

June 30, 1942.

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2,288,072

METHOD AND APPARATUS FOR MAKING BONDED FIBROUS PRODUCTS

Filed June 22, 1938

4 Sheets-Sheet 1

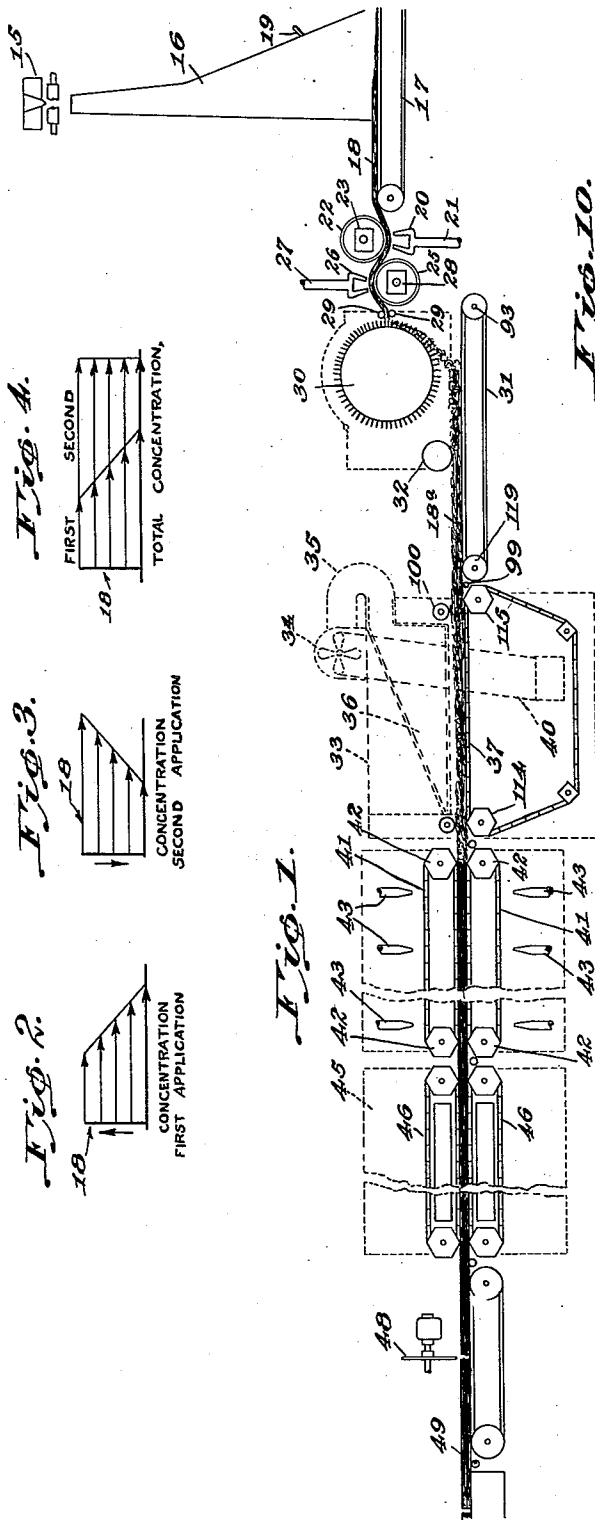


Fig. 4.

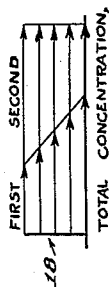


Fig. 3.

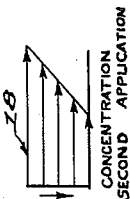


Fig. 2.

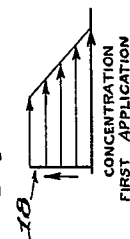


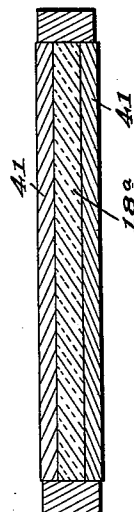
Fig. 10.



Fig. 11.



Fig. 9.



