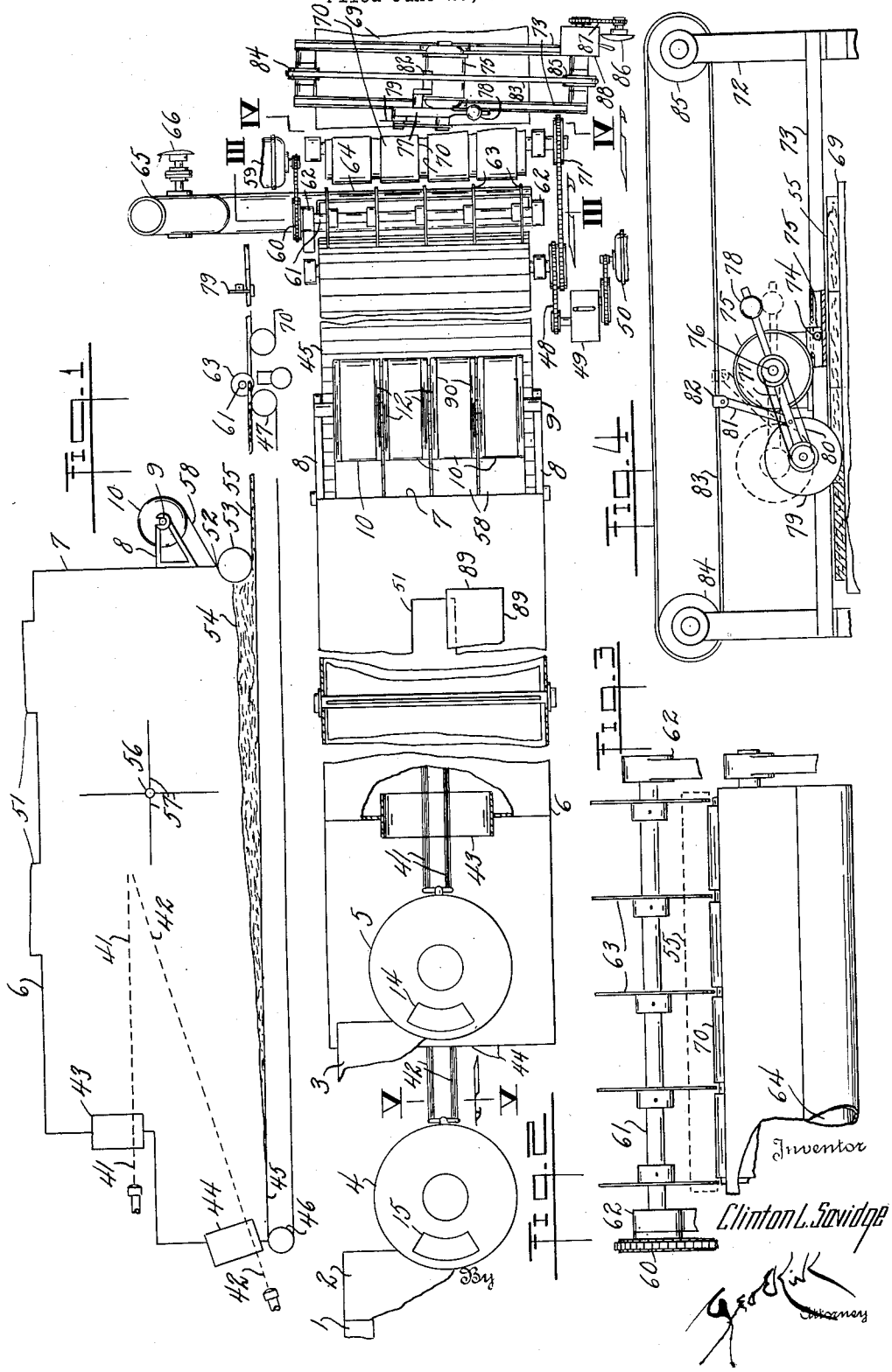
Sept. 15, 1942. C. L. SAVIDGE 2,295,971

FABRICATING MINERAL FIBER

