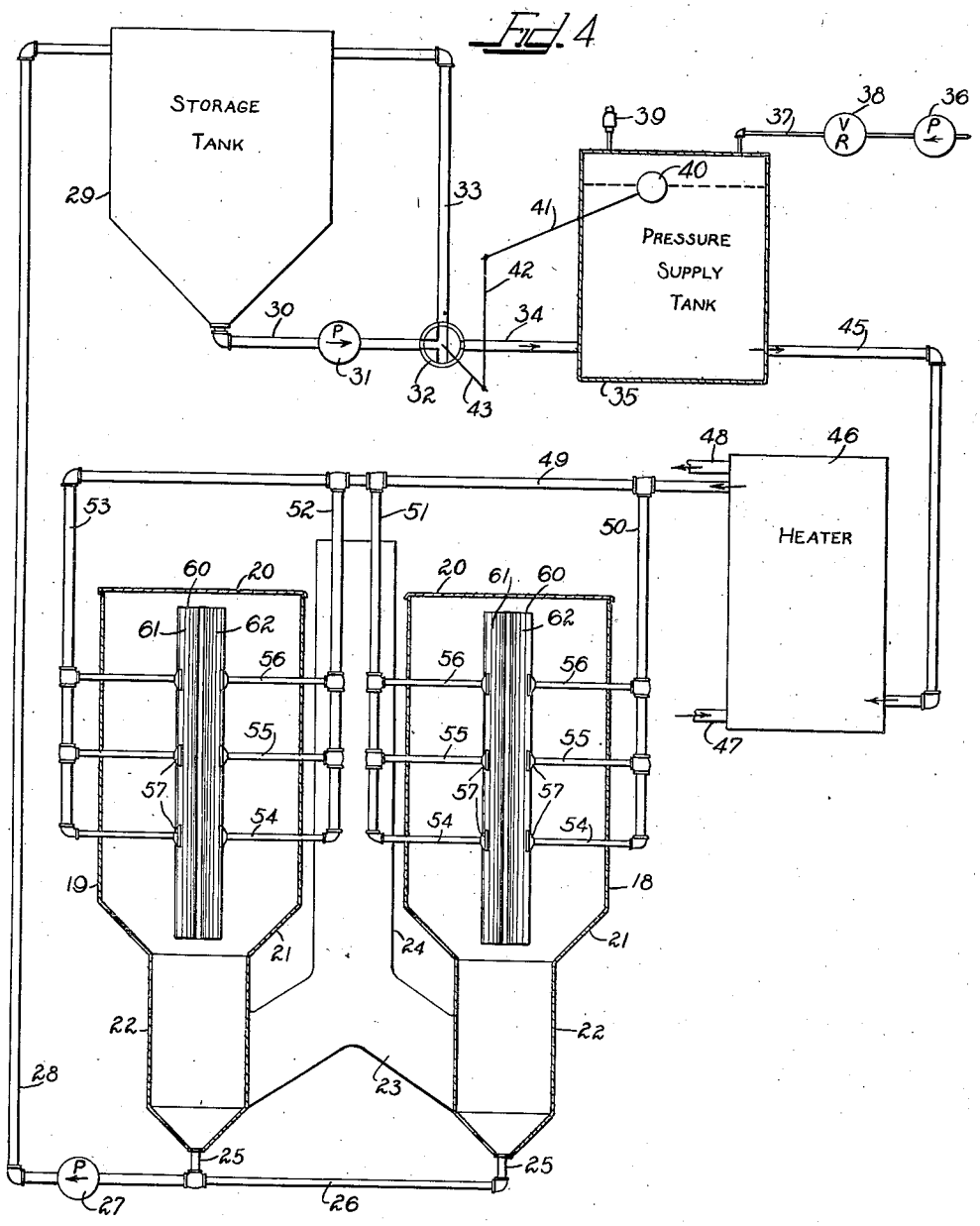
By Charles Stein Atty.

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SPRAY COATING APPARATUS

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Fig. 4



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UNITED STATES PATENT OFFICE

2,217,724

SPRAY COATING APPARATUS

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Application July 20, 1938, Serial No. 220,221

10 Claims. (Cl. 91—44)

This invention relates to apparatus for spray coating sheet material.

More specifically this invention relates to apparatus for coating both broad faces of veneer sheets with an adhesive.

In the manufacture of laminated material such as, for example, plywood, the constituent laminations are united together by means of an adhesive. It is customary to apply the adhesive only to the core sheet or lamination and for this reason both broad faces of the core sheet must be coated.