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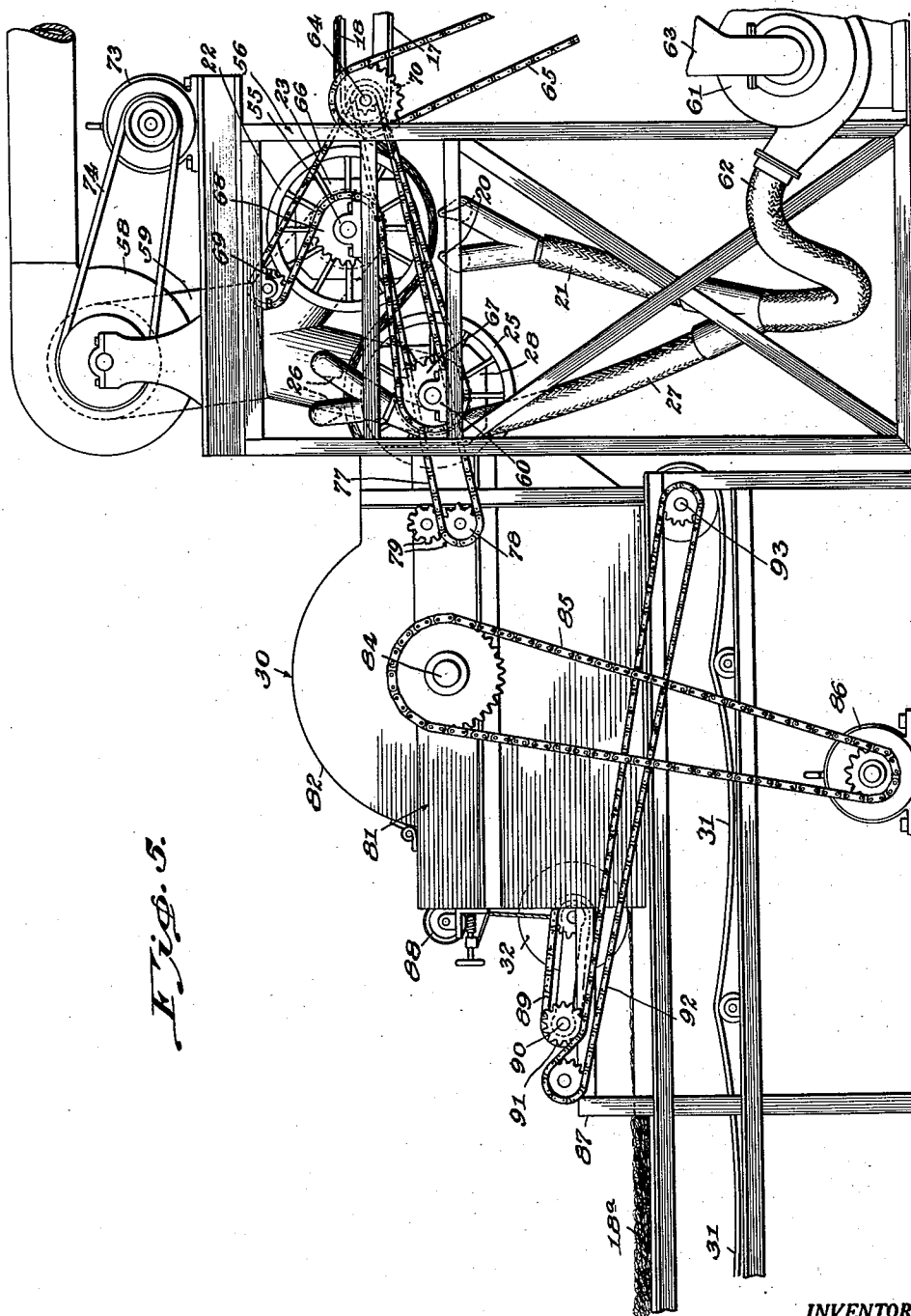
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METHOD AND APPARATUS FOR MAKING BONDED FIBROUS PRODUCTS

Filed June 22, 1938

4 Sheets-Sheet 2



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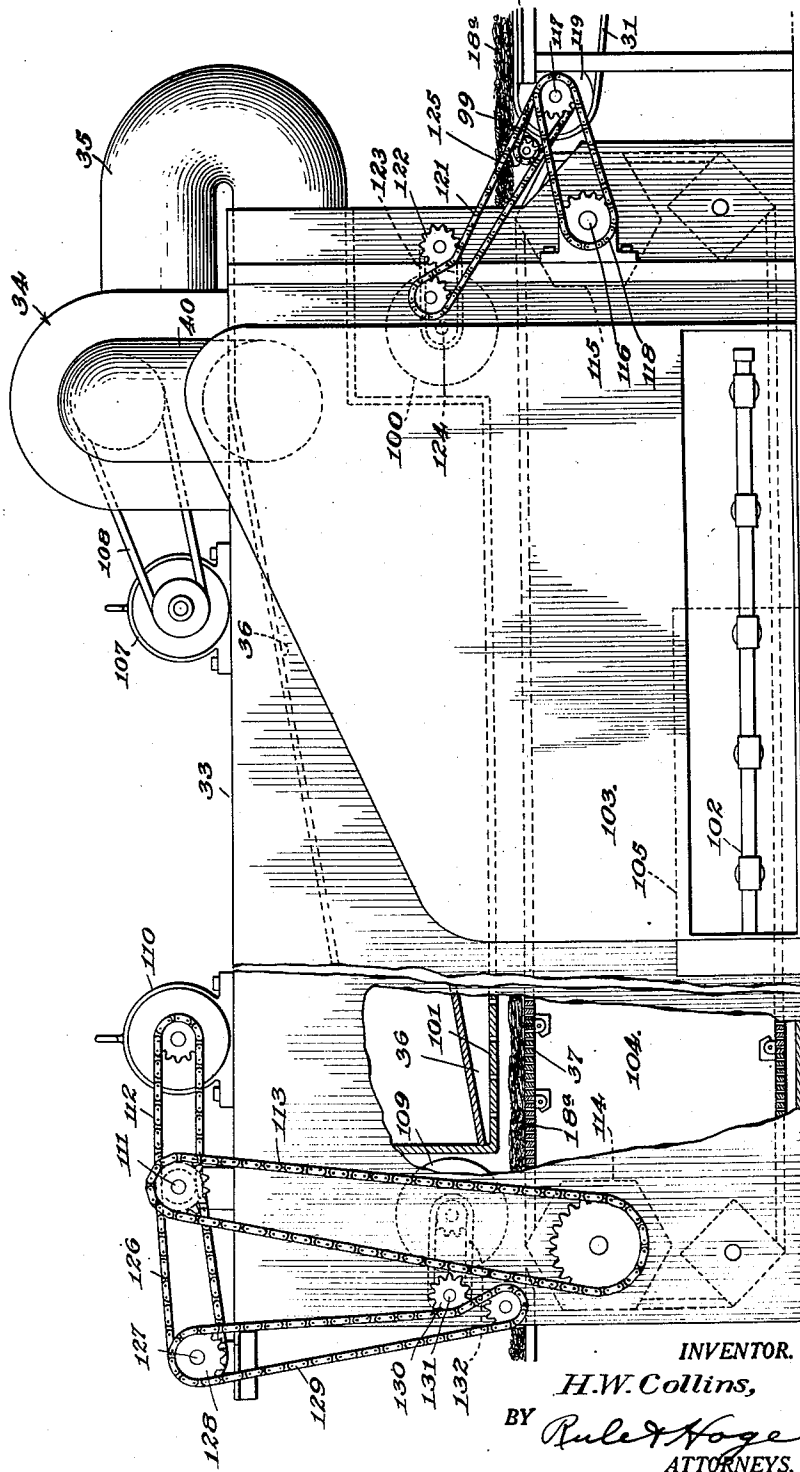
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METHOD AND APPARATUS FOR MAKING BONDED FIBROUS PRODUCTS

