

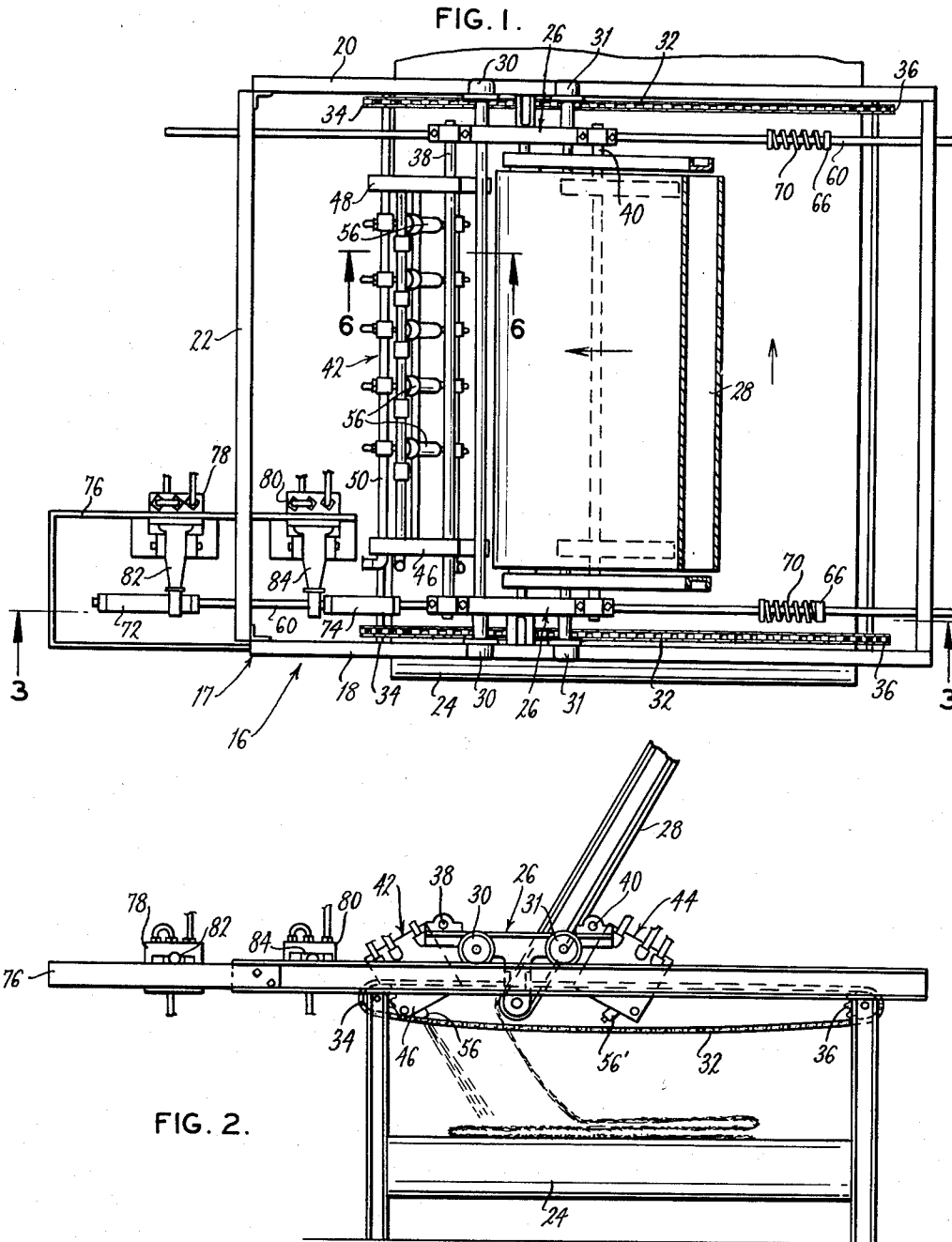
Nov. 15, 1955

P. E. ERBE
 SPRAY APPARATUS AND METHOD FOR FORMING
 IMPREGNATED FIBER PADS

2,723,707

Filed June 8, 1953

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

