Sept. 26, 1933. O. F. MOTTWEILER ET AL 1,928,388

METHOD OF AND APPARATUS FOR TREATING INSULATING MATERIALS

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Fig. 1.

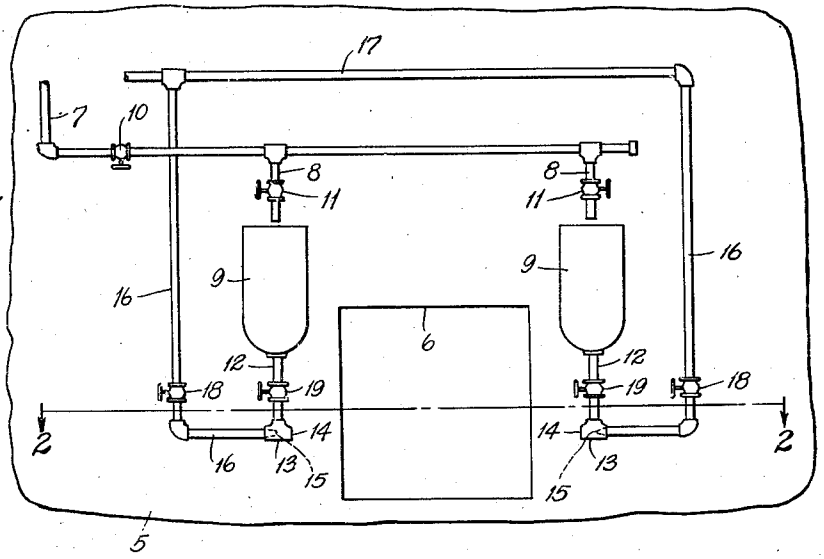


Fig. 2.

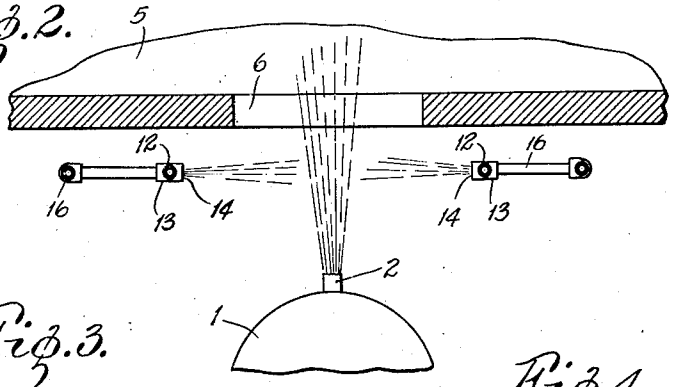


Fig. 3.

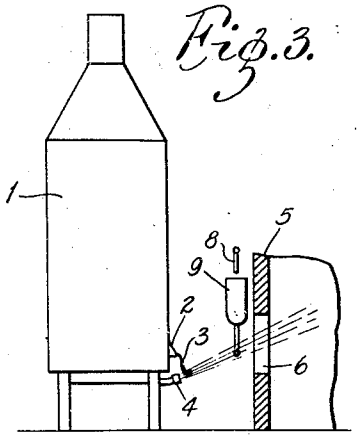


Fig. 5.

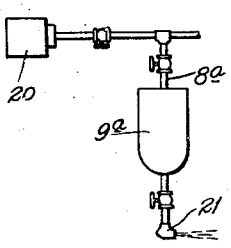
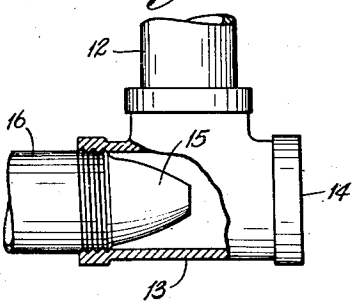


Fig. 4.



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METHOD OF AND APPARATUS FOR TREATING INSULATING MATERIALS

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Application November 21, 1932
Serial No. 643,694

10 Claims. (Cl. 154—28)

The general object of this invention is to provide a novel method of and apparatus for effectively applying a binding material to rock, mineral, or slag wools for the purpose of making insulating products therefrom.

Heretofore, such wools have been treated in various ways for the purpose of adding oil thereto or for incorporating a binding material therewith. Oil in itself acts as a binding material and the preferred method of applying the same is by injecting the oil in regulated quantities into the steam line from which the steam is projected in a blast to form the wool from molten material. The oil selected may be of low specific gravity, or of relatively high specific gravity, according to the purpose to which the wool is to be applied. In certain cases, however, that is to say, for certain types of insulating material, binding material containing more or less water must be used, and great difficulty has been experienced in properly incorporating such binding materials with the wool, by projecting it against the same with the steam blast which shreds the molten material, without the resultant product containing an excessive amount of "shot", which are in reality small balls of glassy material produced by chilling the molten material before the gobules thereof projected by the steam blast have had time to completely dissipate themselves into the form of fine threads.

