Oct. 16, 1934. E. R. POWELL 1,977,406

FLUID JET NOZZLE FOR BLOWING MINERAL WOOL

Filed May 19, 1931

Fig. 1.

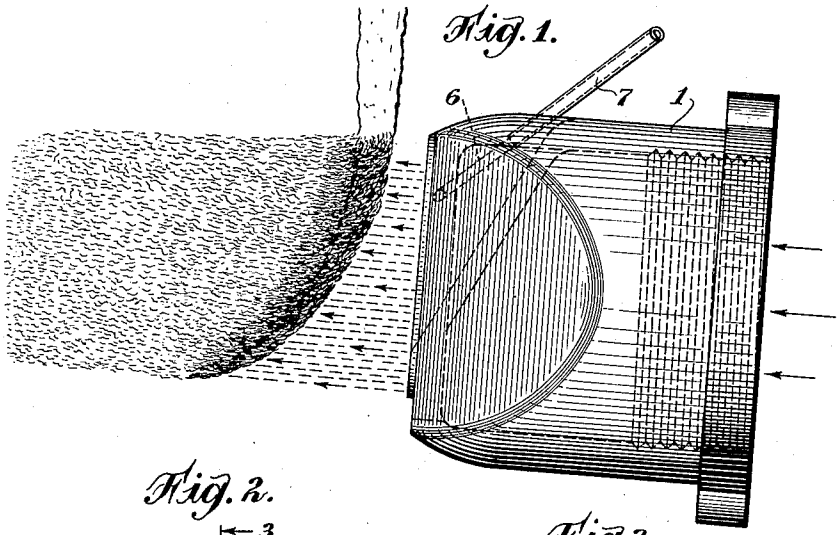


Fig. 2.

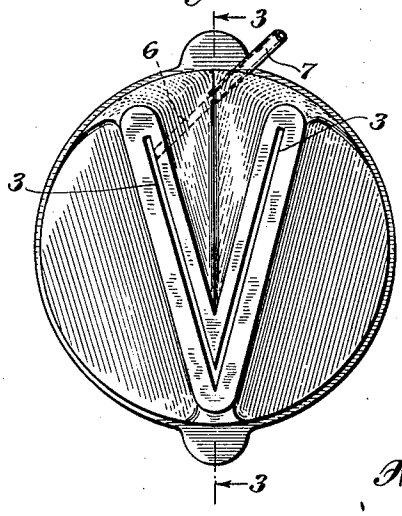


Fig. 3.

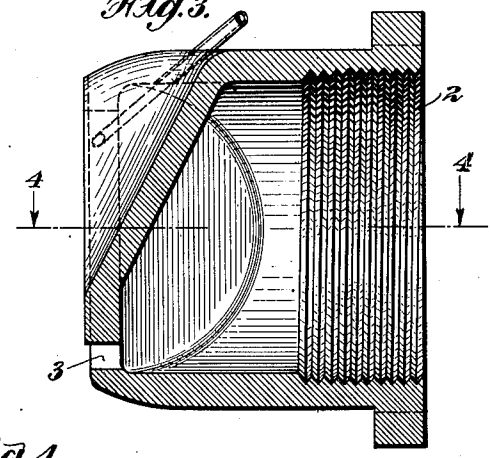
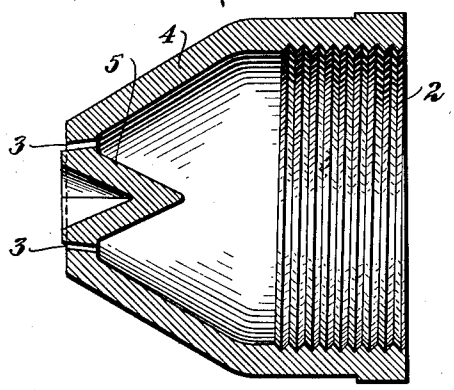


Fig. 4.



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1,977,406

FLUID-JET NOZZLE FOR BLOWING MINERAL WOOL

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Application May 19, 1931, Serial No. 538,487

4 Claims. (Cl. 83—91)

The present invention relates to an improved device for blowing mineral wool from molten slag or rock by impinging a fluid-jet of steam, air or the like upon a thin stream of the molten material.

The quality of mineral wool is largely dependent upon the viscosity of the slag stream and the manner in which the fluid-jet is impinged upon the stream since this relationship is largely controlling with respect to the length and fineness of the blown fibers and the proportion of the slag which is not converted into fibers but remains in the fibers in the form of hard pellets or shot. Heretofore various forms of fluid-jet nozzles have been proposed for the purpose of bringing about a more efficient impingement of the fluid-jet and molten slag stream; however, none to my knowledge have proven entirely satisfactory. A number of proposed blowing devices included a plurality of blowing nozzles arranged with the design of reducing the formation of shot to a minimum. The devices proposed heretofore, have proven unsatisfactory except at very low slag viscosities.