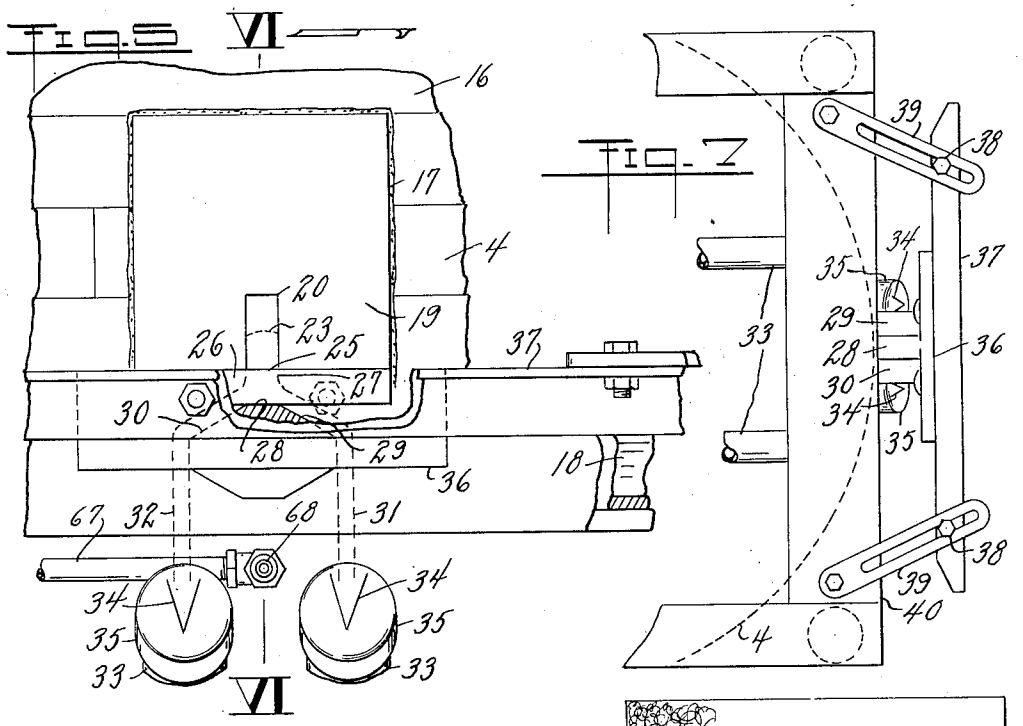
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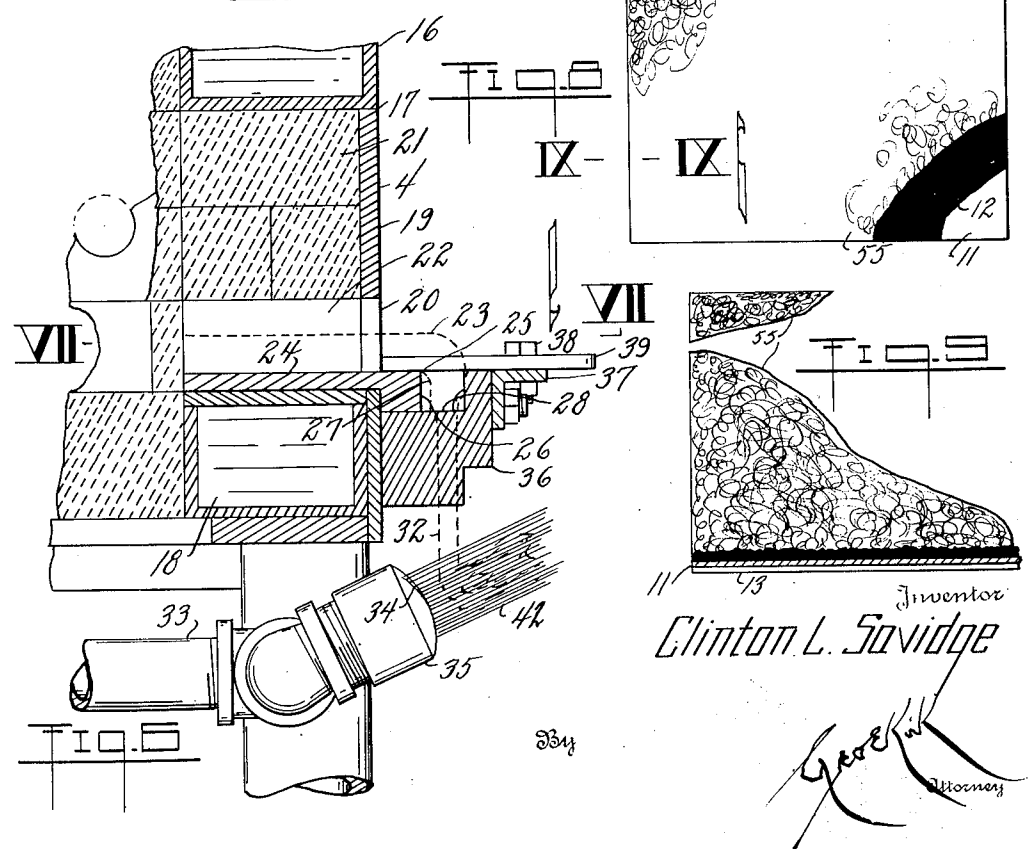