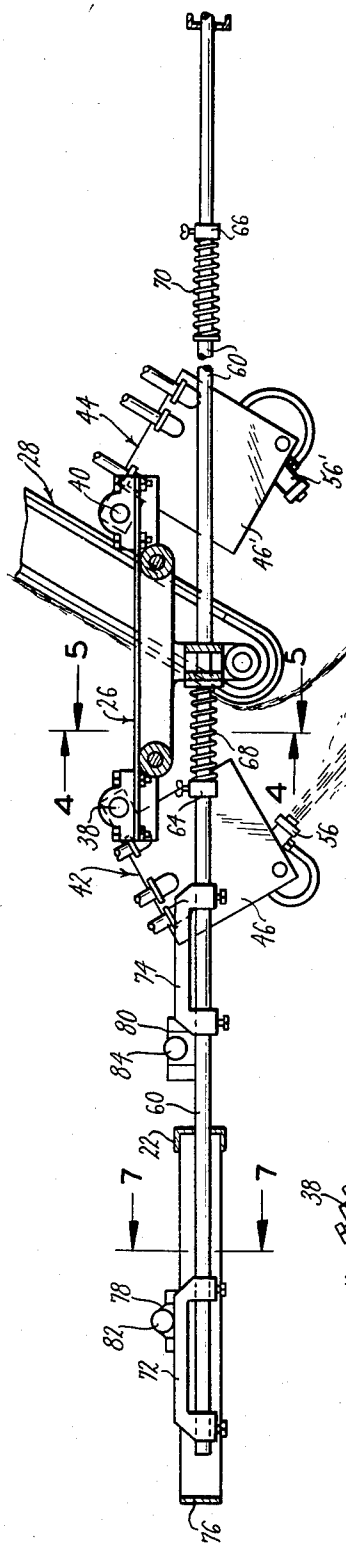


FIG. 3.



FIG. 4.

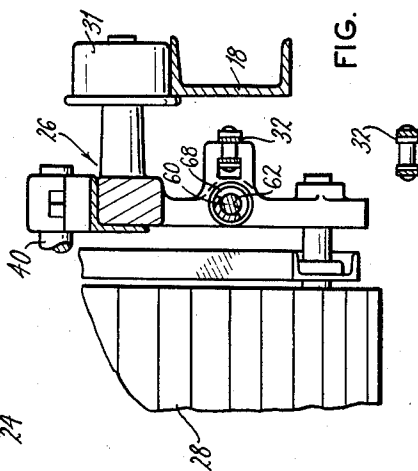


FIG. 5.

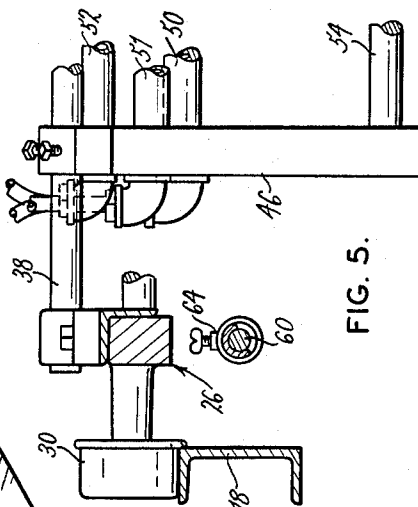
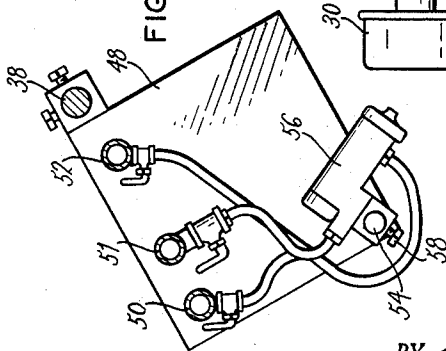


FIG. 6.



