

[54] **ARTICLE REMOVAL DEVICE FOR GLOVEBOX**

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[51] Int. Cl. **B65b 31/04**

[58] Field of Search **141/8, 59, 63, 64, 141/65, 325, 326, 327, 392; 292/247; 312/1; 128/1 R, 1 B**

[56]

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[57]

ABSTRACT

An article removal device for a glovebox comprising a conduit extending through a glovebox wall which may be closed by a plug within the glovebox, and a fire-resistant container closing the outer end of the conduit and housing a removable container for receiving pyrophoric or otherwise hazardous material without disturbing the interior environment of the glovebox or adversely affecting the environment outside of the glovebox.

5 Claims, 4 Drawing Figures

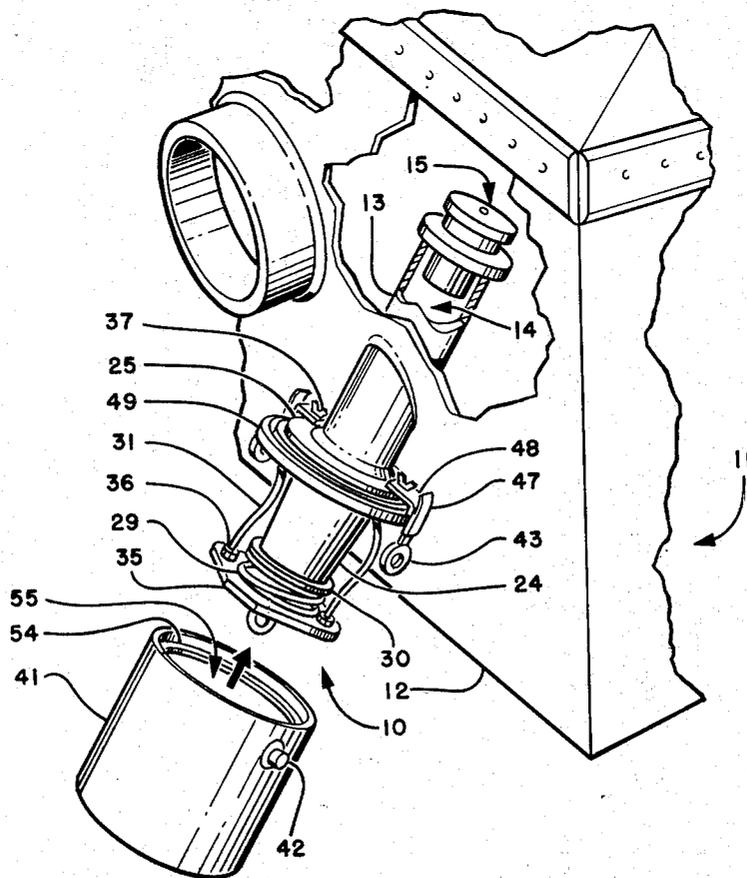


FIG. 1

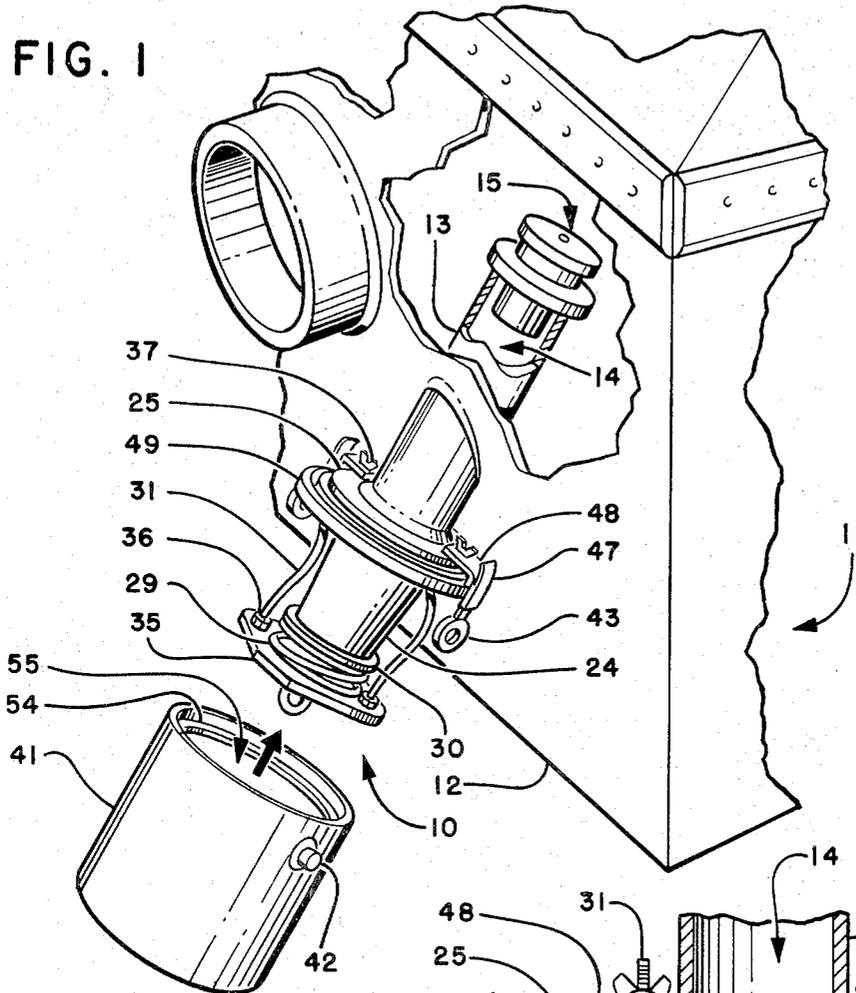


FIG. 2

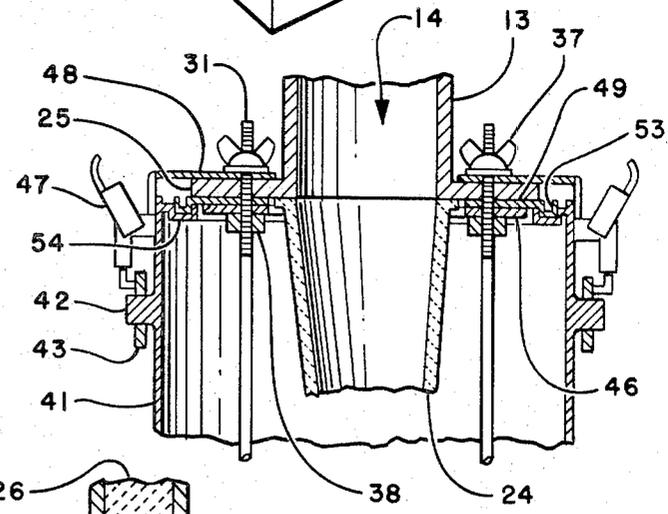


FIG. 3

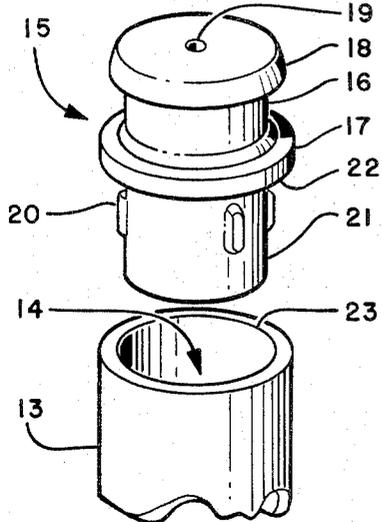
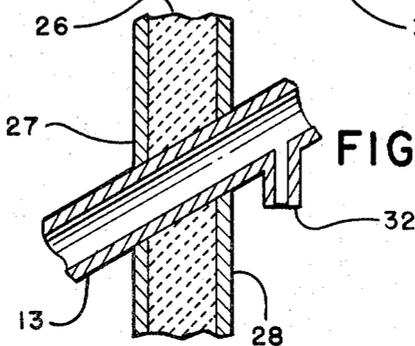


