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GASEOUS CURTAIN FOR VENTILATING EXHAUST

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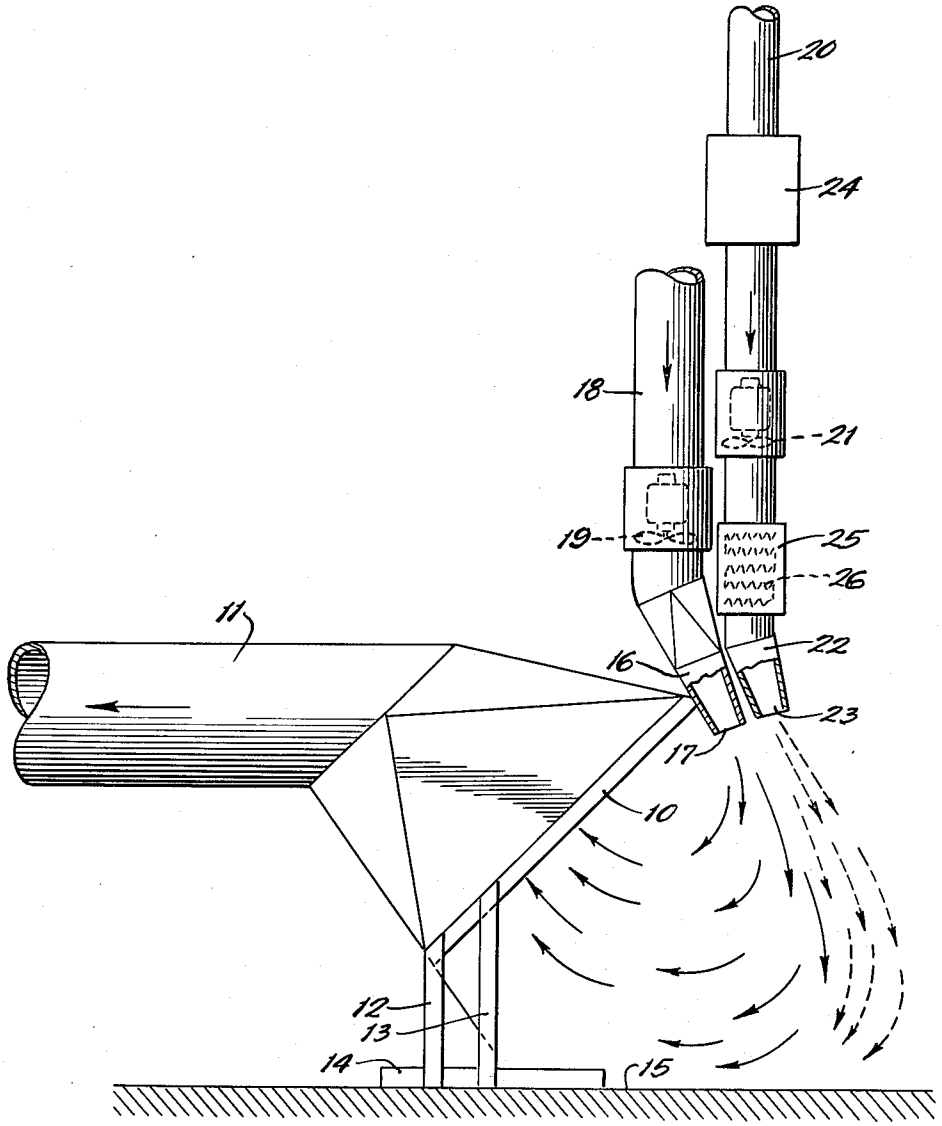

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GASEOUS CURTAIN FOR VENTILATING EXHAUST

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4 Claims. (Cl. 98—115)

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This invention relates to gaseous curtains for ventilating exhaust structures.

The invention is particularly useful in the treatment of fumes, smoke, particle-laden gas, chemical vapors, etc. By the term "gas," as employed herein, I mean not only incondensable gaseous materials but condensable vapors, etc.

