

[54] **SOLID WASTE INCINERATOR AND PROCESS**

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[52] U.S. Cl. **110/8 R, 110/18 R**

[51] Int. Cl. **F23g 5/00**

[58] Field of Search **110/7, 8, 18**

3,483,832 12/1969 Bolletal110/7
3,506,414 4/1970 Skendrovic110/8 X

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Attorney—Head & Johnson

[57] **ABSTRACT**

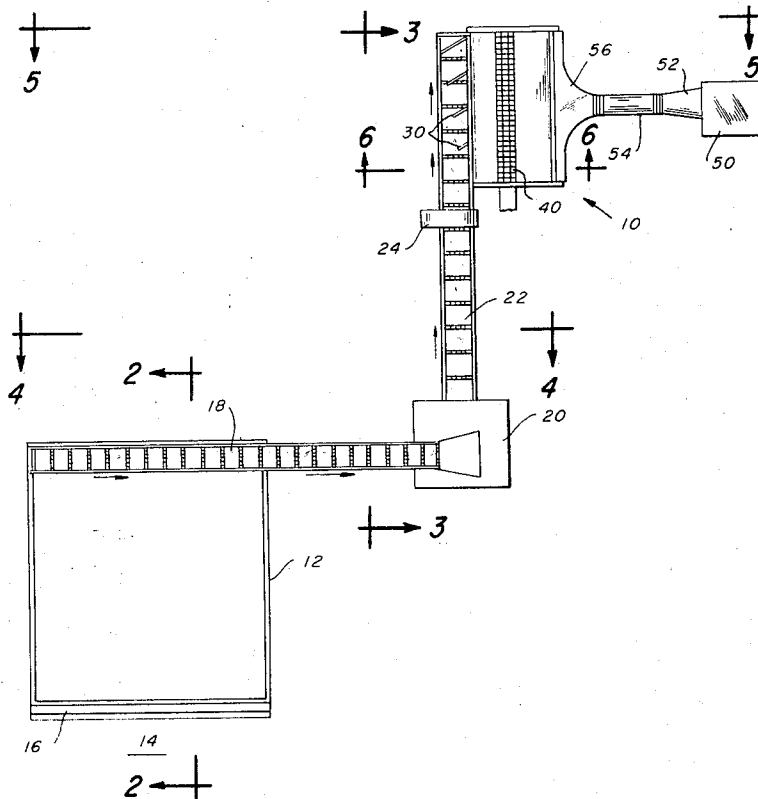
An open pit incineration system for solid waste and refuse utilizes a high velocity air curtain to effect not only complete combustion of solid materials into gaseous products of combustion but to prevent the escape of products of incomplete combustion into the atmosphere. The residue or incombustible solid material remaining is removed from the pit. The invention further incorporates a waste disposal system and process to efficiently collect and transfer the waste material into the incineration pit.

[56] **References Cited**

UNITED STATES PATENTS

3,592,150	7/1971	Lanyon	110/7
3,485,190	12/1969	Pettetier	110/18
3,584,587	6/1971	Siracusa	110/8
3,465,696	9/1969	Amundsen	110/8

