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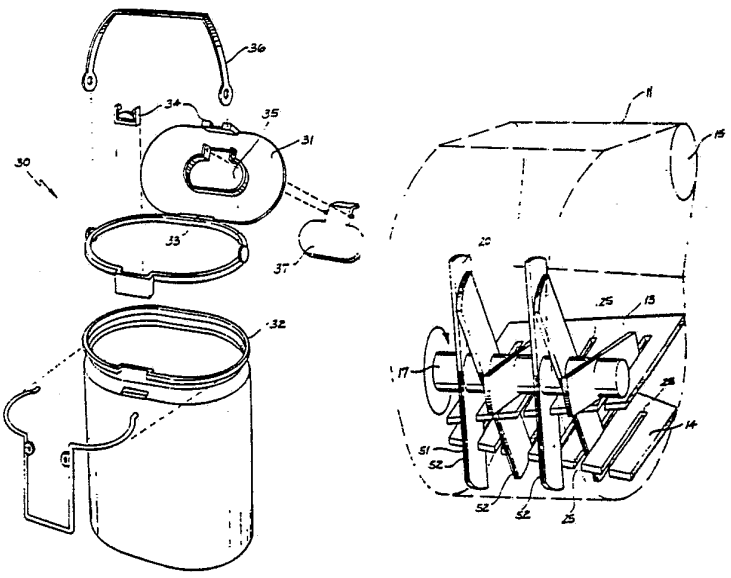
(54) Title: SHARPS DESTRUCTION AND DISPOSAL APPARATUS

(57) Abstract

The present invention relates to an apparatus and method for safe disposal of hypodermic syringes, needles and other small, contaminated instruments such as, for example, scalpel blades, stitch cutters etc. (commonly referred to as "sharps"). The apparatus firstly comprises a collection container (30) having a primary lid (31) which is movable between an open position and a closed position, and is releasably latched in the closed position. The latch mechanism (34) is adapted to be released when the container is brought into cooperation with a destructor apparatus (10). The destructor apparatus comprises a disposal receptacle (55) adapted to receive the container and unlatch the lid, and a destructor means (20, 13, 14) adapted to generally comminute the materials deposited therein. The destructor apparatus has an inlet (15) and an outlet (16), a plurality of rotating blades (20) which cooperate with two cutting plates (13, 14) which are arranged to define a flow path for the materials between the inlet and the outlet. The cutting blades and cutting plates cooperate to comminute the material by impact and cutting action. The present invention provides a convenient means of disposing of sharps generally without risk to the person handling the sharps.



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SHARPS DESTRUCTION AND DISPOSAL APPARATUS

TECHNICAL FIELD

The present invention relates to the safe disposal of hypodermic syringes, needles and other small, contaminated instruments such as, for example, scalpels blades, stitch cutters, etc. (commonly referred to as "sharps").

BACKGROUND ART

It is necessary to safely dispose of contaminated medical tools and other materials used in the medical environment. Such tools and the materials (ie sharps), or more specifically disposable percutaneous devices, have been used, they must be safely disposed of so as to avoid reuse or accidental physical contact (eg needle stick injury).

One present known method of disposing of the above mentioned contaminated materials is to place the used syringe and needle into an apparatus which merely cuts the needle (sharp) from the syringe. The needle is kept in a container portion of the apparatus for later disposal, and the syringe portion is disposed of separately.

Alternatively, in large hospitals, medical centres and pathology departments, the whole needle (sharp) and syringe is placed in any one of a variety of containers as a complete unit, along with other contaminated medical tools or instruments. These containers are then disposed of by either incineration or burial at local garbage tips. Incineration of complete syringe is difficult and often incomplete after considerable incineration time. Further, the sharps and other instruments normally collected for disposal are usually (70 - 80%) highly infectious, and may remain infectious for a considerable time even after burial.

The first mentioned known method of disposal is awkward and requires the person disposing of the syringe to dispose of the syringe portions separately to that of the needle (sharp). The second above mentioned method

of disposal requires the complete syringe and needle unit to be disposed of in one piece. Syringe and needle units are relatively bulky, and when a large number require disposal, the volume thereof can be inconveniently large.

OBJECTS OF INVENTION

It is the object of the present invention to provide apparatus which enables convenient collection of the sharps, a means of transferring the sharps into a sharps destruction apparatus which comminutes and sterilizes the sharps into a generally harmless state suitable for easy disposal by incineration or burial. A method is also defined.

DISCLOSURE OF THE INVENTION

In one broad form the present invention provides apparatus for destruction of contaminated materials such as sharps, comprising:

a sharps collection container having a primary opening and a primary lid adapted to close the primary opening in said container, said primary lid being movable with respect to the container between a closed position closing the primary opening, and an open position opening the primary opening;

said container further comprising a latch means adapted to retain the primary lid in the closed position, and to automatically release the primary lid when said container is brought into cooperation with a disposal receptacle of a destructor apparatus which is adapted to operate to said latch means.

Another broad form of the present invention provides destructor apparatus having a sharps destructor which comprises;

a geneally cylindrical chamber;

A driven rotating cutter apparatus comprising a shaft rotatably mounted in said chamber and having a plurality of cutter blades mounted at predetermined positons along said shaft so as to rotate therewith;

at least one cutter plate mounted in said chamber and having a plurality of elongate slots of prederminted width; said cutter blades being gernally aligned with respective slots in said plates and disposed to sweep therethrough;

an inlet located above said plates;

and an outlet located below said plate;

said plate being downwardly inclined from the inlet towards the outlet.

Preferably the apparatus comprises a disposal receptacle adapted to receive the container and having a projection disposed to operate the latch means of the container.

Another broad form of the present invention provides a method of disposing of contaminated medical tools, sharps and other materials, comprising:

collecting said materials in a collection container by inserting same through a primary opening in said container which is closable by a primary lid;

closing the primary opening with said primary lid which is detachably securable by a latch means into a closed position;

inverting and inserting said container in a disposal receptacle of a destructor apparatus which is adapted to release said latch mean whereby said primary lid is caused to open and discharge said material into said apparatus.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred forms of the present invention will now be described by way of example with reference to the accompanying drawings, wherein:

Figure 1 is a schematic cross-sectional view of the sharps destructor apparatus.

Figure 2 is a longitudinal side elevation sectional view of the apparatus of Figure 1.

Figure 3 is a schematic longitudinal sectional top plane view of the apparatus of Figure 1.

Figure 4 is a longitudinal sectional view of the rotating cutter means of the destructor apparatus.