While we have found in practice that certain oils may be advantageously projected against the molten material from which the wool is formed, by the steam or air blast employed for this purpose, and are aware of patents owned by the company to which this application and invention is assigned covering such method of procedure, we have discovered that where the process is carried beyond the step of merely oiling the wool to allay dust and to render the fibers less brittle; that is to say, where the oil is to be used in quantity sufficient to form a binder, the application of the oil to the wool can be accomplished satisfactorily only by projecting it under pressure against the wool after the latter has been formed by the steam or air blast in the usual way. For example, it has been attempted to apply liquid asphaltum, or other character of binding material, to the wool after the latter has entered the settling, or blow chamber, by spraying it on the wool. Such method of procedure, however, is wholly unsatisfactory, for the reason that it is practically impossible to secure a uniform application of the binder to the wool and the binder sets, or congeals in spots. This applies as well to all types of binding material sprayed on the mineral wool.

Again, in the case of low temperature insulation, that is insulation for use on the pipes, or other parts, of refrigerating plants, and in the composition of which water or other liquids are involved, we have discovered that the only successful way to thoroughly impregnate the wool with the binding material and at the same time avoid the production of an abnormal amount of shot, is to project the same under pressure of air, of steam, against the mineral wool as such, and while it is on its way to the settling chamber.

By this method of procedure, we can not only regulate to a nicety the amount of the binding material to be incorporated in the wool, but we secure absolute uniformity in the application of the binder to the wool; and in the case of binding materials including water, or other liquids, in their composition, we are enabled to prevent chilling the material and thus to a very large extent prevent the formation of shot.

Our invention is illustrated in the accompanying drawing in which:

Figure 1 is a diagrammatic illustration of apparatus for use in practicing our invention;

Figure 2 is a horizontal sectional view on the line 2—2 of Figure 1;

Figure 3 is a view, partly in elevation and partly in section illustrating the position of the apparatus we employ relative to the cupola which supplies the molten material to be shredded and the settling chamber into which the wool is projected;

Figure 4 is a broken sectional view on an enlarged scale showing one of the nozzles for projecting the binding material against the wool; and

Figure 5 is a diagrammatic illustration of a modification in the manner of spraying the binder.

Referring now to the drawing, the numeral 1 indicates a cupola provided at its lower end with a spout, 2, from which molten rock, slag, or the like, 3, may flow, and below the spout with a nozzle, 4, from which a jet of steam or air may be projected with great force to shred the molten material 3. Located immediately in front of the cupola 1 is a settling, or blow chamber, 5, having an opening, 6, through which the rock or mineral wool produced by the blast of steam, or air, may enter the chamber 5. In actual practice, the chamber 5 is supplied with an endless carrier on which the coated wool is deposited and with means for forming the same into bats, or blocks, as

well as with means for drying the coated wool; but as these features form no part of the present invention, they are not illustrated herein.

Our improved apparatus is mounted between the cupola and the settling chamber 5, and will now be briefly described.

Leading from a suitable supply tank (not shown) containing the binding material, is a pipe, 7, having two vertically disposed discharge pipes, 8, located, respectively, directly over containers, 9, into which they are adapted to discharge the binding material. The pipe 7 is provided with a valve, 10, for regulating the flow of the binding material from the supply tank and each of the pipes 8 is provided with a valve, 11, to control the flow of the binding material into the containers 9. Depending from each of the containers 9 is an outlet pipe, 12, on the lower end of which is mounted a fitting, or nozzle, 13, the inner end, 14, of which is open. Screwed into the opposite end of each nozzle 13 is the reduced end, 15, of a pipe, 16, each pipe 16 communicating with a pipe 17 leading from a source of compressed air, or steam, (not shown). The pipe end 15 in conjunction with the pipe 12 and open end of nozzle 13 forms a spray-nozzle, the two spray nozzles being located directly opposite each other on opposite sides of the opening 6 to the settling chamber 5, as clearly shown in Figure 2, and positioned, as shown in Figure 3 as to one of said nozzles, to project sprays of binding material in directions at right angles to the line of movement of the projected wool and into contact therewith. Each of the pipes 16 is provided with a valve 18, and each of the discharge pipes 12 is provided with a valve 19. By regulating the valves 19 the quantity of binding material flowing into the nozzles 13 may be controlled and by regulating the valves 18 the amount of steam supplied to the nozzles may also be controlled. Thus by manipulating the various valves, the amount of material required can be absolutely controlled, and the necessary amount of binding material can be applied to secure the desired density, or adhesive, quality of the binder.

