

(12) UK Patent Application (19) GB (11) 2 028 161 A

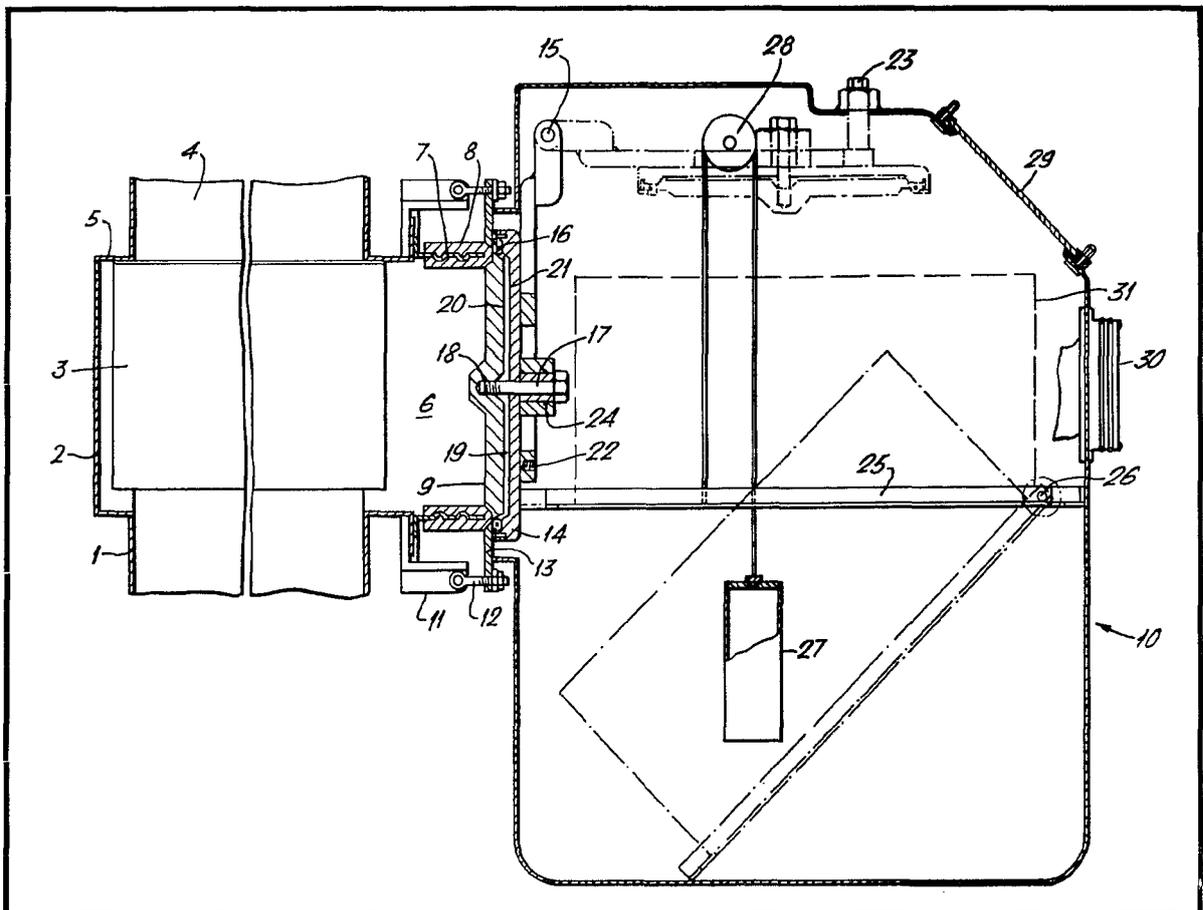
- (21) Application No 7833360
- (22) Date of filing
15 Aug 1978
- (23) Claims filed
15 Aug 1978
27 July 1979
- (43) Application published
5 Mar 1980
- (51) INT CL³ B01D 46/00 //
B25J 21/02
- (52) Domestic classification
B1T 1702 1709 CH
B4Q 9
- (56) Documents cited
None
- (58) Field of search
B1T
- (71) Applicant
United Kingdom Atomic
Energy Authority
11 Charles II Street
London
SW1Y 4QP
- (72) Inventor
Stanley Hackney

