Dec. 18, 1962 R. C. GIESSE ETAL 3,069,091

BLOWER WITH ATOMIZING MEANS

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Fig. 1

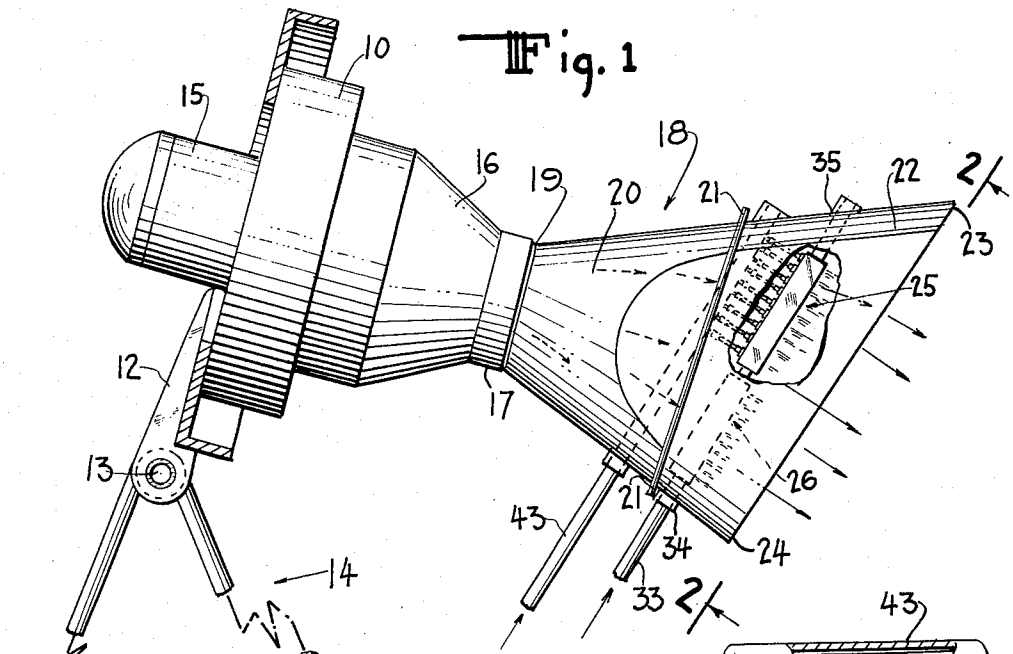


Fig. 2

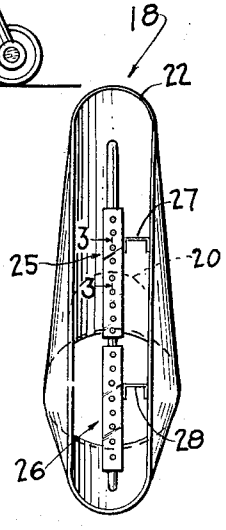
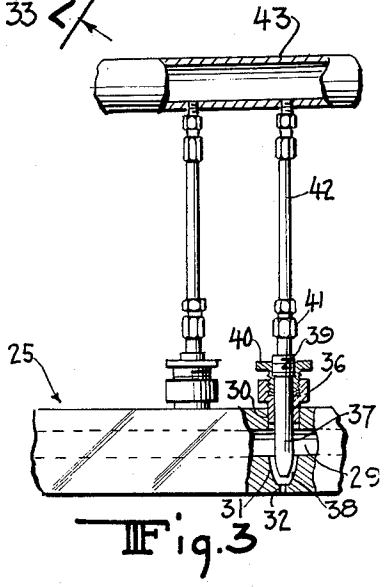


