Dec. 28, 1937. D. C. DRILL 2,103,769

METHOD OF AND MEANS FOR FORMING FELTED STRIPS

Original Filed July 5, 1935 2 Sheets-Sheet 1

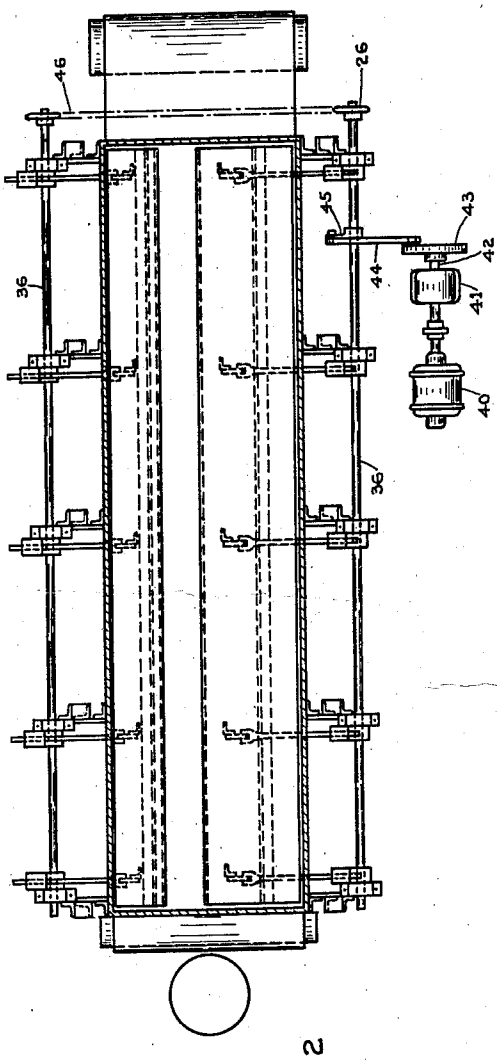

Fig 2

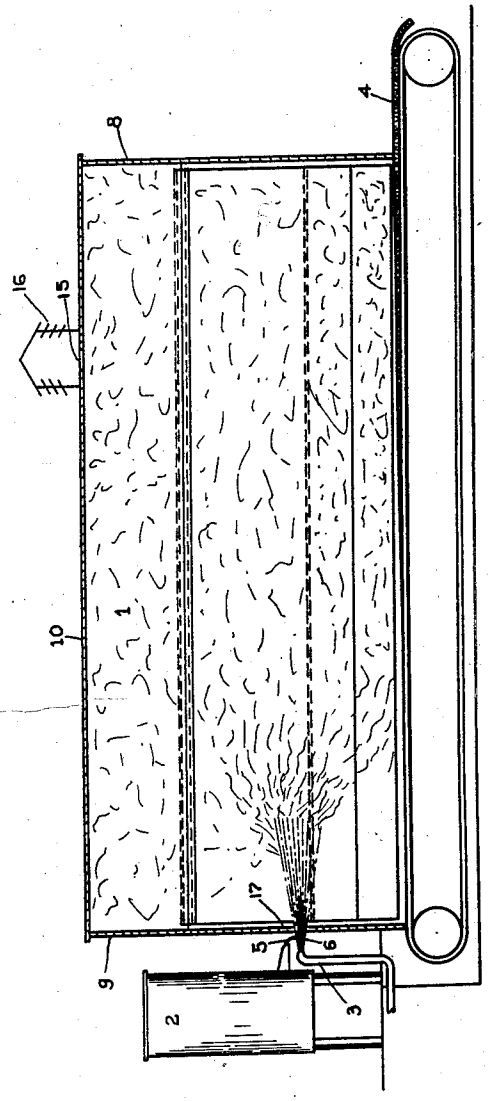

Fig 1

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METHOD OF AND MEANS FOR FORMING FELTED STRIPS

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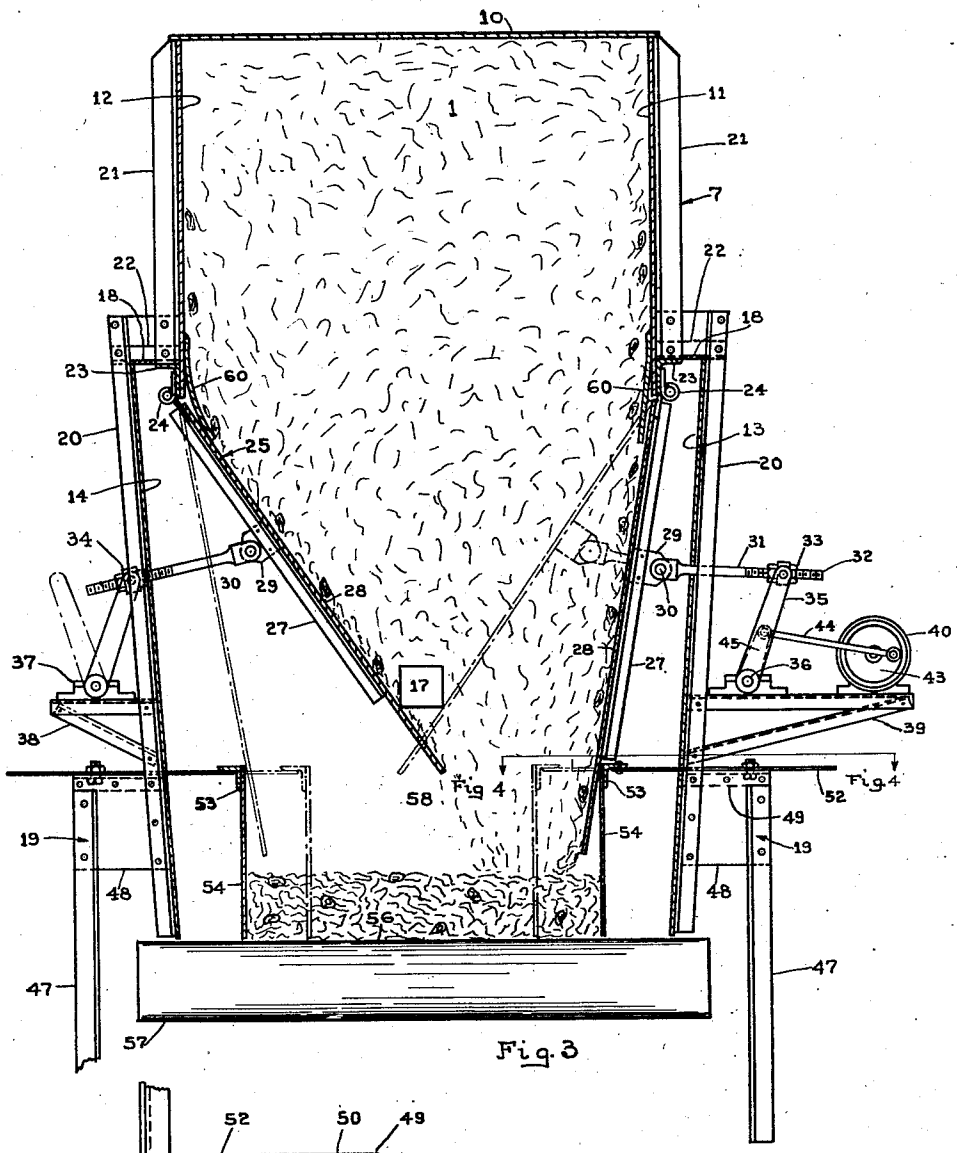

Fig. 3

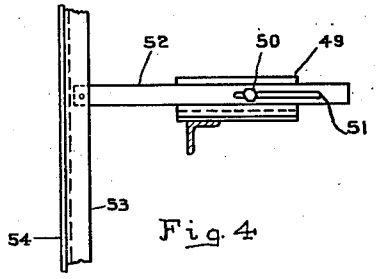

Fig. 4

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UNITED STATES PATENT OFFICE

2,103,769

METHOD OF AND MEANS FOR FORMING FELTED STRIPS

Daniel C. Drill, Wabash, Ind., assignor to American Rock Wool Corporation, Wabash County, Ind.

Application July 5, 1935, Serial No. 29,944
Renewed September 4, 1937

10 Claims. (Cl. 19—155)

This invention relates to methods of and means for forming felted strips, blankets or batts, by the control of the deposition of fibers in a settling chamber.