(74) Agents
M A Thacker

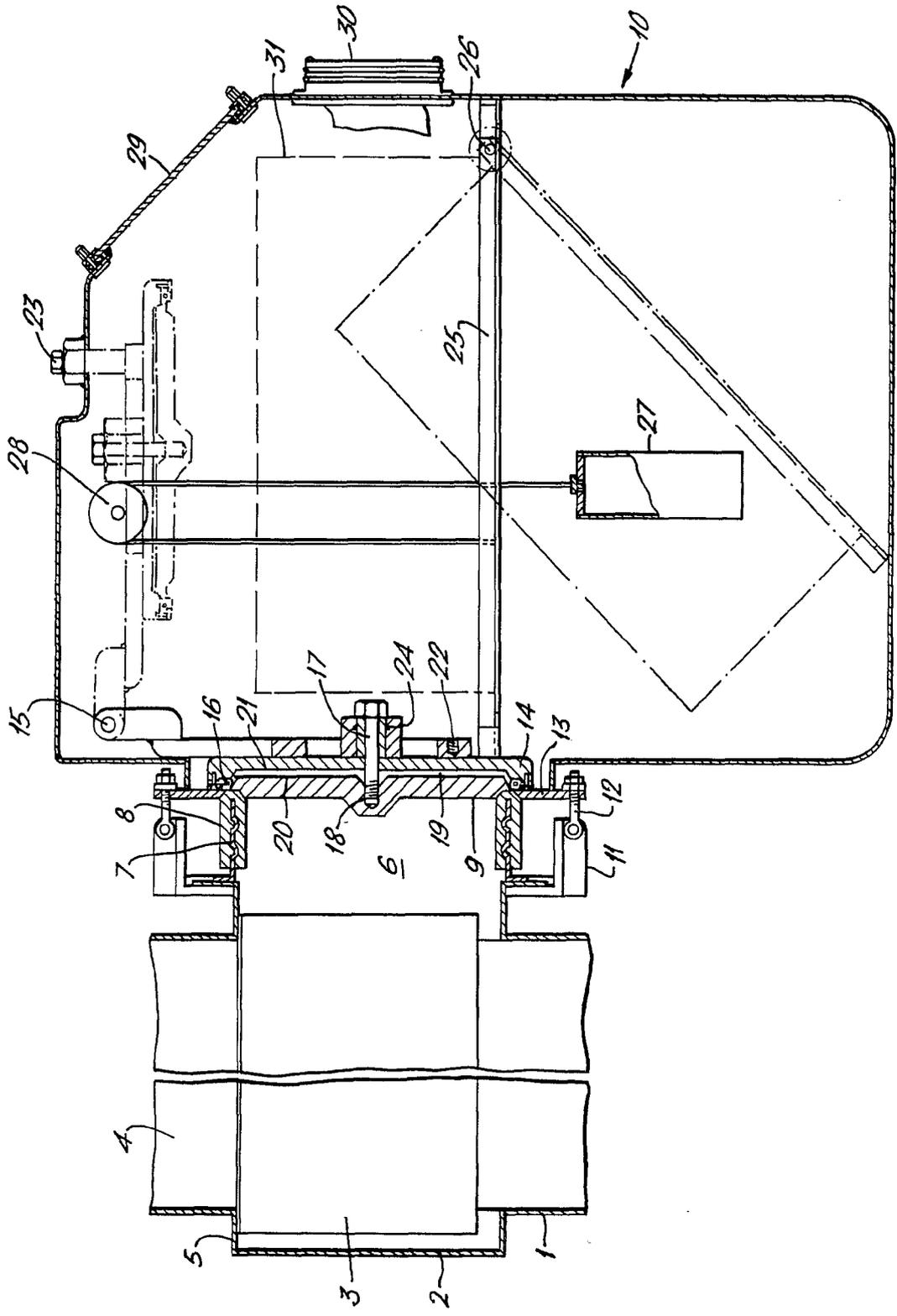
(54) Changing ventilation filters

(57) A filter changing unit 10 has a door 14 which interlocks with the door 9 of a filter chamber 2 so as to prevent contamination of the outer surfaces 20, 21 of the doors by radioactive material collected on the filter element and a movable support 25 which enables a filter 3 after removal from the filter chamber thereonto to be stored within the unit in such a way that the doors of the unit and filter chamber can be replaced. The door 14 pivots about point 15 and interlocks with door 9 by means of bolt 17, a seal 16 around the peripheral lip of door 14 engaging the periphery of door 9 to seal gap 19. Support 25 pivots about point 26 into a

lower filter element storage position. Inspection windows 29 and glove ports 30 are provided. Unit 10 is releasably connected to the filter chamber by bolts 12 engaging in a flange 11 provided around opening 6.



GB 2028 161 A



SPECIFICATION

Changing ventilation filters

5 This invention relates to the changing of ventilation filters and has one application in the changing of ventilation filters for use in installations handling radioactive materials.

