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BLOWER NOZZLE

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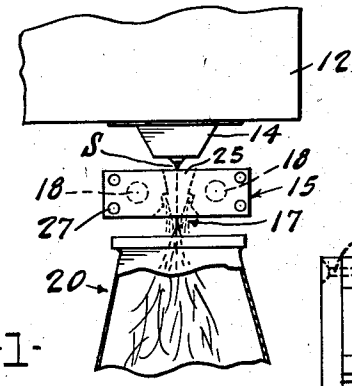


FIG-1-

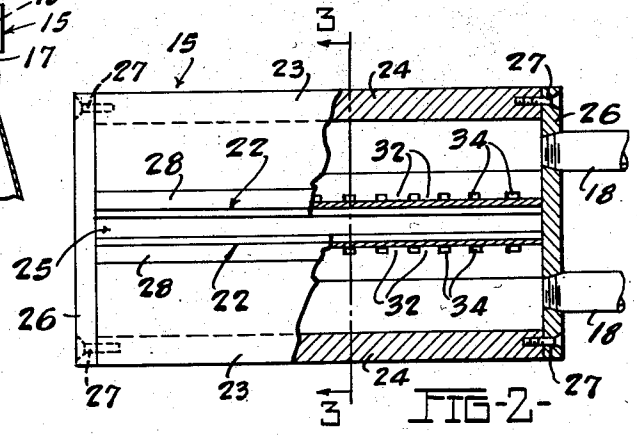


FIG-2-

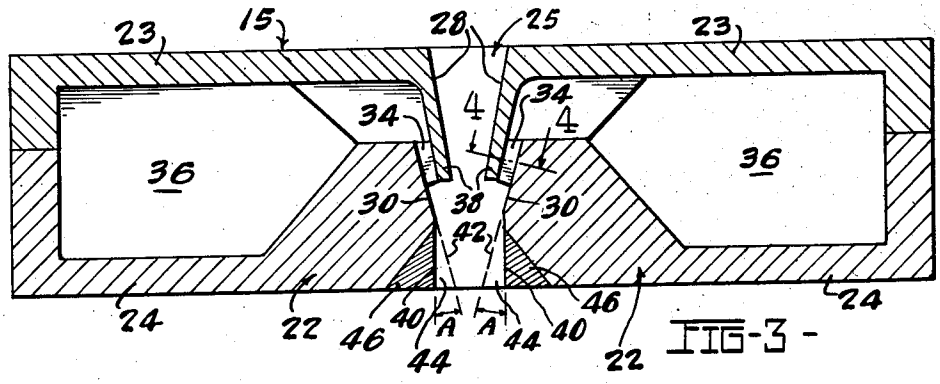


FIG-3-

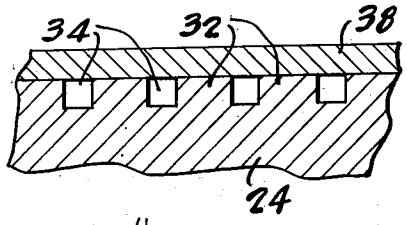


FIG-4-

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BLOWER NOZZLE

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4 Claims. (Cl. 299—140)

This invention relates to method and apparatus for producing fibers from heat-softenable material through the utilization of gaseous blasts for attenuating the material to fibers.

In the commercial production of fibers formed from mineral materials such as glass, slag and certain forms of fusible rock, it has been a practice to flow groups of streams of molten material from a forehearth and direct blasts of steam, air or intensely hot gases of combustion into engagement with and flowing in the general direction of the streams for attenuating the streams to fibers. In methods of fiber attenuation of this character, superheated steam provides an economical gaseous medium for fiber attenuation, the steam being discharged from a blower, the latter being constructed to establish two blasts directed generally downwardly but in converging relation, the streams of molten fiber-forming material being directed into the zone of convergence or confluence of the blasts. It has been found that a certain amount of the molten material acted upon by the blasts is incompletely attenuated and in most instances results in the formation of small pellets or shot. The pellets are of no value in the formation of a fibrous product and hence are waste material.

The present invention embraces a method and apparatus for producing attenuated fibers by the gaseous blast method wherein the attenuating efficiency of the blasts is improved over prior blast methods of attenuation.

An object of the invention resides in configurating blower surfaces adjacent the path of travel of the gases whereby the gases engaging the material at a converging angle are influenced to move in directions more nearly in parallelism with the locus of movement of the streams of material whereby more efficient attenuation of the material is obtained with a consequent increase in production of fibers.