The chief object of this invention is to provide a method and a means whereby strips, blankets or batts having uniform dimensions, resilience, and flexibility may be formed in a settling chamber on the floor of which falling fibers are deposited.

A further object is to provide an efficient and dependable method of and means for forming mineral wool batts of the character described.

Blankets and batts have heretofore been made by blowing or blasting fibers into suspension and thereafter depositing the suspended fibers on the floors of settling chambers which usually consist of continuously movable conveyors.

The method of manufacturing felted strips, blankets or batts, hereinafter termed batts, by the deposition of fibers within a settling chamber, offers many of the advantages found in economical and continuous operations. This method, however, has the defect that many of the floating fibers strike against and slide down the side walls of the chamber and become deposited on the sides of the forming batt. This action causes a batt to be formed which is relatively thin in its central portions and high on its edge portions. Such a batt is unsatisfactory to the trade, which demands a batt of uniform thickness. Rollers have long been used to compress the high edges of batts and make the batts rectangular in cross section. The rolled batt, however, is soft in its center and hard on its side portions. Numerous other means have been employed, but insofar as is known to the applicant, no satisfactory way has been discovered to form a batt in a settling chamber which is of uniform thickness, flexibility and resilience.

When the batt is made of fibers which are tacky, or coated with the binding material, the difficulties of the problem are enormously increased, for the reason that an unusually large proportion of the fibers fail to rebound from the side walls of the chamber.

Mineral wool batts are made of the felted fibers of rock, or slag wool. These fibers are inherently tacky, are coated with a viscous binding material, and easily adhere to each other and to the side walls of the settling chamber. In actual operation, they form myriads of bunches, which, by reason of their aggregate weight, fall down the side walls of the chamber, in a more or less continuous stream. I, therefore, have chosen to illustrate and describe my invention as applied to the making of mineral wool batts, but its application is, of course, not limited to the formation of any particular type of batt. The present invention broadly contemplates the use of moving guide members on which the descending fibers slide downwardly and by which they are distributed evenly upon successive transverse sections of the forming batt. The full nature of this invention and its other objects will be understood from the accompanying drawings and the following description and claims.

In the drawings:

Figure 1 is a partly sectional and partly diagrammatic view of a settling chamber, and a cupola forming part of a mineral wool plant in which the device of my invention is installed within the settling chamber,

Figure 2 is a top plan view of the same, showing the roof of the settling chamber removed,

Figure 3 is a vertical sectional view of the settling chamber, and,

Figure 4 is a section taken along the lines 4—4 of Figure 3.

In carrying out my invention, I make use of any suitable settling chamber on the base of which falling fibers are deposited to form felted batts.

For the purpose of illustrating an application of the principles of my invention, I have depicted a blow chamber 1, which is operatively associated with a cupola 2 and a steam, or air nozzle 3, in the continuous production of a mineral wool batt 4.

Mineral wool is at present produced by causing a molten mineral stream 5 to pour from the cupola upon a blast 6, which shreds the stream of molten material into fibers. The fibers, after being formed in the blow chamber, float rapidly about its interior, until they either become settled on the base of the chamber, or move into contact with its walls.

The chamber 1 is provided with a frame 7, which supports a front wall 8, a rear wall 9, a roof 10, and side wall portions 11, 12, 13 and 14. The roof is provided with a vent 15, which is covered with a ventilator housing 16, through which the heated gases and vapors pass out of the chamber. The rear wall 9 has an open portion 17 through which the co-mingled steam and molten material are blown into the blow chamber. The side wall portions 13 and 14 are preferably offset from the side wall portions 11 and 12 and are connected to these portions by horizontally extending metal strips 18.

The side wall portions are supported on either side of the chamber by a frame which preferably includes a foot portion 19, a lower portion 20, and an upper portion 21, each of which may be offset, substantially as shown. Each of the upper portions 21 is connected to one of the lower portions 20 by a plurality of vertically extending bars 22.

An angle bar 23 is fixedly secured to each of the lower sides of the bars 22 and is preferably placed adjacent to the outer surface of the upper side walls of the chamber.

A guide means 25 is movably secured to each of the bars 23 by any suitable means, such as, for instance, hinges 24. The inner faces of the leaves of the hinges 24 are preferably placed adjacent to the outside surfaces of the angle bars 23 and the guide means 25, as this arrangement provides a smooth surface down which the bunched fibers may freely slide.