Figure 5 is a top plane view of a cutter blade of the destructor apparatus.

Figure 6 is a top plane view of the upper cutter plate of the destructor apparatus.

Figure 7 is a top plane view of the lower cutter plate of the destructor apparatus.

Figure 8 is a schematic perspective exploded view of the sharps collection bin.

Figure 9 is a cross-sectional view of the lid portion of the collection bin.

Figure 10 is a schematic perspective view of the housing showing the disposal receptacle and washing receptacle.

Figure 11 is a cross sectional view of the housing of Figure 10.

Figure 12 is a schematic perspective view of the destructor chamber.

BEST MODE FOR CARRYING OUT THE INVENTION

In Figures 1 to 7 there is depicted sharps destructor apparatus 10 comprising a generally cylindrical chamber 11, a cutter means 12, an upper cutter plate 13 and a lower cutter plate 14. The chamber 11 comprises an inlet 15 located above the cutter means 12, and an outlet 16 located below the cutter means 12.

The cutter means 12 comprises a shaft 17 disposed generally parallel to the longitudinal axis of the cylindrical chamber 11, and rotatably mounted thereto by carrier bearing assemblies 18 which are fixed to the outside of the cylindrical chamber 11.

The shaft 17 projects to one side the cylindrical chamber 11 and has a

pulley 19 fitted thereto to be driven by a vee belt drive from an electric motor (not shown) located within the housing 50.

A plurality of cutter blades 20 are mounted along the shaft 17 at predetermined intervals. The cutting blades 20 are fitted to and held in place by collars 21, and a square key 22 provided on the shaft 17 engages key-ways 24 in the collars 21 and blades 20. The collars 21 and blades 20 are clamped together using a castellated nut 22 which is locked into position with split-pin 22a.

Each of the blades are provided with a central aperture 23 to receive the shaft 17, and a square key way 24 adapted to receive the square key 22 of the shaft 17. There are provided three types of blades 20, each respectively having the key way 24 orientated approximately 120° angularly away from that of the other two blades 20. Each of the three types of blades 20 are positioned sequentially along the shaft so that each respective blade 20 extends in a direction 120° angularly displaced from the adjacent blade 20. The preferred embodiment depicted in the drawings is provided with six cutting blades 20. The blades 20 are approximately 10mm thick and are provided with a central groove 52 extending along the cutting edges 51.

The upper cutting plate 13 and lower cutting plate 14 are each provided with six slots 25 and when they are fitted in the chamber in the specified positions, the slots 25 are generally aligned with the cutting blades 20, which sweep and pass through the slots 27 when the shaft 17 is rotated.

The inlet 15 of the chamber 11 is provided proximate one end 11a and to one side 11b of the chamber 11. The upper cutter plate 13, in cross-section, is inclined downwards from the side 11b towards the central vertical plane of the chamber 11, and in longitudinal section, is inclined downwards from the end 11a to the other end 11c of the chamber.

The lower cutter plate 14, in cross-section, is inclined downwards from side 11b, and in longitudinal section, is inclined downwards from the other end 11c to the end 11aof the chamber.

The lower cutter plate 14 is superposed under the upper cutter plate 13. The lowermost portion of each of the upper cutter plate 13 and the lower cutter plate 14 defined a recess 26 to allow the cut particles to fall therethrough due to gravity into a disposal bin 68.

Each of the cutter blades 20 cooperates with a respective slot 25 in each of the upper cutter plate 13 and lower cutter plate 14, whereby the width of the slots 25, and the clearance between the blades 20 and the slots 25 is predetermined so that the sharps entering the chamber 11 are generally comminuted due to impact and cutting action between the blades 20 and slots 25.

The chamber 11 is generally cylindrical and the shaft 17 is parallel to the walls of the chamber 11, and vertically aligned with the longitudinal axis of the chamber 11.

The shaft 17 is spaced from the bottom surface of the chamber 11 a distance slightly more than the radius of the blades 20. The internal diameter of the cylindrical chamber 11 is approximately one and one half times greater than the diameter of each blade 20.

Each cutter plate 13, 14 is downwardly inclined approximately 15° from the horizontal in a direction from the same side surface 11b of the chamber 11 to a point just past the central vertical plane 1 of the chamber 11. The shaft 7 rotates in a direction whereby the blades approach each of the cutter plates from above (as shown by arrow "A").

The longitudinal downward inclination of each of the cutter plates 13, 14 is approximately 10° from the horizontal. This allows larger cut particles to move across the plate (13 or 14) by gravity to the respective recesses 26.

In operation, the apparatus 10 reduces hypodermic syringes, needles and other small contaminated instruments such as scalpels blades, stitch cutters, by impact and cutting to a proportionately smaller volume, thus facilitating easier transportation, storage and subsequent disposal or incineration. The abovementioned materials are put into the apparatus 10 via the inlet 15, and will exit therefrom via outlet 16 after the materials have passed along the upper and lower plates 13, 14.

The apparatus 10 reduces the volume of the material to be disposed of, and reduces the likelihood of physical contact with any of the contaminated materials.

In Figure 9 there is depicted a sharps collection container 30 being a generally open-ended bucket-shape, with a pivotable lid 31 mounted to a top edge 32 of the container 30 with a hinge 33. The container 30 is provided with a latch mechanism 34 adapted to detachably retain the primary lid 31 in a closed position closing the open end of the container 30.
The primary lid 31 may be biased towards an open position extending transversely away from the plane of the opening, and towards the outside of the container 30.

The primary lid 31 is provided with a secondary lid 37 being pivotably mounted so as to be movable between a closed position closing an opening 35 in the primary lid 31, and an open position extending transversely away from the plane of the primary lid 31 outwards of the container 30. The secondary lid 37 is retained into the closed position by a resilient member 30a. In the preferred embodiment the container 30 defines the resilient member 30a. The retention may be overcome by additional force by the user to reopen the secondary lid 37.

The container 30 is further provided with a handle 36 for carrying purposes. The handle 36 is pivotable with respect to the container 30 between a retracted position and a carrying position.

The container 30 also comprises an inwardly projecting ridge 30a on the inside surface thereof proximate the opening. This ridge generally prevents contaminated fluids from being discharged from the container if accidentally knocked over.

In Figure 10 there is depicted a bulk bin 40 within the housing 50 having a bottom opening 41 which communicates with the inlet 15 of the destructor apparatus 10.