The present invention now provides a spray coating apparatus accommodating sheet material such as wood veneer to coat both broad faces thereof with a uniform film of adhesive. According to this invention the sheets are fed through the coating apparatus in an upright or vertical position. It has been found that a passage of veneer sheets in a horizontal position through a spray coating apparatus results in the formation of ponds or pools of adhesive on the top faces of the sheets while the bottom faces retain a relatively less amount of adhesive thereon. For the production of uniform plywood panels, however, it is essential that both broad faces of the core sheets be uniformly coated.

It is, then, an object of this invention to provide a spray coating apparatus for sheet material.

A further object of this invention is to provide a machine for uniformly coating both broad faces of sheet or board material with a liquid.

A further object of the invention is to provide a spray coater for plywood core sheets.

Another object of this invention is to provide a glue coating apparatus for plywood core sheets wherein the glue or adhesive is continuously circulated through the apparatus under uniform pressure.

Other and further objects of the invention will become apparent to those skilled in the art from the following detailed description of the annexed sheets of drawings which disclose a preferred embodiment of the invention.

On the drawings:

Figure 1 is a top plan view, with parts shown in horizontal cross section, of a spray coating apparatus according to this invention.

Figure 2 is a side elevational view of the apparatus shown in Figure 1.

Figure 3 is a fragmentary cross-sectional view, with parts in elevation, taken along the line III—III in Figure 2.

Figure 4 is a diagrammatic view of the circulating system for the apparatus and showing the spray housings in vertical cross section.

As shown on the drawings:

In Figures 1 and 2 the reference numeral 10 designates generally the frame structure of the machine. The frame 10 comprises legs 11, transverse beams 13 and four longitudinal beams 14, 15, 16 and 17 secured at their ends to the transverse beams 13.

A spray housing 18 straddles the longitudinal beams 14 and 15 and is supported thereon midway between the transverse beams 13. A second spray housing 19 likewise straddles the longitudinal beams 16 and 17. The housing 19 is aligned with the housing 18.

The housings 18 and 19 are closed at the top with covers 20 (Figures 2 and 4) and have sloping bottoms 21 communicating with vertical ducts 22. Both ducts 22 are joined through a Y-duct 23 with a stack or vent 24. This stack 24 discharges uncondensed vapors from the spray housings 18 and 19.

The bottoms of the ducts 22 receive pipes 25 therein for draining adhesive collected therein. The pipes 25, as shown in Figure 4, discharge into a pipe line 26 which is emptied by a pump 27 discharging through a pipe line 28 into a storage tank 29.

The storage tank 29 contains a supply of adhesive or glue that is fed to the spray housings 18 and 19.

As shown in Figure 4, the storage tank 29 drains into a pipe 30. A pump 31 pumps the adhesive from the pipe 30 into a three-way valve 32 which is usually set in the position shown to communicate with a pipe line 33 that discharges into the top of the storage tank 29. Thus, adhesive in the storage tank is recirculated from the bottom to the top of the tank by the pump 31. However, the three-way valve also receives a pipe 34 therein communicating with a pressure tank 35. This pressure tank 35 receives a supply of adhesive from the storage tank 29 and maintains this supply under a constant pressure supplied to the tank 35 by a pump 36. The pump 36 communicates with the top of the tank 35 through a pipe line 37 having a pressure regulator 38 therein interposed between the tank and the pump 36. A blow-off valve 39 is provided at the top of the tank to relieve pressure therein when adhesive is being pumped into the tank.

A float 40 is mounted on the end of an arm 41 in the tank 35. The arm 41 extends through a side of the tank in pivotal relation thereto and

is connected through links 42 and 43 to the core of the valve 32.

When the tank 35 has a predetermined supply of adhesive therein, the float 40, floating on top of the adhesive in the tank, holds the valve 32 in the position shown in Figure 4. In this position the pump 31 merely recirculates the adhesive from the bottom of the storage tank 29 to the top of the tank and thus maintains the adhesive in a constantly mixed, uniform condition. However, when the supply in the tank 35 drops below a predetermined level, the float 40 will have moved downwardly to open the valve 32 with the pipe line 34. The pump 31 will then supply adhesive from the tank 29 to the tank 35, until the float 40 again closes the valve 32.

A pipe line 45 joins the bottom of the tank 35 with a heat exchanger 46 supplied with steam or other heating fluid through an inlet pipe 47 and an outlet pipe 48. The adhesive is heated to a desired temperature in the heater 46 as it flows therethrough.