Each of the guide means 25 may be of any suitable construction, but preferably includes a stiffening frame 27, and a metal sheet 28. Each of the guide means, if desired, may be provided with an apron 60, for the purpose of preventing the fibers from clinging and packing between the lower edge of the upper side wall portions, and the upper edge of the guide means.

A plurality of bearings 29 are fixedly secured to the rear of each of the frames 27. These bearings are operatively connected by a pin 30 to a connecting rod 31, which passes through an open portion (not shown) in the adjacent side wall. The outer portions 32 of the rods 31 are provided with a nut means 33 which is rotatably mounted in a shafted bearing 34. The bearing 34 is rotatably connected to a crank 35 which is keyed to the adjacent one of two elongated shafts 36 which extend parallel to the side walls of the chamber.

The shafts 36 are mounted in a plurality of bearings 37 which are carried on any suitable supports such as, for instance, the supports 38 and 39. These supports are fixedly secured to the lower portions 20 of the frame 7 on either side of the chamber. The supports 39 differ from the supports 38 only in that the supports extend farther away from the frame and are adapted to also carry a motor 40 and a gear reduction means 41. The gear reduction means is provided with a shaft 42, having a wheel 43, which is coupled to one of the shafts 36, through a link 44, and a crank 45. The shafts 36 are each provided at the front end of the settling chamber with sprocket wheels 26 which are operatively connected together by a sprocket chain 46.

The foot portion 19 includes a plurality of upright supports 47 which are connected to the lower frame portion 20 on either side of the chamber 1, by means of plates 48. The plates 48 are bolted, or otherwise secured, to the frame portion and to the supports.

An angle bar 49 is secured to the upper edge of each of these plates and is perforated to receive a bolt 50 which passes through a slotted portion 51 of a flat horizontal bar 52. Half of these bars 52 pass through slotted portions (not shown) in the lower side wall portion 13 and the other half of the bars pass through slotted portions in the lower side wall portion 14. Each of these bars is bolted to one of two elongated longitudinally extending angle bars 53. The bars 53 carry upright plates 54 which are provided for the purpose of enabling the operator to control the width of the forming batt 4. It is apparent that each of the plates may be moved inwardly and outwardly by unbolting and moving the horizontal bars 52. The lower edges of the plates 54 preferably extend to within a fraction of an inch of the upper surface 56 of a conveyor 57, which forms the base of the blow chamber.

In operation, the molten mineral material is shot into the blow chamber at a high velocity, where it forms mineral wool fibers which swirl rapidly through the heated vapors and gases in the blow chamber. Part of the suspended fibers are deposited directly upon the conveyor, but a larger proportion of them float upwardly and come into contact with the side walls 11, 12 of the chamber 1, to which they tend to cling.

The fibers rapidly combine in bunches and their aggregate weight causes them to slide down the side walls. Were it not for the moving guide means 25, these bunches would fall on the edges of the forming batt, and make the batt high on its side portions, and low in its mid-section.

The guide means 25 is designed to be constantly moving to and from the lower central portion 58 of the blow chamber. It will be noted (see Figure 3) that the guide means 25 are so coupled to the motor driven gear reduction means 41 that while one of the guide means is swinging toward the central portion 58, the other guide means is swinging toward its adjacent side wall. It will also be noted that all of the fibers must fall between the lower edges of the guide means, and that these two guide means form, in effect, a huge funnel through which streams of fibers pass moving in a direction transverse to the direction of the conveyor travel, thereby evenly spreading the descending fibers over the surface of the forming batt.

A particular feature of my invention is that the guide means 25 and guide plates 54, can be quickly adjusted to make batts of any desired width by merely loosening the bolt 50, and turning the nut 33.

The settling chamber herein disclosed is adapted to production of rock, or slag wool, but it is obvious that the guide means and the guide plates forming the gist of my invention are equally adapted to be applied and used in any type of settling chamber, on the base of which fibers are deposited from suspension, to form felted strips, blankets, or batts.

I claim:

1. A settling chamber for forming a strip of felted fiber of substantially uniform thickness, said chamber being provided with oppositely disposed side walls and having a downwardly inclined and hingedly mounted guide means secured to each of said side walls and being adapted for receiving the descending fibers and distributing said fibers over successive transverse portions of the base of the chamber, said guide means being coupled to a driving mechanism for synchronously moving said guide means, portions of said driving mechanism passing through the walls of said chamber and being pivotally connected to each of said guide means.