The bulk bin portion 40 is provided with a lid 42 pivotably attached along an pivotal axis 43 on the housing 50. The lid 42 is pivotable between a closed position closing an upper opening 44 in the housing 50, and an open position allowing the container 30 to be inserted in the disposal receptacle 55.

The disposal receptacle 55 comprises a opening 45 communicating with the inside of the bin 40.

The receptacle 55 further comprises a locating means 47 in the form of two slide guides 47a to locate an inverted collection container 30 in the receptacle 55. The lid 31 of the container 30 is caused to open when the container 30 is correctly positioned in the receptacle 55. That is, a latch release means 56 is provided in the receptacle 55 which is adapted to unlatch the latch mechanism 34, thereby allowing the lid 31 to move towards the open position and discharge the sharps directly into the bulk bin 40.

The bin 40 is also provided with a trap door 48 to control the discharge of the sharps into the inlet of the destructor apparatus 10. That is, the trap door 48 is operable so as to be openable only when the shaft 20 of the destructor apparatus 10 is rotating at the desired operating speed.

The bin 40 is also be provided with an agitator 49 to maintain flow of the contaminated materials (sharps) through the bottom opening 41.

In use, the container 30 is used to collect the contaminated sharps by

insertion through the secondary lid 37. When the container is full the secondary lid 37 is closed and the container may then be emptied into the bin 40 by inverting the container 30 and moving it into position in the receptacle 55 using the locating means 47. The latch release means 56 unlatches the latch mechanism 34 to release the contaminated sharps into the bulk bin 40 due to gravity. A number of container 30 loads of sharps may be deposited and stored in the bin 40 until it is desired to destroy and dispose of the contaminated sharps. The destructor apparatus 10 can then be operated by driving the shaft 20, and opening the trap door 48 of the bulk bin 40 whereby the sharps are caused to fall through the inlet 15 into the chamber 11. The sharps are then reduced by impact and cutting and discharged through the outlet 16.

The material being discharged through the outlet 16 is generally safe, that is, the sharps are comminuted and do not pose a danger to the personnel who handle the material.

The comminuted contaminated materials are fed downwards through the chamber 11 to the bottom outlet 16, and collected in a sealable disposal bin 68 for subsequent disposal. The bins 68 may be disposed of by either incineration or burial at local garage tips.

The housing 50 further comprises a washing receptacle 65 adapted to slidably receive the container. The washing receptacle is similar to the discharge receptacle 55 in that a projection 66 is provided which is disposed to unlatch the latch means of the container therby allowing the primary lid to open. Washing jets 67 are provided which, selectively, direct sanitising fluid into the container. The washed container is then ready for reuse without risk of contaminated fluid being discharged therefrom when moved away from the housing 50.

Sanitising fluid is also introduced into the sharps either when they are being discharged from the container into the bulk bin 40, in the bulk

bin 40 or within the chamber 11. This renders the comminuted material environmentally safe.

The comminuted material discharged from the apparatus 10 is able to be buried or incinerated. Previously, whole syringes were incinerated which took considerable time and energy, and was incomplete. That is, incineration leaves a relatively large volume of ashes. When the comminuted material of the present invention are incinerated, there is no residue and power requirements are substantially reduced.

The above described disposal apparatus is easy to use, and attends to the safety of staff and personnel whose job it is to handle the contaminated wastes on a daily basis.

CLAIMS

1. Apparatus for destruction of contaminated materials such as sharps, comprising:

a sharps collection container having a primary opening and a primary lid adapted to close the primary opening in said container, said primary lid being movable with respect to the container between a closed position closing the primary opening, and an open position opening the primary opening;

said container further comprising a latch means adapted to retain the primary lid in the closed position, and be automatically detached when said container is brought into cooperation with said receptacle of an apparatus which is adapted to operate to said latch means.

2. The container of claim 1 wherein said latch means is operated to re-open the primary lid only when the container is brought into cooperation with said disposal receptacle of said apparatus.

3. The container of claims 1 or 2 further comprising a secndary lid movable between an open position opening said secondary opening to facilitate insertion of materials into said container, and a closed position closing the secondary opening.

4. The container of claim 3 wherein said secondary lid is detachably retainable in said closed position by a resilient member.

5. The container of any one of claims 1 to 5 wherein said primary lid is pivotably mounted to said container.

6. The container of claims 3 or 4 wherein said secondary lid is pivotably mounted to said primary lid and is adapted to close the secondary opening in said primary lid.

7. The container of any one of claims 1 to 6 further comprisng a ridge provided on an inside surface thereof generally coextensive with and proximate the primary opening.

8. The container of any one of claims 1 to 7 wherein said latch means comprises a striker member mounted on the primary lid or the container, and a latch mounted on said container or said lid and adapted to releasably retain the striker member, said latch being operable by a generally straight projection of said apparatus.

9. The container of claim 8 wherein said latch comprises a hook portion adapted to resiliently deform and thereby retain said striker member, and to be resiliently deformed by said projection so as release said striker member.

10. The container of any one of claims 1 to 10 further comprising a carry handle.

11. The container of any one claimes 1 to 10 further comprising a wall hanging member adapted to mount the container to a verticle support.

12. Destructor apparatus having a sharps destructor which comprises;

a geneally cylindrical chamber;

A driven rotating cutter comprising a shaft rotatably mounted in said chamber and having a plurality of cutter blades mounted at predetermined positons along said shaft so as to rotate therewith;

at least one cutter plate mounted in said chamber and having a plurality of elongate slots of prederminted widih said cutter blades being gernally aligned with respective slots in said plates;

an inlet located above said plates;

and an outlet located below said plate;

said plate being inclined downwards from the inlet towards the outlet.

13. The apparatus of claim 12 further comprising a receptacle adapted to receive a container according to any one of claims 1 to 11, and wherein a projection in said disposal receptacle is disposed to operate a latch means of said container.

14. Apparatus as defined in claim 13 further comprising a washing

means adapted to wash the container and/or the materials with a sanitising fluid.

15. Apparatus defined in claims 13, or 14 comprising two cutter plates, one plate being generally superposed over the other plate, each of said plates being downwardly inclined longitudinally of the chamber and defining a discharge opening at a lower end;

said inlet being generally above an upper end of said one plate;

an upper end of said other plate being generally below the discharge opening of said one plate;

and said outlet being generally below said discharge below said other plate.

16. The apparatus of claim 15 wherein each of said plates are also downwardly inclined and extend from a side of said chamber at least to a central longitudinal vertical plane of the chamber.

