

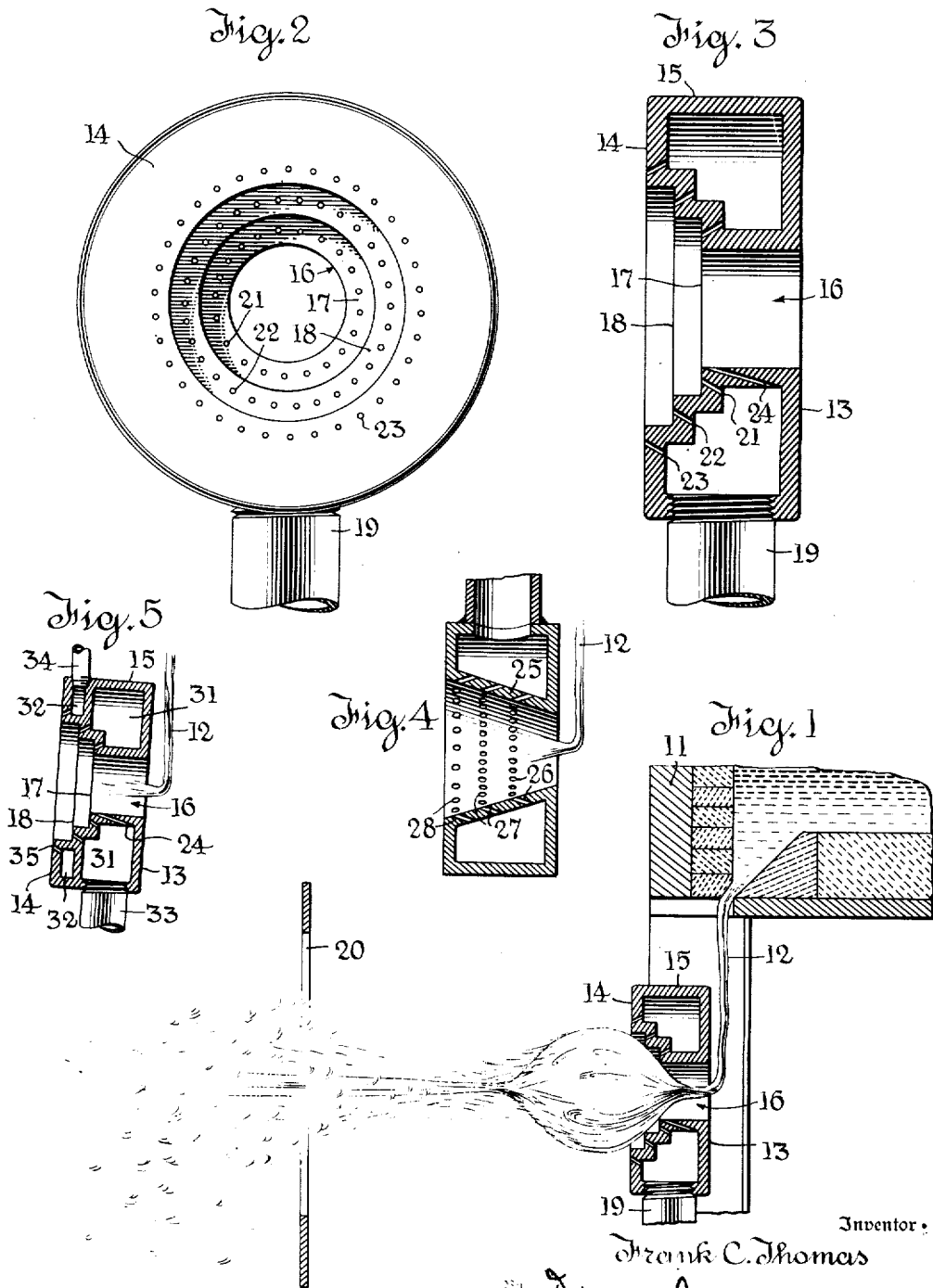
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F. C. THOMAS

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METHOD OF BLOWING MINERAL WOOL

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METHOD OF BLOWING MINERAL WOOL

Frank C. Thomas, Martinsburg, W. Va., assigner
to The Standard Lime and Stone Company,
Baltimore, Md., a corporation of Maryland

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1 Claim. (Cl. 83—91)

This invention pertains to an improved method of blowing mineral wool, the construction and advantages of which will hereinafter appear in detail.

Many devices and methods have heretofore been suggested and employed for subjecting a stream of molten mineral matter to the action of a blast, such as air or steam under pressure, to shred or "blow" the molten mineral matter and thereby to produce the so-called "mineral wool" or glass wool of commerce.

