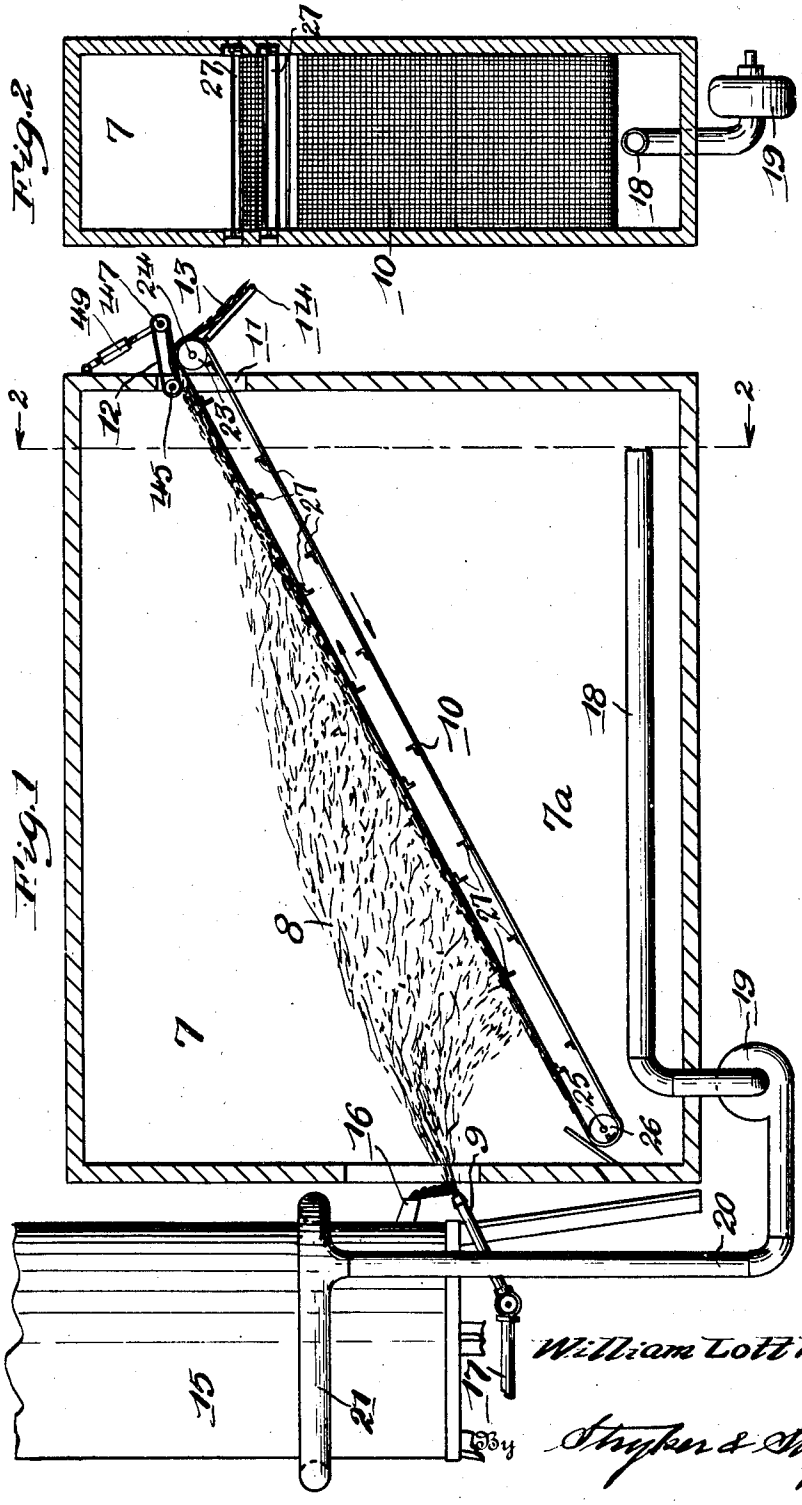
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MACHINE AND METHOD FOR FORMING MINERAL WOOL BATS

