Aug. 26, 1930. W. L. MILLER 1,774,393

MACHINE FOR MAKING MINERAL OR ROCK WOOL BAT

Filed Dec. 28, 1928 2 Sheets-Sheet 1

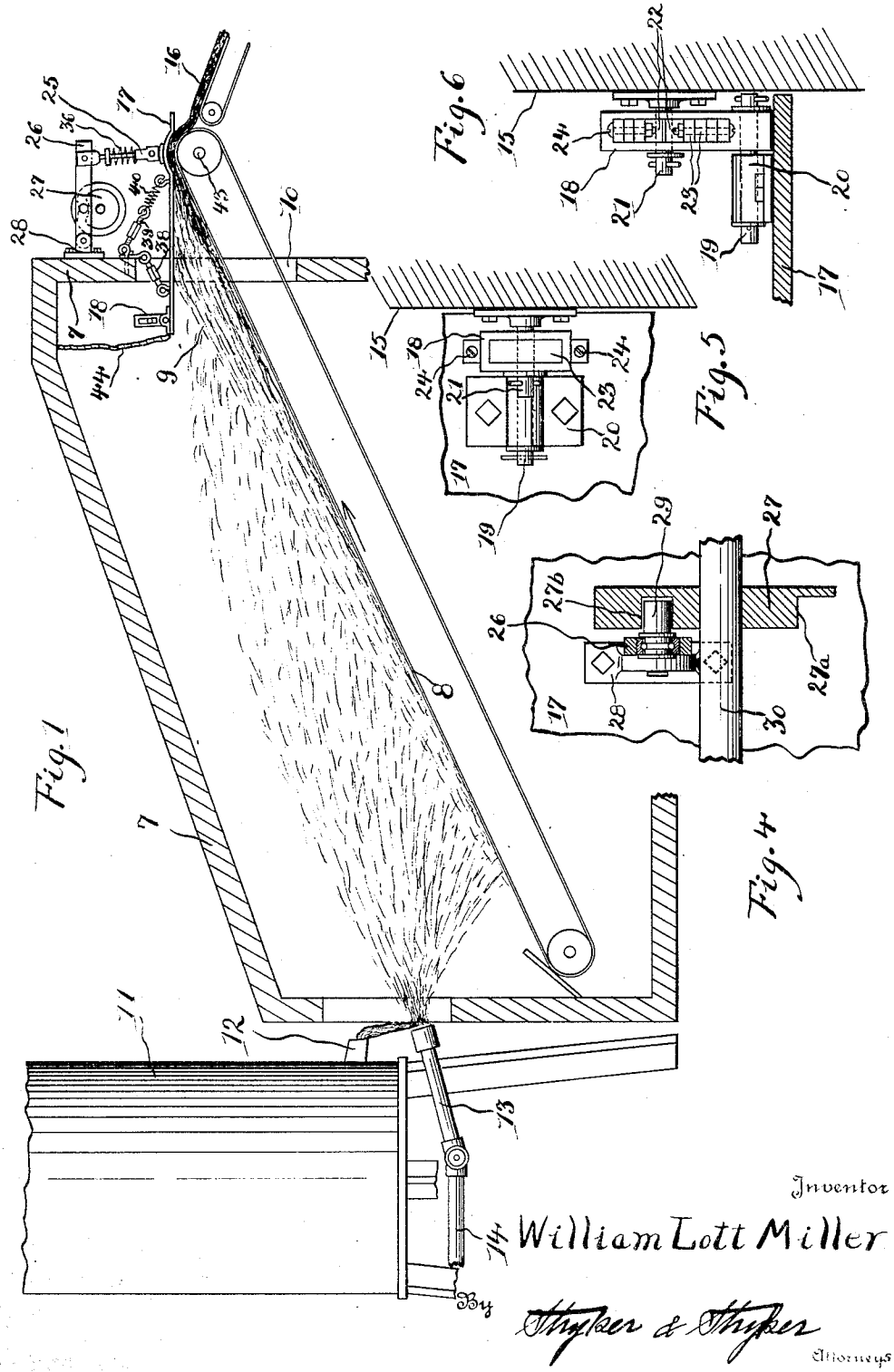

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Fig. 2

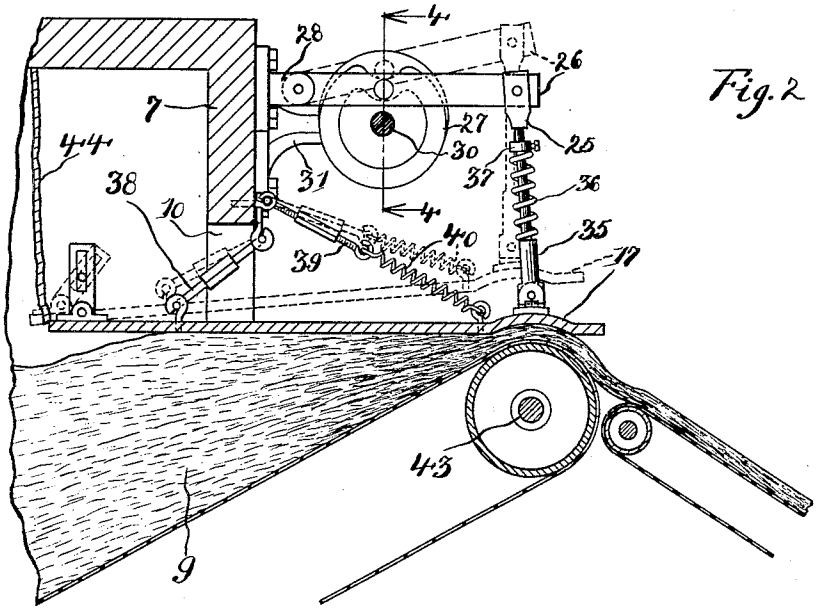