In operation a quantity of binding material is supplied to the containers 9 by opening the valves 10 and 11, and with the apparatus in continuous operation, the flow of the binding material into the containers 9 may also be continuous so as to maintain a head pressure in said containers to provide a uniform flow of the binding material to the nozzles 13. Here the blast of steam, or air, from pipe 16 causes the binding material to issue from the nozzles 13 in the form of a spray, which is projected into the path of the wool fibers just prior to the entrance of the same into the opening 6 of the settling chamber. By thus projecting the binding material in the form of sprays and under high pressure, or at high velocities, the binding material is thoroughly incorporated with the wool and uniformly covers, or coats, the individual fibers thereof.

We prefer to employ steam as the medium both for shredding the molten material to form the wool and for spraying the wool with the binding material, by reason of the fact that being at a high temperature it does not chill the molten material or the wool fibers when projected against the same. For the same reason, if air under pressure is employed for either purpose, it would preferably be highly heated. In either event, the application of the binder to the wool is made without the production of shot, and, as a matter of fact, we find that the production of shot is very materially reduced.

Furthermore, by the arrangement described the pressures can be so equalized as to control the supply of wool entering into the opening 6 and assure that all fibers will be treated with the binder.

As to the broad idea of this invention, we wish it understood that the same is not limited to spraying the binder by means of a blast of air or steam. We recognize the fact that in many cases the binder could be sprayed by placing the same under pressure in the containers 9, by means of a pump. Hence, we have shown in Figure 5 a container 9^a, to which is connected the discharge pipe 8^a, and the binder is forced under pressure into the container by means of a pump 20. On the end of the discharge pipe 12, we mount a spray nozzle 21 of any conventional construction, such as used, for example, for spraying oil in the ordinary domestic oil burner. It will be understood, of course, that the second container will be equipped exactly in the manner just described, and that the only difference in the two arrangements for spraying the binder is that in the preferred construction the binder is sprayed by a jet of steam or air, while in the modified arrangement the binder is sprayed by forcing it under pressure through a spray nozzle.

In the interest of brevity, we will use the term "mineral wool" in the claims as descriptive of any type of wool made by shredding molten material by means of a blast of steam or air.

We claim:

1. The herein described method, which consists in shredding a stream of molten material by means of a blast to form mineral wool and then spraying a treating material at high velocity into the path of the mineral wool.

2. The method of producing insulating material which consists in forming mineral wool and projecting it into a settling chamber and simultaneously directing under pressure a hot spray of binding material into the path of the mineral wool prior to the entrance of the wool into said chamber.

3. The method of producing insulating material which consists in forming mineral wool and projecting it into a settling chamber and simultaneously projecting into the path of the mineral wool prior to its entrance into said chamber sprays of binding material directed from opposite sides of the body of mineral wool at high velocities.

4. The method of coating mineral wool fibers with a binder, which consists in forming mineral wool by a blast directed against a stream of molten material and immediately after the formation of the mineral wool directing into the path of the same a hot spray of binding material projected under high pressure.

5. In combination with a settling chamber having an opening, a source of molten material, means for directing a blast against the molten material and thereby project the resultant mineral wool through said opening, and means for spraying binding material at high velocity and temperature into the path of the projected mineral wool.

6. In combination with a settling chamber having an opening, a source of molten material, means for directing a blast against the molten material and thereby project the resultant mineral wool through said opening, a spray nozzle, a container for binding material, means for con-

trollably supplying binding material from said container to said nozzle, and means for projecting a medium under pressure and at relatively high temperature through said nozzle, whereby to spray said binding material and cause it to be directed into the path of the projected mineral wool.

7. In combination with a settling chamber having an opening, a source of molten material, means for directing a blast against said molten material to form mineral wool and project the same through said opening, containers for binding material located at opposite sides of said opening, means for controllably supplying binding material to said containers, a pair of spray nozzles located at opposite sides of said opening, means for controllably supplying binding material from said containers to said nozzles, and means for directing a controlled blast through each of said nozzles to spray the binding material and project it into the path of the projected mineral wool.

8. The herein described method, which consists in shredding a stream of molten material by means of a blast to form mineral wool and simultaneously spraying a binding material at high velocity into the path of the mineral wool in a direction substantially at right angles to such path.

9. The herein described method, which consists in shredding a stream of molten material by means of a blast to form mineral wool and then spraying a treating material at high velocity and temperature into the path of the mineral wool.

10. The herein described method, which consists in shredding a stream of molten material by means of a blast to form mineral wool and then spraying a treating material at high velocity and temperature into the path of the mineral wool at an angle to its line of projection.

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