FIG. 4



ARTICLE REMOVAL DEVICE FOR GLOVEBOX

BACKGROUND OF INVENTION

The use of gloveboxes or dryboxes is widespread for handling and treating materials, particularly hazardous materials, in a controlled or contained environment. Some materials, which are capable of igniting spontaneously when exposed to air or which present a danger of contaminating surrounding work areas, are among those handled or treated in such boxes. These gloveboxes generally contain viewing windows, gloves to permit work functions without personnel contamination, access ports, service ports, etc. Some processes require that there be a negative pressure within the glovebox and also that there be an inert gas environment. Thus, workers may properly conduct work in an environment distinct from the exterior environment.

The use of these enclosed atmosphere gloveboxes may present a problem of removing samples or workpieces without affecting the type of environment in use or without presenting a hazard to personnel in the environment outside of the glovebox. Many of these samples or articles, particularly in the nuclear processing industry, are pyrophoric and may present the additional hazard of possibly contaminating the surrounding area with radioactive nuclear materials if not properly handled. Further, lubricating fluids and related materials used in working within these gloveboxes may be contaminated and may spread this contamination during a sample removal process.

SUMMARY OF INVENTION

In light of the foregoing, it is an object of this invention to provide a novel article removal device for a glovebox or drybox for removal of pyrophoric and/or contaminated materials from within the glovebox to minimize fire hazard and contamination spread.

It is a further object of this invention to provide a sample removal means which may prevent passage of fluid during use of glovebox and during sample removal.

It is a further object of this invention to provide a sample removal device which permits removal of samples from within the glovebox and placing of samples into the glovebox without adversely affecting the enclosed atmosphere under negative pressure.

Various other objects and advantages will appear from the following description of one embodiment of the invention, and the most novel features will be particularly pointed out hereinafter in connection with the appended claims. It will be understood that various changes in the details, materials, and arrangements of the parts which are herein described and illustrated in order to explain the nature of this invention may be made by those skilled in the art.

The invention comprises a conduit or tubular passage member extending through a glovebox wall having at its interior end a plug cover with an aperture extending therethrough, and at the other extremity a metal or fire-resistant container enclosing, in sealing arrangement, a removable inner container for sample removal.

DESCRIPTION OF DRAWING

FIG. 1 is a perspective, partly cross-sectional view of one embodiment of this invention;

FIG. 2 is a fragmented, cross-sectional view of the mating arrangement of the container to the flange mounting means;

FIG. 3 is a detailed perspective view of a plug cover with ridges and aperture; and

FIG. 4 illustrates a cutaway segment of this invention applied to a multiwalled glovebox with shielding material between the walls.

DETAILED DESCRIPTION

FIG. 1 shows an embodiment of the sample removal device 10 for a glovebox 11. As shown in FIG. 1, the sample removal device 10 includes a conduit or tubular passage member 13 having an internal passageway or chamber 14 communicating with the interior and exterior of glovebox 11.

At the exterior of glovebox 11, a removable inner container 24 may be positioned over the end of passageway 14 of conduit 13 to receive articles or samples transported through passageway 14 and held there in the desired removable fashion. Conduit or tubular member 13 may include a tubular base plate or laterally extending flange means 25 adapted to receive or mate with the open end of inner container 24 to provide a good mating arrangement therewith. A spring bias 29 may retain pressure against inner container 24 by means of inner container base plate 30 and hold container 24 against laterally extending flange means 25, and over the exterior opening of conduit 13 and passageway 14. Struts 31, preferably of bowed configuration to allow easy grasping of inner container 24, may be used to align or set the distances from the laterally extending flange means 25 to the inner container supporting base plate 35 by means of adjusting or positioning nuts 36 and nuts 38 as shown in FIGS. 1 and 2. Retaining nuts (not shown) may retain base plate 35 in a desired position. Adjustable wing nuts 37 maintain or set this distance so that once adjustable nuts 36 and nuts 38 and wing nuts 37 are appropriately positioned or adjusted, the inner container 24 may be removed by downward compression of the spring bias 29 and another or the same inner container replaced without movement of any positioning means.