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MACHINE AND METHOD FOR FORMING MINERAL WOOL BATS

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Fig. 3

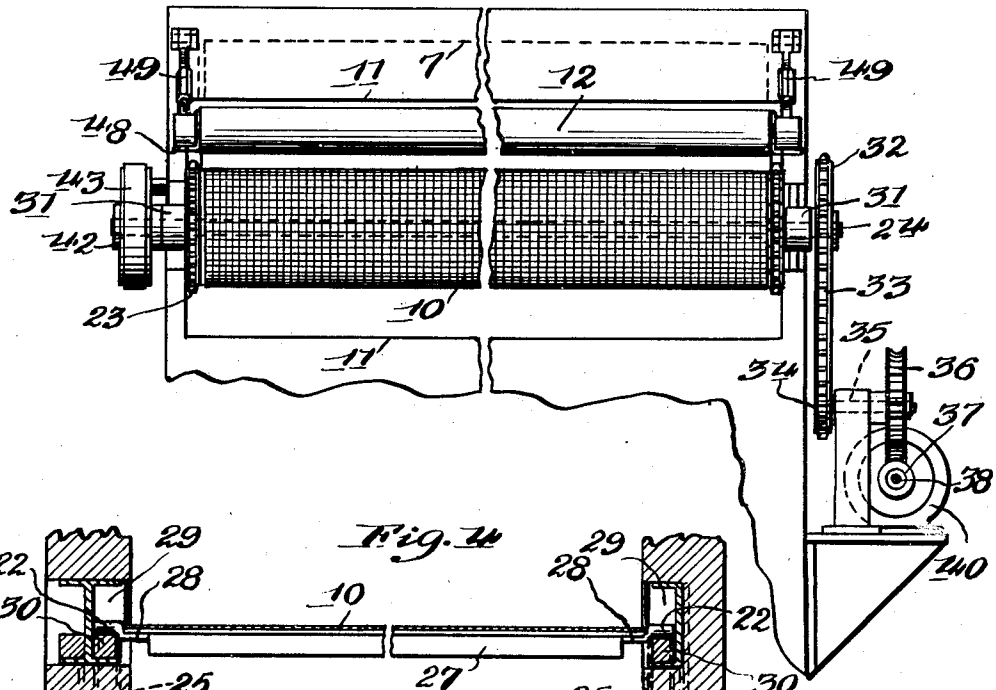


Fig. 4

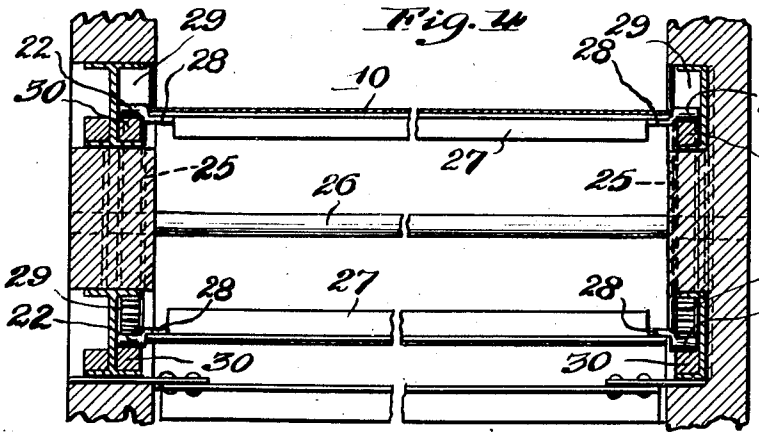


Fig. 5

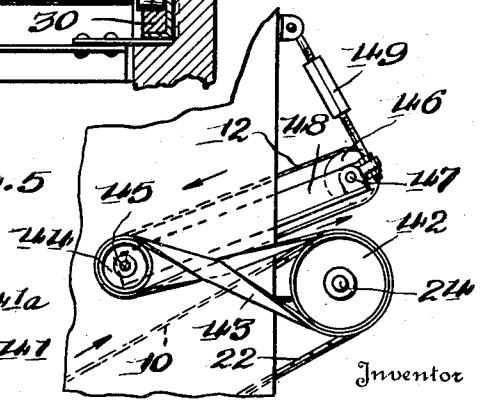
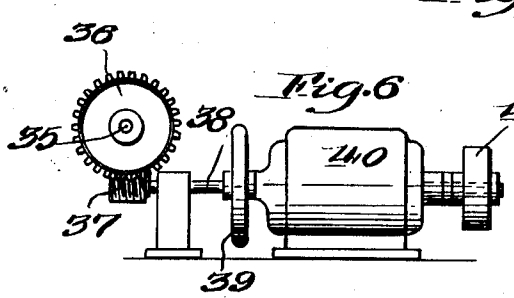


Fig. 6



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UNITED STATES PATENT OFFICE

WILLIAM LOTT MILLER, OF WINONA, MINNESOTA

MACHINE AND METHOD FOR FORMING MINERAL-WOOL BATS

Application filed July 28, 1927. Serial No. 208,955.

It is my object to provide a novel machine and method for forming mineral wool into a blanket or bat of any desired thickness and thereby facilitate the packaging and handling of measured quantities of the wool.

A further object is to improve the efficiency of the wool as insulating material by insuring a thorough and compact felting of the fibers together and by eliminating undesirable particles, such as the glass beads or "shot," which are usually mixed with the mineral fibers.

Other objects are to reduce the cost of manufacture and preparation for shipping and to generally improve the efficiency and speed of the manufacturing process.