17. The apparatus of claim 16 further comprising a retaining plate extending upwards from a lower side of the one plate substantially to the roof of the chamber,

18. The apparatus of any one of claims 12 or 13 to 17 wherein said blades are approximately 10mm thick and have a longitudinal groove along a side edge thereof.

19. A method of disposing of contaminated medical tools, shafts and other materials, comprising:

collecting said materials in a container by inserting same through a primary opening which is closable by a primary lid;

closing the opening lid with said primary lid which is detachably secured by a latch means in a closed position;

inverting and inserting said container in a receptacle of an apparatus which is adapted to release said latch means;

whereby said primary lid opens and said material is discharged into

said apparatus.

20. The method of claim 19 wherein said apparatus is a destructor apparatus adapted to comminute said material by impact and cutting acion.

21. The method of claim 19 wherein said materials and said container are washed by a sanitising fluid.

22. The method of claim 20 wherein said materials are introduced into a chamber of said destructor apparatus though an inlet onto a cutting plate which is downwardly inclined longitudinally of the chamber, the plate having a plurality of slots aligned with a plurality of blades mounted on a rotatable shaft, said blades and said plate cooperating to cut or impact the materials which move down along the plate to a discharge along the plate and onto another cutting plate, or through an outlet of said chamber in a generally comminuted state.

23. The method of claim 20 wherein said materials are inserted though a secondary opening in said container which is closable by a secondary lid said primary lid being kept latched in the closed position.