Filed June 22, 1938

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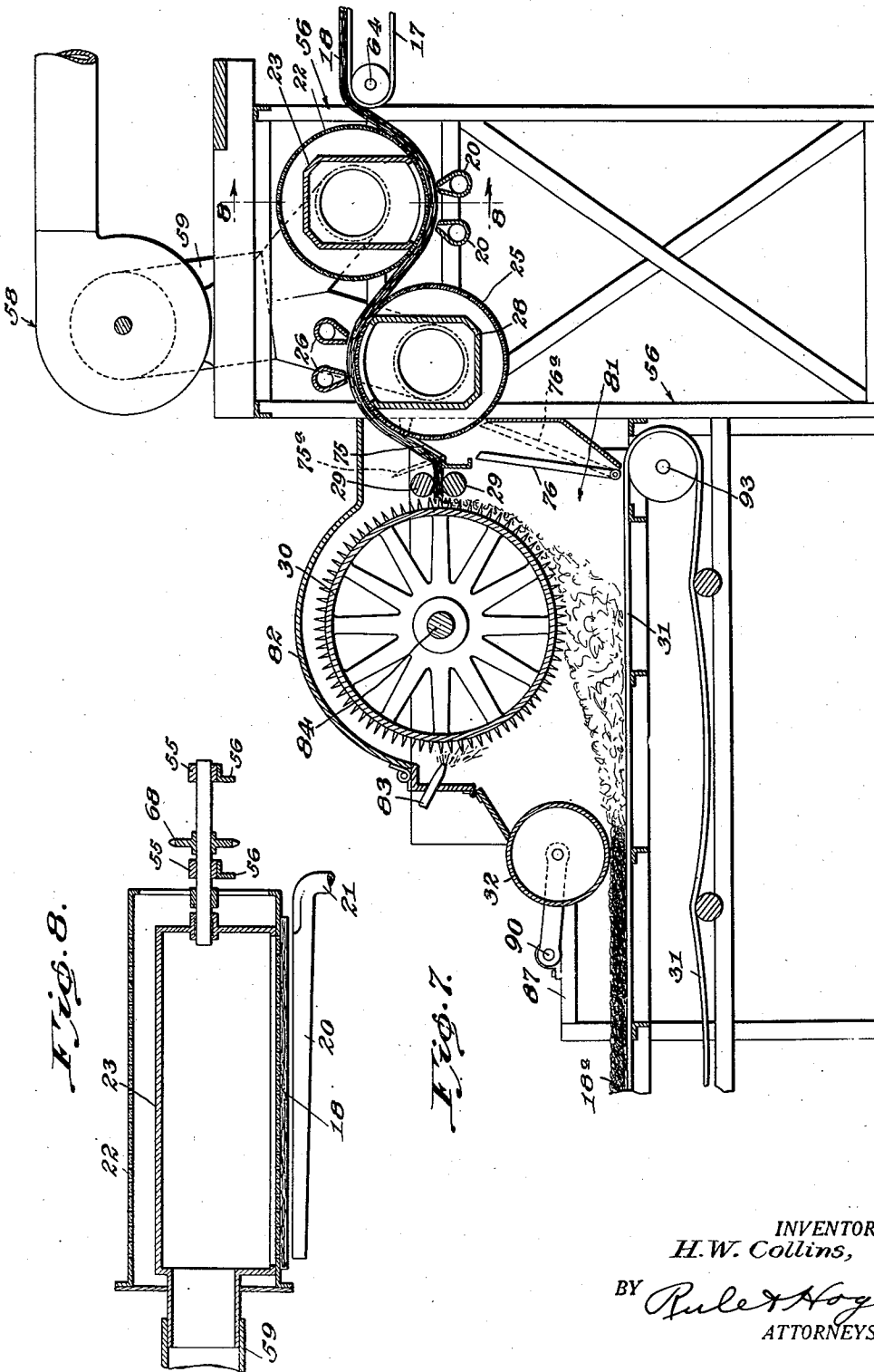
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METHOD AND APPARATUS FOR MAKING BONDED FIBROUS PRODUCTS

Filed June 22, 1938

4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

2,288,072

METHOD AND APPARATUS FOR MAKING
BONDED FIBROUS PRODUCTSHoward W. Collins, Newark, Ohio, assignor, by
mesne assignments, to Owens-Corning Fiber-
glas Corporation, a corporation of Delaware

Application June 22, 1938, Serial No. 215,144

10 Claims. (Cl. 154—27)

The present invention relates to methods and apparatus for making bonded fibrous products, and more particularly to the fabrication of bonded products comprising mineral fibers such as glass wool, mineral wool or the like.