An object of the invention is to provide ventilating exhaust equipment in conjunction with means for forming air or other gaseous curtains about one or more sides of a source of smoke, fumes, particle-laden gas, chemical vapors, etc., so as to confine them in an area adjacent the intake of the ventilating exhaust equipment. A further object is to provide in such a structure, means for providing a plurality of gaseous curtains with the result that one curtain is effective in projecting the other curtain for a greater distance than it would go without such assistance while at the same time providing an outer curtain of clean air or warm air as a protection for the operator. Yet another object is to provide ventilating exhaust equipment wherein contaminated gaseous material or air is used to form an effective curtain about a column of smoke, vapors, etc., while at the same time there is formed an outer sheath of non-contaminated air or gaseous material which protects the operator from said contaminated air curtain, etc. Still another object is to provide an air curtain which may be employed for any purpose and which consists generally of cold air or other gaseous material while at the same time providing a second curtain of air which is heated and which protects the operator or others from the effects of the cold air curtain. Other objects and advantages will appear as the specification proceeds.

The present invention contemplates the formation of a plurality of air curtains. If desired, three air curtains may be employed, the curtains being formed by discharged parallel streams of air or other gaseous material whereby the outer streams reduce the friction to which the inner stream is subjected and thus enable it to be projected a greater distance. Such arrangement is shown more clearly in my co-pending application for "Augmented Jet," Serial No. 698,512. It will be understood that any desired number of air curtains may be formed in the parallel relation described.

In the specific illustration set out, I provide two air curtains formed by nozzles which may be elongated to provide relatively narrow parallel sheets of air or other gas. This arrangement permits the use of contaminated air or gas for the inner sheet or curtain while the operator is protected through the use of an outer curtain of relatively pure air which may be heated or otherwise treated for the benefit of the operator, etc.

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In the illustration given, I provide an exhaust intake 10 communicating with the conduit 11 connected with any suitable source of suction. The intake frame is supported by the standards 12 and 13 fixed to the rails 14 resting upon the floor 15. It will be understood that a source of gaseous material such as smoke, fumes, particulate material, etc., will be brought to the floor space below or to one side of the intake 10 so that the suction in conduit 11 will be effective in removing the rising cloud of such gaseous material.

In order to prevent portions of the rising gaseous material from escaping into the room, while at the same time, giving the operator free access to the source of the gaseous material, I provide a nozzle 16 having an outlet 17 from which is discharged an inner curtain of air or other gaseous material. Preferably the outlet 17 is elongated so as to provide a relatively wide curtain of air which will enclose substantially one side of the source of the gaseous material. However, for certain uses, the port 17 may be relatively short and for other uses, it may be semi-circular or otherwise shaped to provide a curtain of the desired contour. If desired, the outlet port of the discharged nozzle 16 may be so extended as to cover two sides or all four sides of the material which is the source of the rising fumes, smoke, etc., as described more fully in my co-pending application for "Ventilating Exhaust Structure," bearing Serial No. 16,307, which has matured into Patent No. 2,565,933.

The ventilating exhaust formed by the intake 10 and conduit 11, may, if desired, consist of a plurality of suction intakes communicating with separate conduits, as described more fully in my co-pending application for "Gas Treating Apparatus and Method," Serial No. 15,334, which has matured into Patent No. 2,579,401.

Communicating with the curtain forming nozzle 16 is a conduit 18 equipped with a power-driven fan 19 for forcing air through the nozzle outlet 17. The conduit 18 may lead to any source from which contaminated or partially contaminated air may be picked up. Further, if desired, the conduit 18 may lead to a point exterior of the building for the picking up of cold air.

When contaminated air or cold air is introduced through conduit 18, there is danger of injury to the operator who is working with the source of gaseous material supported upon the

floor 15 adjacent the intake 10. In order to protect the operator from the contaminated or cold air stream forming the inner curtain, I provide a second conduit 20 which may lead from the room itself in which the air is relatively clean and relatively warm and may be discharged by the fan 21 through a nozzle 22 having a port 23 substantially similar to the port 17. Port 23 is preferably supported so as to deliver an air stream or curtain which is substantially parallel to the curtain discharged by port 17.