8 Claims, 7 Drawing Figures



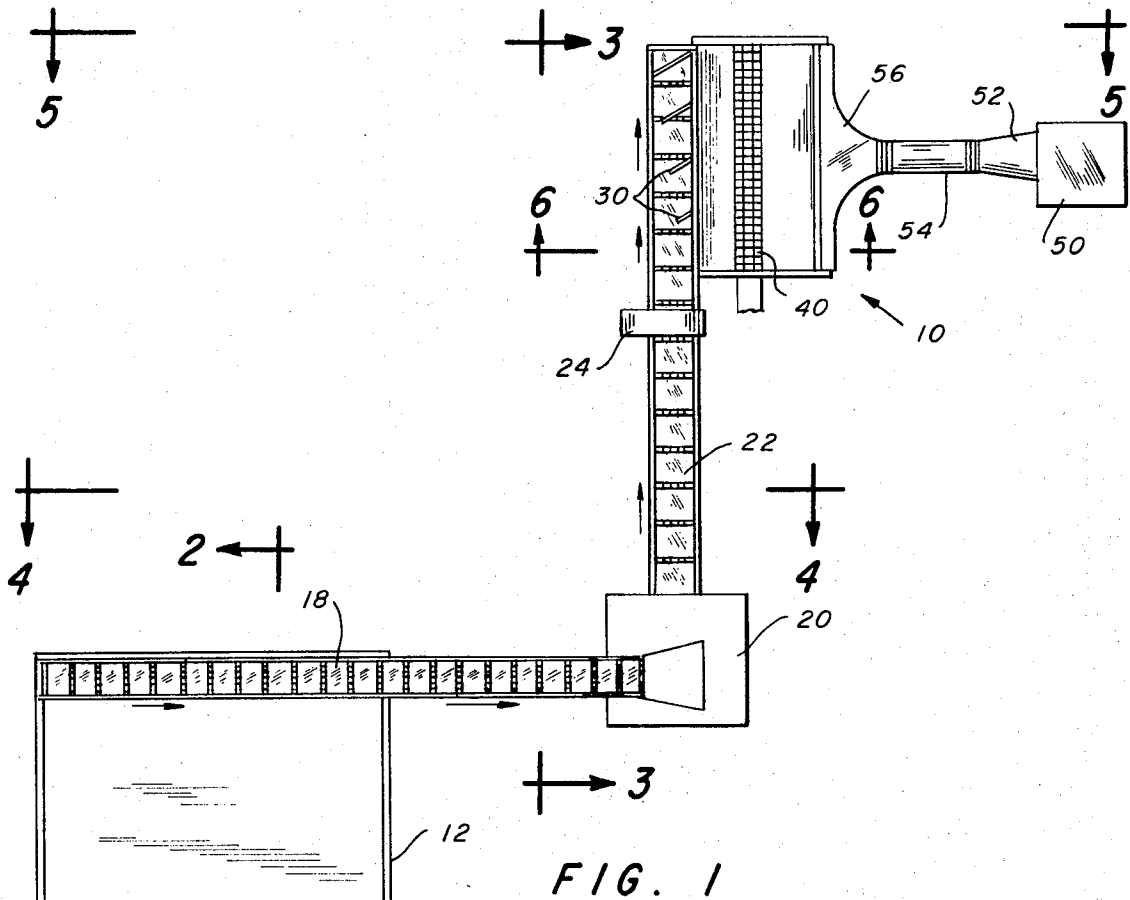


FIG. 1

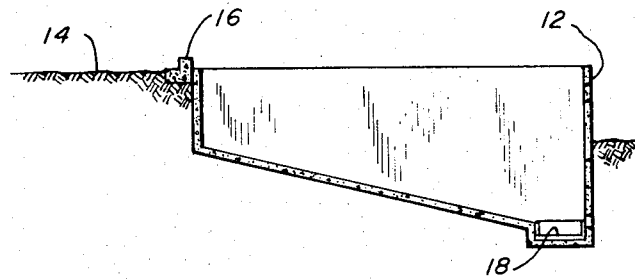


FIG. 2

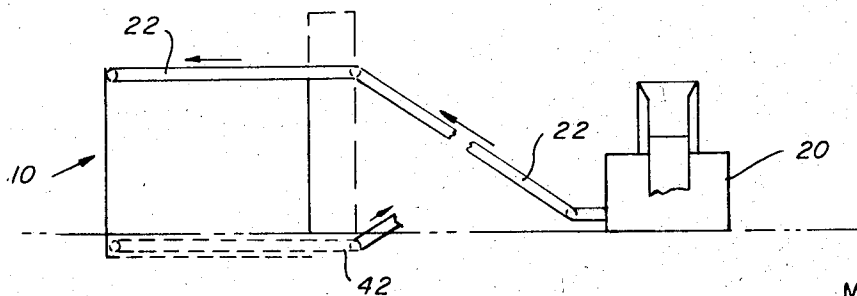


FIG. 3

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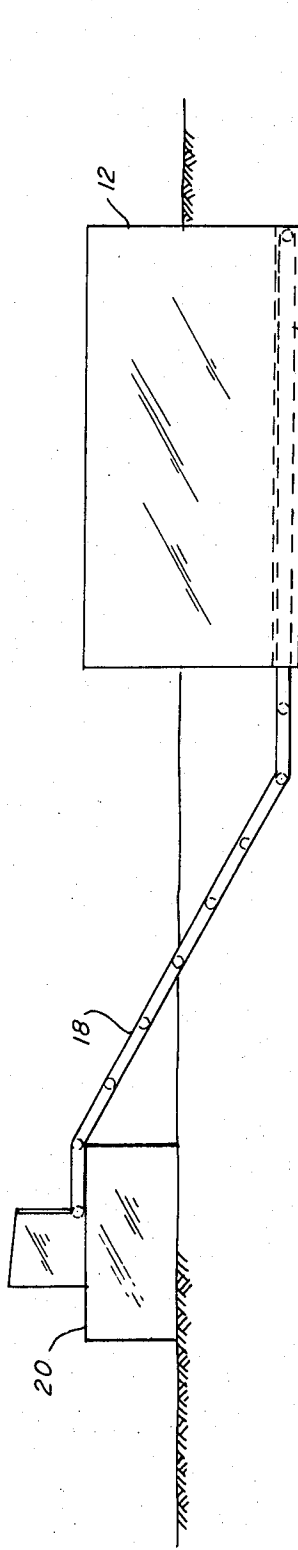