The heated adhesive is circulated out of the heat exchanger 46 into a pipe 49 having branch pipes 50, 51, 52 and 53 joined therewith.

The branch pipes 50 to 53 inclusive each have three horizontal pipes 54, 55 and 56 extending through an adjacent side wall of a spray housing 18 or 19 as is best shown in Figure 4. The pipes 54 to 56 inclusive each have a spray head 57 threaded on the end thereof.

The pipes 54 to 56 are in spaced superimposed relation with the center pipes 55 offset horizontally from the pipes 54 and 56 as is best shown in Figures 1 and 2. Pairs of spray heads 57 are thus diametrically opposed to each other in each spray housing 18 and 19.

The spray housings 18 and 19 have vertical inlet and outlet openings 60 through the front and rear faces thereof. Guide boards or flaps 61 and 62 are adjustably mounted adjacent each opening 60 along the sides thereof. These flaps 61 and 62 can be moved to vary the size of the openings 60 for accommodating veneers of different thicknesses. The flaps 61 and 62 mounted on the inlet opening 60 extend into the housing as shown in Figure 1. The flaps 61 and 62 mounted adjacent the outlet opening 60, however, extend out of the housing as shown in Figure 1.

Veneer sheets such as V are fed through the housings 18 and 19 between the spray heads 57 to receive a coating of adhesive thereon.

The device of this invention includes feeding mechanism for passing veneer sheets V through the spray housings.

The feeding mechanism will now be described.

The longitudinal beams 14 and 15 as well as the beams 16 and 17 have U-shaped straps or bands 65 and 66 mounted in spaced relation on the inlet sides of the housings 18 and 19. Similar bands 67 and 68 are mounted on the beams at the discharge sides of the spray housings as is best shown in Figures 1 and 2.

The bands 65 and 67 have stub-axles 70 mounted thereacross slightly above the longitudinal beams. The bands 66 and 68 each have long axles 71 extending therebetween and across the space between the bands as shown in Figure 1. Thus one axle 71 serves both bands 66 while another axle 71 serves both bands 68.

Sprocket gears 72 are mounted on each axle 70 and 71 adjacent the inside of each leg of the bands 65, 66, 67 and 68 respectively. The sprocket gears 72 mounted between the legs of bands 65 and 66 each have a chain 73 trained thereabout. Pairs of chains 73 are connected by means of cross rods or bars 74 as best shown in Figure 1.

Likewise the sprocket gears 72 mounted between the legs of the bands 67 and 68 have chains 75 trained therearound with pairs of chains 75 joined by transverse bars or rods 76.

The axles 71 receive sprocket gears 80 on the ends thereof in spaced relation from the bands as shown in Figure 1. A chain 81 is trained between the gears 80. An axle 71 is driven by means of a chain connection 82 as shown in Figure 1, so that a rotation of the first axle 71 on the discharge end of the assembly rotates the axle 71 on the intake end of the assembly to move all of the rods or transverse bars 74 and 76 in timed uniform relation. These bars support the bottom edges of the vertical veneer sheets V.

The veneer sheets V are held in vertical position by two sets of opposed vertical rods 85 carried on sprocket chains 86 that are trained between sprocket gears 87 and 88 mounted horizontally near the tops and bottoms of the bands 65 to 68 inclusive on vertical shafts or axles 89 rotatably carried by the bands. The vertical axles 89, as shown in Figure 3, are driven through bevel gears 90 and 91 from the horizontal axles 71. Thus the vertical rods 85 are driven with the horizontal rods 74 and 76 to engage the broad faces of the veneer sheets V and move the same in a vertical position.

As best shown in Figure 1 the veneer sheets V are moved into the spray housings 18 and 19 between the flaps 61 and 62. The portions of the veneer sheets in the housings 18 and 19 are unsupported but each sheet projects through the discharge openings of the housings and is supported on the rods 76 before it has moved off the rods 74.

As shown in Figure 2, a platform 92 may be mounted at the inlet side of the apparatus to permit operators to easily feed veneer sheets on top of the racks 74 and between the vertical rods 88.

From the above description it should be understood that this invention provides an apparatus for spray-coating sheet material such as wood veneers, board or the like. The apparatus includes conveyors for passing the sheet material through spray housings in a vertical position. The apparatus also includes a circulating system for the spray coating material whereby the same is kept in a constantly mixed uniform condition and may be supplied to the articles to be coated in a heated condition.

