

(12) **UK Patent Application** (19) **GB** (11) **2 294 923** (13) **A**

(43) Date of A Publication **15.05.1996**

(21) Application No **9421534.0**

(22) Date of Filing **26.10.1994**

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(51) INT CL⁶
G01N 1/02

(52) UK CL (Edition O)
B8N NTA

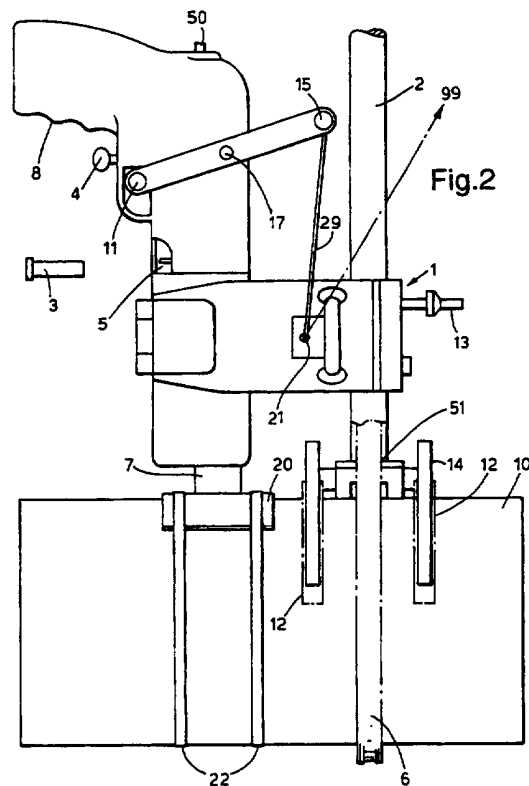
(56) Documents Cited
None

(58) Field of Search
UK CL (Edition M) **B8N NTA NTB , F2P PTBM**
INT CL⁵ **F16L 55/124 55/168 55/17 , G01N 1/02**
ONLINE DATABASES:WPI

(54) **Sampling kit**

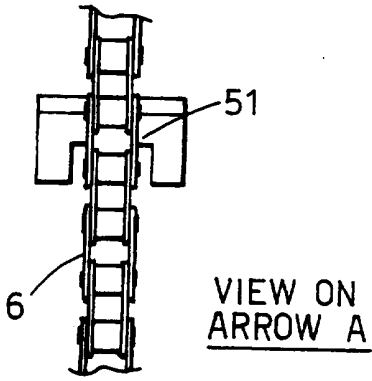
(57) The current invention concerns a portable sampling kit that provides a safe working environment for a technician engaged in the collection of samples of very toxic or extremely hazardous materials. The sampling kit consists of a stand (1) comprising a pillar (2) a saddle (14) and a tensioning chain (6); an opening device (8) and a sampling system (30, 32 Figure 7).

The stand (1) allows attachment of the opening device (8) to a container (10) such as a barrel or drum and permits remote piercing of the container (10) with minimal dispersal of the contents if present of the container; and permits the sampling system to obtain a sample (38) of the contents of the container (10). A rubber septum 20 is used to prevent unwanted escape of the contents of the container 10.