FIG. 4

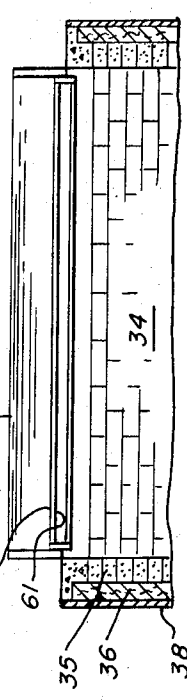


FIG. 7

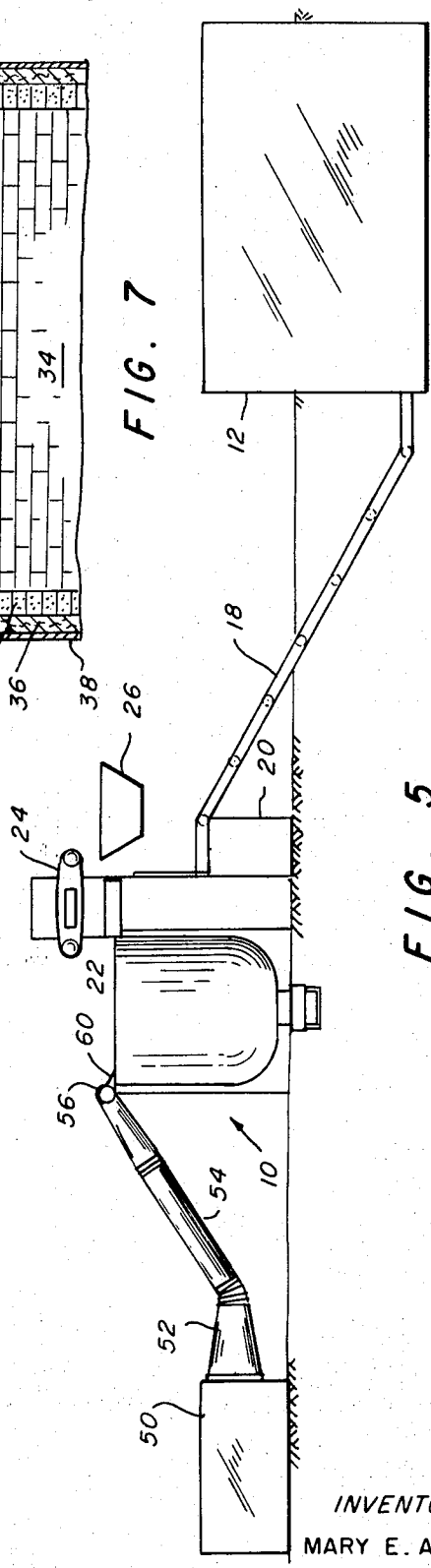


FIG. 5

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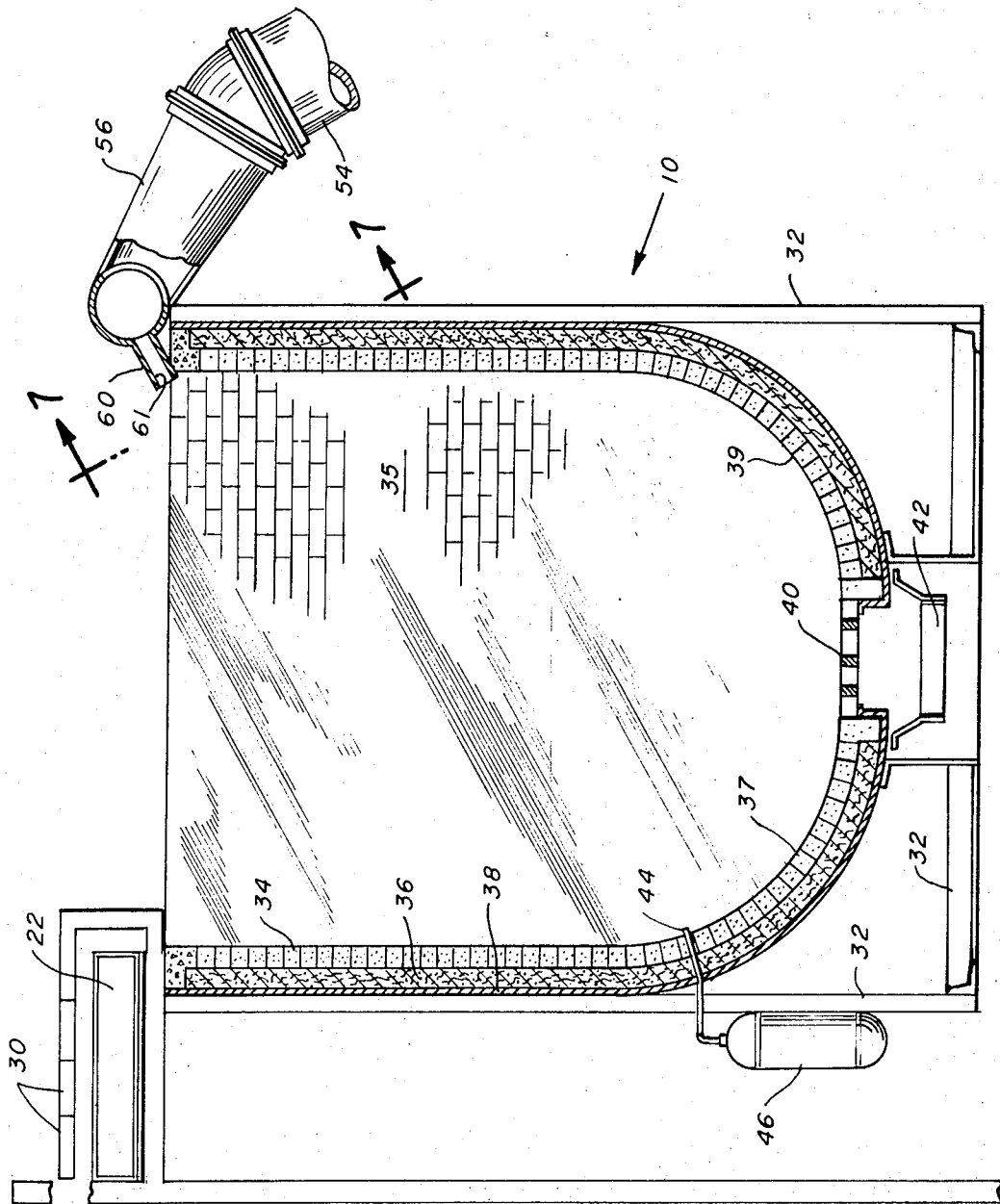


FIG. 6

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SOLID WASTE INCINERATOR AND PROCESS**BACKGROUND OF THE INVENTION**

This invention generally relates to the furnace art for use in environmental pollution control and more particularly to structures designed to burn wet fuel products such as garbage, sewage and refuse to substantially complete combustion thereof.