As is well understood by those skilled in the art, shot is formed in the operation of blowing wool, and the larger the shot and the greater the volume thereof, the lower the insulation value of the wool. For certain purposes, where shot is present, it becomes necessary to remove the same before the wool may be successfully employed. Moreover, it is advantageous to produce a long fibered wool, as it is more easily handled and the long fibers interlace and interlock much better than do those which are relatively short, a factor which enters directly, for instance, in the production of sheets and bats of superior quality.

The present invention provides means whereby a long staple or long fibered wool may be produced with a minimum of shot therein, the wool being quite flexible and soft to the touch.

The invention will be described in connection with the apparatus shown in the annexed drawing, which depicts several embodiments of a blowing nozzle whereby the results above mentioned, to wit, a long fibered soft wool relatively free of shot, may be produced.

In the drawing:

Figure 1 is a sectional elevation showing a portion of a cupola with a downflowing stream of molten mineral matter passing therefrom, and a cooperating blowing nozzle;

Fig. 2, a face view of the nozzle shown in Fig. 1;

Fig. 3, a vertical sectional view thereof;

Fig. 4, a similar view of a slightly modified form of nozzle; and

Fig. 5, a vertical sectional view of a still further modification of the nozzle, wherein means is provided for introducing oil or other treating medium into the mineral wool as it is formed or blown by the jets of gaseous medium under pressure.

Referring first to Figures 1 to 3, inclusive, 11 denotes so much of a cupola as is necessary to illustrate the present invention, the same being provided with a notch from which a stream of scoria 12 flows by gravity. As will be seen upon reference to Fig. 1, the stream passes downwardly in a vertical direction to the rear of the blowing nozzle, free of any contact therewith.

The nozzle body is hollow and may be said to comprise a rear wall 13, a front wall 14, and a peripheral wall 15. A short passageway or in-

take opening 16, preferably annular in cross-section, extends from the rear wall forwardly of the structure and the front wall is provided with a series of annular steps 17 and 18, with the innermost one, 17, of a diameter greater than that of the intake opening 16, while the outer step, 18, is of greater diameter than the innermost step or shouldered portion 17.

A pipe 19 opens into the hollow chamber and is the means by which steam or other gaseous medium is introduced into the nozzle under pressure. Opening through the forward face of the shouldered portion 17 is a series of jet openings 21. A similar set of jet openings 22 extends through the forward face of the shouldered or stepped portion 18, and a third set of jet openings 23 extends through the front face 14.

These series of jet openings are arranged concentric with the axis of the intake opening 16 and in spaced relation with reference thereto. As will be seen in Fig. 2, the openings of each series are spaced successively further from the axis of the opening 16. In other words, the gaseous medium or jets which are projected outwardly through the openings 21, 22 and 23, follow concentric paths and fully surround and encompass the scoria which is drawn inwardly through the opening 16 by the suction set up therein by the jets and carried forwardly thereby.

The openings 21, etc., are so formed that the jets passing therefrom are directed forwardly and toward a common center line which is coincident with the axis of the intake opening 16. This indrawing of the scoria stream from the vertical to the horizontal is due entirely to the suction action established in and through the opening or channel 16, by the jets which are projected forwardly thereof. By the use of the jets arranged in circular series, the scoria is at once surrounded by a hot medium, to wit, say steam under pressure, and this action inheres for quite a distance outwardly from the nozzle. In this way, the entire body of the scoria is not chilled by direct contact with relatively cold air as it is being blown, with the result that a longer staple wool is produced containing a minimum of shot.

As will be seen upon reference to Fig. 1, the scoria stream is first deflected laterally without disruption and without coming into contact with any body that would tend to chill it. The innermost jets, or those passing from the jet openings 21, not only tend to carry the stream forwardly but immediately to attack the outer surface of the stream, which, of course, is cooling more quickly than is the interior thereof. In other words, the blowing medium attacks the relatively cooler outer surface of the scoria stream first, and as the stream is carried forwardly by the successive jets, a substantially complete disper-

sion of the entire body into long and fine filaments is effected.

It has been found that by the employment of a number of jets arranged in annular series and each series acting in a successive zone, a complete breakdown of the scoria is assured, the transformation producing long fibers which are relatively soft. Moreover, as above noted, shot is present in a minimum quantity.

In actual practice, it appears that the jets passing from the openings 21, 22 and 23 produce at the discharge end of the opening 16 and outwardly thereof, a partial vacuum which has the effect of expanding the stream of scoria into a bulbous form, as depicted in Fig. 1, as well as carrying it forwardly in the shape of elongated filaments. The scoria is at all times encompassed or surrounded by the series of jets, whereby the molten material is transformed into wool with a minimum of shot and carried through the opening 20 into a wool room, as is usual. The bulbous form which is produced by the jet action is limited against outspreading to too great an extent and too rapidly by the jet arrangement.