2. A settling chamber adapted for forming a strip of felted fibers of substantially uniform thickness, said chamber including a roof, opposite side walls, and a movable floor, a driving mechanism and a downwardly inclined and hingedly supported guide means mounted adjacent each of said side walls and being adapted for receiving the descending fibers and transversally distributing such fibers over successive portions of the floor, each of said guide means being operatively associated with the driving mechanism whereby

said guide means may be moved synchronously to and fro intermediate of the roof and the floor and intermediate of the side walls of the settling chamber.

3. An apparatus for forming a layer of felted fibers comprising a chamber for receiving the fibers, a movable surface at the bottom of the chamber on which the fibers may be deposited, and a guide leaf hingedly connected with a side of the chamber and depending therefrom, and means for swinging the guide leaf back and forth over the movable surface whereby fibers which have settled on the guide leaf may be distributed over the movable surface.

4. An apparatus for forming a layer of felted fibers comprising a chamber for receiving the fibers, a movable surface at the bottom of the chamber on which the fibers may be deposited, and a guide leaf hingedly connected with a side of the chamber and depending therefrom, and means for swinging the guide leaf back and forth over the movable surface whereby fibers which have settled on the guide leaf may be distributed over the movable surface, said means including an adjustable mechanism for limiting the movement of the guide leaf in a given direction.

5. An apparatus for forming a layer of felted fibers comprising a chamber for receiving the fibers, a movable surface at the bottom of the chamber on which the fibers may be deposited, and a pair of guide leaves hingedly connected with opposite sides of the chamber and depending therefrom, and means for swinging the guide leaves back and forth over the movable surface whereby fibers which have settled on the guide leaves may be distributed over the movable surface.

6. An apparatus for forming a layer of felted fibers comprising a chamber for receiving the fibers, a movable surface at the bottom of the chamber on which the fibers may be deposited, and a pair of guide leaves hingedly connected with opposite sides of the chamber and depending therefrom, and means for swinging the guide leaves back and forth over the movable surface whereby fibers which have settled on the guide leaves may be distributed over the movable surface, said means including a mechanism for synchronizing the swinging movements of the guide leaves over the movable surface.

7. An apparatus for forming a layer of felted fibers comprising a chamber for receiving the fibers, a movable surface at the bottom of the chamber on which the fibers may be deposited, and a pair of guide leaves hingedly connected with opposite sides of the chamber and depending therefrom, and means for swinging the guide leaves back and forth over the movable surface whereby fibers which have settled on the guide leaves may be distributed over the movable surface, said means including an adjustable mechanism for limiting the movements of the guide leaves in a given direction.

8. An apparatus for forming a layer of felted fibers comprising a chamber for receiving the fibers, a movable surface at the bottom of the chamber on which the fibers may be deposited, and a pair of guide leaves hingedly connected with opposite sides of the chamber and depending therefrom, and means for swinging the guide leaves back and forth over the movable surface whereby fibers which have settled on the guide leaves may be distributed over the movable surface, said means including a mechanism for synchronizing the swinging movements of the guide leaves over the movable surface, said means including an adjustable mechanism for limiting the movements of the guide leaves in a given direction.

9. An apparatus for forming a layer of mineral wool fibers comprising a chamber for receiving the fibers, a movable surface at the bottom of the chamber on which the fibers may be deposited, a member positioned and movably supported intermediate of the walls of the chamber and spaced apart from the movable surface to simultaneously push laterally and guide downwardly the fibers and means for moving the member back and forth over the movable surface whereby the fibers may be uniformly distributed over the movable surface.

10. An apparatus for forming a layer of mineral wool fibers comprising a chamber for receiving the fibers, a movable surface at the bottom of the chamber on which the fibers may be deposited, a member positioned and movably supported intermediate of the walls of the chamber and spaced apart from the movable surface to simultaneously push laterally and guide downwardly the fibers and power driven means for continuously moving the member back and forth over the movable surface transversely to the movement of said surface whereby the fibers may be distributed uniformly on the movable surface.

DANIEL C. DRILL.