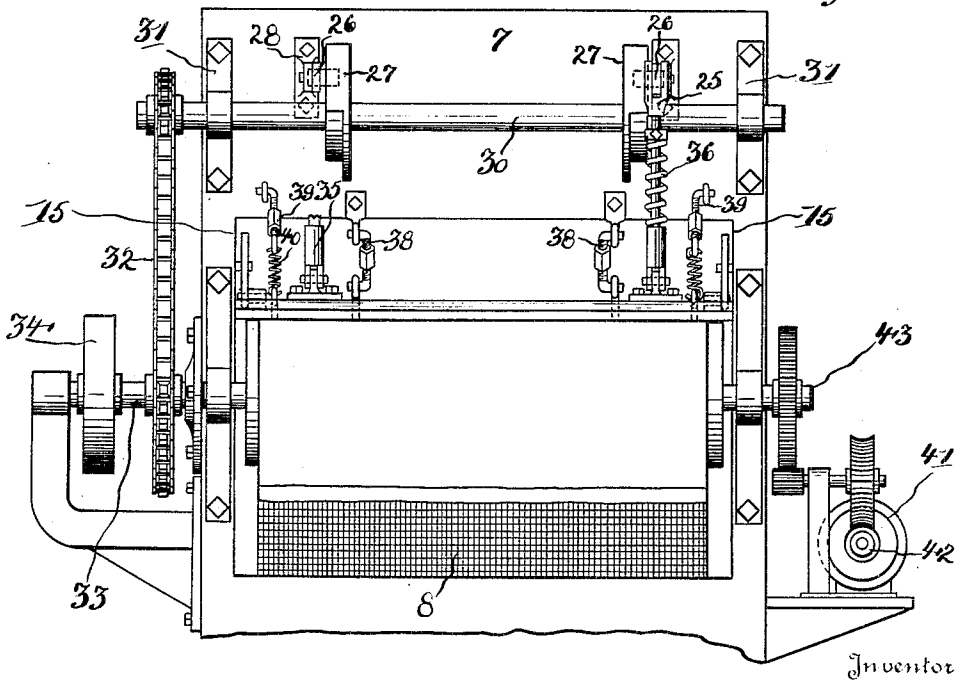


Fig. 3



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UNITED STATES PATENT OFFICE

WILLIAM LOTT MILLER, OF WINONA, MINNESOTA

MACHINE FOR MAKING MINERAL OR ROCK WOOL BAT

Application filed December 28, 1928. Serial No. 329,062.