Fig. 3



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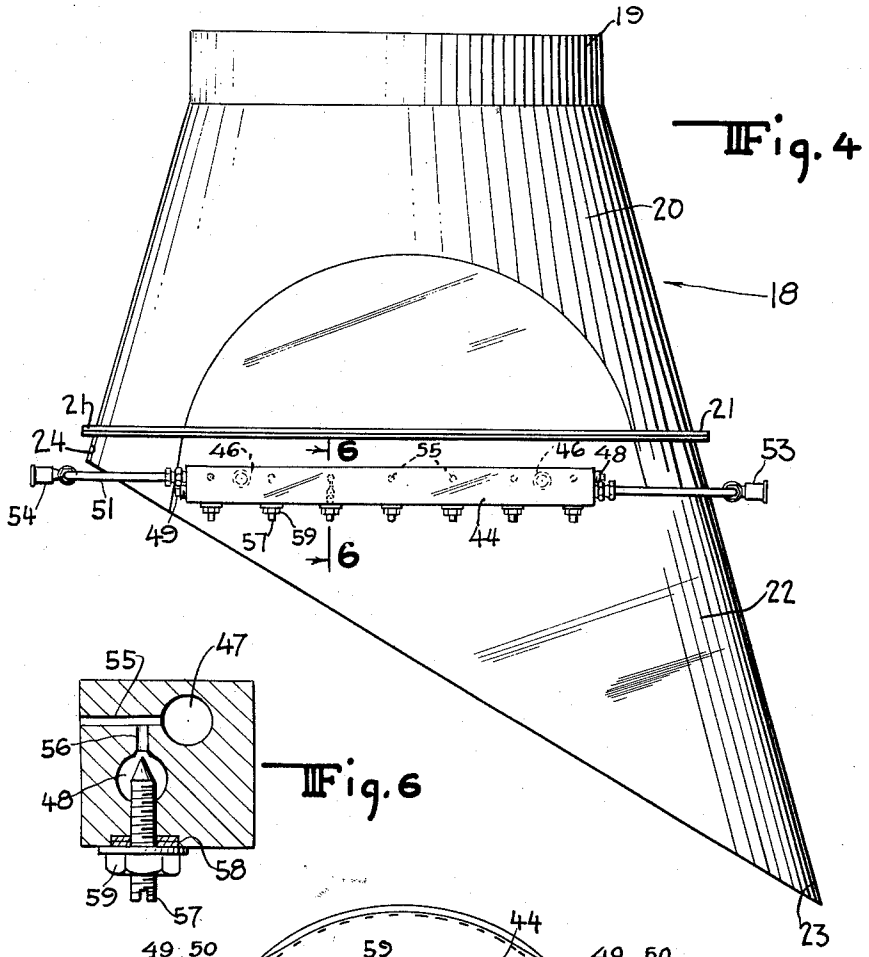


Fig. 4

Fig. 6

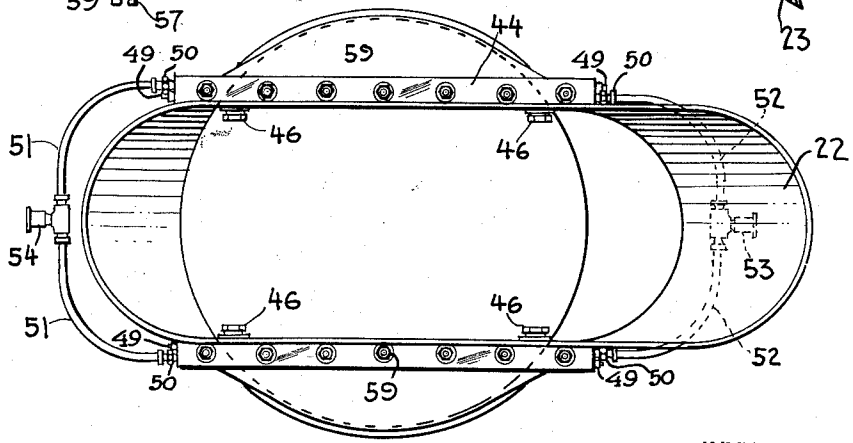


Fig. 5

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United States Patent Office 3,069,091 Patented Dec. 18, 1962

3,069,091

BLOWER WITH ATOMIZING MEANS

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Filed Oct. 1, 1959, Ser. No. 843,774
4 Claims. (Cl. 239—77)

The present invention relates to nozzles for blowers and particularly to a new and improved nozzle for handling high velocity air.

