Sept. 10, 1963 M. M. ROSENFELD 3,103,154

BOMB SHELTER VENTILATION APPARATUS

Filed Dec. 6, 1961

FIG. 1

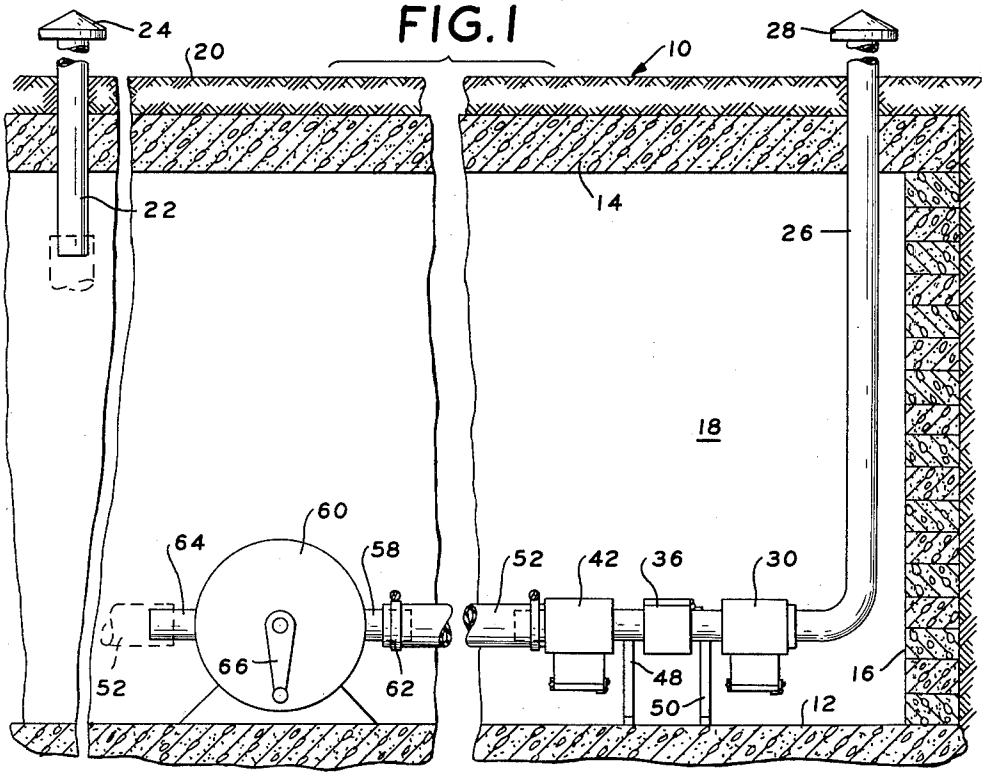
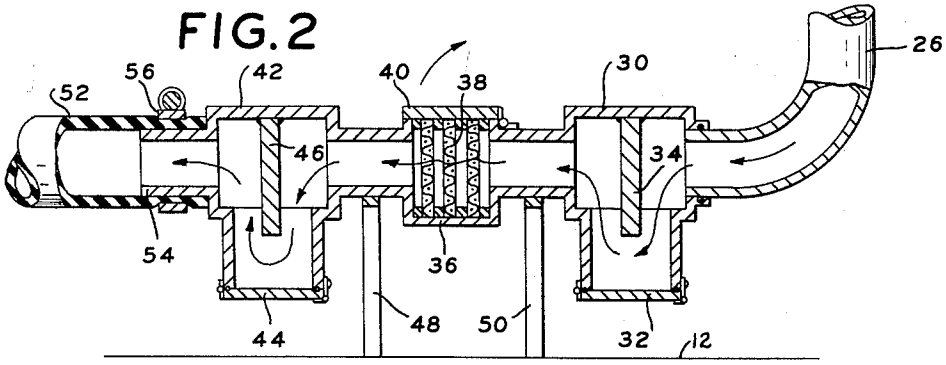


FIG. 2



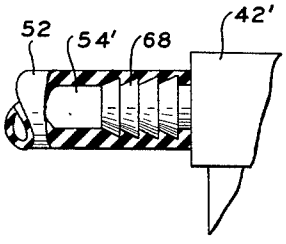


FIG. 3

INVENTOR.
MORTON M. ROSENFELD
BY
Arthur H. Seidel
ATTORNEY

United States Patent Office 3,103,154 Patented Sept. 10, 1963

3,103,154

BOMB SHELTER VENTILATION APPARATUS

Morton M. Rosenfeld, 271 Madison Ave.,
Mount Vernon, N.Y.