This invention relates to means for compressing a loosely felted blanket of mineral or rock wool as the same is formed and delivered from a settling chamber. My device is particularly adapted for use with a settling chamber and conveyor of the type described in my application for Patent Serial No. 208,955, filed July 28, 1927.

It is my object to form a mineral wool bat which is rendered more uniform in thickness and density by improved compressing mechanism.

Another object is to compress the mass of fibre-like particles without disturbing their proper felted, interwoven or interlocking arrangement and thereby produce a stronger bat having improved insulating qualities. The invention also includes a number of novel features of construction which promote smoothness of operation and efficient handling of the bulky mass of hot, loosely felted wool on a moving conveyor.

The invention will be best understood by reference to the accompanying drawings in which Figure 1 is a side elevation of my improved compressing mechanism mounted near the delivery end of a suitable settling chamber in which a loosely felted blanket is formed; Fig. 2 is an enlarged longitudinal section through the mechanism and adjacent portions of the settling chamber and conveyor; Fig. 3 is an end view of the structure shown in Fig. 2; Fig. 4 is a fragmentary vertical section through the operating mechanism taken on the line 4—4 of Fig. 2; Fig. 5 is a plan view of one of the connections between the inner end of the compressing plate and settling chamber and Fig. 6 is a front elevation of the device shown in Fig. 5.

The mineral or rock wool may be formed in the usual manner and blown into a settling chamber 7 where it "snows" down upon a slowly moving conveyor 8 adapted to deliver a loosely felted blanket 9 of the wool through an opening 10 in one end of the settling chamber. The rock or other mineral to form the wool may be reduced to molten state in a suitable cupola 11 having a spout 12 from which the molten material falls in the path of a steam or air jet delivered from a nozzle 13. Steam or air under pressure may be supplied through a pipe 14 communicating with the nozzle 13.

The chamber 7 is preferably long and narrow (preferably about 30 feet in length by 6 feet in width) and has vertical side walls 15 (Fig. 3) between which the conveyor 8 extends. In such a chamber the particles of wool are allowed to fall freely and form a loosely felted mass upon the conveyor 8, this mass having the fibres extending in all directions in planes parallel to that of the conveyor and in the interlocking or interwoven positions in which they fall naturally. It is important, in order to form a strong bat of good insulating qualities, that this natural, interwoven arrangement of the fibres be undisturbed except for the reduction of the thickness and pressing of the particles into more closely interlocking or interwoven positions. The present invention is particularly designed to retain the interlocking positions of the fibres in the compressed bat 16 which is formed.

My mechanism for compressing the loosely felted blanket 9 includes a wide plate 17 of substantial length and extending laterally from one to the other of the side walls 15. The plate 17 projects into the settling chamber 7 through the opening 10 above the conveyor 8 and is pivotally supported at its inner end upon a pair of links 18. As best shown in Figs. 5 and 6 the lower end of each of the links 18 is pivotally connected by a pin 19 to a bearing 20 secured to the plate 17 and a supporting stud 21 is fixed upon the side wall 15 to extend through suitable bearing blocks 22 which are adjustable longitudinally within the link 18. Longitudinal guideways are formed in each of the links 18 to receive a series of removable filler blocks 23. These filler blocks are removably held in place by bolts 24 and may be withdrawn and rearranged in the links 18 to shorten or lengthen the connection between the plate 17 and supporting walls 15.