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FABRICATING MINERAL FIBER

Filed June 29, 1940 2 Sheets-Sheet 2





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UNITED STATES PATENT OFFICE

2,295,971

FABRICATING MINERAL FIBER

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Application June 29, 1940, Serial No. 343,249

5 Claims. (Cl. 154—27)

This invention relates to the production of commercial sections from blast shredding of fluid material.

This invention has utility when incorporated in so-called mineral wool manufacture from fluid flow to bats as a continuous process.

Referring to the drawings:

Fig. 1 is a side elevation, with parts broken away, of an embodiment of the invention for the manufacture of so-called rock or mineral wool bats or paper back sections as units;

Fig. 2 is a plan view of the installation of Fig. 1, parts being broken away;

Fig. 3 is a section on the line III—III, Fig. 2, showing the bed longitudinal severing or strip forming means;

Fig. 4 is a section on the line IV—IV, Fig. 2, showing the transverse cutter or severer for the paper backed fiber stock from the longitudinal cutter of Fig. 3 to form such into units or blanks as the bat sections;

Fig. 5 is a view on the line V—V, Fig. 2, on an enlarged scale, showing the severing blast features;

Fig. 6 is a section on the line VI—VI, Fig. 5, showing the details for the stream flow as to the blast;

Fig. 7 is a view on the line VII—VII, Fig. 6, showing the mechanism for adjusting the stream flow as to the blast;

Fig. 8 is a plan view, with parts broken away, of a production unit or bat; and

Fig. 9 is an enlarged section on the line IX—IX, Fig. 8, parts being broken away, of this bat structure.

Supplies

In the carrying out of the invention herein, raw material may be discharged from a bin by chute 1 to floors 2, 3, adjacent the respective cupolas 4, 5. In the instance of mineral wool manufacture, such has been effectively produced from rock or so-called limestone with a silica content. However, advantageous results have followed from so-called blast furnace slag, subdivided say into fragments that will pass through a 3½ to 4 inch mesh screen. In the event the silica content of the slag be not up to the proportion desired, silicious rock may be introduced in a sufficient proportion to establish the mix standard found efficient hereunder for the production of a fibrous material.

In the production of bats hereunder, sheet material may be applied and is sufficient if such be to but one side of the commingled or felted mass of fiber. To such purpose, settling chamber 6 at its discharge end 7 may carry brackets 8 mounting shaft 9 on which may be placed a plurality of rolls 10. These rolls 10 may be of paper sheet 11 (Fig. 9) with parallel ribs 12 along one face thereof, such lacy-like ribs being of a bituminous or asphalt character. Upon the rolls 10 this rib carrying heat softened face is on the inner side of the roll and, as delivered therefrom, may have such heated from the exposure in the settling chamber 6 to soften or render adherent these ribs 12 as anchorage means with the fibrous stock. The body of this paper sheet 11 may have water-proof or paraffin outer coating 13. There is thus established a flexible sheet backing for the fibrous stock.