With a view of preventing any possible accumulation of scoria upon the lower portion of the wall which defines the opening 16, there may be provided a jet opening 24 which would have the effect of immediately elevating or blowing off any untreated scoria which might lodge thereon. The jet openings 21, 22 and 23 may be said to open outwardly into a surface comparable to a truncated cone and in Fig. 4, a nozzle having a truncated conical opening extending therethrough is shown.

In this instance, there is formed in the nozzle a truncated conical opening defined by a wall 25. The nozzle is located with reference to the scoria stream so that it passes to the rear thereof and out of contact therewith as in Fig. 1, and into the small end of the truncated opening formed by the wall 25. Three annular series of jets, 26, 27, 28, are formed in the truncated wall 25 and when the scoria is drawn inwardly by the suction produced at the smaller end of the truncated opening, it is picked up and acted upon by the successive series of jets which encompass and disintegrate and cool the material, producing a high grade mineral wool in the manner above specified.

As will be noted upon reference to Figs. 1, 3 and 4, the jet openings are preferably inclined at their discharge ends toward the axis of the nozzle so that the more effective suction action is produced, and a sharper impingement of the jets upon the scoria and mineral wool obtains.

In Fig 5, a still further modification is shown. In this instance, the body of the nozzle is provided with two chambers 31, 32, the former being in communication with a pipe 33 through which the gaseous blowing medium is introduced into the chamber 31. A second pipe 34 is in communication with the chamber 32 located at the forward portion of the nozzle and a series of jet openings 35 extend therefrom through the forward face of the nozzle. This pipe serves the purpose of introducing a treating material of any desired character, such as is well known in the art, and causes impingement of such material upon and in contact with the hot mineral wool as it leaves the nozzle. Otherwise, the construction is the same as that shown in Fig. 3 and similar parts are similarly lettered. It will be appreciated, of course, that the chamber 31 might be subdivided and treating material introduced

from one of the subdivided portions through the jets leading therefrom.

In this figure, it will be noted that the upper portion of the nozzle is tilted from the vertical toward the path of the downcoming scoria stream. In other words, the scoria stream does not under any of the arrangements shown, pass by gravity into the intake openings, but is drawn into the same through a suction action which is set up and obtains within the intake passage or opening 16. It will, of course, be appreciated that where steam under pressure is employed as the blowing medium or heated gas is used, the nozzle is warm and there is no tendency for the same to cool the scoria as it passes into and through the intake opening 16.

While the stepped arrangement 17, 18 is shown and described in conjunction with a passageway or opening 16 leading to the first series of jet openings, it is to be understood that said opening 16 must be relatively short. If the passage be too long, the scoria stream cannot be successfully deflected from the vertical or its gravity path, but will come into contact with the walls of such an opening and thus be chilled and a hard mass would be built up within said passageway or opening. This, of course, would defeat the very purpose of the present invention. Viewed in another way, the passage 16 may be looked upon as the smaller end of the frusto-conical passageway or opening into which the jets discharge, as in Fig. 4.

Under all the forms illustrated, the scoria stream is acted upon by encompassing or surround jets which tend to expand and control the same and, likewise, to propel or carry forward the filaments which are formed. While it is difficult to determine what actually takes place within the expanded scoria stream or mass, it is thought that by reason of the fact that the jets act with the same force and effect around and about the forwardly moving stream of scoria and the filaments which are formed therefrom, an equal temperature is maintained and there is not any cooling of one portion over another, as commonly obtains where a single blow jet is employed, or where the scoria stream is bodily deflected by one or more jets into the path of other blowing or shredding jets. Such methods produce unequal temperature changes throughout the mass and lead to the formation of short fibers and a maximum of shot.

What is claimed is:

That method of blowing mineral wool, which comprises producing in space and free of contact with any extraneous body or surface a gravitating stream of molten mineral matter, establishing and maintaining adjacent thereto, in spaced relation therewith and positioned entirely to one side thereof, a plurality of axially and radially spaced series of jets of a gaseous medium under pressure, said jets being arranged in a plurality of circular series extending outwardly along the path of flow and projected simultaneously and in converging relation in the direction of flow and at an angle to the gravitating path of the stream, deflecting the stream laterally by the suction produced by the jets, the suction being devoid of any converging constricting influence on the stream, whereby said stream will be deflected laterally without disruption by the indrawing action of the jets and subjected equally and simultaneously on all sides to the action of the jets of gaseous medium.

FRANK C. THOMAS.