March 21, 1939. D. C. DRILL 2,151,090

FLUID BLAST NOZZLE

Filed Dec. 20, 1937

Fig. 1.

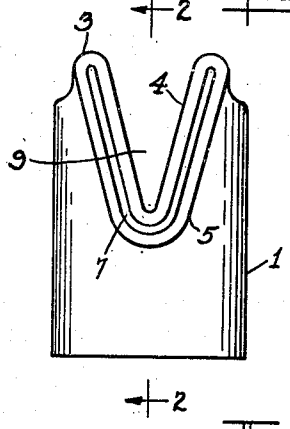


Fig. 2.

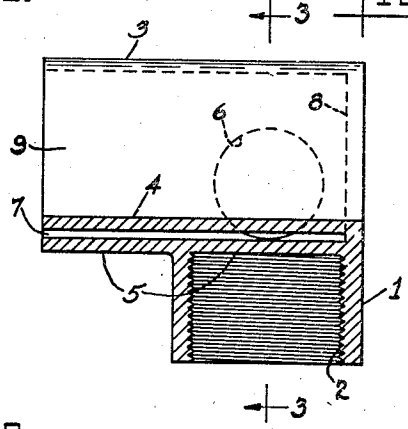


Fig. 3.

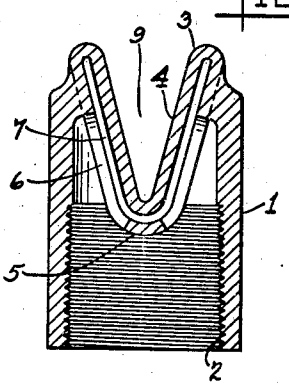


Fig. 4.

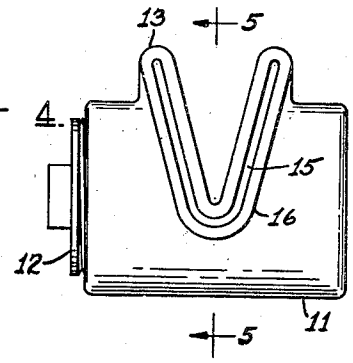


Fig. 5.

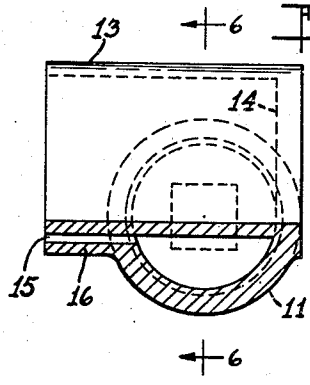
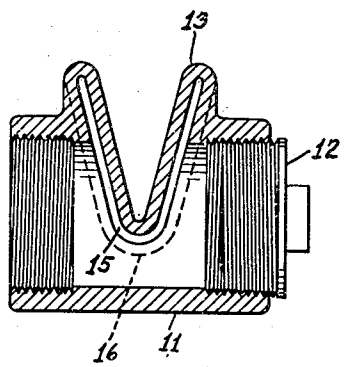


Fig. 6.



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UNITED STATES PATENT OFFICE

2,151,090

FLUID BLAST NOZZLE

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Application December 20, 1937, Serial No. 180,755

1 Claim. (Cl. 299—107)

This invention relates to an improved fluid blast nozzle of a type which is particularly adapted for use in blasting suitable molten mineral materials into mineral wool.

In the production of mineral wool, a thin stream of the molten material is poured upon a powerful blast of air or steam. This blast separates the stream into tiny molten particles and hurls the particles into the relatively stationary gaseous atmosphere of a settling chamber. It has been learned by experience that the molten stream of lava should be applied exceedingly near or substantially adjacent to the nozzle orifice. When, however, this is attempted with the nozzle constructions of the prior art, it has been found that a partial vacuum of constantly variable pressure has been induced by the blast and that this vacuum causes a variable back pressure which causes the lava to be drawn up against the front portion of the nozzle. As soon as the lava comes into contact with the surface of the nozzle it is chilled. The chilled lava adheres to the nozzle until it is manually removed or until the force of the blast removes it in the form of irregular lumps.

The major portion of this chilled lava, whether it is removed manually or by force of the blast, is hurled into the settling chamber and becomes incorporated with the felted strip or bat which is being formed on the conveyor which serves as a movable floor of the settling chamber. The lumps of lava, of course, have no insulating value. They are in substance more or less impure masses of glass, which, in many instances, being sharp and jagged, often injure the hands of the operator or any other person who afterwards handles the mineral wool. To avoid the formations of these glassy lumps, the cupola operator holds the nozzle farther away from the falling stream of lava than would otherwise be desirable. Due, however, to the fact that blast loses its velocity rapidly after it issues from the nozzle, the cupola man is compelled to hold the nozzle close to the lava stream. Due to the variable suction, no matter how careful the operator may be, some of the lava is drawn back upon the nozzle and chilled.