Filed Dec. 6, 1961, Ser. No. 157,412
2 Claims. (Cl. 98—1)

This invention relates to a bomb shelter ventilation apparatus, and more particularly to a bomb shelter ventilation apparatus wherein the occupants may utilize a single duct as both an inlet vent or an outlet vent.

While most bomb shelter constructions include a separate inlet vent and a separate outlet vent, it is most desirable that upon the destruction or obstruction of one of the vents, the single remaining vent may be utilized to function as both an inlet vent and an outlet vent. It is further desirable that this be accomplished notwithstanding that the mechanical blower utilized in the system be capable of rotation in a single direction.

In addition, it is desirable that bomb shelter units permit a reverse flow of air through the vents to clean accumulated dust from the filters, if any, used in the vents. The filters will become clogged or otherwise impeded after usage, and means must be provided to effect removal of material from the filters without interfering with the ventilation of the bomb shelter.

It is an object of the present invention to provide a novel bomb shelter apparatus.

It is another object of the present invention to provide a bomb shelter ventilation apparatus in which in an emergency a single vent may be utilized both as an inlet vent and as an outlet vent.

It is a still further object of the present invention to provide a bomb shelter ventilation apparatus in which the filter means within either the inlet vent or outlet vent may be readily cleaned without removal therefrom.

It is a further object of the present invention to provide a bomb shelter ventilation apparatus in which a reverse flow of pressurized air may be achieved notwithstanding the fact that the blower may be operated in but a single direction.

Other objects will appear hereinafter.

For the purpose of illustrating the invention there is shown in the drawings forms which are presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

FIGURE 1 is a partial sectional view of a bomb shelter incorporating the ventilation apparatus of the present invention.

FIGURE 2 is an enlarged sectional view of a portion of the ventilation apparatus illustrated in FIGURE 1.

FIGURE 3 is a partial sectional view illustrating an alternative embodiment by means of which flexible conduit may be detachably connected in the bomb shelter ventilation apparatus of the present invention.

Referring to the drawings, wherein like reference characters indicate like elements, there is shown in FIGURES 1 and 2 an underground bomb shelter designated generally as **10**. It is to be understood that an underground bomb shelter is illustrated solely by way of example, and that the present invention contemplates the use of above-ground bomb shelters as well as underground bomb shelters.

The illustrated underground bomb shelter **10** may be made from concrete or the like. No claim is made to the particular form of the shell of the bomb shelter shown in the drawings, and any of the numerous available bomb shelter shell constructions may be utilized in the present invention. The bomb shelter **10** includes a floor **12** and a ceiling **14** supported from the floor **12**

by means of walls, such as walls **16** and **18**. The ceiling **14** is separated from the ground level **20** by a layer of earth. The layer of earth between ground level **20** and the ceiling **14** provide protection to the bomb shelter **10**.

The interior of bomb shelter **10** is in communication with the atmosphere by means of vent pipes **22** and **26**. Vent pipe **22** is provided with a hood **24**, and vent pipe **26** is provided with a hood **28**. The hoods **24** and **28** are preferably protected, so as to prevent tampering therewith. This may be accomplished by positioning the hoods **24** and **28** at a high level above the ground level **20**, or by providing means about the hoods **24** and **28**, such as screened inlets, to prevent vandals from stuffing foreign matter therein thereby interfering with the free flow of air through the pipes **22** and **26**.