In many industrial processes, quenching of heated material is often required to produce an end product having desired physical characteristics. By way of example only, in the extrusion of aluminum, as the hot extruded aluminum leaves the press, it is necessary to quench it at a predetermined rate to a predetermined temperature in order to impart to the extruded aluminum desirable physical properties.

Depending upon the desired physical properties, in the past, certain types of hot extruded aluminum were required to be fed through solution heat treating furnaces. These furnaces represent substantial capital investment and their operation retained the extruded aluminum within the furnaces for substantial time limits in the order of hours.

It has recently been found that such heat treating furnaces may be dispensed with by employing high velocity air jets strategically located along the table receiving the extruded aluminum products from the extrusion press.

An important object of this invention is to provide a nozzle having a fluid expanding portion of a specific configuration to develop the desired flow pattern of the quenching medium.

Another object of this invention is to provide a nozzle of unique construction in combination with multi-fluid atomizing means for use with high volume, high velocity blowers for producing a high velocity mass of finely divided water particles and directing said mass onto heated articles to produce an optimum quenching effect.

Another object of this invention is to provide such a nozzle having a fluid expanding portion of a configuration having major and minor axes.

Another object of this invention is to provide such a nozzle having mounted within the fluid flow pattern-forming portion thereof a multi-fluid atomizing nozzle capable of cooperating with the blower nozzle to produce a high velocity mass of finely divided liquid particles.

Another object of this invention is to provide such a nozzle having associated with it atomizer means capable of providing as wide a spray pattern as possible.

In one aspect of the invention, the blower nozzle may comprise a rear portion having a circular band adapted to be fixed to the circular outlet at the throat of a high volume, high velocity blower. The band may be integrally connected to an intermediate section that varies from a circular cross section at its juncture with the circular band portion, to a portion having a cross section at its forward end including major and minor axes. A third member may be integrally connected to the forward end of the intermediate member and it may maintain the cross section of the intermediate member and form a hood for directing the high velocity air from the blower in a particular fashion. This construction provides a maximum total flow of air through the nozzle by providing a more even velocity pattern therein which substantially eliminates turbulence and reduces expansion losses to a minimum.

In another aspect of the invention, a multi-fluid atomizing nozzle may be located along the major axis of the intermediate section and near the outlet of the blower nozzle. This atomizing nozzle may comprise a plurality of parallel spaced jets located along the major axis of the blower nozzle which may be supplied with water in a manner such that a separate high pressure air jet for each water jet quickly breaks up the water droplets by a shearing action into extremely fine particles of water and imparts to them an extremely high velocity.

In still another aspect of the invention, separate atomizing means may be located along the opposite side walls of the intermediate section of the nozzle, parallel to the major axis thereof and arranged to direct jets of finely divided water particles transversely across the intermediate section.

The above and other objects and novel features of the invention will become apparent from the following specification and accompanying drawings which are merely exemplary.

In the drawings:

FIG. 1 is a side elevational view of a blower having a nozzle to which the principles of the invention have been applied;

FIG. 2 is a front view of the nozzle shown in FIG. 1, and looking in the direction of the arrows along line 2—2 of FIG. 1;

FIG. 3 is an enlarged partial sectional view taken substantially along line 3—3 of FIG. 2;

FIG. 4 is a side elevational view of a blower nozzle similar to that shown in FIG. 1, and which includes a modified form of the invention;

FIG. 5 is a front view of the nozzle shown in FIG. 4; and

FIG. 6 is a sectional view taken substantially along line 6—6 of FIG. 4.