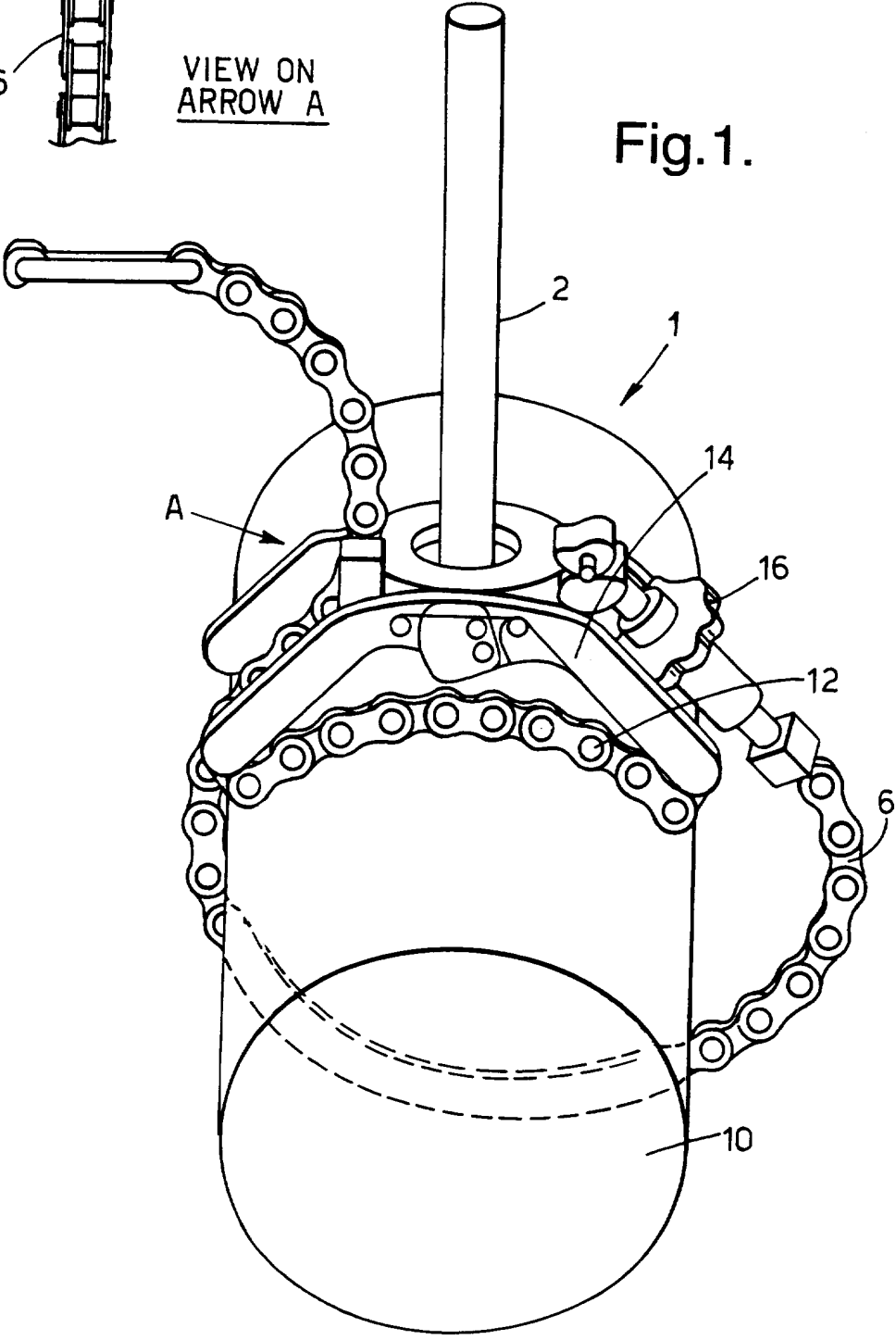
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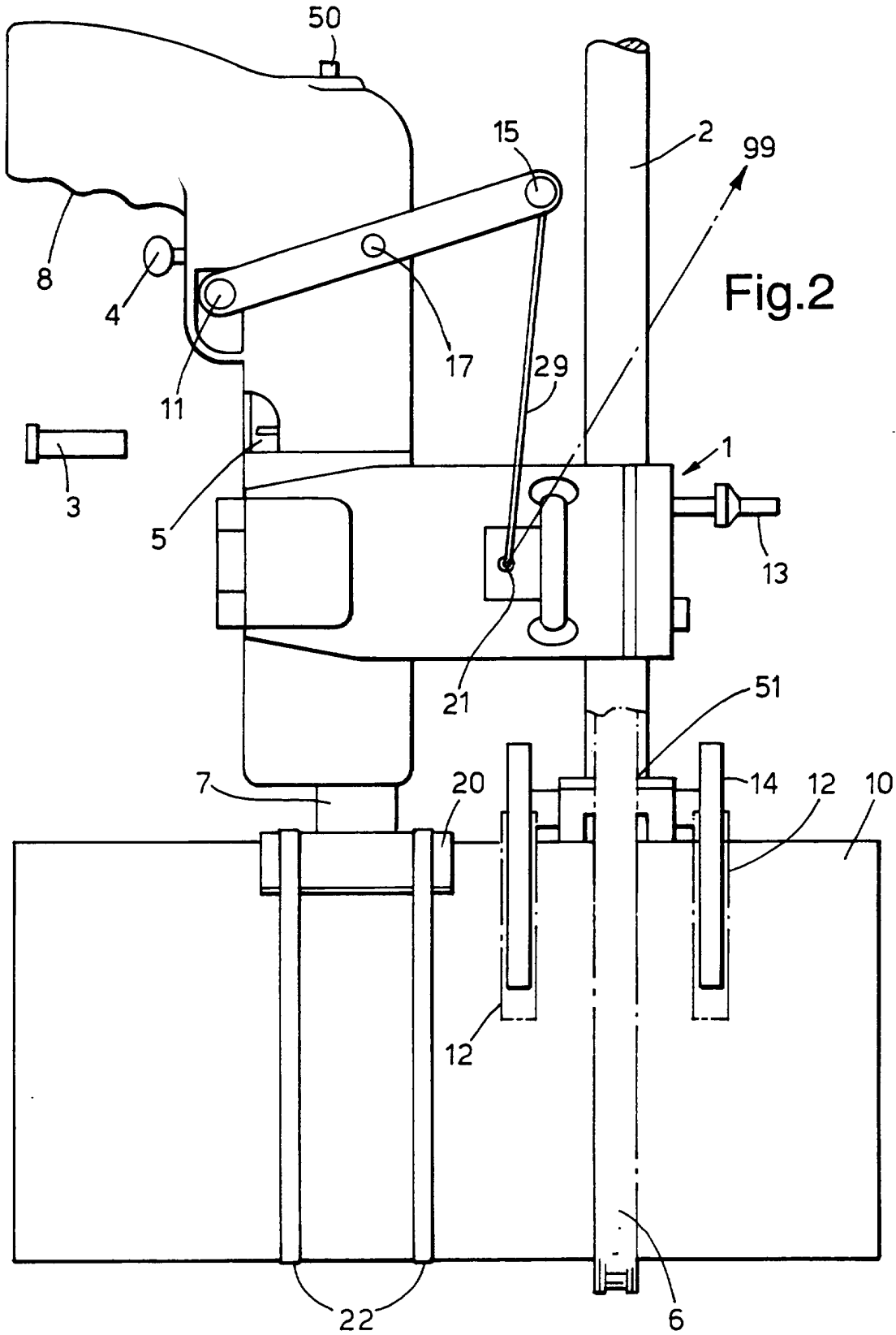
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VIEW ON
ARROW A

Fig. 1.