Either one of the pipes **22** and **26** may be an inlet pipe with the other pipe being designated as an outlet pipe. As will be explained more fully below, in the event that one of the pipes is obstructed, or otherwise rendered inoperative, the occupants of the bomb shelter may satisfactorily exist by the use of a single vent pipe.

For the purposes of the present invention the vent pipe **26** will be described in detail. However, it is to be understood that the vent pipe **22** may be identical to the vent pipe **26**.

The lowermost end of the pipe **26** is arcuately formed so as to extend in a horizontal direction. The lowermost end of the pipe **26** is sealingly disposed within the inlet side of a dust trap designated generally as **30**. The dust trap **30** is provided with a pivotable door **32** as a bottom wall. The door **32** is capable of being sealed with respect to the housing of the dust trap **30**. The dust trap **30** is provided with a center partition **34** extending to a point adjacent to and spaced from the door **32** so that air must flow through a circuitous path when passing through the trap **30**. A trap of this nature will separate heavy particles of air-borne matter and cause the same to settle on the door **32**. By pivoting the door **32** to an open disposition, such separated air-borne matter may be removed from the trap **30**.

The outlet side of the trap **30** is in communication with the inlet side of a filter designated generally as **36**. The filter **36** is provided with a filter cartridge **38** which is readily removable by means of a pivotably mounted lid **40**. The filter cartridge **38** is of a type capable of separating air-borne dust thereby purifying the air which flows therethrough. If desired, the filter cartridge **38** may also be of the type which absorbs poisonous gases or mist.

The outlet side of the filter **36** is in communication with the inlet side of a dust trap designated generally as **42**. The dust trap **42** is identical in construction to the dust trap **30**. Thus, the dust trap **42** is provided with a pivotable door **44** as a bottom wall. The door **44** is capable of being sealed with respect to the housing of the dust trap **42**. The dust trap **42** is provided with a center partition **46** extending to a point adjacent to and spaced from the door **44** so that air must flow through a circuitous path when passing through the trap **42**.

The dust trap **30**, filter **36**, and dust trap **42** are an integral unit and this unit is supported on the brackets **48** and **50**. If desired, the dust traps **30** and **42** may be separable elements removably secured to the filter **36**.

A conduit **52** is removably secured to the outlet duct on the dust trap **42**. In the illustrated embodiment the conduit **52** is shown as a flexible conduit, such as one formed from an elastomer, such as rubber, synthetic rubber, or the like. However, it is to be understood that the conduit **52** may be formed of rigid material, and standard fittings may be utilized to couple the conduit **52** to the

duct 54 which extends from the dust trap 42, and to the inlet pipe 58 of the blower 60.

In the illustrated embodiment in which a flexible conduit 52 is utilized, the conduit 52 is secured to the duct 54 by means of an adjustable clamp 56.

The conduit 52 is removably secured to the inlet pipe 58 of the blower 60 by means of the clamp 62.

The blower 60 is conveniently supported on the floor 12. The blower 60 is provided with an outlet pipe 64 and a crank handle 66. The blower 60 may be of any conventional type, and may comprise a blower which is unidirectional, namely one whose impeller may not be reversed, so that the inlet pipe 58 will always function as an inlet and the outlet pipe 64 will always function as an outlet.

The operation of the apparatus of the present invention is as follows:

When the conduit 52 is utilized in the solid line position as illustrated in FIGURES 1 and 2, air from the atmosphere is sucked in through the vent pipe 26 by means of the blower 60. Such air is filtered by the filter cartridge 38 and is discharged into the interior of the bomb shelter 10 by way of the outlet pipe 64. The air within the interior of the bomb shelter 10 is returned to atmosphere through the vent pipe 22. When it is desired to clean the filter cartridge 38, clamp 62 is unloosened and the end of the pipe 52 is removably secured to the outlet pipe 64 on the blower 60. Thereafter, operation of the blower 60 will cause air from within the bomb shelter 10 to flow through the conduit 52, through trap 42, through filter 36, through trap 30 and through vent pipe 26 to the atmosphere. With the elements in this relationship, any large particles of air-borne matter within the bomb shelter 10 will be removed as the air passes through trap 42. In this manner, the inner surface of the filter cartridge 38 will not become clogged. The air flowing through the filter cartridge 38 will cause any accumulated dust to accumulate in trap 30.