In the production of a bonded felt of mineral or glass wool, it has been customary to introduce the binder, in the form of liquid cement or granular powder, into the air or steam jets with which the material is being treated, before the blast strikes the molten mineral or rock wool, or into the fibrous particles as they are being blasted. However, in the old methods, if sufficient adhesive is introduced to effect a strong bonding of the fibers, there is a tendency for the bonded material to adhere to and accumulate on the walls and other surfaces of the settling chamber. Such accumulations are periodically disengaged and produce objectionable scab in the finished wool.

On the other hand, if the glass wool process is used wherein the fibers are conveyed downwardly by the vehicular blast and deposited upon a belt by the blast which passes therethrough, such as shown for example in the Australian Patent 103,314, and a large amount of binder is sprayed directly upon the web of fibers as they are being collected upon the belt, the flexibility of the operation is materially hampered, and material portions of the binder in finely divided form such as dust or the like, may pass through the web and be carried away by the vehicular steam.

It has also been suggested to pick fibrous material by means of a picker or the like and simultaneously, as the material is collecting upon a belt or the like to distribute binder in subdivided form. One of the difficulties of this process is that the dust binder does not penetrate throughout the individual tufts of the material. While the binder may be distributed on the fibers on the outer layers of the tufts, and may appear to have a good distribution throughout the mat, but when the individual tufts are pulled apart, it is apparent that the binder has not penetrated into the interiors thereof and that a uniform distribution over all the fibers is lacking.

With the foregoing difficulties in mind, it is an object of the present invention to provide a method whereby a binder may be uniformly distributed throughout the thickness of a fibrous mat, especially one formed of felted, long mineral or glass wool fibers.

Another object of the invention is to provide a method of procedure whereby a mat of picked mineral wool fibers may have binder distributed

substantially uniformly throughout the thickness thereof and throughout the individual tufts of fibers making up the mat.

Still another object of one phase of the invention is to set up the binder with maximum speed and with optimum binding effect. In this connection, it is desired to provide means for adjusting conditions so that a product having any degree of toughness, hardness, rigidity, lightness in density, temperature resistance, and water-proofness may be produced.

Another object of the invention is to provide a novel method and means to distribute the binder uniformly throughout the fibrous mass, and then cause it to be pyrolyzed under conditions where a maximum toughness and strength may be produced without loss of binder or valuable cooperating constituents therein.

It is also within the contemplation of the invention to provide a procedure and apparatus for producing bonded products in any desired shape, one specific shape being cylindrical for pipe coverings, although other shapes such as corrugated, flat, or special shapes, for use in automobile dash or panel insulation, wall boards, shingles, partition material, siding material, boiler lagging, refrigerator insulation or the like, may also be produced.

Other objects and advantages of the present invention will become apparent from the following description taken in conjunction with the drawings, in which:

Fig. 1 is a diagrammatic elevational view of an apparatus capable of performing the present invention;

Figs. 2, 3 and 4 are diagrammatic charts illustrating the effectiveness of the present invention in securing a uniform distribution of binder throughout the cross-section of a fibrous mass;

Fig. 5 is an elevational view of the portion of the apparatus adapted to apply or distribute the binder uniformly throughout the fibrous mass;

Fig. 6 is an elevational view, shown partly in section, of a preheating unit for preheating the binder prior to pyrolyzing the same;

Fig. 7 is an elevational side view, shown in cross-section, of the apparatus shown in Fig. 5;

Fig. 8 is a fragmentary cross-sectional end view of a portion of the apparatus shown in Fig. 7, the section being taken along the line 8—8 of Fig. 7;

Fig. 9 is a partial, cross-sectional view of the pyrolyzing or heat treating apparatus showing a mat being treated between platens;

Fig. 10 is a similar view of a modified embodi-

ment of a heat treating or pyrolyzing apparatus adapted to produce a corrugated shape; and

Fig. 11 is an end view of a pipe cover produced from a corrugated shape such as shown in Fig. 10.

Referring now more particularly to Fig. 1 of the drawings, reference character 15 designates a fiberizing unit, such for example as illustrated and described in the British patent to Triggs No. 428,720 or the Slayter and Thomas U. S. Patent No. 2,133,236. Other modes of fiberizing may be used, however, such as for example the Blum Patent No. 1,923,183 adapted to produce crimped or corrugated wool. The fibers in either case may descend from the fiberizing apparatus 15 into a forming hood 16 and lay themselves upon a belt 17 where they form into a loosely belted mat 18. As the fibers accumulate and form a web upon the belt 17, they may be sprayed by means of a spray gun 19 with a suitable lubricating medium such as oil, stearic acid emulsion or the like, or the coating described in Williams and Bone Patent No. 2,083,132.