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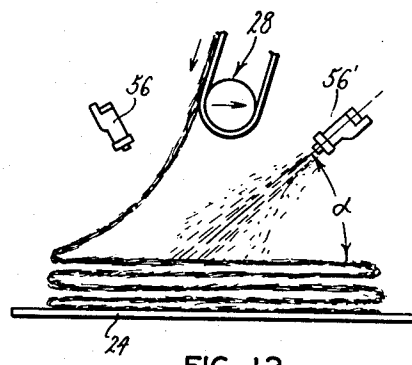
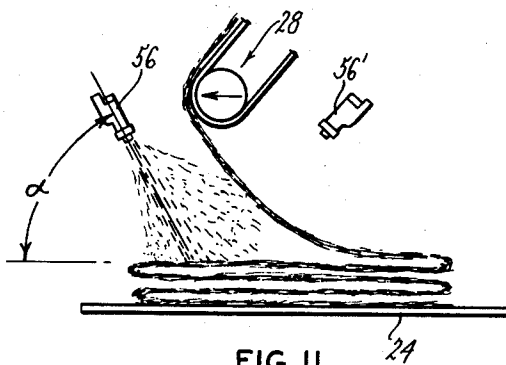
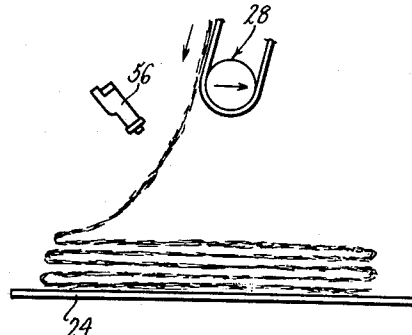
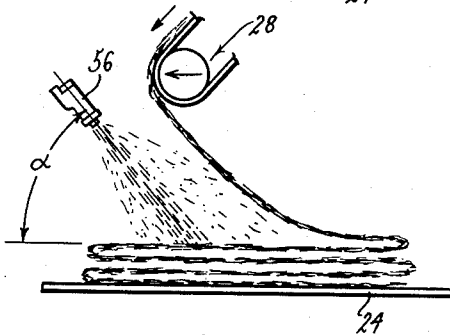
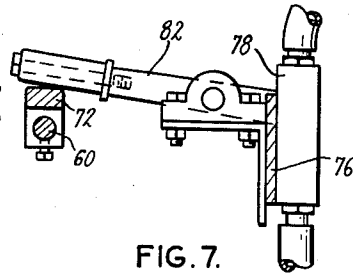
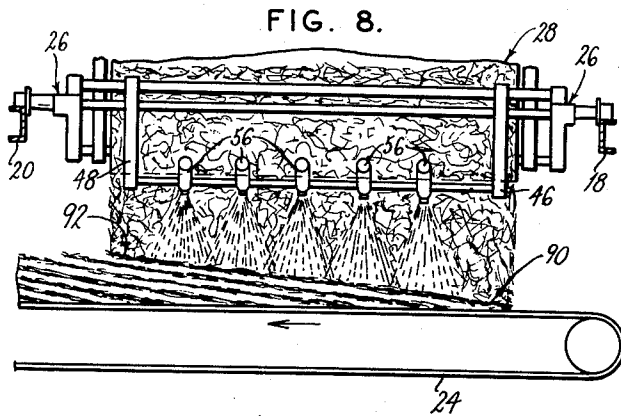
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1

2,723,707

SPRAY APPARATUS AND METHOD FOR FORMING IMPREGNATED FIBER PADS

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Application June 8, 1953, Serial No. 360,207

20 Claims. (Cl. 154—29)

The present invention relates generally to the manufacture of fiber pads and more particularly to a novel spray apparatus and method for forming fiber pads of any thickness which are thoroughly impregnated throughout with a binder such as liquid latex or the like.

At the present time, impregnated fiber pads are formed by cross-lapping a thin layer or veil of material onto a moving conveyor using a device known as a "camel-back" mechanism. After the layers of fiber have been laid-up to form a pad, the top of the pad is sprayed with the binder, and the pad is then turned over and the bottom portion thereof is sprayed. Because a fiber pad is like a filter, the binder can penetrate into the pad only a limited distance depending upon the force at which the binder is sprayed into the pad and the density of the pad. Thus, if a pad is relatively thick or relatively dense, the binder will penetrate only a short distance into the pad from the faces thereof, and consequently the center of the pad will not contain any binder.

Various devices and methods have been tried for impregnating each layer of the pad as it is being laid down on the conveyor, but heretofore none have met with any degree of success because the force of the spray blew holes in the veil or web of fiber, or the binder was deposited on the floor conveyor apron or on the "camel-back" apron, thereby causing a stoppage of the machine.

It is an object of the present invention, therefore, to provide a novel spray apparatus and method for forming fiber pads of any desired thickness which are thoroughly impregnated throughout with a liquid binder such as liquid latex or the like. More particularly it is an object to provide an apparatus and method for spraying either one or both sides of a fold of fiber laid down on a moving conveyor as by means of a "camel-back" mechanism.

Another object of the present invention is to position the spray guns for spraying the binder onto the layer of fiber in such a manner that the veils of fiber laid down will be of uniform thickness and will be thoroughly impregnated so as to cause the folds of fiber to adhere together. More particularly, it is an object to position the spray guns relative to the web or veil of fiber coming off the "camel-back" apron and to the moving floor conveyor so that the layers of fiber will be impregnated with the binder without the fiber coming off the "camel-back" apron having holes blown therein so as to adversely affect the uniform thickness of the pad, and without causing frequent stoppages of the machine.

Further objects and advantages of the present invention will be apparent from the detailed description, reference being had to the accompanying drawings wherein a preferred embodiment of the present invention is shown.

In the embodiment of the invention shown and described, spray guns are placed on opposite sides of the carriage which supports the discharge end of the "camel-back" apron, and are directed inwardly and downwardly so that the axis of each spray is at an acute angle relative to the floor apron and is substantially parallel with the veil of fiber coming off the "camel-back" apron. Means

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are provided for controlling the operation of the spray guns responsive to the position of the carriage so that the guns on opposite sides of the carriage operate alternately to spray the web of fiber when the web leaving the "camel-back" apron is inclined toward the gun on that side of the carriage.