For the most part municipalities have utilized land fill processes for disposing of solid and liquid waste and refuse materials. Not only are such processes inefficient and costly, the land areas are constantly dwindling because of price and location relative to the concentration of the population in specific geographic areas of the world. Further the filled land is generally not suitable for use for many years thereafter. Prior artisans have taught open pit burning as a means to reduce the mass of waste or refuse. For example, this is recognized in the U.S. Pat. No. 3,465,696. The aforesaid patent accomplishes this by a combustion chamber involving a plurality of separated planar air jet nozzles. Such nozzles, however, have not been capable of adequately providing a substantially continuous air curtain over and across the open pit incinerator. In some instances the nozzles become clogged or do not distribute the air evenly across the pit, and therefore leave gaps within the incinerator for the release of products of incomplete combustion emitted into the atmosphere.

In addition, the prior art has not conceived of an overall disposal system which includes preliminary waste or refuse treatment in order to make the open pit incinerator operate more efficiently.

SUMMARY OF THE INVENTION

Accordingly this invention provides an open pit furnace or incinerator which utilizes a high velocity substantially solid curtain of high velocity air over and across the incinerator pit to effect complete combustion of the products of the waste and refuse products therein or to reduce the material to a minor amount of non-combustible solid material which is removed and of significantly smaller volume to make more efficient use of disposal or land fill disposal areas.

It is another object of this invention to provide an overall waste product and refuse disposal system which incorporates means for collecting the waste material, shredding or pulverizing the material into smaller overall sizes, separating noncombustible or high melting point materials, metals or other materials which may be reused with the remainder being injected into the open pit incinerator or furnace of this invention. In addition, means is provided in the bottom of the incinerator pit to remove remaining particles which are incapable of complete combustion.

It is further an additional object of this invention to provide a portable open pit incinerator apparatus capable of use upon mobile trash collecting equipment to preliminarily or otherwise reduce the bulk of waste material prior to its disposal and hence permit the increased collection capabilities of the initial haulers or collectors of trash and refuse.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view, somewhat schematic of the overall process of this invention.

FIGS. 2, 3, 4, 5 and 6 are sectional views taken along the respective lines of FIG. 1.

FIG. 7 is a sectional view taken along the line 7—7 of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Before explaining the present invention in detail it is to be understood that the invention is not limited in its application to details of construction and arrangement of parts illustrated in the accompanying drawings, since the invention is capable of other embodiments and of being practiced or carried out in various ways. Also, it is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Referring now to the drawings the open incineration pit of this invention is generally designated by the numeral 10. Preferably an overall waste disposal system located as for example at present land filled areas or other areas adjacent a municipality would include a primary collection pit or hopper 12 which includes an appropriate unloading ramp 14 for trucks adjacent at one end thereof. Curbing 16 limits the travel of such trucks relative to the hopper 12. The collection hopper may be suitably inclined wherein the waste and refuse material is caused to traverse to a first conveyor belt system 18 in which the waste and refuse material is caused to pass to a shredder 20 as, for example, an impactor type capable of crushing, grinding and/or pulverizing the waste material. A typical installation will be a shredder capable of reducing the material at the rate of 40 tons per hour. The shredded material from shredder 20 is then caused to pass upon a second conveyor 22 which in turn is caused to pass across a transversely located magnetic separator 24. Typically such a separator may be of the transverse self-cleaning type manufactured by Bux Schrader Magnetic Products Co. In such an arrangement iron particles are caused to be drawn into the overhead suspended magnetic belt to travel to a position beyond the magnetic field which may be either a permanent magnet or an electro magnet type where the material is removed into a collection bin 26 for resale or reuse. The remaining waste and refuse products continue travel on the conveyor where they are diverted by a plurality of staggered diversion baffles 30 into the combustion chamber of the incinerator 10. Although the incinerator is shown in an upright above the ground position in this embodiment it is to be understood that the chamber may be located below the ground. The combustion chamber, as shown in FIG. 6, comprises support members 32 the chamber itself being formed of a substantially U-shape in which the straight sidewalls smoothly converge in the tight portion. The chamber is closed at its longitudinal ends by walls 35. The walls of the chamber are of course adapted to be receptive of high temperatures and in one embodiment includes an outer layer of fire brick 34 behind which is found a layer of fiber insulation 36 upon a supporting steel plate 38. At the lower extreme of the pit is a grate 40 through which the products which are not capable of complete combustion will pass and drop unto a removal conveyor 42. Within the sidewalls are one or more fuel injection openings 44 which, as schematically shown, are supplied fuel from one or more tanks 46. An important aspect of this in-