The problem now is to incorporate binder uniformly throughout the mat 18. If binder is sprayed upon the mat from one side thereof, the fibers in the mat act as a filtering medium, causing the major portion of the binder to deposit in the exposed face of the mat and leave a dearth of binder in the opposite face. For this reason, application of the binder to a fabricated mat has heretofore proved unsuccessful, especially when a dense or closely packed mass was being treated.

I have discovered, however, that uniform distribution may be achieved throughout the mat and that the filtering problem may be overcome by applying the binder alternately first to one side of the mat and then upon the other. To assist the penetration of the binder in subdivided form, I preferably apply it in an air stream, drawing the air through the mat and permitting the fibers to filter out the dust. Liquid or solid binders in subdivided form may thus be applied. Most successful results may be achieved with powdered asphalt, or asphalt and clay mixtures, especially since no drying problem is involved and these binders may be set up to any desired consistency by means of a heat treatment. Other binders such as gums, rosins, natural or artificial resins, phenol or urea formaldehyde, methylmethacrylate, wax, sugars, glyptols, linseed oil, glue, sodium silicate, casein, pitches, tar, stearin, tallow, low melting metals or the like, etc., may be used. To increase fire resistance, various compounds such as sodium carbonate, sulphates, or phosphates or the like may be added. In the present application an air circulation system has been shown which is most suitable for dry binders, such as powdered asphalt, clay, sugars, or the like, although other spraying or binder applicators may be used in connection with the present invention according to the nature of the substance applied.

Thus, a system of spray nozzles 20, supplied with air under pressure and through a pipe 21 may throw dust binder with force upon the lower side of the mat 18 as it passes under a perforated drum 22. A suction box 23 may be provided inside of the drum 22 to assist in the withdrawal of the air. The mat 18 then progresses over a second perforated drum 25 and is treated with another application of dust binder by means of spray nozzles 26 which are supplied with air under pressure carrying the binder through the supply pipe 27. A suction box 28 may be provided in the drum 25 to facilitate the passage of

the binder laden air through the mat. In this operation, the binder laden blast of air preferably is directed into the mat from the side thereof that is presented in convex relation to the spray nozzles and the incoming binder, thereby stretching out each side of the mat in turn at the point of forceful introduction of the binder and facilitating deep penetration by the binder dust.

By such a process of applying the binder alternately through both faces of the mat, uniform distribution throughout the mat may be achieved. The mechanics of this are diagrammatically illustrated in Figs. 2 to 4. As will be observed in Fig. 2, a diagram is shown wherein the vertical ordinate represents the thickness of the mat, and each place along the ordinate designates the corresponding point in the mat. Horizontal abscissas designate by length of arrows the concentration of the binder at the corresponding point in the mat.

In Fig. 2 the resulting concentration of binder through any portion of the mat caused by the first application of binder applied from below, is shown. Thus, the horizontal arrows show a varying concentration of binder from the bottom to the top of the mat caused by the major portion of the binder being filtered out near the bottom of the mat and progressively less to the top.

Fig. 3 shows, on the other hand, the concentration of binder caused by the second application of binder blown in the opposite direction. In this case it will be noted that the concentration is greatest at the top and ranges progressively less to the bottom.

In Fig. 4, the total concentration caused by the application first from below and then from above is depicted. The resultant, it will be noted, falls on a substantially straight line throughout the thickness of the mat, thus indicating that the distribution and concentration of the binder is substantially uniform throughout the entire thickness of the mat.

I have discovered that while reversing of the flow of air through the mat may blow away a minor portion of the binder which may have been deposited by a prior application and accumulated along the outer surface thereof, the main bulk of the binder remains in position where it was first filtered out and deposited upon the fibers. It is thus possible to reverse the flow any number of times without materially disturbing the binder which has once been deposited upon the fibers.

The mat 18 having the binder distributed therein may then be directly pyrolyzed or otherwise treated with heat, or reacting fluids to set up the binder. If desired, several layers of the mat 18 may be built up or laminated to form a mat of suitable thickness.

On the other hand, the mat 18 after having been treated with binder by the drums 22 and 25 may be passed directly through feed rolls 29 into a picker 30. The picker serves to tear the mat apart, and ordinarily if the fibers are of sufficient length, the mat is disrupted into a multiplicity of small tufts which fall upon the belt 31 and arrange themselves to form a new mat 18^a of any desired thickness. A compressor roll 32 may be used to level off the mat to the desired thickness and density. When the picker is used, the fibers in the mat are distributed in directions more or less haphazardly throughout the mats, with the binder upon the fibers distributed uniformly over the fibers. If any tufts are present the binder is distributed throughout the interior of said tufts.

To facilitate pyrolysis, the binder laden mat 18^a may be heated by means of the preheater 33 adapted to circulate hot air through the mat by means of a blower 34 through conduit 35, heat supply chamber 36, the mat 18^a, and the belt 37 5 to the conduit 40 and back to the blower 34.

The mat 18^a may then be subjected to pyrolyzing heat within a confined zone between caterpillar platens 41 mounted upon rollers 42. The platens 41 may be heated by any suitable means such as steam jets, burners 43 or the like. The 10 pyrolysis generally takes from three to fifteen minutes in temperatures ranging from several hundred degrees to 700° or 800° F., according to the degree of pyrolysis desired. As shown in Fig. 9, the platens preferably contact and partially compress the mat.