Should the pipe 20 lead from a source of contaminated air or cold air, I prefer to pass it through a filter 24 supported within conduit 20 and also through the heater 25 supported in conduit 20. If warm air is being circulated from the room, the heater 25 may be cut off. Any means for furnishing heat to the heater structure 25 may be provided. In the specific illustration given, electric resistance elements 26 are shown. It will be understood, however, that a steam heat exchanger or other suitable means for heating the air may be employed.

Operation

In the operation of the apparatus, the casting or other source of the rising column of gases, fumes, smoke, etc., may be brought by car, crane or any other means of conveyance to a position on the floor 15 adjacent the ventilating exhaust intake 10. Contaminated or cold air or a gaseous body from any source, may be introduced through the pipe 18 and discharged through nozzle 16 to form a curtain about the source of gaseous material on one or more sides thereof. By enveloping the source of gaseous material or the rising column of gaseous material, escape of any portion thereof is prevented and such material is confined about the intake until it can be effectively drawn off. At the same time, however, the operator who is standing on the floor 15 opposite the intake 10 and the air curtain discharged through port 17, is protected from the contaminated air or unheated air by an outer curtain 23 which consists of relatively pure air and air which may be heated. If the conduit 18 is employed for forming a gaseous curtain of extremely hot air or other gases, the conduit 20 may be employed for passing cold air through the nozzle 22 to form an outer sheath of cool air which protects the operator from the inner curtain of hot air, etc.

The outer stream formed by the nozzle 22 not only provides the protection for the operator described above but also serves to eliminate frictional resistance to the outer side of the air curtain from nozzle 16 and thus causes the inner air curtain to be projected for a greater distance downwardly toward the floor 15 where it serves not only as a means for confining the smoke, etc. within the area but also it supplies the carrier fluid needed for withdrawing the contaminated material. In addition, the outer curtain of air as it approaches the floor 15 turns inwardly to provide additional carrier fluid serving as the conveying means for removal of the contaminant.

In the foregoing description, a specific embodiment has been set out and described in connection with a specific form of ventilating exhaust. It will be understood that there are many forms in which the air curtains may be employed and in which the methods described herein may be used.

While in the foregoing specification, I have set forth a specific structural embodiment in great detail for the purpose of illustrating the invention, it will be understood that the details of such structure and of the method steps described may be varied widely by those skilled in the art without departing from the spirit of my invention.

I claim:

1. In ventilating exhaust apparatus for the treating of a rising column of gas, a hood having an inlet opening, supporting means for said hood and supporting the inlet portion of said hood at an inclination with respect to said rising column of gas whereby the lower portion of said hood is at one side of said column and the upper portion of said hood extends into said column, a suction pipe communicating with said hood, and a pair of pipes provided with elongated parallel discharge openings supported adjacent the upper forward edge portion of said hood, said outlets being directed outwardly and downwardly across said rising column of gas, and means for discharging air through said outlet openings to form parallel curtains of air across said rising column and on the outer side thereof opposite said hood.

2. In a method for treating a rising column of gas, the steps of withdrawing a portion of said rising column in a stream along one side of said rising column, discharging a curtain of air about the opposite side of said column of gas, heating a body of air and discharging a portion thereof in a plane substantially parallel with and contiguous with the path of said first-mentioned curtain of air to provide a warm curtain of air about said first-mentioned curtain.

3. In ventilating exhaust apparatus for the treating of a rising column of gas, a hood casing providing a chamber having an inlet opening along one side of said rising column of gas, supporting means for said hood, a suction pipe communicating with said hood, a casing providing a pair of discharge chambers adjacent the upper forward edge portion of said hood, and a pair of pipes leading from different sources of air separately to and communicating with said casing chambers, said discharge openings being directed outwardly and downwardly across said rising column of gas.

4. In a method for treating a rising column of gas, the steps of withdrawing a portion of said rising column in a stream along one side of said rising column, discharging a curtain of air about the opposite side of said column of gas, collecting a body of air cleaner than the air forming said first-mentioned curtain, and discharging the same in a plane substantially parallel with and contiguous to the path of said first-mentioned curtain of air to provide a protective curtain of air about said first-mentioned curtain.

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