vention is the utilization of a blower 50 in which air as for example operating to produce 60,000 cubic feet per minute (c.f.m.) is then caused to enter a reduction conduit 52, thence duct 54 into a plenum chamber 56. Here the air is distributed to a substantially open longitudinal vent 60 with port 61 which such port is adapted to provide a complete coverage of air across the pit 10 to provide not only excess air for complete combustion of the products within the pit but also a sufficient blanket to prevent products of incomplete combustion, smoke, particles, ashes from passing upwardly into the atmosphere. The port is oriented downwardly across the chamber preferably at an angle of about 60° to the vertical and is adapted to provide a velocity of air within the range of 60-120 miles per hour across the pit.

The removal of glass from the refuse is a major problem of incineration type disposal. In this invention the combination effect of the vortex of high velocity air combined with the curved bight portion 37 of the U-shaped combustion chamber removes the previously shredded glass particles through the grate 40 substantially before the glass will achieve slagging temperature. The glass particles being substantially heavier than the remaining waste particles will tend to travel, as by centrifugal force, along the curved wall through the grate 40 for removal via conveyor 42.

The conveyor 42 below the pit may be of any well known type as for example a vibrating type conveyor for removing the ash residue from the pit to an ultimate disposal area.

What is claimed:

1. An open pit incinerator for waste and refuse products comprising:
 - a combination chamber formed of a substantially longitudinal U-shape, closed at the longitudinal ends and open at the top thereof, said chamber formed of heat resistant materials and including means at the bottom thereof to remove residual products incapable of complete combustion;
 - a longitudinal port extending substantially along the longitudinal length of one vertical leg of said chamber and oriented downwardly across and toward the opposite vertical leg of said chamber to provide a uninterrupted curtain of said air substantially across thereof from said end to end; and means to supply sufficient air to said port whereby the air ensuing therefrom traverses at a substantially high velocity.
2. An incinerator of claim 1 wherein said means to supply air to said port includes a blower or compressor

supplying said air to a longitudinal plenum chamber, to which said port is attached, sufficient to create air velocity from said port within the range of 60 to 120 miles per hour.

3. An incinerator of claim 1 wherein said port is oriented into said pit at an angle of 60° to said vertical leg of said chamber.

4. A solid waste and refuse material disposal system comprising:

- a first stationary primary collection hopper to receive said waste and refuse;
- first means to convey portions of said waste and refuse to a means for shredding or breaking said material into smaller substantially equal size particles;
- a combustion chamber;
- second means to convey said particles from said shredder to said combustion chamber;
- third means contiguous to said second means to remove reusable waste and refuse materials prior to said combustion chamber;
- said combustion chamber formed of a substantially longitudinal U-shape, closed at the longitudinal ends and open at the top thereof, said chamber formed of heat resistant materials and including means at the bottom thereof to remove residual products incapable of complete combustion;
- a longitudinal port extending substantially along the longitudinal length of one vertical leg of said chamber and oriented downwardly across and toward the opposite vertical leg of said chamber to provide a uninterrupted curtain of said air substantially across thereof from said end to end; and means to supply sufficient air to said port whereby the air ensuing therefrom traverses at a substantially high velocity.

5. A system of claim 4 wherein said third means including:

- a magnetic separator for ferrous particles.
- 6. A system of claim 5 including means to separate glass particles.

7. A system of claim 4 wherein said means to supply air to said port includes a blower or compressor supplying said air to a longitudinal plenum chamber, to which said port is attached, sufficient to create air velocity from said port and across said pit within the range of 60 to 120 miles per hour.

8. A system of claim 4 wherein said port is oriented into said pit at an angle of 60° to said vertical leg of said chamber.

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