24. The method of claim 20 wherein said comminuted material is discharged into a disposal bin.

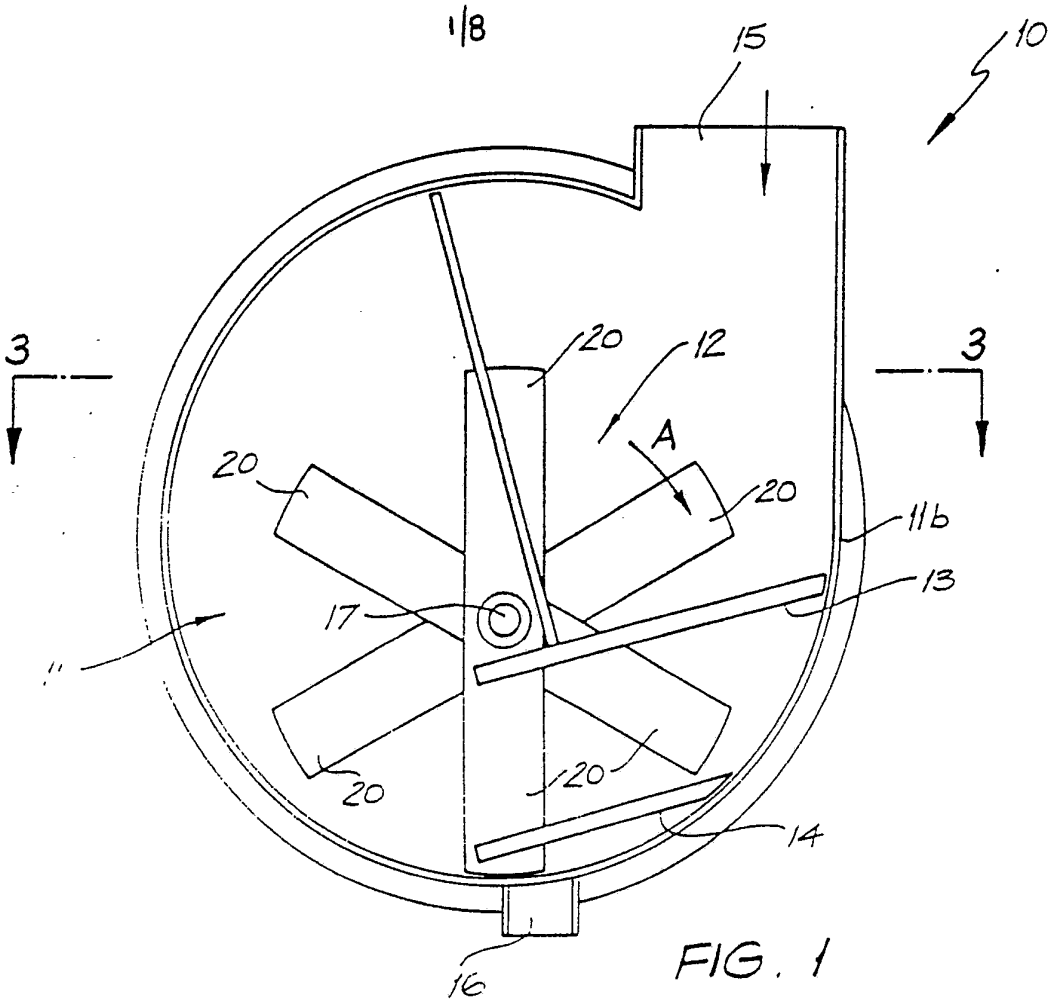


FIG. 1

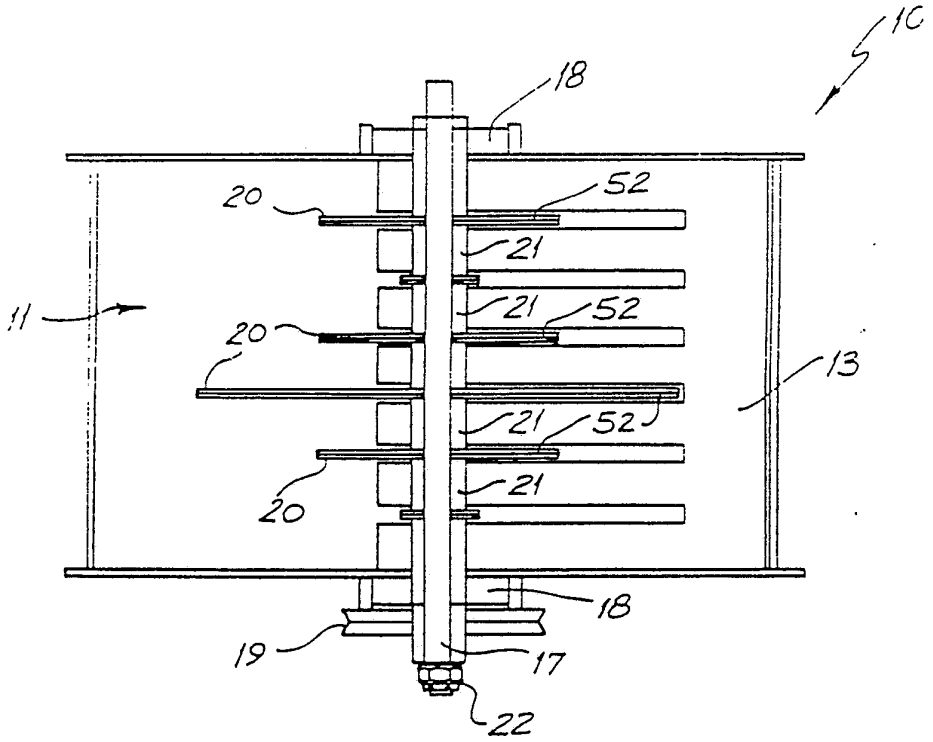
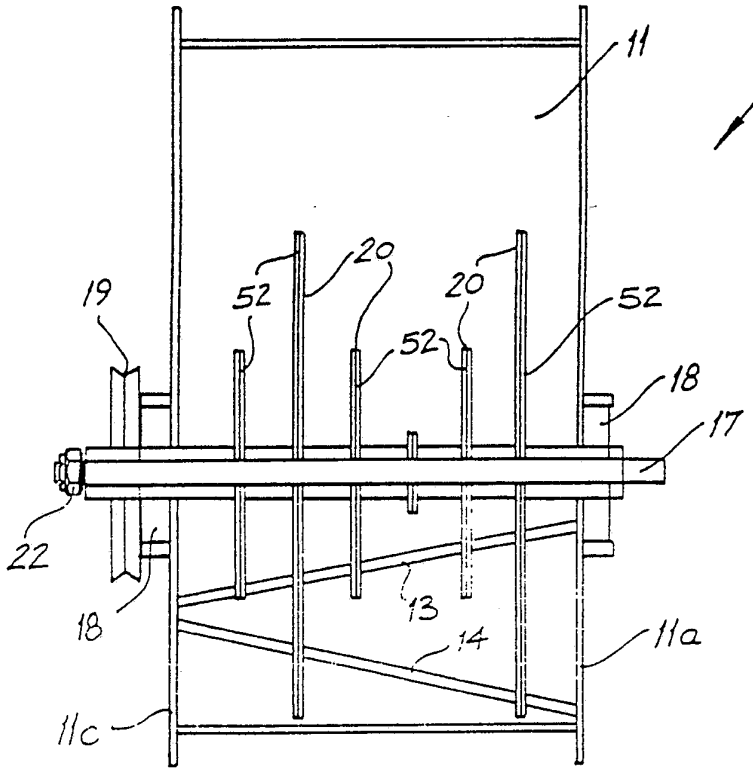


FIG. 3

SUBSTITUTE SHEET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20
20
52
52
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17
22
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13
14
11a
11c