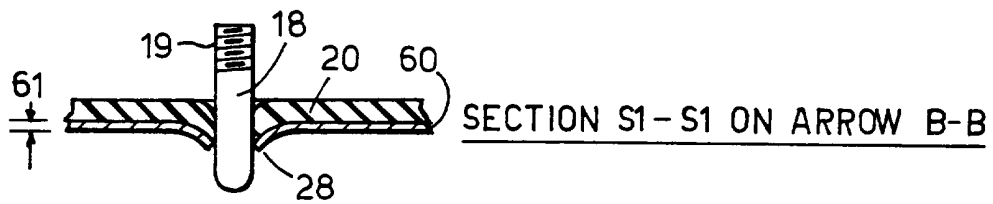
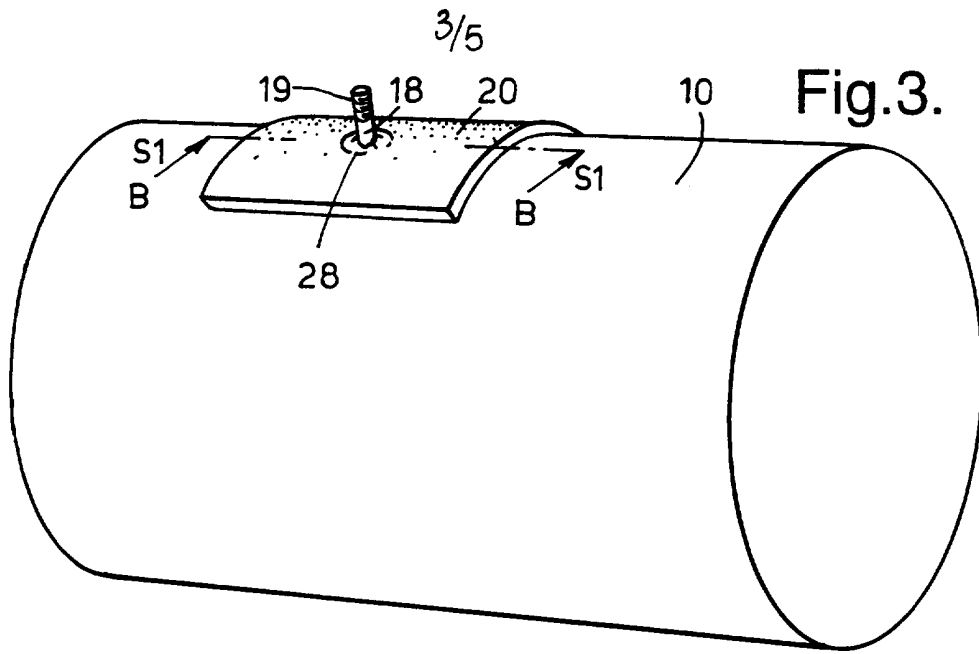
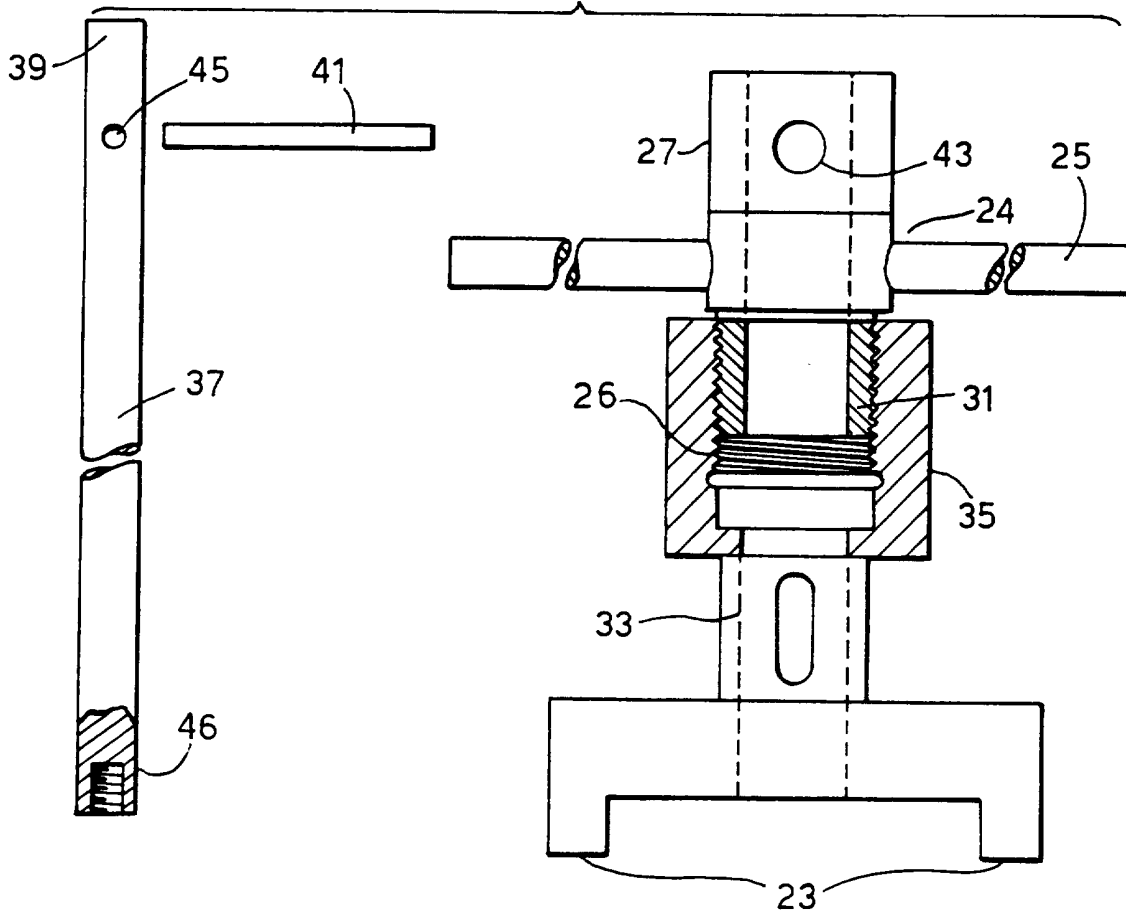