The guns are also positioned relative to the floor apron and to the "camel-back" apron so that the sprayed binder does not pass through the pad and onto the floor apron, and does not blow onto the "camel-back" apron or side rail mechanism.

In the drawings:

Fig. 1 is a top plan view of a conventional "camel-back" mechanism provided with a spray apparatus embodying the teachings of the present invention, the details of the "camel-back" mechanism being omitted in order to more clearly illustrate the spray apparatus,

Fig. 2 is a side elevational view of the "camel-back" mechanism as viewed from the bottom of Fig. 1,

Fig. 3 is an enlarged fragmentary vertical sectional view taken on the line 3—3 in Fig. 1,

Figs. 4 and 5 are enlarged fragmentary vertical sectional views taken on the lines 4—4, and 5—5, respectively, in Fig. 3, showing the spray gun control mechanism,

Fig. 6 is an enlarged vertical sectional view taken on the line 6—6 in Fig. 1, showing the mounting of the spray guns,

Fig. 7 is an enlarged vertical sectional view taken on the line 7—7 in Fig. 3, showing the spray gun valve lever,

Fig. 8 is a schematic front elevational view of the mechanism showing how the thickness of the pad varies during the forming process, and the positions of the spray guns,

Figs. 9 and 10 are schematic views showing the relative positions of the guns and the web or veil of fiber during the forward movement of the "camel-back" apron (Fig. 9) and the rearward movement thereof (Fig. 10), using one set or bank of spray guns, and

Figs. 11 and 12 are similar to Figs. 9 and 10 except that in these views there are two banks of guns for spraying the fiber during both the forward and rearward movement of the "camel-back" apron.

Referring to the drawings more particularly by reference numerals, specifically Fig. 1, 16 indicates generally a "camel-back" mechanism provided with a spray apparatus and control constructed in accordance with the teachings of the present invention.

The "camel-back" mechanism 16 includes a rectangular shaped framework 17 which is horizontally disposed above the floor and which includes channel-shaped side rails 18 and 20, and a front rail 22.

Disposed beneath the framework 17 is a conveyor or floor apron 24 which moves transversely relative to the side rails 18 and 20, and in the direction away from the side rail 18.

A carriage 26, which supports the discharge end of a "camel-back" apron 28, contains spaced flanged wheels 30 and 31 at each side thereof which ride on the upper surfaces of the side rails 18 and 20 to permit forward and rearward movement of the carriage 26 and the discharge end of the "camel-back" apron 28.

The "camel-back" apron is driven by conventional means not shown, and the carriage 26 is moved back and forth by a link chain 32 which is connected to the carriage (Fig. 4) and which runs over sprockets 34 and 36 at opposite ends of the side rails 18 and 20.

Thus, as the discharge end of the "camel-back" apron 28 is moved back and forth on the side rails 18 and 20, it lays down a thin web or veil of fiber on the floor apron 24 in a zig-zag or accordion fashion, as shown schematically in Figs. 8 through 12.

Adjacent the one side of the "camel-back" apron 28, the layers of fiber on the floor apron 24 are relatively few in number, but, as the floor apron passes further under the apron 28, the number of layers increases (Fig. 8). This fact is important because it determines the position of the spray gun closest to the starting end of the floor apron (adjacent the side rail 18), as will be more fully described hereinafter.

Mounted on the carriage 26 so as to extend transversely in front of and at the rear of the discharge end of the "camel-back" apron 28, are rods 38 and 40 which support the front and rear spray gun assemblies 42 and 44, respectively, for spraying the web or veil of fiber laid down on the floor apron 24.

Inasmuch as the spray gun assemblies are substantially identical in construction, only the front assembly 42 will be described but the parts of the rear assembly 44 will be indicated by like numbers, primed.

Pivotal and adjustably mounted on the rod 38 are end plates 46 and 48 (Figs. 1 and 6) which support three pipes 50, 51 and 52, for carrying compressed air and a liquid binder such as liquid latex to the spray guns. Pipe 50 carries the air for operating the guns, pipe 51 carries the atomizing air, and pipe 52 carries the binder which is sprayed onto the fiber. The end plates 46 and 48 also support a rod 54 for adjustably supporting the spray guns 56. The spray guns 56 can be moved along the rod 54 and can be pivoted about it and are maintained in adjusted lateral and pivotal position by means of set screws 58 (Fig. 6).

The spray guns 56 are inclined at an angle α relative to the plane of the floor apron 24 so as to maintain the axis of the spray substantially parallel with the veil of fiber being laid down by the "camel-back" apron, the angle being between about 50 degrees to 60 degrees, and preferably about 57 degrees for the mechanism used. Each gun sends out a spray of binder which is substantially fan-shaped, i. e., the thickness of the spray as shown in Fig. 9 is fairly uniform and diverges a relatively small amount from the tip of the gun to the layer of fiber on the floor apron, but the sides of the spray diverge outwardly a considerable amount and overlap, as shown schematically in Fig. 8. It is to be understood, however, that some of the binder blows or floats upwardly onto the layer of fiber dropping off of the discharge end of the "camel-back" apron.