Referring to the drawing and particularly to FIG. 1, a high velocity blower may comprise an impeller housing **10** that is fixed to a frame **12** and which is pivotally mounted at **13** to a portable carriage **14**. A blower motor **15** may be fixed to the housing **10** and it may be drivingly connected to a bladed impeller (not shown) within housing **10**. The housing **10** may be provided with a Venturi throat portion **16** terminating in a cylindrical outlet portion **17**.

Referring to FIGS. 1 and 2, a nozzle **18** may include a rear band portion **19** of circular cross section adapted to be fixed to the outlet **17** of the throat **16**. An intermediate portion **20** may be fixed to the band portion **19**, and its cross section may vary from a circle at the juncture between it and the band portion **19** to a cross section at its forward terminus along a line **21—21** (FIG. 1), having major and minor axes and as shown in FIG. 2 including parallel side walls joined by curvilinear ends.

A forward portion **22** may be integrally connected to the intermediate portion **20**, the former having the same cross section as the terminal end of the intermediate portion **20** and including an upper portion **23** extending outwardly beyond a lower portion **24**.

Referring to FIG. 2, located within the nozzle **18**, preferably along the major axis of the cross section thereof and near the outlet of the nozzle, atomizing manifolds **25** and **26** may be arranged. The manifolds **25** and **26** may be supported by angle members **27** and **28** fixed to the side wall of the nozzle **18**. One or more such manifolds **25** and **26** may be employed, and since they are identical, only the manifold **25** will specifically be described.

Referring to FIG. 3, the manifold **25** may be made from bar stock and may be provided with a central pas-

sage 29 extending along its longitudinal axis. Holes 30 at spaced intervals along the manifold 25 may be drilled at right angles to, and across the central passage 29 and may terminate in cup-shaped cavities 31 from which an orifice 32 leads to atmosphere. Water is adapted to be supplied to the passage 29 by a line 33 (FIG. 1) that extends from the outside of the nozzle 18 through bosses 34 and 35 on its side walls and which acts as supplementary supporting means for the manifolds 25 and 26.

Referring again to FIG. 3, the holes 30 are adapted to receive in sealing relation a guiding gland 36 for supporting an air nozzle 37 that may extend across the passage 29 and terminate within the cup portion 31. The diameter of the forward end of the nozzle 37 within cup 31 is such that an annular space 38 is provided between the walls of cup 31 and the outer surface of the nozzle tip.

The upper end of the nozzle 37 may be threaded at 39 into an internally threaded recess within a packing gland 40, and a union connection 41 may be provided between the upper end of nozzle 37 and a conduit 42, thereby providing means for axially adjusting the location of the nozzle 37.

A conduit 42 may be connected to an air supply line 43 that extends through the side walls of the nozzle 18 in the same manner that the water line 33 extends therethrough.

The construction and arrangement of the parts are such that a high velocity air stream is directed axially through each jet orifice 32, and the water within each recess 30 must move at right angles to, and into this stream. It can be theorized that droplets of water having a diameter substantially equal to that of orifice 32 are continuously subjected to the shearing action of the high velocity air stream, causing them to be broken into very fine particles which have imparted to them the high velocity of the air stream.

The high velocity, fine particles of water issuing from jet 32 are picked up by the high velocity air from the blower passing through the nozzle 18. The result is a mass of finely divided water particles moving at a high velocity from the mouth of the nozzle 18 which, when directed onto heated material such as hot extruded aluminum and the like, produces an optimum quenching action.

Referring to FIGS. 4, 5 and 6, a modified form of the invention is shown. It may include a nozzle idenitical to that shown in FIGS. 1 and 2. Atomizing manifolds 44 and 45 are shown as being fixed to the exterior of the parallel walls of the section 22 by fastening screws 46. The manifolds are identical and, therefore, only the manifold 44 will specifically be described. It may be made from bar stock and have drilled longitudinally therethrough, two passages 47 and 48 (FIG. 6). The one end of each passage 47 and 48 may be closed by a pipe plug 49 at opposite ends of the manifold 44. The other end of each passage 47 and 48 may be provided with a fitting 50 for the reception of lines 51 and 52, respectively. The lines 51 and 52 may extend between the manifolds 44 and 45 and each may have a common inlet 53 and 54. The inlet 53 may be connected to a supply of water under a predetermined pressure, while inlet 54 may be connected to a supply of air under a predetermined pressure. From the foregoing it is evident that passage 47 is supplied with air under pressure and passage 48 with water under a predetermined pressure.