The mat 18^a then progresses into a cooling chamber 45, and may be acted upon by the caterpillar belts 46 which may be air or water-cooled to withdraw the heat from the mat 18^a. The 20 mat 18^a, now in the form of a board or sheet having great toughness, strength and resilience, as desired, may be slit by means of a rotating knife or the like 48 to form blocks, boards, slabs, bats, 25 or similar products 49.

Referring now more particularly to Figs. 5 to 8, wherein more detailed views of portions of the apparatus are shown, it will be noted that the conveyor belt 17 feeds the mat 18 under the perforated drum 22. The drum 22 is mounted upon 30 bearings 55 fixed to the framework 56. Within the drum 22 is the suction box 23 communicating with a blower 58 through the conduit 59. The mat 18 then passes over the perforated drum 25 mounted upon bearings 60 fixed to the framework 56.

Spray nozzles 20 are mounted below the drum 22, and as shown in Fig. 8, preferably extend across the entire width of the mat. Similar spray nozzles 26 are mounted over the perforated drum 25 to treat the other side of the mat. The 40 spray nozzles 20 and 26 communicate with a blower 61 through the conduits 21 and 27, respectively, and the conduit 62. A suitable binder in subdivided form may be dusted into the air streams through the blower 61 and for this purpose a feed hopper 63 with suitable feed adjusting means may be provided.

The suction boxes 23 and 28 cause the binder particles to be driven into the mat where they are filtered out and distributed through the mat. The vehicular air is then withdrawn by the blower 58 through the conduit 59 to a suitable chamber, filter or cyclone (not shown) where the residual binder may be removed. If desired, the 50 air and residual binder may be returned directly to the blower 61 where additional binder may be added to bring up the concentration of the air to the desired degree.

The conveyor belt 17 at its forward end of travel runs over a drum which is mounted on a shaft 64 and driven by a chain 65 suitably actuated. The drums 22 and 25 may be driven by a chain 66 running over the sprockets 67 and 68 60 of the drums 25 and 22, respectively, the idler sprocket 69, and sprocket 70 running on the shaft 64. The drums 22 and 25 may thus be run in synchronism with the belt 17.

The blower 58 may be actuated by an independent motor 73 mechanically connected by means of belt 74.

Referring more particularly to Figs. 5 and 8, the mat 18 after having been laden with binder material may either be conducted through the 75

feed rolls 29 to the rotating picker 30 which tears up the mat and permits it to fall upon the belt 31, or directly to the belt 31, without being picked. In either case the subsequent procedure is substantially the same.

A chute or guide plate 75 pivoted at its lower edge may be laid in a tangential position against the drum 25 in the position shown in Fig. 7, to peel the mat 18 from the drum 25 and guide it into the feed rolls 29. A second guide plate 76 10 pivoted also at its lower edge may be placed in the position shown in Fig. 7 to close off the front end of the chamber 81 when the picker is in use.

When the picker is not in operation, however, and the mat 18 passes directly from the drum 25 to the belt 31, the guide plate 75 is lifted away from the drum 25 to its position 75^a shown in dotted outline, and the guide plate 76 is moved down to assume the position 76^a shown in dotted outline. The mat 18 then moves from the drum 25 onto the chute 76 in its position 76^a and passes down to the belt 31 by which it is conveyed into the preheater, more fully described hereinafter. If desired, the mat 18 may be built up in laminated form with paper, cloth, gypsum plaster, sheet metal, metal foil, or laminated with a plurality of layers similar to itself, or laminated with picked material, or the like, as desired, prior to the preheating step.

The feed rolls 29 may be powered in synchronism with the drums 22 and 25, and the belt 17, by being mechanically connected to the drive on the shaft 64. The mechanical connection may include chain 77, a sprocket 78, and spur gears 35 79 which are fixed to the feed rolls 29.

The picker 30 is mounted upon a shaft 84 and housed within a chamber 81 having a hinged cover 82 which may be swung open to provide access thereto. A chain 85 actuated by a motor 86 drives the picker at any desired speed. If electrostatic effects within the picker chamber 81 are excessive, causing the picked material to accumulate in bunches along the side walls, it is desirable to apply a water spray nozzle 83 45 adapted to raise the humidity within the chamber and thus counteract the electrostatic effect.

A compressing or leveling off roller 32 is mounted upon a frame 87 at the discharge end of the chamber 81. The roll 32 may be adjusted or raised into inoperative position by means of an adjusting device 88 of suitable design, and may be driven by the chain train including chain 89, shaft 90, sprocket 91, chain 92, and shaft 93 which is actuated by the belt 31. 55 Thus, the roll 32 is actuated by and in synchronism with the belt 31. The drive mechanism for the belt 31 will be brought out more fully hereinafter.

Referring now to Fig. 6, the belt 31 carries the mat 18^a to the intake end of the preheat chamber 33, through which it is carried upon the perforated or apron conveyor 37. The transfer from the belt 31 to the conveyor 37 may be facilitated by means of a transfer roll 99. At the intake side of the chamber 33 is a compressing roller 100 which may level off and/or compress, if desired, the mat 18^a to predetermined dimension and density. Mounted over the conveyor 37 and spaced therefrom is a perforated plate 101 adapted to admit heated air uniformly over the surface of the mat 18^a from the air supply chamber 36.