As shown in Fig. 8, the end spray gun closest to the side rail 18 is positioned far enough from the side rail 18 and the beginning edge of the pad being laid down on the floor apron 24, so that sufficient fiber is deposited on the apron 24 below it to prevent the liquid spray from passing through the layer of fiber and onto the floor apron 24 and from being blown into the side rail mechanism, and the gun closest to the side rail 20 is positioned away from it to prevent the binder from blowing up into the rail mechanism on that side.

As described above, the angle of the axis of spray of each gun relative to the floor apron 24 and to the web of fiber leaving the discharge end of the "camel-back" apron 28, is such as to prevent the fiber from having holes blown in it and from being blown away as it drops from the discharge end of the "camel-back" apron. Consequently, the bank of spray guns on the forward side of the carriage, which is used for spraying the web during the forward movement of the "camel-back" apron, cannot be used for spraying when the "camel-back" apron is moving in the rearward direction because of the change in the angular position of the web of fiber leaving the apron relative to the axes of the guns. Therefore, regardless of whether one or two banks of spray guns are used, it is necessary to provide means for stopping the spraying when the "camel-back" apron 28 moves away from the guns, and for starting them again when it moves towards the guns. This control mechanism will now be described.

As shown in Figs. 1, 3 and 4, a horizontally disposed valve control rod 60 is slidably mounted in an opening 62 contained in the side of the carriage adjacent the side rail 18. Adjustable stop nuts 64 and 66 are mounted on the control rod 60 on opposite sides of the carriage, and coil springs 68 and 70 are disposed on the rod 60 between the carriage frame and the nuts 64 and 66, respectively. Thus, as the carriage 26 moves in the forward direction, it contacts one end of the spring 68 and moves the control rod 60 in the forward direction, and, when the carriage reverses direction, it contacts spring 70 and moves the control rod 60 in the opposite direction.

Cams 72 and 74 are adjustably mounted on the forward end of the control rod 60 and move with it for actuating the control valves, which will now be described.

As shown in Figs. 1 and 2, a combination guard and supporting bracket 76 is mounted on the side rail 18 and the front rail 22. Valves 78 and 80 are mounted on the bracket 76, the valve 78 controlling the operation of the front bank of spray guns, and the valve 80 controlling the operation of the rear bank of spray guns. The valve 78 includes a control lever 82 which is actuated by the cam 72, and the valve 80 includes a control lever 84 which is actuated by the cam 74, each bank of guns being in operation when the lever of the valve associated therewith is in the raised position, and being inoperative when the lever is horizontal.

The cams 72 and 74 are spaced relative to the control levers 82 and 84 so that only one or the other is in the raised position so that both banks of guns cannot be operative at the same time.

Operation

As previously mentioned, the lower end of the "camel-back" apron 28 is caused to oscillate back and forth in a horizontal plane so as to lay down a plurality of folds or layers of fiber on the conveyor or floor apron 24, as shown schematically in Figs. 9 through 12.

The floor apron 24 moves transversely relative to the movement of the "camel-back" apron 28 and in the direction away from the side rail 18, whereby the material on the floor apron 24 adjacent the side rail 18 is relatively thin, and the thickness of the material increases progressively toward the side rail 20 (Fig. 8).

When a relatively thin web or veil of fiber is laid down, a single bank of spray guns (Figs. 9 and 10) is satisfactory because the binder can penetrate through several layers of fiber on the floor apron 24. If a relatively thick veil is being used, it is desirable to use a bank of guns adjacent both the front and back portions of the carriage 26 so as to spray within each fold of the fiber (Figs. 11 and 12).

Referring to Figs. 9 and 10, the bank of spray guns 56 adjacent the front portion of the discharge end of the "camel-back" apron 28 is turned on when the latter starts moving in the forward direction (Fig. 9), and is turned off when the apron 28 starts moving in the rearward direction (Fig. 10).

It will be noted that the axis of spray of each of the guns 56 is inclined at an angle α to the plane of the floor apron 24 so that the liquid binder is sprayed at an acute angle relative to the fiber on the floor apron, and substantially parallel with the veil of fiber dropping off of the discharge end of the "camel-back" apron 28. Although the spray is not directed at the fiber coming off of the "camel-back" apron 28, some of it drifts or mists upwardly and is deposited on it. Consequently, there is very little, if any, tendency to blow away the fiber, or blow a hole in the web so that the layers of fiber laid down on the floor apron are of uniform thickness throughout. Also, the web coming off of the discharge end of the "camel-back" apron 28 traps or smothers the spray so as to prevent it from drifting upwardly into the "camel-back" mechanism.