Referring to FIG. 6, a plurality of jet passages 55 may extend from passage 47 to atmosphere. The passages 55 may be parallel and longitudinally spaced along the manifold 44. A passage 56 for each passage 55 may extend from passage 48 to passage 55. Each passage 56 may be at right angles to its corresponding passage 55 and intersect said passage 55 within the manifold 44. The passage 56 may be counterbored and threaded to receive a screw 57 for adjusting the flow of water through each passage 56 from passage 48. Sealing means 58 and locking means 59 may be provided for the screw 57.

The jet passages may extend through suitable openings in the parallel side walls of the section 22 and the action of the air within jet passages 55 is to shear off, within the manifold 44, the droplets of water that move through passages 56 at right angles to the air jets within passages 55. This produces a mass of finely divided water particles that are forced under high velocity transversely into the high velocity air stream issuing from the nozzle 18, resulting in a spray pattern of maximum width.

Although the various features of the new and improved high velocity air nozzle which is shown in combination with atomizing means have been shown and described to fully disclose two embodiments of the invention, it will be evident that numerous changes may be made in such details and certain features may be used without others without departing from the principles of the invention.

What is claimed is:

1. In a blower, a housing containing an impeller; said housing including a throat through which air is forced at high velocity by said impeller and also including a nozzle connected to said throat; atomizing means for discharging fluid through a wall of said housing and including a manifold; means within said manifold for supplying liquid droplets toward an outlet in said manifold; and means within said manifold for directing high velocity air streams longitudinally of said outlet at right angles to said droplets for breaking them into fine liquid particles and imparting a high velocity to said particles in said outlet, said means for directing also directing said air stream transversely of the high velocity air issuing from said nozzle.

2. In a blower, a housing containing an impeller; a throat through which air is forced at high velocity by said impeller; a nozzle connected to said throat; said nozzle terminating in a portion having a cross section including major and minor axes; atomizing means including a manifold mounted parallel to the major axis of said portion near the outlet thereof; means within said manifold for supplying liqiud droplets toward an outlet in said manifold and means within said manifold for directing high velocity air streams longitudinally of said outlet at right angles to said droplets for breaking them into fine liquid particles and imparting a high velocity to said particles in said outlet, said means for directing also directing said air stream transversely of the high velocity air issuing from said nozzle.

3. In a blower, a housing containing an impeller; a throat through which air is forced at high velocity by said impeller; a nozzle connected to said throat; atomizing means mounted exteriorly of said nozzle including a manifold connected to said nozzle and adapted to direct finely divided water particles into the path of the high velocity air flowing therethrough; means within said manifold for supplying water droplets towards an outlet in said manifold; and means separate from the air flowing through said nozzle for directing high velocity air streams longitudinally of said outlet at right angles to said droplets for breaking them into fine water particles and imparting a high velocity to said particles in said outlet, said means for directing also directing said air stream transversely of the high velocity air issuing from said nozzle.

4. In a blower, a housing containing an impeller; a throat through which air is forced at high velocity by said impeller; a nozzle connected to said throat and including parallel side walls joined by curvilinear ends; atomizing means for discharging fluid through at least one of said walls and including a manifold; means within said atomizing means for supplying water droplets towards an outlet in said atomizing means; and means for directing high velocity air streams at right angles to said droplets for breaking them into fine water particles and imparting a high velocity to said particles, said means for directing also directing said air stream transversely of the high velocity air issuing from said nozzle.

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