10 In installations handling radioactive materials the atmosphere is filtered to remove particulate material to protect the operators within the installation from exposure to radioactivity and to prevent the egress of radioactive particles from the installation. In use the filters
15 collect radioactive materials and therefore when the filter is to be changed the change must be made in such a way that the exposure to radioactivity of the operator making the change is as low as possible and that the
20 redispersal of the material on the filter is prevented. It is also important that the amount of contaminated waste produced during the changing operation is kept to a minimum.

25 According to a first aspect of the present invention there is provided an assembly for changing ventilation filters in an installation wherein the filters are located, in use, in a filter chamber having an opening, closable by
30 a first removable cover, through which a filter can be removed or inserted, the assembly comprising a casing having an opening with a second removable cover for sealingly closing the opening in the casing, means for connecting the casing to the filter chamber with said
35 openings in alignment, means to interlock first and second removable cover to enclose those surfaces of the covers which are exposed to the environment when the casing with the
40 opening closed by the second cover and the filter chamber closed by the first cover are separated, means within the casing for storing the interlocked covers when they have been removed from their respective openings and a
45 support member movable within the casing from a first position in which it is able to receive a filter passing from the filter chamber into the casing to a second position in which the interlocked covers can be replaced in the
50 openings when a filter is supported on the support member.

According to a second aspect of the present invention there is provided a method of changing ventilation filters in an installation
55 wherein the filters are located, in use, in a filter chamber having an opening, closable by a first removable cover, through which a filter can be removed or inserted, said method including the steps of removing a filter from
60 the filter chamber by connecting to the filter chamber a casing having an opening closed by a second removable cover, the connection being made so that the opening in the casing is aligned with the opening in the filter chamber,
65 interlocking the first and second covers to

enclose those surfaces of the covers which are exposed to the environment when the casing with its opening closed by the second cover and the filter chamber closed by the first
70 cover are separated, removing the interlocked covers from the openings, withdrawing the filter to be removed from the filter chamber through the aligned openings into the casing, receiving the filter on a support member located in a first position in which it is able to
75 receive a filter passing through the opening, moving the support member to a second position in which the interlocked covers can be replaced in the openings, replacing the interlocked covers in their respective openings and separating the interlocked covers.

The invention will be illustrated by the following description of an assembly for and a method of changing ventilation filters in an
85 installation handling radioactive materials. The description is given by way of example only and has reference to the single Figure of the accompanying drawings which is a cross-sectional view of the assembly.

90 In the Figure there is shown an inlet duct 1, a filter chamber 2 containing a filter 3 and an outlet duct 4. The filter 3 seats against a flange 5 around the outlet duct 4. The filter chamber 2 has an opening 6 through which
95 filters can be removed from and inserted into the filter chamber 2. The opening 6 is surrounded by an upstanding flange 7 which receives an extruded rubber seal 8. In normal use the opening 6 is closed by a chamber
100 cover 9 which seats against the seal 8. Conveniently the chamber cover 9 is manufactured from a polyethylene polymer. Because the interior of the filter chamber 2 is at subatmospheric pressure the chamber cover 9 will be
105 held in place by the atmospheric pressure outside the assembly. Additional means to hold the cover 9 in place may also be provided.

When it is necessary to remove the filter 2
110 a filter changing unit 10 is connected to a further flange 11 around the opening 6 by nuts and eye bolts 12 which fit in slots in a flange 13 around an opening in the casing of the unit 10. As the nuts are tightened on the
115 bolts 12 the flange 13 is drawn into contact with the seal 8 around the opening 6. The opening in the unit 10 is closed by a dished cover 14 which is pivoted at 15. A seal 16 around the dished cover 14 contacts the interior of the flange 13 to seal the unit 10. The
120 seal 16 also contacts the seal 8 around the opening 6 when the unit is connected to the filter chamber 2 as shown in the Figure. The dished cover 14 is penetrated by bolts 17
125 which may be received in threaded bores 18 in the chamber cover 9 to interlock the dished cover 14 and the chamber cover 9. As the bolts 17 are rotated to bring the covers 14, 9 together the chamber cover 9 is urged into
130 contact with the seal 16 around the dished

cover 14. The seal 16 prevents ingress of material into the gap 19 between the covers. Thus the surface 20 of the chamber cover 9 which is exposed to the atmosphere when the filter changing unit has been removed and the surface 21 of the dished cover 14 which is exposed when the unit has been removed are shielded from contamination. The dished cover is provided with a threaded bore 22 to receive a securing bolt to hold the interlocked covers in the horizontal position shown by the chain-dotted lines in the Figure. With the interlocked covers in this position the interior of the unit 10 is in communication with the filter chamber 2. An 'O' ring 24 prevents ingress of material where the dished cover 14 is penetrated by the bolt 17.