The melt to blast fibering

From the floor 3 fragments of the mix may be charged through opening 14 in the cupola 5 for melting such down. From the charging floor 2 the attendant may keep proper supply of the fragments delivered into opening 15 for the cupola 4. These respective cupolas have water jacket 16 (Fig. 6) and take-off openings 17 for the tap or flow of a stream of molten material therefrom. Fusing or fluxing may be at 2600° F., more or less, according to the character of the mix. The water jacket 16 has portion 18 below the opening 17. Into this opening 17, against the outer side of the cupola, may be thrust facing 19 as a metal casting having port 20, above which may be placed refractory material or fire brick 21, thus to protect the facing 19 from the direct action of the heat of the melt in the cupola and leave therebelow a flow-off way 22 for escape of gas above flowing stream 23 on stream bed 24 over the water jacket portion 18. This stream bed portion 24 has forward edge 25 with drop 26 therefrom of a body dimension sufficient for holding the form of the edge 25 notwithstanding the high temperature of the stream 23 as flowing abruptly and continuously thereover. This stream 23 as passing from the edge 25 has dropping portion 27 (Fig. 5) riding on subdivider portion 28 for flow by inclines 29, 30, into respective streams 31, 32. Steam blasts from pipes 33 (Fig. 6) extend to discharge jets 34 in heads 35. These V-shaped jets 34 are such as to impinge upon the respective streams 31, 32, in an efficient shredding action as well as projecting the shredded streams in fibrous form.

Importance resides in the location of the stream divider 28. This stream divider 28 is mounted on plate 36 as away from the side of the

cupola. The opposite side of this stream divider abuts the plate 19 for heat conductivity thereto. There is heat conductivity or dissemination from this plate 36 as well as to mounting strip 37 with bolts 38 in slotted arms 39 from frame 40 from the respective cupolas. This distribution of metal as to the portions over which the stream flows is effective as to the metal extent to resist ready erosion from the molten stream. Furthermore, it may take a sufficiently high temperature while still holding its shape so it is not warped out of shape or otherwise rendered defective. There is sufficient metal with sufficient spacing from the water to permit the metal to carry a high temperature but that such does not go into a critical or detractive region.

Settling chamber

From the various heads 35 projected streams 41 (Fig. 1) of fiber from the cupola 5 and 42 from the cupola 4 enter the settling chamber 6 through respective intake openings 43, 44. The settling chamber 6 is shown equipped with endless conveyor slat-forming bottom 45 about idle roller 46 from drive roller 47. This drive roller 47 is driven through transmission 48, speed control means 49, and motor 50 (Fig. 2). From this settling chamber 6 there may be uptake draft portions 51. It is contemplated the primary collection and settling shall be in this chamber 6 as the upper reach 45 of this endless conveyor progresses continuously away from the ports 43, 44, toward the discharge end 7, at which there is opening 52 wherein there is located roller 53 as gravity resting upon the loose bedded fiber 54 tending to reduce the thickness thereof in compacting or working such down into fibrous strata mass 55 as passing under this roller 53.

It is to be noted that in this settling chamber 6 there is transverse shaft 56 having straight vanes 57. This location intermediate the extent of projection from the respective streams 41, 42, is in position to be impinged. This means there is in the course of transit or travel of these streams a varying length for such travel as the blades or vanes 57 move as to the stream. In practice, these vanes may be actuated by the blast or draft in the chamber. The direction of this rotation seems to be rather delicate in its response according to the particular direction of the respective streams 41, 42, or possibly the initial position for the vanes as impinged. It is found this direction of rotation may be clockwise or counter-clockwise. A dual purpose seems to develop from this vane structure. There is not a mass accumulation of separate lengths of fiber or as to dimension or accumulation upon one face of the bed. Even as to the presence of so-called "beads" or "seeds," experience herein is that these do not in the operation hereunder accumulate superficially or seem to have a presence in clusters. The resulting product as passing under the roller 53 for the compressed bed 55 is of homogeneous felted fiber.

The backing

While this uniform body of fiber may pass from the chamber 6 by the opening 52, in the functioning hereunder the roller 53 serves a dual purpose which is beyond that of compacting from the loose bed 54 into the more close bed 55. This additional functioning has to do with taking from the respective rolls 10 strip paper by way of reach 58 to pass about the roller 53, and, with the instance herein taken of parallel ribs 12 of asphalt thereon, the temperature in the settling chamber 6 is sufficient to soften or render adherent these asphalt coatings. Accordingly, as from the reach 58 the strip from the roll 10 entering this chamber 6 has this coating rendered sticky or adherent and acting on the bed 54, and such emerges therefrom in adherent relation on a face 11 of the upper side of the respective strips on this uniform bed. In practice, these strips may be say of a dimension to go between the studding of a house, say 15 inches for bats to be used in building construction. This means that in the transit from the chamber 6 and as passing under the roll 53 there may be the several continuous strips as determined by the respective rolls 10. These parallel strips as along conveyor reach 45 out from the chamber 6 may, in the vicinity of the terminal roll 17, have such bed severed to respond to the strips.