The hot air is supplied by means of a heater 102 within a chamber 103 arranged alongside of the conveyor belt 37. The air is drawn from

the chamber 103 to a conduit 40 by means of the blower 34 from where it is blown through the conduits 35 into the heat supply chamber 36. The air passes through the perforated plate 101, the mat 18^a and the perforated belt 37 and then enters a suction chamber 104 below the belt from where it is conducted through an opening 105 into the heat chamber 103. With this arrangement, it will be noted that the heated air circulates constantly through the mat and is constantly maintained at suitable temperature by means of the heater 102. Ordinarily the mat is preheated to about 300° F. although more or less heat may also be used.

The blower 34 may be actuated by a motor 107 mechanically connected by means of belt 108.

After emerging from the preheat chamber 33, the mat may pass under a compressor or leveling roller 109.

The entire system may be driven synchronously by a motor 110 mounted at the upper end of a preheat chamber 33. The motor 110 supplies power to a jackshaft 111 by means of a chain 112. The jackshaft 111 supplies power through the chain 113 to the drum 114 over which the conveyor 37 travels, thus actuating the said conveyor 37. At the other end of its travel the conveyor 37 runs over the drum 115, and thereby actuates shaft 116 which in turn rotates the shaft 117 by means of a chain 118. The shaft 117 has mounted on it, drum 119 over which runs the belt 31 to drive the same.

The shaft 117 also supplies power to the compressor roll 100 through a mechanical train including the chain 121, sprocket 122, chain 123, and shaft 124 on which the drum 100 rotates. The shaft 117 is also mechanically connected to the conveyor roll 99 by means of the chain 125.

Jackshaft 111 also drives the compressing roll 109 through the mechanical train including the chain 126, the shaft 127, sprocket 128, the chain 129, sprocket 130, shaft 131, and chain 132.

It will be thus observed that the motor 110 operates simultaneously all of the conveyor and compressor elements, including the belts 31 and 37 and coacting compressor rolls in synchronism with one another.

From the preheat chamber 33, the preheated mat 18^a passes into the pyrolyzing unit between the platens 41 which completes the heat treatment and tends to set up the binder to the desired consistency.

The heat treatment of the binder may vary according to the material treated and the desired result. Thus, temperatures from about 180° F. to about 900° F. may be used for powdered asphalt binders according to the type of material desired. A wall board or partition may have a curing temperature of about 250° F. to 600° F. An ordinary bat for refrigerator insulation or similar material may be treated with relatively low temperatures. A light density automobile dash or panel insulation may also be treated lightly, if desired. High temperature material such as boiler lagging or pipe insulation may be pyrolyzed to about 800° to 900° F.

The curing time may vary widely, as for example, from about three minutes to fifteen minutes, inversely proportional as a general rule to the temperature to which it is subjected. In brief, a lower temperature and longer time are used to produce maximum toughness, and high temperature and shorter time are used for maximum temperature resistance.

The material is preferably pyrolyzed within a

confined zone, as for example, between the heated platens shown. It has been found that pyrolysis within a confined zone is ordinarily desirable to prevent the volatile constituents of the binder from escaping and thus apparently cause them to condense on the fibers and serve to plasticize the residual carbonaceous constituents. The flexural strength, toughness, feel and resiliency of the product have been found much improved by such procedure.

It is to be observed that the mat may be pyrolyzed or molded into various shapes, as desired. As shown in Fig. 9, a planular shape suitable for boards, sheets, or light weight plats may be formed, or, as shown in Fig. 10, the mat 18^b may be set into a corrugated shape between undulating platen forms 41^a. Such a product finds use, for example, for roofing material and may be placed under a metal corrugated roof. In this event, however, the corrugations are slightly less pronounced than shown in the drawings to conform with the corrugated metal.

It is also possible to produce pipe covering from the corrugated material shown in Fig. 10. This may be done by cutting the corrugated material through the adjacent bends in the material to produce a series of semicylindrical sections 18^c, such as shown in Fig. 11. These may then be placed in pairs over a pipe to provide insulation therefor.

The present invention may handle and laden with binder fibrous mats of any desired thickness and density. Ordinarily it has been found that a relatively thin mat, as for example, about an inch or so in thickness, and having a relatively light density, as for example one and a half to two pounds per cubic foot is preferable, since they may be laden with binder at high speeds with this present process. Glass wool mats having relatively long fiber lengths and diameters ranging from about .0002 inch to .0008 inch are ordinarily preferable. When crimped wool is used, the larger diameters and lighter densities generally are most suitable.

If desired, however, mats of much greater thickness and/or density may also be used, as for example a two or four inch thick mat of the density normally and conveniently producible on the fiberizing machine. The time of application, however, varies directly with this thickness of the mat, so that when thicker mats are used, more time is required to apply the subdivided binder. The amount of binder may also vary widely, that is, from a few per cent to a large amount such as forty or fifty per cent or more. The densities of the finished product may also vary widely, as for example a few pounds per cubic foot to about 20 or more pounds.