FIG. 2

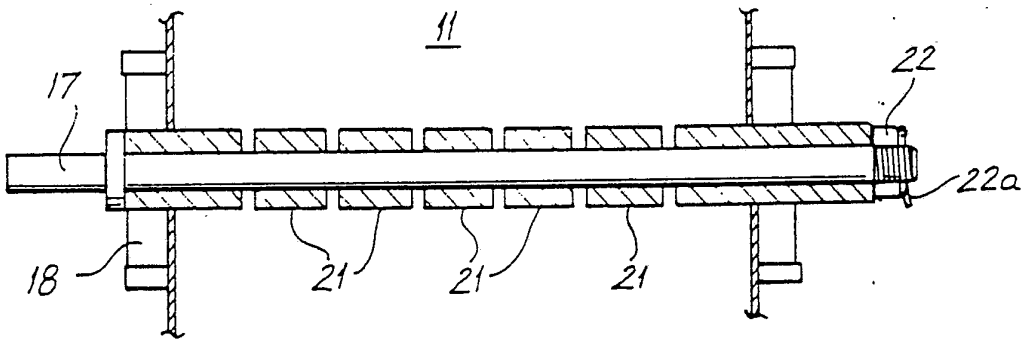
11
17
22
22a
18
21
21
21

FIG. 4

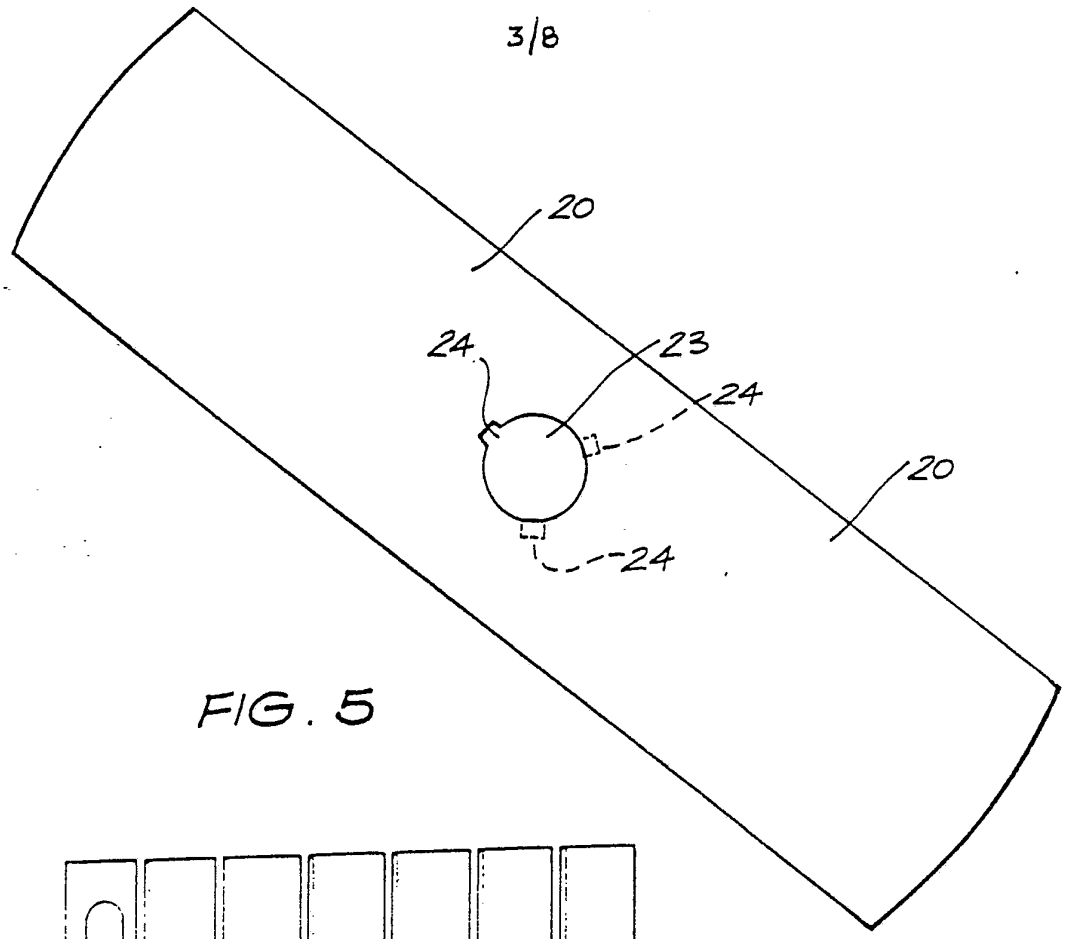

FIG. 5

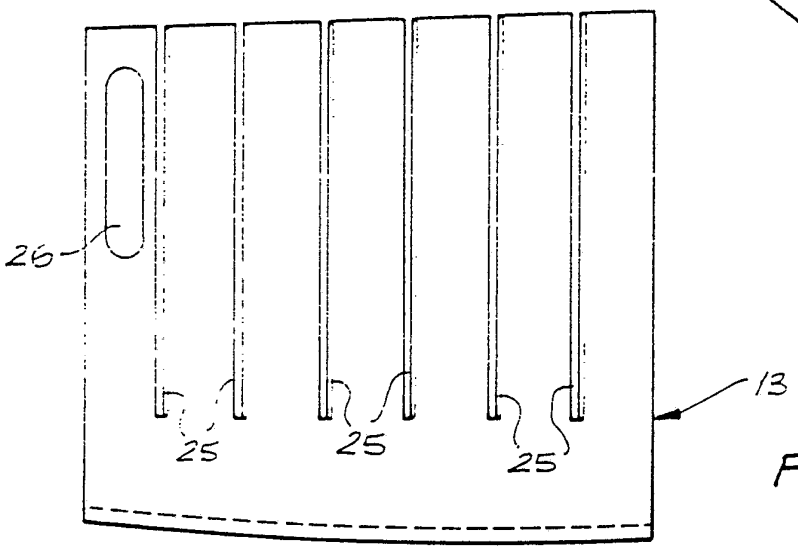

FIG. 6