Bed severing longitudinal

From drive 59 (Fig. 2) through transmission 60, shaft 61, mounted in bearings 62 at opposite sides of the conveyor, carries a plurality of rotary blades 63 spaced to be effective between the respective strips 11 of the paper from the rolls 10. Accordingly, in the transit from this conveyor reach 45 the bed of the fiber is severed by the disks 63. This cutting action is continuous with the feed travel of the bed from the settling chamber.

Chilling

At this longitudinal severing region in the take-off at the end of the conveyor bed from the severing chamber, there is chamber 64 to which is connected rotary fan 65 (Figs. 1, 3) driven by motor 66. The direction of draft may be elected. However, that which has been found acceptable is a suction draft, and as drawing air from about the bed and through this fiber mass at the cutting there are no fragments scattered about. In this intake draft there is an effective lowering of the temperature or cooling of this bat having the upper face against the paper strip 11. Accordingly, there is a further drop in the temperature beyond that from leaving the chamber 6 sufficient to render this asphalt coating effectively adherent to the felted fiber mass.

Supplemental binding

In the event the felting between the fibers be not construed of sufficient anchorage relation therebetween, there may be provision or supply by duct 67 (Fig. 5) to discharge nozzle 68. This means that simultaneously with the delivery streams 41, 42, of fiber there may be commingled therewith from this jet 68 through the openings 43, 44, a binding agent say rosin or a solvent sufficient that such may be blown thereinto under pressure.

Bat units

The continuous strips as passing from the chilling and longitudinal severing of the bed may flow upon table 69 (Fig. 2) having respective conveyor belts 70 thereon driven by transmission 71. Astride this table may be frame 72. This frame 72 has in a region clearing the table 69 opposing channels 73 forming a pair of parallel tracks on which rollers 74 of truck mount motor 75. This motor 75 has shaft 76 upon which is mounted rocker arm 77 having counterweight 78 at one side from the shaft 76. At the other side from

the shaft 76 there is rotary cutting blade 78 driven by belt 80 from the shaft 76. Intermediate the length of this arm between the blade 78 and the shaft 76 and rigid therewith is bracket 81 having connection 82 with haulage line 83 from idler roller 84 at one end of the frame 72 and drive roller 85 at the other side, actuating the drive motor 86 through transmission 87 as to reversing box 88. This means that in the control with the lower reach of this endless actuator or haulage line 83 in draft toward the roller 85 there is a tilting of this arm on the shaft 76 as an axis to bring the rotary blade 78 clear of the strips of fiber and top face paper covering or backing 11 thereon. However, in the reverse direction of travel, that is for this haulage line 83 to have draft toward the roller 84 as to its lower reach, the blade 78 is pulled to swing below the track 73 and thus have this rotary cutter sever the continuous strips of paper from the rolls 10 into desired length sections, and, as passing further therethrough, approach the belt 70 in going to a major extent through the fibrous body of these bats or units. By placing this cutter at a slight angle there may be compensation for its interval of transit. However, the speed of operation, notwithstanding the continuity of the feed, is such that there is in this compressible stock a sufficient accuracy to approach rectangular formation even with the device approximately perpendicular to the line of direction of travel. The extent of venting for the chamber 6 may be controlled by closures 89 (Fig. 2).

The paper sheet 11 may be provided with reverse folded strip edges 90 along each side thereof.