When the "camel-back" apron 28 starts to move rear-

wardly (Fig. 10), the axes of the front guns 56 are approximately normal to the web of fiber being laid down, and, if the guns were allowed to operate, they would blow holes in the web, or blow away the fiber as it falls from the discharge end of the "camel-back" apron 28. Consequently, it is necessary to turn off the front guns before the apron 28 starts to move rearwardly.

It is necessary that the axes of each of the spray guns be substantially parallel to the web which is coming off of the discharge end of the "camel-back" apron 28. It has been determined that this is accomplished with the equipment used by applicant when the angle alpha is between about 50 degrees and 60 degrees and preferably about 57 degrees.

When relatively thin veils of fiber are being laid down, one set of guns is adequate because even though the binder is sprayed between alternate folds, the binder can penetrate the top layer of fiber laying on the floor apron and pass downwardly into the layers beneath it (Figs. 9 and 10). However, when relatively heavy webs of fiber are being laid down, it is advisable to use two sets of guns, one in front and another in back (Figs. 11 and 12).

Inasmuch as the valve control apparatus operates in the same manner regardless of whether one or two sets of guns are used, the operation of the device employing two sets will be described.

In Fig. 3, the discharge end of the "camel-back" apron 28 and the valve control rod 60 (which is carried by the apron 28) are shown as moving forward and approaching their forwardmost positions. In this view the valve 78 is open because its control lever 82 is in the raised position on the cam 72, and the valve 80 is closed by reason of its control lever 84 being horizontal and out of engagement with the cam 74. Consequently, the front guns 56 are in operation, and the rear guns 56' are inoperative.

As the discharge end of the "camel-back" apron 28 and the valve control rod 60 (with the cams 72 and 74 mounted thereon) continue their forward movement, the cam 72 will move from under the control lever 82, thereby causing it to drop to a horizontal position so as to close valve 78 and stop the operation of the front bank of spray guns as the apron 28 reaches its forwardmost position.

At approximately the same time, the cam 74 is carried under the control lever 84 and causes it to be moved upwardly thereby opening the valve 80 and causing the rear bank of guns to become operative. There is a slight time delay before the rear guns start to operate, and the discharge end of the apron 28 is moving relatively fast, consequently, the rear guns do not start to spray until the apron 28 has started to move in the rearward direction.

When the discharge end of the "camel-back" apron 28 moves in the rearward direction away from the position shown in Fig. 3, the carriage 26 moves out of engagement with the inner end of the spring 68 and ultimately into engagement with the spring 70. As the spring 70 is compressed, the control rod 60 is moved rearwardly so as to disengage the cam 74 from the valve control lever 84 and to cause the valve lever 82 to ride up on the cam 72. This causes the rear guns 56' to become inoperative just as the apron 28 reaches the end of its rearward travel and causes the front guns 56 to become operative when the apron 28 reverses direction and starts to move in the forward direction. Thus, as the discharge end of the "camel-back" apron 28 and the carriage 26 move back and forth laying down a series of layers of fiber on the moving floor apron 24 in a zig-zag fashion, the guns 56 and 56' are alternately operated responsive to the movement of the carriage as it contacts the inner ends of the springs 68 and 70 and carries the control rod 60 back and forth, so as to spray the liquid binder into the fold formed by the top layer of the fiber on the floor apron and the veil or web of fiber falling from the discharge

end of the "camel-back" apron 28. This thoroughly impregnates the fiber, and consequently there is no limit to the thickness of the pads which are impregnated in this manner.

Because the spray guns are always directed at an acute angle relative to the layer of fiber on the floor apron 24 and are substantially parallel to the web or veil being laid down by the discharge end of the "camel-back" apron 28, the fiber is not blown away as it falls from the apron 28 nor are holes blown in the web. Consequently, the layers are of uniform thickness throughout. Furthermore, the inclination of the web leaving the discharge end of the apron 28 blankets the spray of liquid binder so as to prevent it from drifting or misting upwardly into the "camel-back" mechanism.

As commented on previously, the fiber on the floor apron 24 adjacent the side rail 18 is relatively thin because of the movement of the floor apron away from it. Therefore, as shown in Fig. 8, the end gun in each bank, closest to the side rail 18, is spaced a sufficient distance from the side rail 18 so that there is enough fiber disposed on the floor apron beneath it to prevent the binder from passing through the fiber and sticking on the floor apron 24. Consequently, no binder is sprayed on the surface 90 or on the underside of the fiber pad by the guns 56 or 56'. The same is true of the gun closest to the side rail 20. The end gun on that side is spaced inwardly to prevent the binder from drifting upwardly into the side rail mechanism on that side of the "camel-back" device. It is also spaced inwardly so as not to spray the surface 92 at the top of the pad because the pad is passed under a roller (not shown) which presses together the folds of fiber.