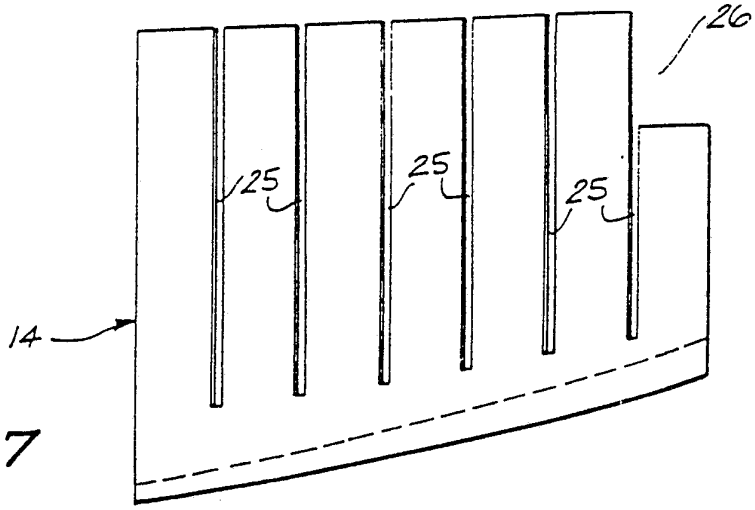

FIG. 7

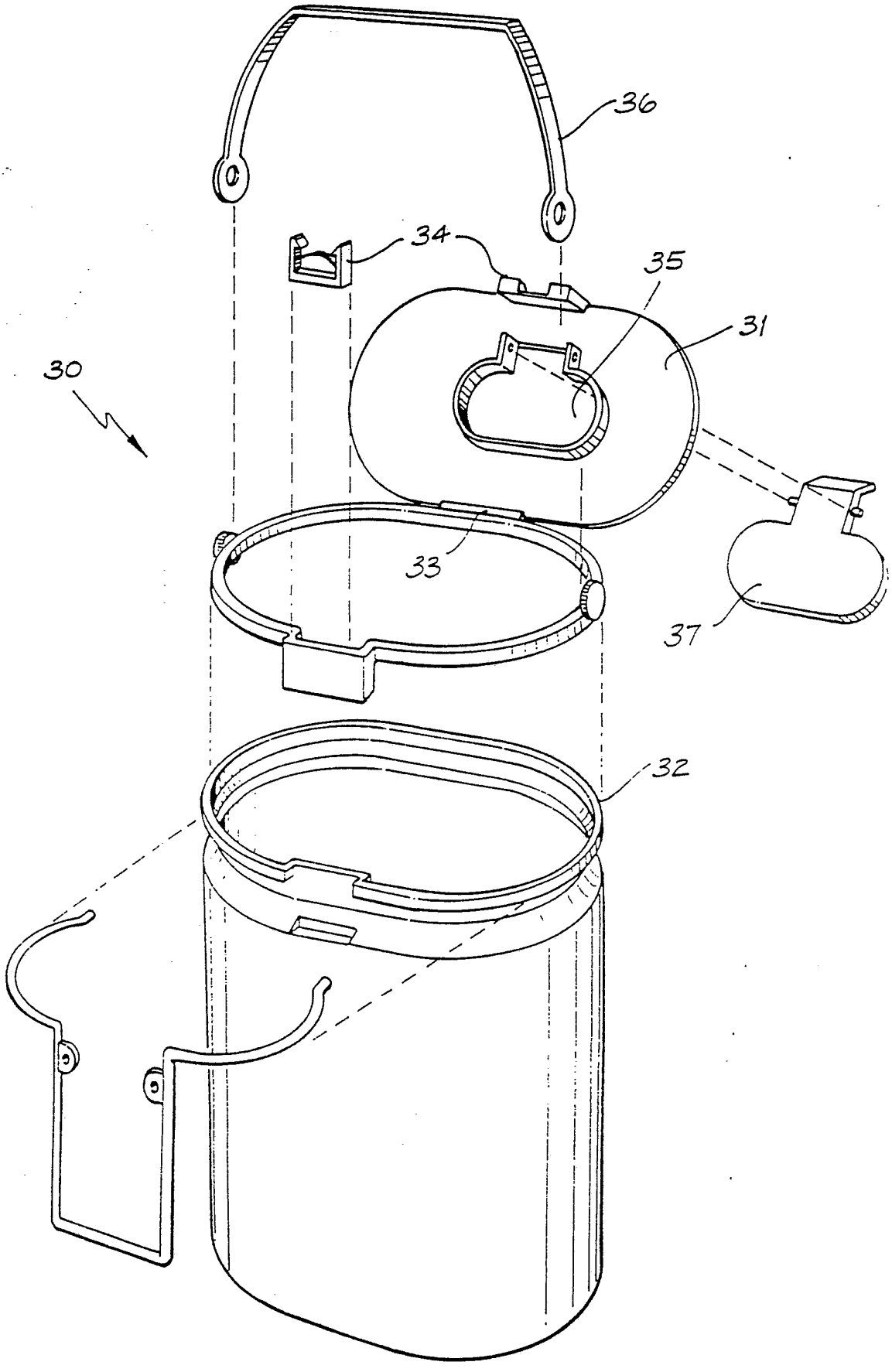

FIG. 8

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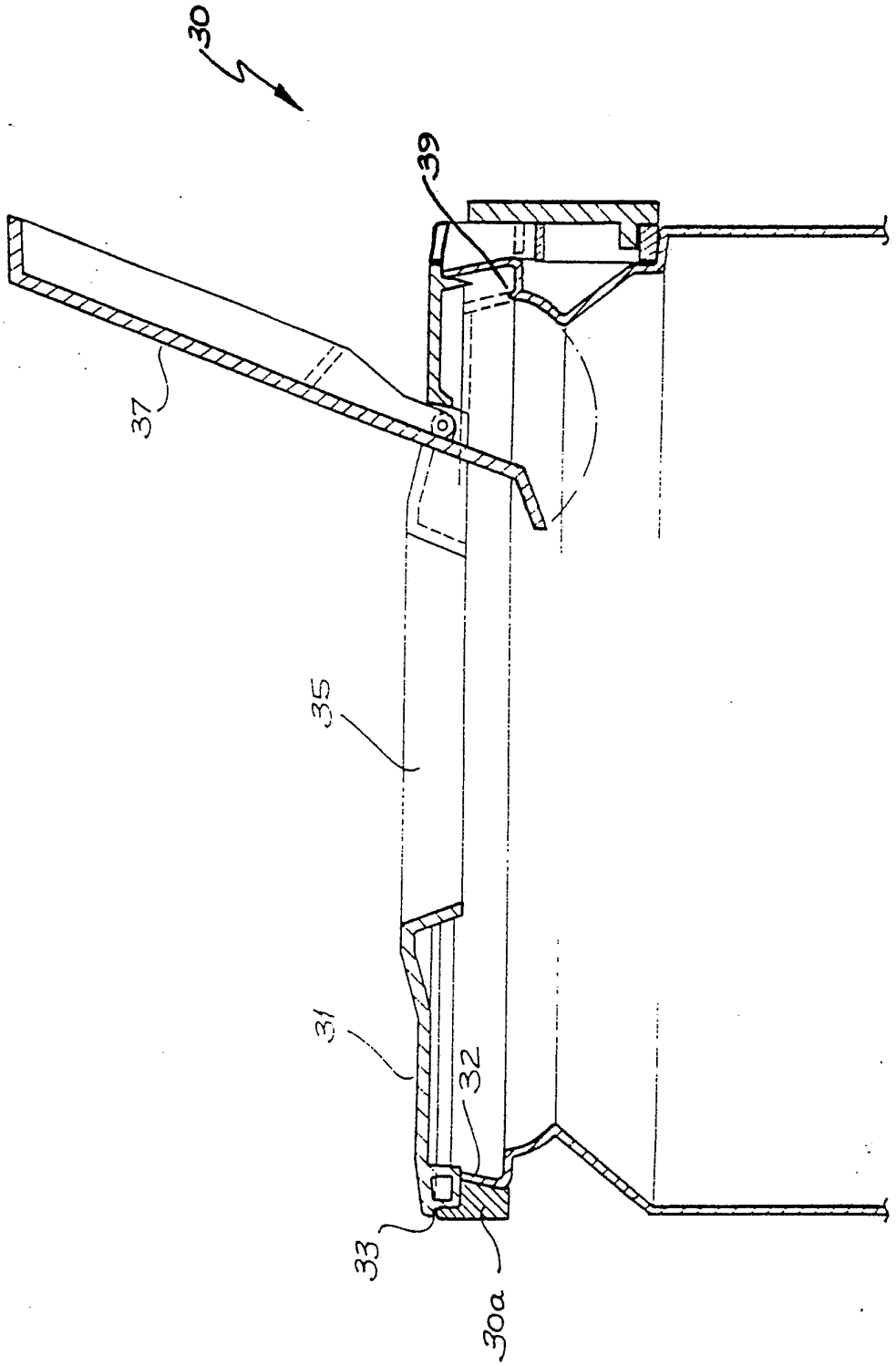