Fig.4



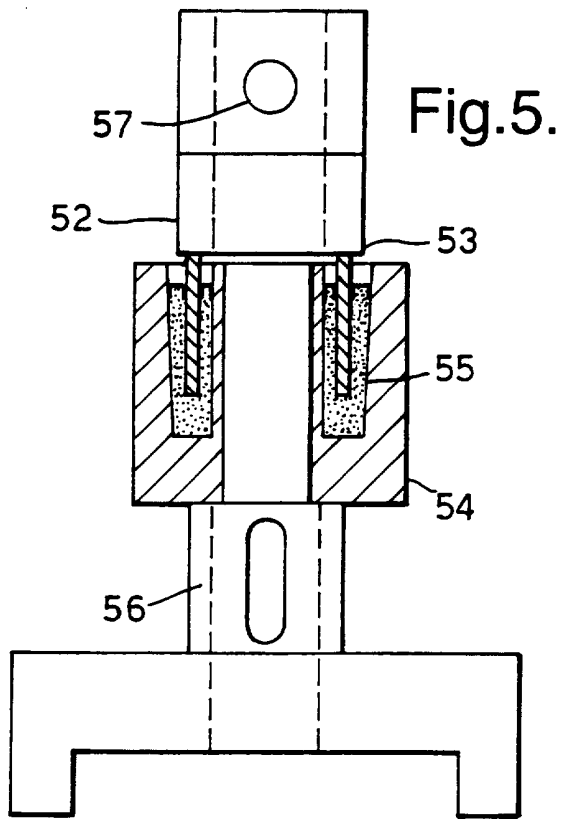


Fig. 8.