The outer end of the plate 17 is alternately raised and lowered in oscillating movement imparted to it by a pair of arms 25 each connected at its upper end to an operating lever

26. Each of the levers 26 extends adjacent to a cam 27 and has a pivotal support 28 upon the end of the settling chamber 7. As best shown in Fig. 4, each of the levers 26 has a roller 29 projecting at one side and resting upon a peripheral cam surface 27[a] of the adjacent cam. This surface 27[a] has a reentrant portion adapted to allow the lever 26 to descend in compressing the blanket 9 and opposite the reentrant portion is a cam surface 27[b] for forcing the lever downward in its oscillating movement. The cams 27 are fixed on a power-driven shaft 30 supported in suitable bearings 31 (Fig. 3) upon the end of the settling chamber 7. As illustrated, the shaft 30 may be driven by suitable sprocket wheels and a chain 32 connecting it with a counter-shaft 33 which is in turn operable by power applied to a pulley 34.

A resilient downward thrust of the arm 25 is provided for by making the lower end of said arm slidable in a sleeve 35 and by placing a compression spring 36 between the upper end of said sleeve and a suitable abutment 37 on the upper part of said arm. The lower end of the sleeve 35 is pivotally connected to the plate 17.

In order to minimize the disturbance of the felted particles in the blanket 9, I cause the plate 17 to be moved during its downward stroke in the direction of the travel of the particles. To this end, an oblique link 38 is pivotally connected to the plate 17 and to the end on the chamber 7, said link extending rearwardly of the direction of movement of the conveyor, and a second suspension member 39 is arranged to extend obliquely forward and downward from the end of the chamber 7. The member 39 has a coiled tension spring 40 connecting it to the outer end of the plate 17, said spring being arranged to resiliently support the greater part of the weight of the forward end of the plate and tending to draw the plate back into the opening 10 during its movement to the elevated position shown in dotted lines in Fig. 2. Suitable turnbuckles are provided in the oblique members 38 and 39 to facilitate adjustment of the pressure applied by the plate 17 and tension of the spring 40.

As shown in Fig. 3, the conveyor 8 may be driven at the desired slow speed by a motor 41 operating a worm 42 and connected, through a suitable train of gears, with a shaft 43 for driving the conveyor 8. In order to prevent the lodging of quantities of the wool upon the top of the plate 17 a baffle 44 of flexible material is connected at its lower end to the rear end of the plate 17 and at its upper end to the ceiling of the chamber 7, said baffle extending from side to side of the chamber.

In operation the motor 41 drives the conveyor 8 in the direction indicated by an arrow in Fig. 1 while the jet from the nozzle 13 breaks up the stream of mineral from the spout 12 and forms the fibre-like particles which are blown into the chamber 7. The particles, settling upon the conveyor 8, form the continuous and loosely felted blanket 9 which is moved into contact with the smooth bottom surface of the plate 17. The outer end of this plate, which extends obliquely toward the conveyor, is oscillated at a relatively rapid rate to compress the blanket 9 by a series of downwardly and forwardly directed short strokes. The cam 27 is continuously rotated by power applied to the pulley 34 (Fig. 3).

During the upward movement of the plate 17 (from the full to the dotted line positions shown in Fig. 2) the forward urge of the plate 17 caused by the moving blanket 9 is progressively lightened so that the weight of the parts tending to straighten the arms 25 and action of the tension springs 40 is sufficient to draw the plate 17 longitudinally backward through the opening 10. Upon the downward stroke of the plate 17 the friction of the wool fibres against the plate is progressively increased and the downward thrust created by the cam surface 27[b] (Fig. 4) together with gravity causes the spring 40 to be extended while the oblique link 38 allows forward but prevents backward movement of the plate 17 relative to the direction of travel of the wool. Thus the plate 17 is caused to move forward during its compression stroke and I prefer to have forward movement equal to the advance of the blanket 9 during the same interval of time. In order to adjust the thickness and density of the bat 16 the speed of the conveyor 8 is sometimes changed and to retain the conformity of the advance of the plate with that of the wool blanket it is possible to readjust the speed of the cam shaft 30. However, as a practical matter I have found it sufficient to impart one compression stroke to the plate 17 for each two to six inches of advance of the bat where the forward stroke of the plate is equal to about two inches.