Operation

In the carrying out of the operation herein, the raw material to the cupolas and the facing material or sheet paper at the rolls 10 supply the stock. The fiber severing in the flow off from the cupolas may be accurately adjusted in the blast to be commingled in the settling chamber 6. The bladed member 57 in the settling chamber is a factor in promoting homogeneous characteristics throughout the bed. The heat of the chamber 6 is utilized to soften or melt an asphalt facing on the strip of paper to be top applied to the bat as a backing continuous as emerging and rendered adherent with the compacted fiber as leaving the chamber. The cooling draft at the chamber 64 promotes this chilling, which, if a blow, may be more rapid in its action than if suction. The bed is severed by the blades 63 to correspond to the strips for the paper 10. While such might be rolled into sections of considerable length, in the building industry convenience is had for handling in having these so-called bats of relatively short rectangular sections, say less than 3 feet or thereabouts in length. Accordingly, such severing is effected in the carrying out of this continuous process by the interposed manual step of this transverse cutting by means of the blade 78 (Fig. 4). This frame instead of being positioned to act toward the belts 70 may be a spacing or groove in the transfer table 69 following the blades 63. In some practice the belts 70 may feed up strips of paper for the underside of the fibrous matter and such facing may be run from the belts 70 over an incline to clear such stock from the belts or be beyond the belt termini and there severed into the lengths.

This application is a continuation-in-part of my copending application for United States Letters Patent, Ser. No. 129,721, filed March 8, 1937, for Rock or mineral wool manufacture.

What is claimed and it is desired to secure by United States Letters Patent is:

1. The method of producing sheet backed fibrous mineral wool sections as a continuous process to form accumulated slag with sufficient silica content, subdivided into fragments to pass through a four inch mesh screen to form a charge, wherein delivery is had of such charge for melting at a suitable temperature therefor, drawn off from the melting in stream continuity, simultaneous blasting transversely a plurality of the streams into fiber by projecting the fiber therefrom, commingling of the fiber being promoted abruptly changing the course of fiber projection, the fiber having been settled to form a continuously moving bed, comprising the steps of utilizing residual melting heat from the projected fiber thereby to soften a coated faced sheet, supplying said sheet softened coating side directly against the moving sheet in simultaneous common direction of travel therefor, holding the sheet against the bed, chilling the bed and sheet for establishing of adherence between the bed and sheet, and subdividing the bed and sheet into sheet backed sections.

2. The method of producing mineral wool fiber sections comprising directing a blast through a stream of hot molten material, settling said material into a bed, supplying sheet material free from adherent facing at normal temperature, utilizing heat from the material in transit to the bed to render a sheet adherent, placing said sheet on the bed, and chilling said sheet into adherence with the bed.

3. A mineral fiber manufacturing installation embodying a settling chamber having the conveyor forming a carrying bed for the fiber, a roller opposing the bed and compacting the fiber thereagainst at a discharge from the chamber, supply means for sheet stock having facing normally severable from abutting relation, and directing means to pass said sheet stock about the roller and thence upon the upper side of the bed as from said chamber, said sheet stock being rendered adherent by heat in the chamber for assembly of said sheet stock with the bed as passing the roller from the chamber.

4. A mineral fiber manufacturing installation embodying a settling chamber having the conveyor forming a carrying bed for the fiber, a roller opposing the bed, and compacting the fiber thereagainst at a discharge from the chamber, directing means for placing normally self-freeing sheet stock from a supply to pass about the roller and thence upon the upper side of the bed as from said chamber, said sheet stock being changed over from its non-adherent condition by heat in the chamber for assembly of said sheet stock with the bed as passing the roller from the chamber, and means for establishing a cooling to promote adherence between the sheet and bed.

5. The method of producing sheet backed fibrous mineral wool sections as a continuous process from accumulated slag with sufficient silica content, subdivided into fragments to pass through a four inch mesh screen in forming a charge, there having been delivery of such charge for melting at a suitable temperature therefor, drawn off from the melting through different levels subdivided into streams, said streams being simultaneously blasted into fiber, transversely of the different levels, by projecting the fiber there-

from, commingling of the fiber having been promoted by intercepting the projected fiber by impinging action from the blasts in thereby abruptly changing the course of fiber projection, the steps comprising settling the fiber to form a continuously moving bed, supplying a sheet of facing coated for severability at normal temperature, utilizing heat from the projected fiber to soften said coating of the sheet, supplying said sheet softened coating side directly against the moving sheet in simultaneous common direction of travel therefor, holding the sheet against the bed, chilling the bed and sheet for establishing of adherence between the bed and sheet, and subdividing the bed and sheet into sheet backed sections.

CLINTON L. SAVIDGE.

CERTIFICATE OF CORRECTION.

Patent No. 2,295,971. September 15, 1942.

CLINTON L. SAVIDGE.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, second column, line 16, claim 1, before "abruptly" insert --by--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 20th day of October, A. D. 1942.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.