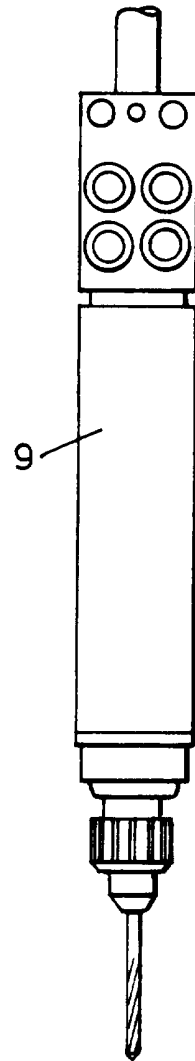
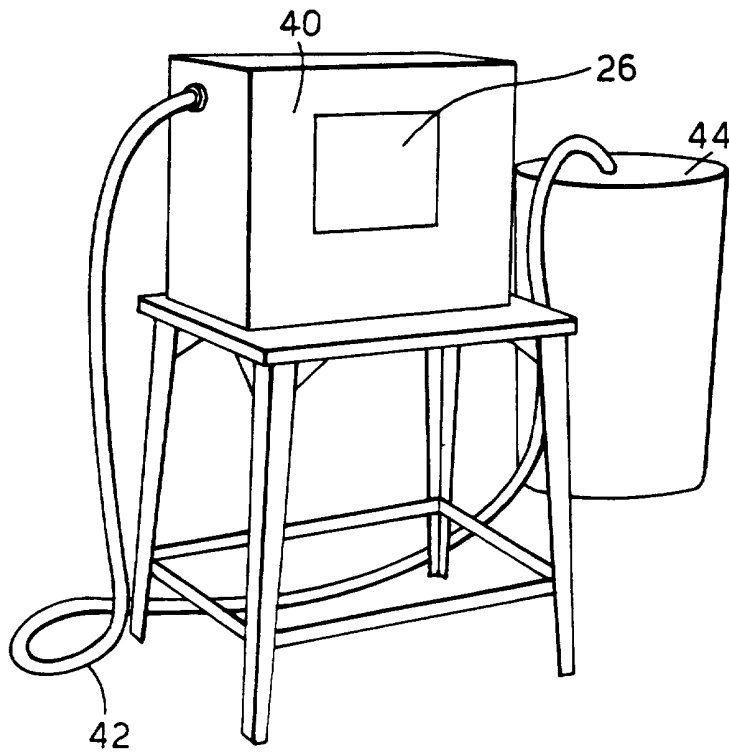
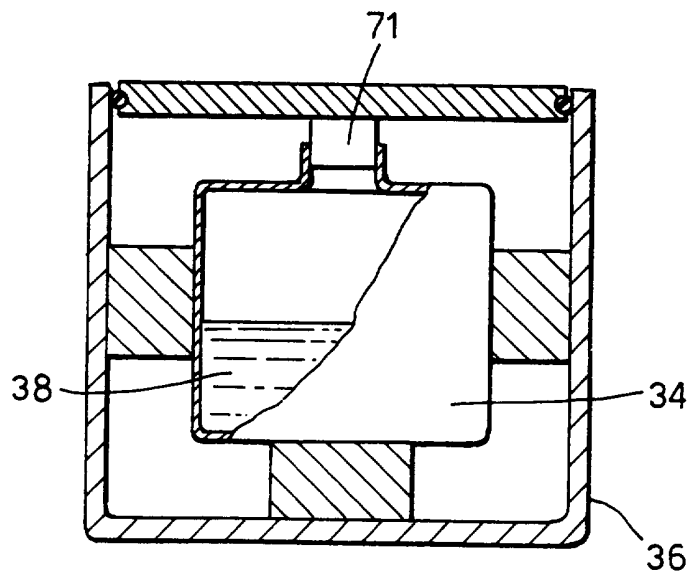
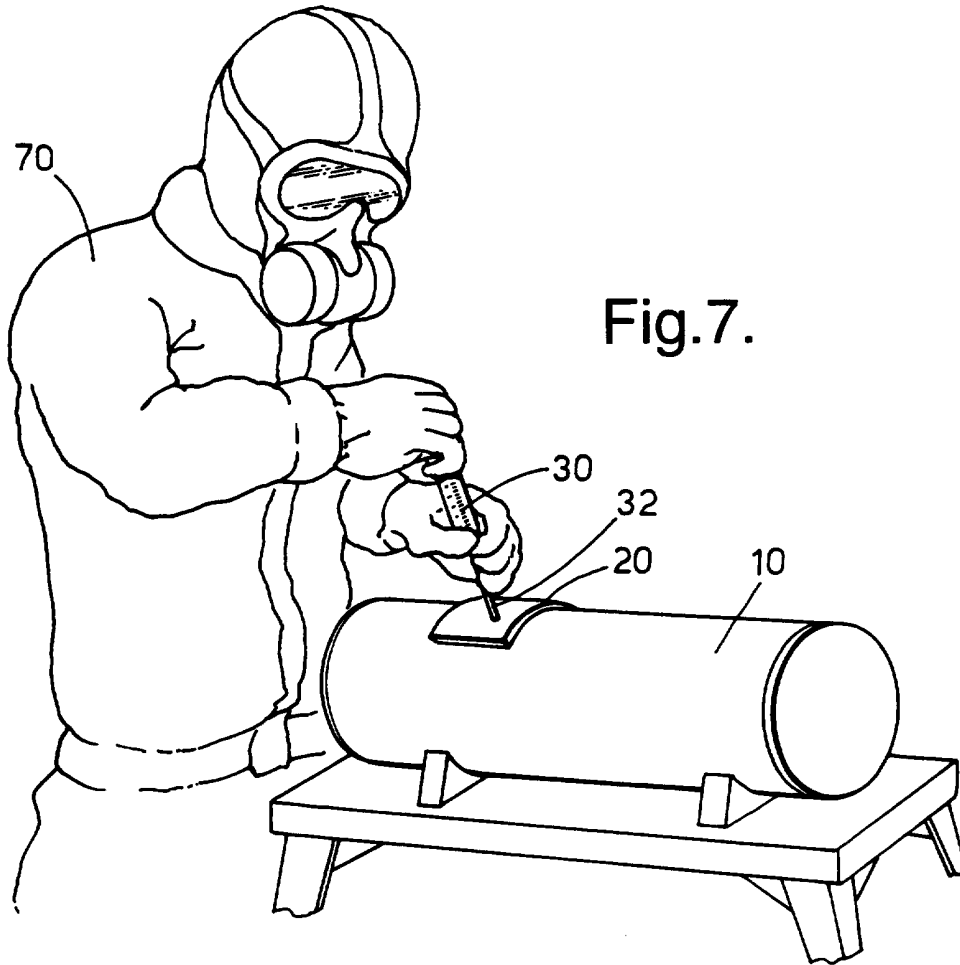


Fig. 6.