The filter in vent pipe 22 may be cleaned by connecting the conduit 52 in the phantom position illustrated in FIGURE 1. Thereafter, operation of the blower 60 will cause air from within the interior of the bomb shelter 10 to flow through the conduit 52 and vent pipe 22 to atmosphere. Air flowing through the filter (not shown) in the vent pipe 22 will cause accumulated dust to be removed. Instead of connecting the end of the conduit 52 to one end of the vent pipe 22, such end of the conduit 52 may be manually held and disposed in any desired location where it is desired to have a source of pressurized air. For example, such end of the conduit 52 may be held against the inner surface of a filter in a door to blow off accumulated dust and thereby clean such filter.

The dust trap 42 serves as a backup trap for the filter 36, and may be used to capture particles which have fallen from the filter cartridge 38, such as might occur when a portion of the filter cartridge 38 became broken due to mechanical failure.

If dust traps 30 and/or 42 become filled, they may be emptied by opening their respective doors 32 and 44. Suitable precautions should, of course, be taken in the emptying of radioactive dust or other material from the dust traps 30 and 42.

In the event that one of the vent pipes, such as vent pipe 22 is obstructed or otherwise rendered inoperative,

then the occupants of the bomb shelter 10 may continue to satisfactorily exist by resorting to the single vent pipe 26. Thus, the conduit 52 may be alternatively switched from the inlet pipe 58 of the blower 60 to the outlet pipe 64 of the blower 60, and the vent pipe thereby alternatively operated as both an inlet and an outlet. The filter cartridge 38 would be cleaned each time the vent pipe 26 functioned as an outlet.

The trap 42 prevents any large particles of air-borne matter from within the bomb shelter from contacting the inner surface of the filter cartridge 38. This prevents clogging of the filter cartridge 38 and manfunctioning of the filter cartridge 38.

There is shown in FIGURE 3 another embodiment of the manner in which the flexible conduit 52 may be secured to the trap 42' or to the inlet and/or outlet pipes on the blower 60. As illustrated in FIGURE 3, the outlet pipe 54' on the trap 42' is provided with a serrated outer peripheral surface of the type which has been conventionally utilized on laboratory equipment. A coupling of the conduit 52 and the pipe 54' may be accomplished more readily by means of the friction fit as illustrated in FIGURE 3.

While the present invention is illustrated as being disposed within a bomb shelter, it is within the scope of the present invention to utilize the ventilation apparatus in other types of structures, such as underground enclosures associated with subways, mines, etc.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification as indicating the scope of the invention.

I claim:

1. Apparatus comprising means defining an underground enclosure, a vent pipe providing communication between the atmosphere and the interior of said enclosure, a blower having an inlet and an outlet, a flexible conduit, a filter connected between one end of said flexible conduit and said vent pipe, a dust trap between said filter and said vent pipe, said dust trap having a partition therein for causing air flowing therethrough to flow through a downwardly extending circuitous path, a second dust trap having a partition therein for causing air flowing therethrough to flow through a downwardly extending circuitous path, said second dust trap being connected between said one end of said flexible conduit and said filter, means removably connecting the other end of said flexible conduit to the inlet of said blower, and the outlet of said blower being in communication with the interior of said enclosure.

2. The apparatus of claim 1 including a second vent pipe providing communication with the atmosphere and the interior of said enclosure, said flexible conduit being of sufficient length so that it may selectively inter-connect the outlet of said blower and said second vent pipe.

References Cited in the file of this patent

FOREIGN PATENTS

234,555	Switzerland	Oct. 14, 1944
829,412	France	Nov. 17, 1937
849,492	France	Aug. 3, 1938
896,311	France	July 12, 1943