A metal or otherwise fire-resistant housing 41 may be appropriately and removably mounted and positioned about container 24 and its supporting and bias arrangement and firmly or hermetically sealed thereabout to provide an enclosed system with passageway 14, aperture 19 and glovebox 11 interior. The metal container 41 is shown with protruding ears 42 on two sides of said metal container 41, said ears being adapted to go in engagement with correspondingly shaped rings 43 mounted on the latch means 47. Latch means 47 are integrally connected to a bar 48 which is held in place by means of wing nuts 37 against laterally extending flange means or base plate 25. Latch means 47 are so designed that when released, the latching rings 43 swing out and thus allow insertion and gripping of protruding ears 42 when the latch means 47 are again closed. An annular seat or cover 49 having a central opening communicating with passageway 14 may be fitted between latch means 47 in sealing engagement with base plate 25 and may be used to grip and seal the open end of metal housing 41. If desired, a circumferential washer 46 as shown in FIG. 2 may be joined to annular cover 49 in order to provide greater rigidity. In one embodiment of this invention, the protruding lip 53

extending around the metal housing annular cover 49 mates with the canal 54 of the metal housing 41 to form a seal which may be hermetic. Located within the chamber 55 of metal housing 41 when housing 41 is mated with cover 49 may be the inner container 24 and mounting assembly consisting of inner container base plate 30, spring 29, and bottom base plate 35.

A particularly well adapted metal housing 41 may be easily prepared by obtaining a suitably sized paint-type can and lid, removing the center from the lid, making appropriate passages through said lid to connect the struts 31 to the wing nuts 37 through the lid, then placing a support washer under the lid while tightening wing nuts 37 to the laterally extending flange means 25 to use the lid as cover 49. The container cover 49 may be joined to the laterally extending flange means 25 by means of a suitable adhesive, or by welding, or by appropriate nuts 38 and 37 with struts 31 to provide an adequate seal and thus provide rapid replacement of inner containers 24. The paint can may have or be provided with handle hinge protrusions or ears 42 to enable adaptation to the ring latches 43.

At the interior of the glovebox 11, a plug cover 15, which may be fitted over the opening of passageway 14 as shown in FIG. 3, may include a circumferential cut-out or recess 16 area forming a stopper flange 17 and a grip flange 18 thereby enabling easy grasping and handling of the plug cover 15 with gloved hands. Plug cover 15 may also include an aperture 19 extending through the plug cover 15 providing means for evacuation and maintenance at controlled atmosphere of tubular passage chamber 14 and any chamber or container coupled to passageway 14 at the exterior end of the tubular member 13. Aperture 19 size is determined by the use which is to be made of the glovebox but is preferably sufficiently small so as to minimize or prevent passage of fluids or solids into conduit or tubular passage chamber 14 and any chamber communicating therewith without blocking desired evacuation of passageway 14. Aperture 19 diameters which have been used are from about one-eighth inch to about one-quarter inch. Plug cover 15 may also include two or more raised guide ridges 20 on surface 21 of plug cover 15, said surface may extend into passageway 14 to provide easy insertion and removal of plug cover 15 into tubular member passageway 14. For this purpose, underside wall 22 of the bottom flange 17 of the plug cover 15 is in flush fit relationship with the end wall 23 of the tubular passage member 13 so as to eliminate fluid or solid passage therebetween.