A SAMPLING KIT

The current invention relates to disposal of dangerous materials, and especially to the disposal of materials that are hazardous to health.

05 In particular the current invention concerns a sampling kit that provides a safe working environment for a technician engaged in the collection of samples of very toxic or extremely hazardous materials.

In circumstances where hazardous materials are about
10 to be disposed of, it is often the case that there is no evidence of their actual identity. Containers of hazardous materials may be confused with containers of non-hazardous materials with the possibility of disastrous consequences.

15 Known systems for the collection of samples of very toxic materials range from lorry mounted and factory based opening devices to mass production cryogenic crushing processes.

A disadvantage of the known systems is that they may
20 not be readily transportable to the site where the containers of hazardous materials are stored. Also they may be inconvenient for use by technicians dressed overall in protective clothing.

Another disadvantage is that they may not be adapted
25 to particular situations which require the technician to select a particular procedure dependent on the information available on the contents of the containers to be sampled. A change in procedure may be desirable dependent on, for example, whether the contents are in the form of solid,
30 powder, liquid or gas; or whether the contents are at a pressure exceeding the ambient pressure.

The technical difficulties of obtaining samples of very toxic materials due for destruction are such that it is well known for no action to be undertaken to destroy
35 stored hazardous materials that have been abandoned.

The problem in the United Kingdom has recently been exacerbated by the passing of new anti-pollution legislation in 1991.

According to the current invention a sampling kit is provided having a stand attached to a band; an opening means attached to the stand; and a sampling means; arranged so that the band enables the clamping of the stand to a container of any size or shape to provide a secure support for the stand and the opening device; and so that operation of the opening means pierces a wall of the container with minimal dispersal of the contents if present of the container; to allow the sampling means to extract a sample of any contents if present in the container.

The advantages of the current invention is that it is portable especially it is man and air-portable. This is beneficial in that the sampling kit can be taken to the container that requires sampling; rather than taking the container to the sampling kit, a procedure that is potentially hazardous. Portability is achieved by the container automatically providing a stable platform for the stand and opening means; obviating the need for substantial equipment to be transported to the container.

According to another aspect of the invention opening means is an air or electrically operated drill capable of piercing the wall of the container; or a stud gun capable of explosively firing a stud into the wall of the container. These opening devices have the advantage that they can be remotely actuated at a safe distance from the container.

According to yet another aspect of the invention a septum of flexible material attached to the wall of the container so that the drill or the stud pierces the septum before piercing the wall of the container the properties of the septum being chosen to allow, on removal of the

drill or the stud, hole made in the container to reseal. The septum thus permits the breaching of a container with minimal dissipation of the contents of the container into the atmosphere.

05 According to yet another aspect of the invention when the container has been breached a hand held syringe with a hollow needle allows a sample of the contents of the container to be removed from the container to a receptacle contained with a protective enclosure. The advantage of
10 this method is its ease of use by a technician dressed overall in protective clothing. For this task it is found in practice that needles of the necessary length may be cut from a stock of hollow tubing of a suitable diameter.

According to yet another aspect of the invention
15 band securing the stand to the container is a length of chain attached to one side of the stand, that wraps around the container, locking the chain in position on an opposite side of the stand; and is tightened by an adjuster. The advantage of this method of attachment is
20 that it resists the relatively high shock loads imparted by the firing of the stud gun and also provides a secure support for the drill without the need for additional equipment.

One way of carrying out the invention will now be
25 described, by way of example only, with reference to the accompanying diagrammatic drawings of which:

Figure 1 is a perspective view of a pillar and chain tensioned saddle attached to a container,

Figure 2 is a side elevation of a stud gun mounted
30 on the pillar,

Figure 3 is a perspective view of a stud after firing into a container shown protruding through a septum,

Figure 4 is an elevation of a manually operated device for extraction of the stud,

Figure 5 is an elevation of an hydraulically device for extraction of the stud,

Figure 6 is a perspective view of the container in a fume hood awaiting removal of the stud,

05 Figure 7 is a perspective view of a sample being taken from the container,

Figure 8 is a elevation of an air operated drill, an alternative opening device to the stud gun.

The sampling kit consists of three main assemblies:

10 a. A stand generally shown by the numeral 1, comprising a pillar 2, a saddle 14 and tensioning chain 6 (Figure 1),

b. An opening device 8, 9 (Figure 2 and Figure 8), including a stud removal device 24, 51 (Figures 4 and 5),
15 and a protected venting enclosure 40 (Figure 6),

and c. A sampling system 30 and 32 (Figure 7).

Referring to Figure 1, the stand 1 is designed to clamp to a container 10 of any size or shape and thereby to provide a mount in the form of a pillar 2 for the
20 opening device 8 selected to open the container 10.