It will be evident that by my arrangement for adjusting the effective lengths of the link 18 and oblique members 38 and 39, bats of different thickness and density may be formed. Experience has shown that my arrangement of the suspended compression member 17, which is operated to compress the bat in step by step movement, results in a superior product because objectionable disturbance of the hot, light particles upon the conveyor is avoided and its operation is attended by a minimum of trouble.

Obviously the invention may be employed with wool of the oiled or so-called annealed type as well as with the unoiled or unannealed wool, and it is to be understood that the terms "mineral wool" or "wool" in the following

claims do not limit the invention to any particular kind or type of wool.

Having described my invention what I claim as new and desire to protect by Letters Patent is:

1. In mechanism for forming material wool into a bat, said mechanism having a settling chamber and a conveyor for delivering a loosely felted blanket of the wool from said chamber, a plate extending obliquely forward toward said conveyor above and near the delivery end of the same, and means for imparting oscillating movement to said plate transverse said blanket to compress said blanket.

2. In mechanism for forming mineral wool into a bat, said mechanism having a settling chamber and a conveyor for delivering a loosely felted blanket of the wool from said chamber, a compression plate extending obliquely in the path of said blanket above the same, and means for imparting oscillating movement to said plate downward to compress said blanket by alternately compressing and partially releasing the same.

3. In mechanism for forming mineral wool into a bat, said mechanism having a settling chamber and a conveyor for delivering a loosely felted blanket of the wool from said chamber, a compression plate extending obliquely forward toward and in the path of said blanket above tht same, means for suspending said plate for movement substantially in its own plane along said conveyor and means for imparting oscillating movement to said plate transverse said blanket to compress said blanket step by step.

4. In mechanism for forming mineral wool into a bat, said mechanism having a settling chamber and a conveyor for delivering a loosely felted blanket of the wool from said chamber, a plate extending above said blanket, means for suspending said plate for movement substantially in its own plane along said conveyor and means for imparting oscillating movement to said plate transverse said blanket for compressing said blanket step by step.

5. In mechanism for forming mineral wool into a bat, said mechanism having a settling chamber and means for delivering a loosely felted blanket of the wool from said chamber, a plate extending above said blanket, means for supporting said plate to permit movement substantially in its own plane and means for alternately raising and lowering said plate to compress said blanket step by step.

6. In mechanism for forming mineral wool into a bat, said mechanism having a settling chamber and a conveyor for delivering a loosely felted blanket of the wool from said chamber, a plate extending obliquely forward toward said blanket, means for pivotally supporting the rear end of said plate and means for imparting oscillating movement to the forward end of said plate transverse said blanket to compress the same.

7. In mechanism for forming mineral wool into a bat, said mechanism having a settling chamber and a conveyor for delivering a loosely felted blanket of the wool from said chamber, a compression plate extending obliquely in the path of said blanket above the same, a pivotal support for the rear end of said plate and means for imparting oscillating movement transverse the blanket to the forward end of said plate to compress the blanket.

8. In mechanism for forming mineral wool into a bat, said mechanism having a settling chamber and a conveyor for delivering a loosely felted blanket of the wool from said chamber, a plate extending obliquely forward toward and in the path of said blanket above the same, a plurality of swingable links suspending said plate for movement substantially in its own plane along said conveyor and means for alternately raising and lowering said plate to compress said blanket step by step.

In testimony whereof, I have hereunto signed my name to this specification.

WILLIAM LOTT MILLER.