To use this invention after it is installed, latch means 47 may be released allowing the metal housing 41 to be removed. An inner container 24 of predetermined size is positioned on the inner container base 30 and the metal housing 41 replaced. When a specimen (not shown) is ready to be removed, the plug cover 15 is raised and the sample slipped into the tubular passageway 14. The plug cover 15 may then be replaced, or if preferred, left open to assure continuous evacuation of the conduit into the glovebox because of the negative pressure within the glovebox, thereby also preventing passage of fluids to external environment during inner container 24 exchange. Latch means 47 may then be released, and the housing 41 and inner container 24 then removed and processed as required. Because of the small aperture 19 in the plug cover 15, the environment within the glovebox 11 is not objectionably af-

fected and, in turn, neither is there contamination of the environment external to the glovebox. Another inner container 24 may then be put into appropriate position and clamped in place by biased plate 30, the housing 41 mated with the annular cover 49, and latch means 47 closed around the protrusions 42 of metal housing 41. The plug cover 15 then, at the operator's option, may be removed and replaced in order to quickly purge the sample removal device 10. Although plug cover 15 has been described as having an aperture 19, the same effect may be realized by not having said aperture 19 in cover 15 but by having a conduit or tubular member 32 communicating between conduit 13 and the internal environment of glovebox 11 as shown in FIG. 4. Member 32 may be of any suitable length and inner diameter, and one-half inch long members with about one-eighth inch to about one-quarter inch inner diameters have been successfully used.

The sample removal device 10 may be made from any suitable material compatible with the glovebox wall 12 of the glovebox 11 and with the materials to be handled or treated. Examples of materials which lend themselves to this use are aluminum, stainless steels, carbon steels, nonferrous metals, plastic lined ferrous and nonferrous materials, etc. The inner container may be made of a suitable material such as paper, plastic, cardboard, metal, etc.

It will be apparent to those skilled in the art that this invention is not limited to the configuration illustrated in the drawings and that it may be modified to be incorporated into any conventional glovebox design. For example, the sample removal device 10 may be installed in an existing access port so as not to penetrate a glovebox wall and to facilitate installation of the device. The sample removal device 10 may be readily employed with gloveboxes or dryboxes having a plurality of walls, as in FIG. 4, or through gloveboxes which incorporate shielding materials in the space 26 between glovebox walls 27, 28 as for example, neutron shielding materials such as steel and iron balls with water interspersed, or such as gelled water solutions as shown in FIG. 4, wherein gelling may be provided by several means such as polyacrylamides, gelatine and gelatine derivatives, and inorganic silica sols.

It must be further noted that the latching means presented in the drawing and described herein does not limit the invention to the particular latch means described. For example, the latch means may be incorporated on the housing with the latch mating portion on the housing mating component. It is possible also to use latch means that enable the housing to be removed and slipped into position without complete removal of the housing and by the use of clip type latch means.

Neither is this invention to be limited to the removal of samples since by the use of a short passageway, a hook type tool or other grasping device, samples could be placed into the glovebox without difficulty by means of the sample removal device hereinabove described.

Sample removal devices of this construction have been successfully used in the processing of plutonium and related materials. The use of this device minimizes hazards of combustion and of contamination of work areas, facilitates the maintenance of the environment within the work chamber, and minimizes knocking down or dropping sample containers, which factors are of importance in processing of nuclear materials.

What is claimed is:

1. A glovebox sample removal device comprising a conduit penetrating a glovebox wall, laterally extending flange means carried by said conduit exteriorly of said wall, means for removably retaining an inner container in sealed mating engagement with said flange means such that said conduit and said inner container form a continuous aligned passageway to receive samples through said conduit from within said glovebox, cover means, having a hole therethrough, rigidly attached to the exterior of said flange means, with said hole being in alignment with said passageway, for sealing engagement with a housing generally surrounding said inner container, and latch means rigidly connected to said flange means, coacting with a projection on said housing for removably holding said housing in sealing engagement with said cover means and surrounding said

inner container.

2. The device of claim 1 wherein said cover means includes an annular protruding sealing ridge and said housing has an annular canal for mating with said annular protruding ridge for sealing engagement therewith.

3. The device of claim 1 together with a plug carried by said conduit within said glovebox.

4. The device of claim 3 wherein said plug has an aperture therethrough to allow evacuation of said conduit and said inner container, and said plug has raised ridges on the periphery thereof for guiding said plug to conduit covering position.

5. The device of claim 4 wherein said aperture diameter is from about one-eighth inch to about one-quarter inch.

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