Two support chains 12, attached to a saddle 14 that is in turn attached to the pillar 2, allows the stand 1 to sit on any shape or size of container 10. Clamping of the saddle 14 to the container 10 is achieved by the third
25 tensioning chain 6, that wraps around the container 10 and is tightened by a hand wheel 16. In trials of the sampling kit a commercially available double linked pipe wrench has been found suitable for use as the tensioning chain 6.

30 Referring to Figure 2, the pillar 2 and opening device 8 is shown securely attached to a container 10.

It has been found in trials that a suitable opening device 8 is a commercially available industrial stud gun manufactured by RAMSET (TM).

The RAMSET (TM) of stud gun 8, provides a convenient and easy method of opening containers 10 where wall thicknesses do not exceed 10mm of steel. However, other similar guns of comparable performance could be used. The
05 RAMSET (TM) stud gun 8, uses a 5.588mm (0.22 inch) diameter cartridge explosive charge 3 to fire a bullet shaped stud 18 that has a threaded base 19 into the casing of the container 10. A breech 5 is activated by a half turn of the stud gun 8, this allows the stud 18 and the
10 cartridge 3 to be loaded in to the breech 5. A variety of charge weights are available corresponding to the predicted or measured wall thickness of the container 10. In practice the thickness 61 of the wall 60 of the container 10 may be measured with a thickness meter using
15 a non-destructive method, such as an eddy-current meter.

The stud gun 8 has two stages of arming that prevent the stud gun being used as an offensive weapon. Firstly, a front portion 7 of the stud gun 8 must be pressed against a non-resilient surface; causing the a indicator
20 button 50 to project from the stud gun 8. Secondly, a safety pin 9 must be removed to allow a trigger 11 to be moved. A thumb screw 13 locks stud gun to the pillar with the front portion 7 pressed against the container 10. The lever 15 pivots about a fulcrum 17 so that the trigger can
25 be operated remotely by a lanyard 19 attached the lever 15 and threaded over a roller 21. The remote end of the lanyard terminates near to a firing point 30.

Referring to Figures 2 and 3 the stud 18, with a threaded portion 19, is fired through a rubber septum 20.
30 The septum 20 is adhesively bonded to the container 10 or attached to the container by steel banding 22. The stud 18 forms a hole 28 in a wall 60 of thickness 61 in the container 10.

Referring to Figure 4 and Figure 5, the stud can be extracted by a mechanical extractor 24 (Figure 4) or a hydraulic extractor 52 (Figure 5). The mechanical extractor 24 is more suited to manual operation, and the
05 hydraulic extractor 52 is more suited for use where remote operation is desired.

The mechanical extractor 24 consists of a body 27 with an external threaded portion 31 that engages with an internal threaded portion 33 of a body 35. In practice
10 the threaded portions 31 and 33 may be of opposite hand to the threaded portion 19 of the stud 18. An internal bore 33 allows one end 35 of an extraction tool 37 to be attached to the threaded end 19 of the stud 18. The other end 39 of the extraction tool 37 is then inserted into the
15 internal bore 33 and anchored by a pin 41 in the bore 43 and the bore 45. Rotation of the handle 25 causes the stud 18 to be withdrawn from the container 10 by reaction of feet 23 against the container 10.

The hydraulic extractor 52 can be substituted for
20 the mechanical extractor 24. The hydraulic extractor 52 consists of a piston body 53 and a cylinder body 54; arranged so that a chamber 55 formed between the piston body 53 and the cylinder body 54 can be pressurised by an hydraulic fluid. The extraction tool 37 can be inserted
25 into a bore 56 and the pin 41 into a bore 57 and used to withdraw the stud 18 from the container 10 by pressurising the chamber 55.

The rubber septum 20 provides a seal to prevent leakage of the contents of the container 10. This is
30 especially necessary where the contents of the container 10 are under pressure of up to 1 barr above the ambient pressure.

For containers 10 where the wall thickness is about 2mm to 10 mm it has been found that a seal is not necessary and that the stud 18 self seals the hole 28 in the container 10.

05 The alternative opening system utilises a DESOUTER (TM) automatic feed drill 9 shown in Figure 7 driven by an air motor. Automatic feed drills driven by electric motors may also be used, although the automatic feed is usually air operated.

10 In order to minimise the risks to the technician air powered drills are preferred.

Referring to Figure 7 the method for sampling method of sampling the contents of the container 10 utilises a syringe 30, with a long steel hollow needle 32 and a well 15 stoppered receptacle 34 that for the sample 38 carried within an associated lidded steel enclosure 36.

Where the contents of the container 10 are liquid the syringe 30 has proved satisfactory. Contents in other forms such as powders require a modified procedure 20 depending on the physical characteristics of the contents.

One method of using of the sampling kit will now be described referring to the above mentioned drawings.

As much of the available information on the containers 10 and their contents that are due for disposal 25 should be assessed and reviewed. X-ray examination of the container 10 may be beneficial in order to assess the optimum position to penetrate the container 10.

The preliminary information, where available, is used to select the point for penetration of the container 30 case 10. At this point the rubber septum 20 if used is secured to the container 10 and the pillar 2 and saddle 14 fixed to the container 10 so that the stud gun 8 will penetrate the centre of the septum 20 at the preselected spot.