In carrying out my invention, I provide a long and relatively narrow chamber, in place of the usual settling chamber, and a conveyor, occupying the lower part of the chamber, is arranged to receive the fibers which are blown into the chamber as they are formed. The slag, rock or other minerals for forming the wool may be reduced to molten state in a furnace or cupola of common type and a jet of air or steam may be applied to a stream of the molten mineral so as to form the fibers in the usual manner. The jet is arranged to direct the particles into a long and relatively narrow chamber, where they settle upon the conveyor, forming a continuous loosely felted blanket. The conveyor is arranged to deliver this bat or blanket through an opening in one end of the chamber and means are provided near the delivery end of the conveyor for compressing the bat. The finished bat is finally rolled into packages of convenient size. The thickness of the bat may be regulated by changing the speed of the conveyor and by adjusting the position of the compressing means near the delivery end of the conveyor.

In the accompanying drawings, I have illustrated one form of machine suitable for carrying out my invention. In the drawings, Figure 1 is a diagrammatic side view of my invention, showing the settling chamber in vertical, longitudinal section; Fig. 2 is a section taken on the line 2—2 of Fig. 1; Fig. 3 is a fragmentary end view showing the delivery end of the conveyor, suitable driving mechanism and means for compressing the bat; Fig. 4 is a typical, transverse section through the conveyor; Fig. 5 is a fragmentary, side view, showing the compressing means and driving mechanism therefor and Fig. 6 is a detail of the speed controlling means, as viewed from the right of Fig. 3.

As shown in Figs. 1 and 2, I provide a long and relatively narrow chamber 7 into which the particles of mineral wool 8 are blown by a jet of air or steam delivered by a nozzle 9. A foraminous conveyor 10 is arranged to receive the mineral wool particles within the chamber 7 and is operated at a slow speed, so as to receive the wool from the blower in substantial amounts to form a blanket of proper thickness and density and deliver the product through an opening 11 at the end of the chamber 7 opposite the nozzle 9. To compress the loose blanket of wool formed on the conveyor 10, an endless belt 12 is mounted near the upper end of the conveyor 10 in position to press the particles upon said conveyor and to form the bat 13, which is delivered as a continuous sheet upon a chute 14 (Fig. 1).

Suitable molten mineral for the formation of the wool is prepared in the usual way in a cupola 15, which delivers a continuous stream of the mineral through the spout 16. As the molten material falls from the spout 16, it is struck by the jet of steam or air from the nozzle 9, said nozzle being supplied with suitable fluid under pressure through a pipe 17.

The lower part 7^a of the chamber 7 is separated from the upper part, by the conveyor 10, and I prefer to draw air downward through the conveyor by means of a pipe 18 and blower 19. The delivery outlet of the blower 19 is connected by a pipe 20 with a manifold 21, which communicates with the interior of the cupola 15 to supply the forced draft therefor.

Details of the construction of the conveyor and suitable driving mechanism therefor are shown in Figs. 3 to 6, inclusive. As here shown, the conveyor 10 consists of an endless wire screen extending from side to side and

substantially from end to end of the chamber 7 and supported at its side edges by a pair of endless chains 22. I have found that a screen formed from three strand, tinned wire of No. 32 gage and 8 to 12 mesh is suitable for the conveyor 10.

Power driven sprocket wheels 23 are mounted upon a shaft 24 at the upper or delivery end of the conveyor 10, while a pair of sprocket wheels 25 are arranged to guide the chains 22 at their opposite ends, the latter sprocket wheels being supported upon a shaft 26. This shaft 26 has suitable bearings in the side walls of the chamber 7. To support the bed or wire of the conveyor 10, I provide at suitable intervals transverse angle bars 27, which are carried by the chains 22. The chains 22 have projecting ears 28 to which the bars 27 and screen are secured and said chains run in recesses 29 in the side walls of the chamber 7 and are supported upon rails 30 in said recesses.

The power driven shaft 24 is journalled in suitable bearings 31, projecting from the end of the chamber 7. At one end, the shaft 24 projects and has fixed thereon a sprocket wheel 32, adapted to be driven by a chain 33. The chain 33 is in turn driven by a sprocket wheel 34 upon a shaft 35 (Figs. 3 and 6). A worm wheel 36 is fixed on the shaft 35 and adapted to be driven by a worm 37 upon a shaft 38. The speed of rotation of the shaft 38 may be varied by operating a wheel 39 for controlling a variable speed transmission 40 of common type. The power shaft 41 may be driven by electric motor connected thereto by a suitable belt operating upon a pulley 41^a.