It is also to be observed that the application of binder on alternate sides of the mat may be made any number of times, as for example, three, four or even more times on each side in order to distribute the binder uniformly throughout the mat. The mat or perforated drums may also be agitated, preferably in the direction of the thickness of the mat, in order to facilitate entry of the binder throughout the mat. This may be done simultaneously as the dust laden air is passing through the mat, or later.

Modifications may be resorted to within the spirit and scope of the invention as defined in the appended claims.

I claim:

1. Apparatus for incorporating a binder into a mineral fibrous mat which comprises a drum

having a perforated surface over which one major surface of said mat passes, means for drawing air laden with binder in subdivided form through said mat and said perforated surface, a second perforated surface upon which the other major surface of said mat passes, and a second means for drawing air laden with binder in subdivided form through said mat in a direction opposite to the first application of binder laden air.

2. Apparatus for incorporating a binder into a mineral fibrous mat which comprises a drum having a perforated surface over which one major surface of said mat passes, means for drawing air laden with binder in subdivided form through said mat and said perforated surface, a second perforated surface upon which the other major surface of said mat passes, a second means for drawing air laden with binder in subdivided form through said mat in a direction opposite to the first application of binder laden air, a picker for shredding said mat, and means for accumulating said shredded material in successive increments and withdrawing the same continuously in the form of a newly formed mat.

3. Apparatus for forming a strong, tough fibrous product which comprises means for producing a mat of glass wool, a perforated rotatable drum over one major surface of said mat passes, means for blowing air laden with binder dust through said mat and into said drum, means associated with said drum for exhausting said air, a second perforated rotatable drum over which the opposite major surface of said mat passes, means for blowing air laden with binder dust through said mat and into said second drum in the direction opposite the direction of the first dust laden air, and means associated with said second drum for exhausting the air passing thereinto.

4. The method of incorporating binder within a loose, fluffy mat of fibrous material which comprises bending said mat, establishing a region of negative pressure at the concave side of said bent mat, and blowing a gaseous medium laden with binder in subdivided form through the bent mat from the convex side thereof to cause the fibers to filter out and retain the binder.

5. The method of incorporating a dry binder material in a loose, fluffy mat of fibrous glass which comprises establishing a stream of gaseous medium laden with dry binder in the form of dust passing through the mat by flowing a gaseous medium laden with such binder into the mat from one side thereof while exhausting the medium from the other side, reversing the direction of the blast of binder laden gaseous medium through the mat by blowing said medium into the mat from the other side while exhausting the medium from the first side, whereby the dry binder dust is evenly distributed throughout the thickness of the mat.

6. The method of incorporating dry binder within a loose, fluffy mat of fibrous glass which comprises bending said mat transversely to its length, passing a gaseous medium laden with binder in subdivided form through said mat from the convex face thereof, bending said mat in the opposite direction and transversely to its length, and then passing a gaseous medium laden with subdivided binder through said mat from the now convex face thereof to cause the binder to pene-

trate into the mat alternately from opposite sides, whereby the individual fibers of the mat filter out and retain the binder particles.

7. Apparatus for producing a bonded mat which comprises means for depositing mineral fibers and producing a mat continuously thereof, means for conveying said mat away from the deposition zone, a rotatable cylindrical drum spaced from the deposition zone in the direction of travel of said mat and provided with a perforate surface over which said mat passes in arcuate contact therewith, a blower at the mat-contacting side of the perforate surface spaced therefrom a distance greater than the thickness of the mat for directing a blast of binder-laden air into said mat, and an exhaustor at the other side of the perforate drum surface, whereby a blast of binder laden air is established through said mat while on said drum to cause the binder to be filtered out by the fibers in said mat and distributed through the thickness of said mat.

8. Apparatus for producing a strong, tough board of fibrous material which comprises means for producing a loose, fluffy mass of glass wool in mat formation, a pair of rotatable cylindrical drums spaced from said first named means and having perforate surfaces over which said mat is passed respectively in opposite directions, and spray nozzles adjacent each drum arranged to direct a blast of gaseous medium laden with dust binder through the drum surface for passing a stream of gaseous medium laden with binder through said mat, with said blast alternately entering each major face of said mat while presented in convex relation to said spraying nozzles.

9. The method of incorporating binder within a loose, fluffy mat of fibrous material which comprises bending said mat, establishing a region of negative pressure at the concave side of said bent mat, directing a blast of gaseous medium laden with binder in subdivided form through the bent mat from the convex side thereof to cause the fibers to filter out and retain the binder, then bending the mat in the opposite direction, establishing a region of negative pressure at the now concave side of the bent mat, and passing a gaseous medium laden with binder in subdivided form through said mat from the now convex side to cause the fibers to filter out and retain additional binder material.

10. The method of forming a bonded mat of fibrous glass which comprises establishing a stream of gas laden with dry binder in dust form passing through a continuous glass wool mat, by flowing a gas laden with such binder into the mat from one side thereof while exhausting the gas from the second side, reversing the direction of the blast of binder laden gas through the mat by blowing said gas into the mat from the second side while exhausting the gas from the first side, whereby the dry binder dust is evenly distributed throughout the thickness of the mat, then shredding said mat by means of a picker, collecting the shredded material into the form of a new mat having the fibers arranged to extend promiscuously in substantially all directions, and then treating said new mat to cause said binder to be set and produce a strong, tough fibrous product.

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