I am aware that many changes may be made and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I, therefore, do not purpose limiting the patent granted hereon otherwise than necessitated by the prior art.

I claim as my invention:

1. A spray coating apparatus comprising a closed housing having elongated slots in opposite sides thereof, flaps adjustably secured along the edges of said slots for regulating the size of the openings defined by the slots, spray devices in said housing, a duct communicating with the bottom of the housing, a ventilating stack communicating with said duct, and a drain pipe communicating with the bottom of the duct.

2. A spray coating apparatus comprising a frame structure having spaced parallel horizontal beams, a housing straddling said beams at the

mid-points thereof, said housing having vertically elongated slots in opposite side thereof, U-shaped bands secured in spaced relation on said beams on each side of said housing, horizontal axles rotatably mounted between the legs of said bands, sprocket gears mounted on said axles adjacent the inner face of each band leg, endless conveyors trained around said sprocket gears, vertical axles rotatably mounted in each band between the legs thereof, sprocket gears secured on said vertical axles, vertical conveyors trained around said sprocket gears and means for driving said horizontal and vertical axles in unison to move the conveyor for feeding sheet material in vertical position through the slots of said housing.

3. A spray coating apparatus comprising in combination a frame having a pair of transverse beams and four longitudinal beams in spaced parallel relation, spray housings straddling adjoining longitudinal beams at the mid-points thereof, horizontal conveyors mounted on said longitudinal beams on each side of said housing, vertical conveyors mounted above said horizontal conveyors and means for driving all of said conveyors in unison for feeding sheet material in vertical position through said housing.

4. A spray coating apparatus comprising a pair of housings each having vertically elongated slots through opposite sides thereof for receiving sheet material in vertical position therethrough, ducts communicating with the bottom of each housing, a Y-duct joining said first mentioned ducts a ventilating stack communicating with the Y-duct, a horizontal conveyor and a pair of opposed vertical conveyors adjacent the sides of each housing, means for driving all of said conveyors in unison to feed sheet material through the vertical slots of the housing and spray devices in said housing for coating the sheet material as it passes therethrough.

5. A spray coating apparatus including a spray housing, means for draining liquid from said housing, a storage tank for receiving the drained liquid, a pump for pumping liquid out of said storage tank, a pressure supply tank, a return pipe line to said storage tank, a three-way valve for controlling flow of liquid from said pump to said pressure supply tank or to said return pipe line, a float device in said pressure supply tank for operating said valve, means for maintaining a constant pressure in said pressure supply tank, a heater for receiving liquid from said pressure supply tank, and spray devices in said housing receiving heated liquid from the heater whereby a substantially constant supply of liquid under pressure is maintained and a constant circulation of liquid from the storage tank is obtained to supply thoroughly mixed liquids under controlled constant pressure to the spray devices.

6. A spray coating apparatus comprising a housing having front, rear and side walls, a top wall and a sloping bottom, said front and rear walls having vertically elongated slots therein, adjustable flaps secured along the edges of the slots for regulating the effective size thereof, a duct communicating with the sloping bottom, means ventilating said duct and a drain pipe at the bottom of said duct.

7. A spray coating apparatus comprising a vertical housing having vertically elongated inlet and outlet openings on opposite sides thereof, a plurality of spray heads in said housing on opposite sides of said openings, and mechanical conveyors positioned wholly outside said housing for moving sheet material through said housing in vertical position.

8. A coating device comprising a closed housing having aligned vertically elongated slots in opposite walls thereof, means positioned wholly without said housing for feeding sheet material through said slots and spray devices in said housing facing the broad surfaces of the sheet material.

9. A device for coating sheet material comprising a closed housing shorter than said sheet material and having vertically elongated slots in opposite walls thereof, means at each side of the housing positioned wholly without said housing for feeding said sheet material through said slots, said means terminating immediately adjacent the slots to support projecting positions of the sheet material and spray devices in said housing facing a broad surface of the sheet material.

10. A coating device for sheet material comprising two aligned endless conveyors having horizontal upper runs spaced apart for a distance less than the length of the sheet material, a pair of endless vertical conveyors above the upper run of each of said horizontal conveyors, said vertical conveyors having their inner runs in spaced opposed relation to receive therebetween sheet material supported on the upper runs of said horizontal conveyors, said inner runs of the vertical conveyors being sufficiently close to each other to hold the sheet material in upright position, means for driving all of said conveyors in unison, and spray devices positioned intermediate said spaced horizontal conveyors for coating said sheet material.

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