However, after the pad passes under the aforementioned roller, it passes under a reciprocating spray gun which impregnates the top surface of the pad. The pad is then turned over and the bottom sprayed by means of a similar reciprocating gun.

Thus, it is apparent that there has been provided a novel spray apparatus and method for forming impregnated fiber pads which fulfils all of the objects and advantages sought therefor. The layers of fiber are thoroughly impregnated and there is no limit to the thickness of pads which can be formed following the teachings of this invention. The fibers are not blown off the "camel-back" mechanism and holes are not blown in the webs, whereby the layers of fiber are of uniform thickness throughout. Also, the binder is not deposited on the floor apron and does not drift upwardly onto the "camel-back" mechanism.

It is to be understood that the foregoing description and the accompanying drawings have been given only by way of illustration and example, and that changes and alterations in the present disclosure, which will be readily apparent to one skilled in the art, are contemplated as within the scope of the present invention which is limited only by the claims which follow.

What is claimed is:

1. The process of forming an impregnated fiber pad including the steps of laying down a plurality of layers of fibrous material one on top of the other on a conveyor by an apron moving back and forth across it whereby the web of material leaving the apron forms an acute angle with the layer of material on the conveyor; and spraying a binder onto the layer of fibrous material on the conveyor at an acute angle relative thereto in front of the web of material leaving the apron.

2. The process of forming an impregnated fiber pad including the steps of laying down a plurality of layers of fibrous material one on top of the other on a conveyor by an apron moving back and forth across it whereby the web of material leaving the apron forms an acute angle with the layer of material on the conveyor; and spraying a binder onto the layer of fibrous material on the conveyor at an acute angle relative thereto in

front of the web of material leaving the apron, the spray being directed to simultaneously impregnate the upper surface of the layer and the lower surface of the web.

3. The process of forming an impregnated fiber pad including the steps of laying down a plurality of layers of fibrous material one on top of the other on a conveyor by an apron moving back and forth across it whereby the web of material leaving the apron forms an acute angle with the layer of material on the conveyor; and spraying a binder onto the fibrous material in the acute angle formed by the layer and the web, the axis of the spray being directed at an acute angle relative to the top layer of fiber on the conveyor.

4. The process of forming an impregnated fiber pad including the steps of laying down a plurality of layers of fibrous material one on top of the other on a conveyor by an apron moving back and forth across it whereby the web of material leaving the apron forms an acute angle with the layer of material on the conveyor; and spraying a binder onto the fibrous material on the conveyor in front of the web of material leaving the apron, the axis of the spray being substantially parallel with the web coming off of the apron.

5. The process of forming an impregnated fiber pad including the steps of laying down a plurality of layers of fibrous material one on top of the other on a conveyor by an apron moving back and forth across it whereby the web of material leaving the apron forms an acute angle with the layer of material on the conveyor; and spraying a binder onto the fibrous material in the acute angle so formed, the axis of the spray being directed at an angle of between about 50° to 60° relative to the plane of the conveyor.

6. The process of forming an impregnated fiber pad including the steps of laying down a plurality of layers of fibrous material one on top of the other on a conveyor by an apron moving back and forth across it whereby the web of material leaving the apron forms an acute angle with the layer of material on the conveyor; and spraying a binder onto the fibrous material in the acute angle so formed, the axis of the spray being directed at an angle of about 57° relative to the plane of the conveyor.

7. The process of forming an impregnated fiber pad including the steps of laying down a plurality of folds of fibrous material one on top of the other on a conveyor by an apron moving back and forth across it; and spraying a binder between each fold as it is being laid down.

8. The process of forming an impregnated fiber pad including the steps of laying down a plurality of layers of fibrous material one on top of the other on a conveyor by an apron moving back and forth across it; and alternately spraying first on one side and then on the other side of the web of fiber as it is being laid down, the axis of the sprays being inclined at an acute angle relative to the top layer of fiber on the conveyor.

9. The process of forming an impregnated fiber pad including the steps of laying down a plurality of layers of fibrous material one on top of the other on a conveyor by an apron moving back and forth across it; and alternately spraying first on one side and then on the other side of the web of fiber as it is being laid down, the axis of the sprays being inclined inwardly toward one another and inclined at an angle of between about 50° to 60° relative to the plane of the conveyor.