The principal object of the present invention is the provision of a fluid-jet nozzle which obviates the disadvantages and limitations of the types above mentioned.

The fluid-jet nozzle provided by my invention comprises a tubular body, preferably an integral casting, having a V-shaped orifice in the end thereof, the configuration of the body being such that the velocity of the steam or other fluid passing therethrough is progressively increased in the direction of the orifice. The external contours of the nozzle are preferably stream lined with respect to the orifice in order to permit high air velocity adjacent the orific with a minimum formation of undesirable eddy currents.

Fig. 1 is a side view of the nozzle and illustrates diagrammatically the manner in which the fluid-jet impinges the molten slag stream;

Fig. 2 is a front elevation of the nozzle;

Fig. 3 is a central sectional view of the same; and

Fig. 4 is a sectional view taken along line A—A of Fig. 3.

Referring to the drawing, the nozzle comprises a tubular body or integral casting 1 formed from any suitable material, such as cast iron. The inner part of the tube is provided with suitable means for securing it to the steam line, such as screw threads 2. The opposite end of the tube terminates in a V-shaped orifice comprising slots 3. The fluid-jet produced by such an orifice will, of course, be of a trough-like shape, and the term "V-shape" is employed herein generically to describe an orifice adapted to produce a fluid-jet of this character. The inner surfaces of the side walls 4 of the tube are gradually convergent in section in the direction of the orifice, as shown, so that the velocity of the steam or other jet fluid is progressively and gradually increased before passing into the orifice. In order to enhance this effect, the portion of the tubular body between the slots of the orifice is preferably extended inwardly in the form of a wedge-shaped element 5 which divides the current of steam evenly between the two slots. The face of the wedge-shaped element 5 preferably projects a slight distance forward of the outer edges of the orifice, since it has been ascertained that this expedient results in improved characteristics in the blowing jet. The outer surfaces of the side walls 4 are likewise convergent in section or stream-lined in the direction of the orifice since this configuration permits the attainment of a high jet velocity without the formation of undesirable eddy currents in the atmosphere adjacent the jet.

In the blowing of mineral wool it has been found desirable in some cases to add a waterproofing or binding liquid, such as asphalt or the like, to the steam jet. Accordingly, in the preferred embodiment of my invention as shown, a liquid passageway 6 is drilled thru the wall of wedge 5 into the orifice. By terminating this passageway in the portion of the body bounding the orifice the liquid is introduced into the steam jet at the point of its maximum velocity, and a much superior distribution of the liquid is thus obtained. A small tube or pipe 7 is inserted in the outer end of passageway 6 for the introduction of the liquid thereto.

The nozzle provided by my invention has been found to be particularly adapted to the production of soft long-fibered mineral wool with a minimum shot content regardless of variations in character of the slag stream.

What I claim is:

1. A fluid-jet nozzle for blowing mineral wool which comprises a tubular body having a V-shaped orifice in an end thereof and internal side walls gradually converging in the direction of the orifice, whereby the velocity of the fluid is gradually and progressively increased as it travels through the tubular body into said orifice and the external contours of the body being

gradually convergent in section in the direction of the orifice.

2. A fluid-jet nozzle for blowing mineral wool which comprises a tubular body having a V-shaped orifice in the end thereof, the portion of the tubular body between the two slots of the orifice being extended inwardly in the form of a wedge-shaped element adapted to divide the fluid current evenly between the two slots of the orifice, the fluid passageways leading to the orifice and defined by the inner surfaces of the wedge and side walls of the tubular body and the external contours of the body being gradually convergent in section in the direction of the orifice.

3. A fluid-jet nozzle for blowing mineral wool which comprises a tubular body having a V-shaped orifice in the end thereof, the portion of the tubular body between the two slots of the orifice being extended inwardly in the form of a wedge-shaped element adapted to divide the fluid current evenly between the two slots of the orifice, the fluid passageways leading to the orifice and defined by the inner surfaces of the wedge and side walls of the tubular body and the external contours of the body being gradually convergent in section in the direction of the orifice, the face portion of said wedge-shaped element being disposed so as to extend slightly forward of the outer side edges of the orifice.

4. A fluid-jet nozzle for blowing mineral wool which comprises a tubular body having a V-shaped orifice in an end thereof the internal side walls and external contours of the body being gradually convergent in the direction of the orifice, whereby the velocity of the fluid is gradually and progressively increased as it travels through the tubular body into said orifice, said body being provided with a liquid passageway opening into the portion of the body bounding said orifice.

EDWARD R. POWELL.