Numerous efforts have been made to avoid this difficulty, but in as far as I am advised, no satisfactory solution has been found due to the fact that none of the proposed improvements have been so designed as to permit a substantially straight line flow of air adjacent the nozzle orifice.

The chief object of the present invention is to provide a nozzle construction which obviates this difficulty which is found in the production of mineral wool.

In the preferred form of my invention, the upper portion of the nozzle orifice is separated from the atmosphere only by a smooth straight rearwardly extending wall of sufficient thickness to enable the nozzle construction to withstand the necessary fluid pressures. This feature provides a free and unobstructed flow of the air in a substantially straight line both above and to the rear of the orifice opening.

In the accompanying drawing:

Figure 1 is a front elevational view of the preferred form of my invention;

Figure 2 is a section taken along the line 2—2 of Figure 1;

Figure 3 is a section taken along the line 3—3 of Figure 2;

Figure 4 is a front elevational view of a modified form of my invention;

Figure 5 is a section taken along the line 5—5 of Figure 4; and

Figure 6 is a section taken along the line 6—6 of Figure 5.

The preferred form of my invention shown in Figures 1 to 3, inclusive, comprises a preferably metal tubular member 1, the lower portion of which is open and provided with internal threads 2 whereby the tubular body is adapted to be connected to a fluid pressure supply pipe, not shown. The upper portion of the body 1 consists of a double wall V-shaped member 3 which is welded or otherwise made integral with the tubular member 1. The upper and outer wall portion 4 of this member 3 is imperforate but the lower and inner wall portion 5 is provided with openings 6 through which steam, air, or other fluids may pass in between the two wall portions before it is discharged from the nozzle opening 7, which opening is preferably formed by merely leaving the front end of the double wall member 3 open. The rear end of this member 3 is closed, as indicated at 8, by any suitable means, such as, for instance, by welding.

From the foregoing description the operation of my invention will be readily understood. The tubular member 1 is threadedly connected to the pressure supply pipe and the valve of the pressure supply pipe is opened, thereby admitting steam or air, as the case may be, to the tubular member. The fluid passes through the opening 6 and discharges from the nozzle opening 7 at a high pressure. The fluid is usually under a

pressure of approximately 100 lbs. per square inch.

The resultant blast has, at the nozzle opening, an extremely high velocity. This blast carries with it a substantial amount of air and tends to produce a vacuum. Due to the free, straight, and unobstructed passageway 9, the air is permitted, however, to freely follow the blast, and no appreciable vacuum results. The absence of an appreciable vacuum pressure permits the nozzle opening to be held exceedingly close to the stream of molten lava without causing the lava to adhere to the nozzle. The air, in practice, passes in a continuous stream through the channel or air passageway 9 and this air stream blows the lava away from the upper wall portion 4 and from the nozzle orifice. Inasmuch as the front portion of the double wall member 3 extends in front of the tubular member 1, the air is also permitted to flow adjacent the outside of the wall portion 6 as well as within the channel way 9. It is, therefore, apparent that this construction permits the air to flow freely on both the inside and the outside of the front portion of the member 3, thereby preventing, for all practical purposes, the building up of any back pressure around the nozzle opening.

Figures 4, 5, and 6 show a modified form of my invention. This form includes a tubular section 11 which is open and is internally threaded at either end. One of its ends is closed with an exteriorly threaded plug 12. The other of its ends is adapted to be attached to be threadedly connected to a pressure supply pipe, not shown. The mid-portion of the tubular plug carries a preferably unitary V-shaped double wall nozzle portion 13 which serves the same function as the double wall portion 3 of the preferred form of my invention. The rear end of this wall portion is closed as is indicated at 14. The front end of the wall portion 13 is left open to provide a nozzle outlet 15. The outer wall 16 of the nozzle portion does not extend within the tube 11 as this part is eliminated to permit the fluid to freely pass through the tube to the nozzle opening 15. The tubular section 11 and the V-shaped double wall portion 13 may be cast as a single unit, or the two parts may be welded together in a manner well understood by the art.

The preferred form of my invention is particularly adapted to be connected to an upright pressure supply pipe. The modified form is equally adapted to be connected to a horizontal fluid pressure supply pipe.

In the foregoing description, I have shown but two forms of my invention. In each of these constructions the nozzle opening assumes a V-shaped form, but it will, of course, be understood that the nozzle opening may assume other forms without departing from the spirit of my invention.

I claim:

A nozzle adapted for use in the shredding of suitable molten mineral materials into mineral wool fibers, said nozzle comprising a chambered member adapted for engagement with a source of steam or air under pressure and having a re-entrant substantially V-shaped roof portion extending the entire length of the upper part of said member and having an orificed portion immediately below said roof portion and so arranged and constructed as to produce a steam or air jet being substantially V-shaped in cross-section and projected in a direction substantially parallel to a plane passing longitudinally through said roof portion.

DANIEL C. DRILL.