An object of the invention resides in the provision of apparatus for establishing discharge of gaseous blasts into engagement with flowable fiber-forming material for attenuating the material to fibers wherein the amount of pellets or unfiberized material is substantially reduced and a higher percentage of usable fibers obtained in the end product.

Another object resides in a method of establishing a zone adjacent the gaseous blasts of a differential pressure for influencing or modifying the path of travel of the gases to improve the attenuating characteristics of the blasts in their engagement with fiber-forming material.

Further objects and advantages are within the scope of this invention such as relate to the arrangement, operation and function of the related elements of the structure, to various details of construction and to combinations of parts, elements per se, and to economies of manufacture and numerous other features as will be apparent from a consideration of the specification and drawing of a form of the invention, which may be preferred, in which:

Figure 1 is a semidiagrammatic elevational view illustrating the method of directing gaseous blasts into engagement with streams of material for producing fibers;

Figure 2 is a top plan view partly in section illustrating a blower embodying the construction of the present invention;

Figure 3 is a sectional view through the blower construction of the invention, the section being taken on the line 3—3 of Figure 2, and

Figure 4 is a fragmentary detail sectional view taken substantially on the line 4—4 of Figure 3.

While the invention has been illustrated in connection with apparatus especially adaptable for attenuating a plurality of streams of glass to fibers, it is to be understood that the principles of the invention may be utilized in other forms of blast-producing apparatus.

Referring initially to Figure 1, there is illustrated a forehearth **12** which may be associated with a melting furnace (not shown) wherein glass batch or other material is heated to a flowable state and conveyed to the forehearth. Disposed beneath the forehearth **12** is one or more feeders or bushings **14**, each formed with a plurality of orifices arranged in a row through which flow streams S of molten glass or other fiber-forming material from the forehearth. Arranged adjacent the feeder is a blast-producing means or blower construction **15** configurated in a manner hereinafter described for directing blasts **17** of gases moving at a high velocity into engagement with the streams S for attenuating them to fibers.

Conduits or pipes **18** are connected with the blower **15** adapted to convey gases under pressure to the blower where they are discharged in the form of high-velocity blasts. Disposed beneath the blower **15** is a hood **20** formed of sheet metal providing a chamber within which the streams are drawn into fine fibers by the high-velocity gaseous blasts, the fibers being collected on a surface or conveyor (not shown) disposed beneath the hood.

The apparatus or means forming part of the blower construction for establishing the cross-sectional configuration of the blasts and for determining the direction of flow of the gases of the blasts is illustrated in Figures 2 through 4. The blower includes two blast-producing units **22**, each being of substantially rectangular configuration. Each unit is formed of two component elements **23** and **24** and the units are spaced to provide an elongated passage **25** through which the streams S are directed from the feeder **14**. The units are secured in spaced relation by means of bars **26** secured in place by screws **27**. One of the bars is formed with threaded openings to receive the tubes **18**.

The entrant walls **28** of the passage **25** are convergingly arranged in the manner illustrated in Figure 3. The element **24** of each unit of the blower construction is formed with a wall which is angularly arranged with respect to the axis of the passage **25**, the walls **30** of the units being inclined downwardly in converging relation to direct the gases of the blasts into a zone of confluence to engage the streams S and travel in the general direction of the flow of the streams. A portion of each of the walls **30** is provided with a series of projections **32** which form recesses **34** through which the gases from the chamber **36** formed interiorly of each pair of elements **23** and **24** are discharged to provide the high-velocity gaseous blasts. The elements **23** are formed with downwardly inclined projecting portions **38** which are disposed adjacent the projections **32** and serve to form a closure wall for each of the recesses **34** formed on the element **24**.

It has been found that by inclining the walls **30** relative to the axis of the passage **25** at an angle of about 12° (which forms an included angle between the walls **30** of 24°) the gases of the blasts engage the streams to

obtain efficient attenuation of the streams to fibers. The inclination of the walls **30** provides the directive for causing the blasts to be brought into a zone of confluence and into attenuating engagement with the streams, most of the gases of the blasts thereafter moving downwardly in a direction substantially parallel with the streams S during fiber formation. In prior blower construction, the confluence of the gas streams set up or established a turbulence at said zone which, in a measure, was a contributing cause of the formation of small pellets, shot or unfiberized material.