The unit 10 is divided internally by a support member 25 which is pivotted about a point 25 so as to be movable between a position in which it is horizontal as is shown by the solid lines in the Figure and a position in which it is inclined as is shown by the chain dotted lines in the Figure. A counter-weight 27 connected to the support member via a pulley 28 is used to balance the weight of the support member when a filter is placed on it.

The unit 10 is provided with a viewing panel 29 and has glove ports 30 to enable the operator to manipulate items within the unit without penetrating the containment. Means (not shown) may be provided to move the unit towards and away from the filter chamber and to support the unit.

The procedure for changing a filter will now be described. The unit 10 is positioned and connected to the flange 11 and the covers 9, 14 interlocked. The interlocked covers are then pivotted into the horizontal position (shown in chain dotted lines) and are secured in that position by the bolt 23. The filter 3 is located from its position contacting the flange 5 of the outlet duct and is withdrawn from the filter chamber 2 on to the support member 25. The filter in this position is shown in dotted outline 31 in the Figure. The support member 25 is then pivotted to the inclined position shown by the chained dotted lines in the Figure. With the support member in this position the interlocked covers can be released and repositioned in the openings. The bolt 17 is then released so that when the unit 10 is freed from the filter chamber 2 by releasing the nuts on the bolts 12 the unit may be removed leaving the opening 6 closed by the cover 9 and the opening in the unit closed by the dished cover 14. The surfaces 20 and 21 which become exposed as the covers are separated were shielded whilst the covers were interlocked and so no contamination is dispersed as the unit 10 is moved away from the filter chamber. The used filter is then taken away for storage or disposal. A second unit 10 is preferably used to transport

a replacement filter and to fit it into the filter chamber 2. This second unit is used so that the replacement filter is carried in a unit which has not been contaminated by a used filter.

The unit 10 is used each time a filter is changed. Heretofore filters have been changed using a system in which they are transferred to bags conveniently manufactured from polyvinylchloride polymers. The use of such bags in an installation handling radioactive materials results in the generation of large quantities of contaminated waste which must be stored and disposed of. The use of the unit 10 obviates this waste.

The use of the pivotted support member 25 within the unit 10 enables the unit 10 to be made only slightly larger than the filter 3. This facilitates handling of the unit 10 and enables adjacent banks of filters in a large installation containing many filters to be located closer together.

CLAIMS (27 Jul 1979)

1. An assembly for changing ventilation filters in an installation wherein the filters are located, in use, in filter chambers each having an opening closed by a first movable cover through which a filter can be removed or inserted, the assembly comprising a casing for receiving the filter, the casing having an opening with a second movable cover for sealingly closing the opening in the casing, means for releasably connecting the casing to the filter chamber with said openings in alignment, means to interlock the first and second movable covers to enclose those surfaces of the covers which are exposed to the environment when the casing with the opening closed by the second cover and the filter chamber closed by the first cover are separated, means within the casing for storing the interlocked covers when they have been moved from their respective openings and a support member movable within the casing from a first position in which it is able to receive the filter passing from the filter chamber into the casing to a second position in which the interlocked covers can be replaced in the openings when the filter is supported on the support member.

2. An assembly as claimed in claim 1 in which the second cover is pivotally mounted on a support in the casing for movement between the closed position and the stored position.

3. An assembly as claimed in claim 1 or 2 including retaining means for holding the interlocked covers in the stored position.

4. An assembly as claimed in any preceding claim in which the second cover has a peripheral lip with a seal around the lip to engage the periphery of the first cover when the covers are interlocked.

5. An assembly as claimed in any preceding claim in which the support member com-

prises a platform pivotally mounted within the casing.

6. A method of changing ventilation filters in an installation wherein the filters are located, in use, in a filter chamber having an opening closable by a first movable cover through which a filter can be removed or inserted, the method including the steps of removing a filter from the filter chamber by connecting to the filter chamber a casing having an opening closed by a second movable cover, the connection being made so that the opening in the casing is aligned with the opening in the filter chamber, interlocking the first and second covers to enclose those surfaces of the covers which are exposed to the environment when the casing with its opening closed by the second cover and the filter chamber closed by the first cover are separated, removing the interlocked covers from the openings, withdrawing the filter to be removed from the filter chamber through the aligned openings into the casing, receiving the filter on a support member located in a first position in which it is able to receive a filter passing through the opening, moving the support member to a second position in which the interlocked covers can be replaced in the openings, replacing the interlocked covers in their respective openings and separating the interlocked covers.

7. An assembly for changing ventilation filters in an installation substantially as herein described with reference to and as illustrated in the accompanying drawing.

8. A method of changing ventilation filters in an installation substantially as herein described with reference to the accompanying drawing.