Fixed on the end of the shaft 34, opposite the sprocket wheel 32, is a pulley 42, which drives a belt 43 and the latter belt operates a pulley 44 upon a drive shaft 45 for the compression belt 12. This belt 12 extends the width of the conveyor 10 and is supported at its ends upon suitable drums. One of these drums is driven by the shaft 45 to operate said belt in the direction indicated by arrows in Fig. 5. It will be noted that the lower run of the belt 12 is located adjacent to the conveyor 10 and at an angle to the upper run of said conveyor so as to compress the loose blanket of mineral wool upon the upper surface of the conveyor 10. To facilitate adjustment of the pressure applied by the belt 12, I mount the drum 46 upon a shaft 47, which is supported at its ends upon a pair of angle bars 48. These angle bars are pivotally connected at their inner ends to the shaft 45 and arranged to be raised and lowered at their outer ends by suitable turn buckles 49 (Figs. 3 and 5).

In operation, the conveyor 10 is driven in the direction indicated in Figs. 1 and 5 at a slow speed, say at a lineal speed of ¼ to 2 feet per minute, depending upon the thickness and density of the bat 13 required. As the mineral fibers are formed and blown into the chamber 7 by the jet of steam or air, they settle upon the upper run of the moving conveyor 10. Settling is expediated and the fibrous structure of the bat is improved by the downward draft created by removing the air beneath the conveyor 10. As will be readily understood, the air in the chamber 7 is heated by the steam jet and by the hot mineral, so that air taken into the pipe 18 is hot and the blower 19 delivers this hot air into the draft manifold 21 of the cupola 15. This increases the efficiency of the cupola and at the same time avoids separate heating means for the air. By reason of the foraminous nature of the conveyor 10, particles of undesirable matter, such as the glass beads or "shot," which are heavier than the fiber, fall near the receiving end of the chamber 7 and pass through the conveyor at this end where the mineral fibers do not obstruct the passage of such matter. Thus, these undesirable particles are, to a considerable extent, eliminated from the bat 13. As the fibrous particles fall upon the conveyor they form a felted loose blanket. As this loose blanket of fiber approaches the delivery end of the conveyor 10, it is compressed by the belt 12, the lower run of which is operated in the same direction and at the same speed as the upper run of the conveyor 10. Obviously, the pressure applied by the belt 12 may be adjusted by means of the turn buckles 49.

It will now be understood that a compact, continuous bat or blanket of the mineral fibers is delivered upon the chute 14. I prefer to place measured quantities of the bat in rolls for shipping. Thus, a sheet of paper may be rolled with the bat to retain the same in the form of a compact quilt of uniform thickness and density. It will be evident that this blanket can be used for insulating purposes with a minimum of installation work. To adjust the thickness of the bat, it is only necessary to change the speed of the conveyor 10 by operating the control wheel 39 of the transmission 40. Where substantial changes in thickness of the bat are required, it will be necessary to change the position of the compression belt 12, relative to the upper run of the conveyor 10, by operating the turn buckles 49.

While I have shown the conveyor 10 in inclined position, with the delivery end higher than the receiving end, I do not consider this essential to successful operation. Thus, the conveyor may be arranged substantially horizontally or inclined in the other direction, if desired to meet the conditions of a particular case.

In most conditions under which mineral wool is used for insulating purposes, it best serves its purpose in sheet or bat form and this form also promotes convenience and economy in handling and shipping the ma-

terial. It will thus be seen that by forming a bat of required thickness and density during the usual process of blowing the wool, I promote both efficiency and economy.

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

1. In a machine of the class described the combination with a settling chamber having vertical side walls, means for forming mineral wool fibers and for blowing them into said chamber, a conveyor arranged in said chamber to receive said particles and extending sidewise from one of said walls to the other to receive freely falling particles, means for compressing the fibers and means for operating said conveyor to deliver a loosely felted blanket of fibers at an end of said chamber.

2. In a machine of the class described the combination with a settling chamber, of means for forming mineral wool fibers and for blowing them into said chamber, a conveyor arranged to receive said fibers as they fall in the chamber and means for operating said conveyor to deliver a loosely felted blanket of fibers of predetermined thickness and density at an end of said chamber.

3. In a machine of the class described the combination with a settling chamber, means for forming mineral wool fibers and for blowing them into said chamber, a foraminous conveyor arranged in said chamber to receive said particles, suction means in the lower part of the chamber for drawing the fibers down upon the conveyor and means for operating said conveyor to deliver a loosely felted blanket of fibers at an end of said chamber.

4. The method of forming mineral wool into a bat, which consists in creating fibrous particles from a molten mass by applying a jet thereto and immediately allowing said particles to settle upon a foraminous support to form a loosely felted blanket, compressing said blanket and retaining the same in the form of a bat until used.

5. The method of forming mineral wool into a bat, which consists in producing fibrous particles from a molten mass by applying a jet thereto and allowing said particles to settle in the form of a loosely felted blanket, continuously moving said blanket and compressing said blanket to form a continuous bat of the desired thickness and density.

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

WILLIAM LOTT MILLER.