The pillar 2 and saddle 14 is placed on the container 10 so that the stud gun 8 will be correctly positioned above the septum 20. The chain 6 is then tightened in position using the wheel 16 attached to one
05 end of the chain 6. The other end of the chain 6 is engaged in a slot 51 in the saddle 14. The selected stud gun 8 is secured to the pillar 2 and the remote control lanyard 19 laid in an up wind position and terminated at the firing point 30 preferably behind splinter proof
10 protection or hide. The stud gun 8 is operated and any pressure is allowed to dissipate before approaching the container 10. An alternative to atmospheric venting where conditions permit is shown in Figure 5 in which venting is allowed to occur inside a hood 40 which in turn is vented
15 through a tube 42 to a suitable absorption tank 44. The tank 44 may be substituted for by a charcoal filter.

The opened container 10 may then be approached by a technician dressed in suitable protective clothing 70. A sample 38 of the contents of the container 10 may then be
20 taken using the syringe 32 fitted with the needle. The sample is transferred to the receptacle 34 fitted with a stopper 71. The stoppered receptacle 34 is then placed in steel enclosure 36 for transportation to a test site.

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WHAT IS CLAIMED IS

1. A sampling kit having a stand attached to a band; an opening means attached to the stand; and a sampling means; arranged so that the band enables the clamping of the stand to a container of any size or shape to provide a secure support for the stand and the opening device; and so that operation of the opening means pierces a wall of the container with minimal dispersal of the contents if present of the container; to allow the sampling means to extract a sample of any contents if present in the container.

2. A sampling kit as claimed in claim 1 wherein the opening means is a air or electrically operated drill capable of piercing the wall of the container.

3. A sampling kit as claimed in claim 1 wherein the opening means is a stud gun capable of explosively firing a stud into the wall of the container.

4. A sampling kit as claimed in any one of the preceding claims wherein the opening means includes a septum of flexible material attached to the wall of the container so that the drill or the stud pierces the septum before piercing the wall of the container the properties of the septum being chosen to allow, on removal of the drill or the stud, hole made in the container to reseal.

5. A sampling kit as claimed in any one of the preceding claims wherein the drill or the stud gun is capable or remote operation.

6. A sampling kit as claimed in any one of the preceding claims where the sampling means is a hand held syringe and a hollow needle to allow a sample of the contents of the container to be removed from the container to a receptacle contained with a protective enclosure.

7. A sampling kit as claimed in any one of the preceding claims where the band is a length of chain attached to one side of the stand, that wraps around the container, locking the chain in position on an opposite side of the stand; and is tightened by an adjuster.

8. A method of obtaining a sample of the contents of a container using a sampling kit including the steps of:
examining the container to select a position to penetrate the container;
measuring a wall thickness of the container at the pre-selected position;
attaching a flexible septum to the container;
placing a stand on the container;
threading a chain attached to a side of the stand around the container;
locking the chain in position an opposite side of the stand;
tightening the chain to secure the stand to the container;
attaching a stud gun to the stand so that a stud fired from the stud gun will penetrate the centre of the septum at the pre-selected position;
selecting a cartridge weight dependent on the thickness of the wall to be penetrated;
firing a stud from the stud gun remotely;
fitting a hydraulic extractor onto the stud protruding from the container;
removing the stud inside a hood to prevent the dissipation of any of the contents of the container if present;
taking a sample of the contents of the container using a syringe fitted with a hollow needle;
transferring the sample to a receptacle fitted with a stopper;
and placing the receptacle in an enclosure.

9. A method of obtaining a sample of the contents of a container using a sampling kit including the steps of:
- examining the container to select a position to penetrate the container;
 - attaching a flexible septum to the container;
 - placing a stand on the container;
 - threading a chain attached to a side of the stand around the container;
 - locking the chain in position an opposite side of the stand;
 - tightening the chain to secure the stand to the container;
 - attaching a drill to the stand so that the drill will penetrate the centre of the septum at the pre-selected position;
 - piercing remotely the container with the drill;
 - fitting a hydraulic extractor onto the drill protruding from the container;
 - removing the drill inside a hood to prevent the dissipation of any of the contents of the container if present;
 - taking a sample of the contents of the container using a syringe fitted with a hollow needle;
 - transferring the sample to a receptacle fitted with a stopper;
 - placing the receptacle in an enclosure.
10. A sampling kit substantially as hereinbefore described with reference to the attached drawings Figures 1 to 8.

Patents Act 1977
 Examiner's report to the Comptroller under Section 17
 (The Search report)

Application number
 GB 9421534.0

Relevant Technical Fields

- (i) UK Cl (Ed.M) B8N NTA, NTB F2P PTBM
 (ii) Int Cl (Ed.5) G01N 1/02 F16L 55/124, 55/168, 55/17

Search Examiner
 MR S WALLER

Date of completion of Search
 19 DECEMBER 1994

Databases (see below)

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

Documents considered relevant following a search in respect of Claims :-
 1-10

(ii) ONLINE DATABASES: WPI

Categories of documents

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