10. In combination with a "camel-back" mechanism including a conveyor, and an apron having the discharge end thereof supported by a carriage which moves back and forth across the conveyor so as to lay down a plurality of layers of fibrous material on it: a spray gun mounted on the carriage to one side of the apron and directed to spray a binder onto the upper layer of fiber to one side of the web of fiber falling from the apron; and means responsive to the movement of the carriage controlling the operation of the spray gun.

11. In combination with a "camel-back" mechanism including a conveyor, and an apron having the discharge end thereof supported by a carriage which moves back and forth across the conveyor so as to lay down a plurality of layers of fibrous material on it: a spray gun mounted on the carriage to one side of the apron and directed to spray a binder onto the upper layer of fiber to one side of the web of fiber falling from the apron; and means responsive to the movement of the carriage controlling the operation of the spray gun whereby it is operative only when the side of the web on which it is spraying forms an acute angle with the plane of the conveyor.

12. In combination with a "camel-back" mechanism including a conveyor, and an apron having the discharge end thereof supported by a carriage which moves back and forth across the conveyor to lay down a plurality of layers of fibrous material on it: a spray gun mounted on the carriage to one side of the apron and inclined inwardly to direct a spray of binder onto the top layer of fiber at an angle of between about 50° to 60° relative thereto; and means responsive to the movement of the carriage controlling the operation of the spray gun.

13. In combination with a "camel-back" mechanism including a conveyor, and an apron having the discharge end thereof supported by a carriage which moves back and forth across the conveyor to lay down a plurality of layers of fibrous material on it: a spray gun mounted on the carriage to one side of the apron and inclined inwardly to direct a spray of binder onto the top layer of fiber at an angle of about 57° relative thereto; and means responsive to the movement of the carriage controlling the operation of the spray gun.

14. In combination with a "camel-back" mechanism including a conveyor, and an apron having the discharge end thereof supported by a carriage which moves back and forth across the conveyor to lay down a plurality of layers of fibrous material on it: a spray gun mounted on the carriage to one side of the apron, the gun being directed inwardly to direct a spray of binder substantially parallel with the web falling off the discharge end of the apron when the latter is moving toward the gun; and means responsive to the movement of the carriage controlling the operation of the spray gun.

15. In combination with a "camel-back" mechanism including a conveyor, and an apron having the discharge end thereof supported by a carriage which moves back and forth across the conveyor to lay down a plurality of layers of fibrous material on it: a set of spray guns mounted on the carriage on each side of the apron; and means responsive to the movement of the carriage controlling the operation of each set of spray guns whereby no more than one set of guns is in operation at a time.

16. In combination with a "camel-back" mechanism including a conveyor, and an apron having the discharge end thereof supported by a carriage which moves back and forth across the conveyor to lay down a plurality of layers of fibrous material on it: a set of spray guns mounted on the carriage on each side of the apron; and means responsive to the movement of the carriage controlling the operation of each set of spray guns whereby the only set in operation at any one time is the one on the side toward which the carriage is moving.

17. In combination with a "camel-back" mechanism including a conveyor, and an apron having the discharge end thereof supported by a carriage which moves back and forth across the conveyor to lay down a plurality of layers of fibrous material on the conveyor: a set of spray guns mounted on the carriage on each side of the apron the guns being inclined inwardly so that the axis of the spray is substantially parallel with the web of fiber falling from the discharge end of the apron; and means responsive to the movement of the carriage controlling the operation of each set of spray guns whereby the

only set in operation at any one time is the one on the side toward which the carriage is moving.

18. In combination with a "camel-back" mechanism including a conveyor, and an apron having the discharge end thereof supported by a carriage which moves back and forth across the conveyor to lay down a plurality of layers of fibrous material on it: a plurality of spray guns mounted on the carriage to one side of the down apron and directed to spray a binder onto the upper layer of fiber to one side of the web falling from the apron, one of the end guns being spaced inwardly from the side of the apron so that the spray of binder falls short of the side edge of the layer of fiber being sprayed.

19. In combination with a "camel-back" mechanism including a conveyor, and an apron having the discharge end thereof supported by a carriage which moves back and forth across the conveyor to lay down a plurality of layers of fibrous material on it: a plurality of spray guns mounted on the carriage to one side of the down apron and directed to spray a binder onto the upper layer of fiber to one side of the web falling from the apron, the end guns being spaced inwardly from the sides

of the apron so that the spray falls short of the side edges of the layer of fiber being sprayed.

20. In combination with a "camel-back" mechanism including a conveyor, and an apron having the discharge end thereof supported by a carriage which moves back and forth across the conveyor to lay down a plurality of layers of fibrous material on it: a plurality of spray guns mounted on the carriage to one side of the down apron and directed to spray a binder onto the upper layer of fiber to one side of the web falling from the apron, the spray from the guns overlapping and being substantially fan-shaped and having their major axis substantially parallel with the discharge end of the apron.

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