In order to reduce the turbulence at the zone of intercontact of the blasts and to provide for influencing the gases of the blasts to be deflected or bent into more nearly parallel relation with the movement of the streams of fiber-forming material, the inner walls of the elements **24** forming part of the passage **25** are fashioned to the configuration shown at **40** in Figure 3. Heretofore the walls **30** of the blower construction have been projected to the lower surface of the blower in the manner indicated by the broken lines at **42**. By configurating the lower portions **40** of the walls **30** substantially parallel with the axis of the passage **25**, the gases of the blasts are guided or directed downwardly by the walls **30** to the points of intersection of the walls **30** with the vertical walls **40**. Through this arrangement, contact of the gases with the guiding walls is reduced and hence a high velocity is maintained for the blasts. There is also provided a zone or pocket 44 adjacent each of the walls **40** in which a decreased pressure is set up by reason of the high-velocity blasts. These zones of reduced pressure influence the path of travel of the gases of the blasts to be bent or deflected more nearly in parallelism with the path of movement of the glass streams. The establishment of the reduced pressure zones 44 reduces the turbulence at the confluence of the blasts with the result that more of the fiber-forming material is attenuated to usable fibers with a consequent reduction in the amount of unfiberized material in the form of pellets or shot. Furthermore, the blasts attenuate more material to fibers in a given unit of time than was possible with prior constructions thus increasing fiber production without the expenditure of additional energy. Through this method of establishing forces influencing the path of the gases of the blasts in zones at the termini of the blast-guiding walls **30**, there is established a smoother engagement of the gases of the blasts with the streams of fiber-forming material with consequent improvement in attenuating efficiency and a reduction in waste or unfiberized material.

The elements **24** are formed adjacent the passage **25** with hardened metal inserts **46** to minimize wear of the walls **40** under the impingement of the fibers against the walls. It has been found that an alloy such as Stellite, a composition embodying cobalt, chromium and minor amounts of other metals, provides a satisfactory insert material.

While it has been found that superheated steam under comparatively high pressure produces blasts of sufficient velocity to adequately attenuate molten glass or other heat-softenable mineral material to fibers, it is to be understood that the principles of the invention may be utilized with blowers or blast-producing means wherein gases of combustion may be discharged through a guiding configuration of the character herein disclosed and described wherein intensely hot gases moving at high velocity may be utilized in lieu of steam. It is to be understood that compressed air or other gas under pressure may be used as the fiber-attenuating force, if desired.

It is apparent that, within the scope of the invention, modifications and different arrangements may be made other than is herein disclosed, and the present disclosure is illustrative merely, the invention comprehending all variations thereof.

What we claim is:

1. A blower comprising a horizontally disposed body having opposed surfaces spaced to provide an elongated passage extending vertically through the blower body; chambers within said body adapted to contain gases; a plurality of parallel channels disposed in a row at each side of the passage for discharging gas under pressure from each chamber in the form of a blast; the lower portions of surfaces bounding the passage in said blower body being arranged in substantial parallelism, the gas-discharge channels being configurated to direct the gases of the blasts in converging relation at an included angle of approximately twenty-four degrees and out of contact with the substantially parallel surfaces of the walls of the passage.

2. Apparatus for discharging gases in the form of a high velocity blast including, in combination, a member having a chamber formed therein adapted to contain gases under pressure, said member having a walled passage extending therethrough, the walls of the passage being formed with a plurality of slots through which gases are discharged from the chamber at high velocity, said slots being arranged to direct the discharged gases against each other at an acute angle to cause confluence of the gases forming the blast, a hardened metal insert secured to each wall of the passage in the member beneath the slots, each of said inserts having a surface defining the portion of the passage beneath the slots, said surfaces being arranged in substantial parallelism.

3. Apparatus for discharging gases to form high velocity fiber attenuating blasts including, in combination, a pair of substantially horizontally disposed chambers adapted to contain gases under pressure, said chambers being spaced to provide a passage therebetween, a wall of each of the chambers being formed with a plurality of downwardly-elongated spaced slots through which gases from the chambers are discharged at high velocity, a wall of each of the chambers adjacent the passage and beneath the slots having an insert formed of cobalt and chromium alloy, the surfaces of the inserts forming wall portions of the passage being angularly disposed relative to the path of discharge of the gases through the slots and being in substantial parallelism.

4. Apparatus for discharging gases to form high velocity fiber attenuating blasts including, in combination, a pair of substantially horizontally disposed chambers adapted to contain gases under pressure, said chambers being spaced to provide a passage therebetween, a wall of each of the chambers being formed with a plurality of downwardly-elongated spaced slots through which gases from the chambers are discharged at high velocity, a wall of each of the chambers adjacent the passage and beneath the slots having an insert of hardened metal of substantially triangular cross-section, the adjacent surfaces of the inserts defining a portion of the passage being angularly disposed relative to the path of discharge of the gases through the slots.

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