FIG. 9

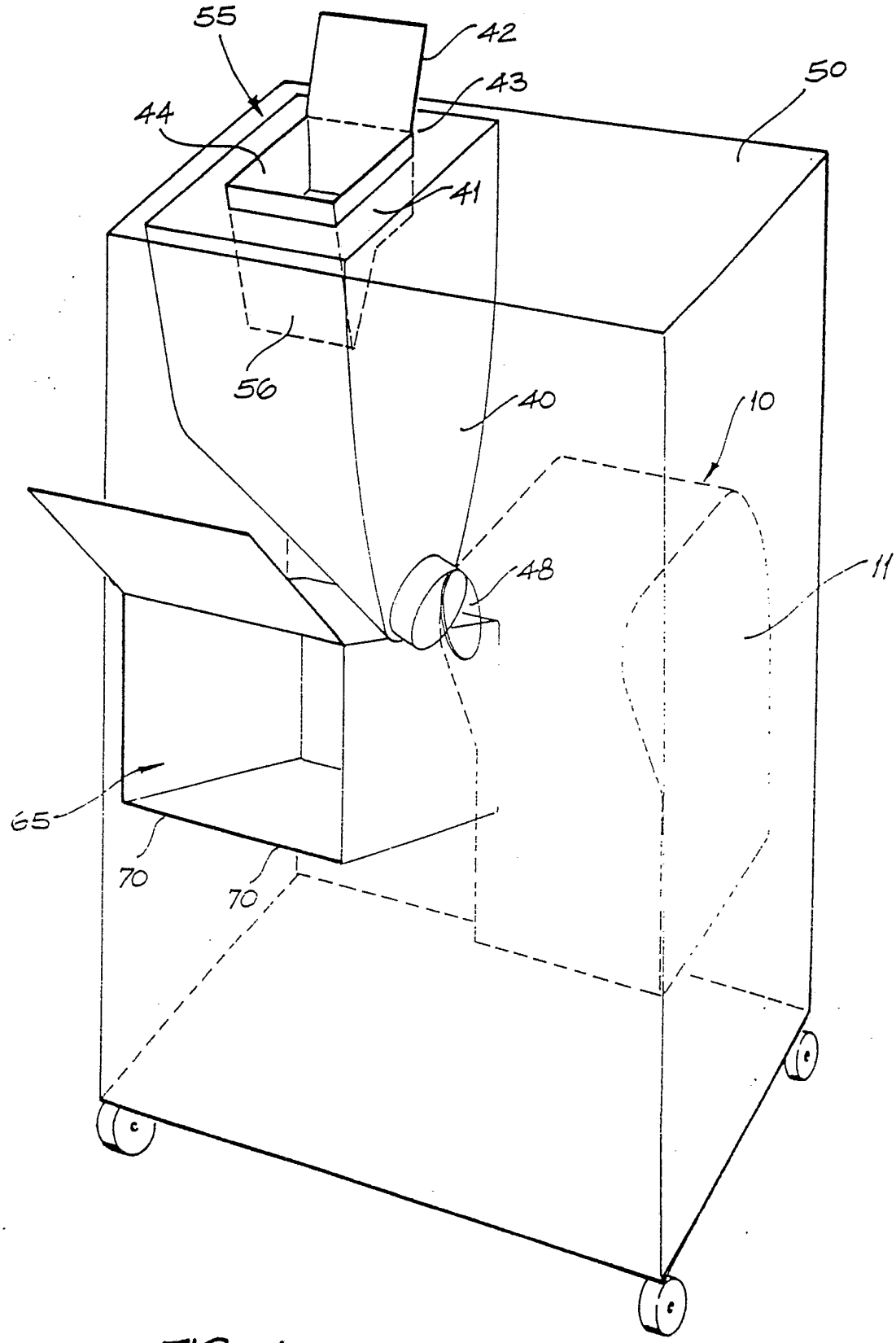

FIG. 10

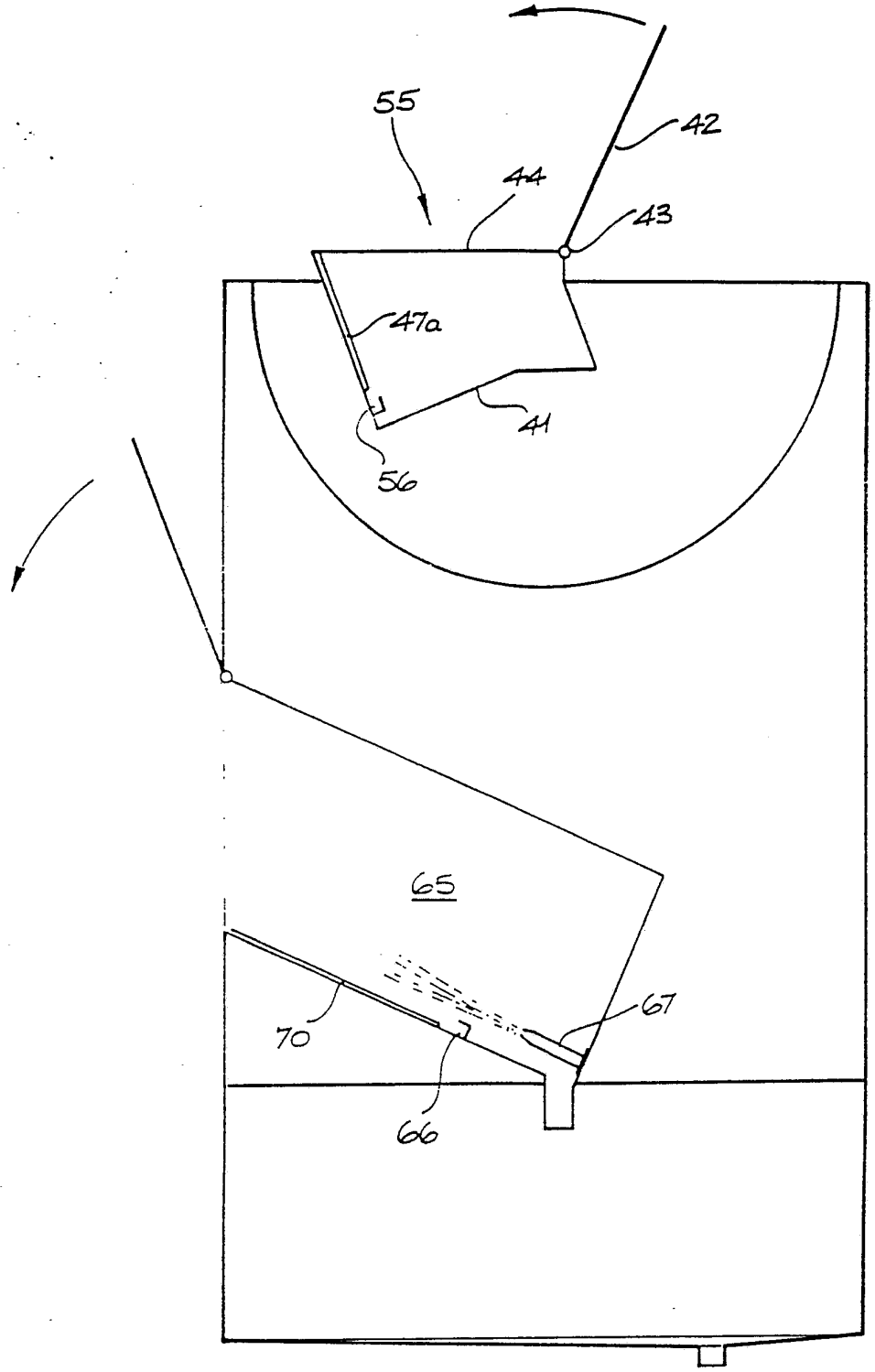

FIG. 11

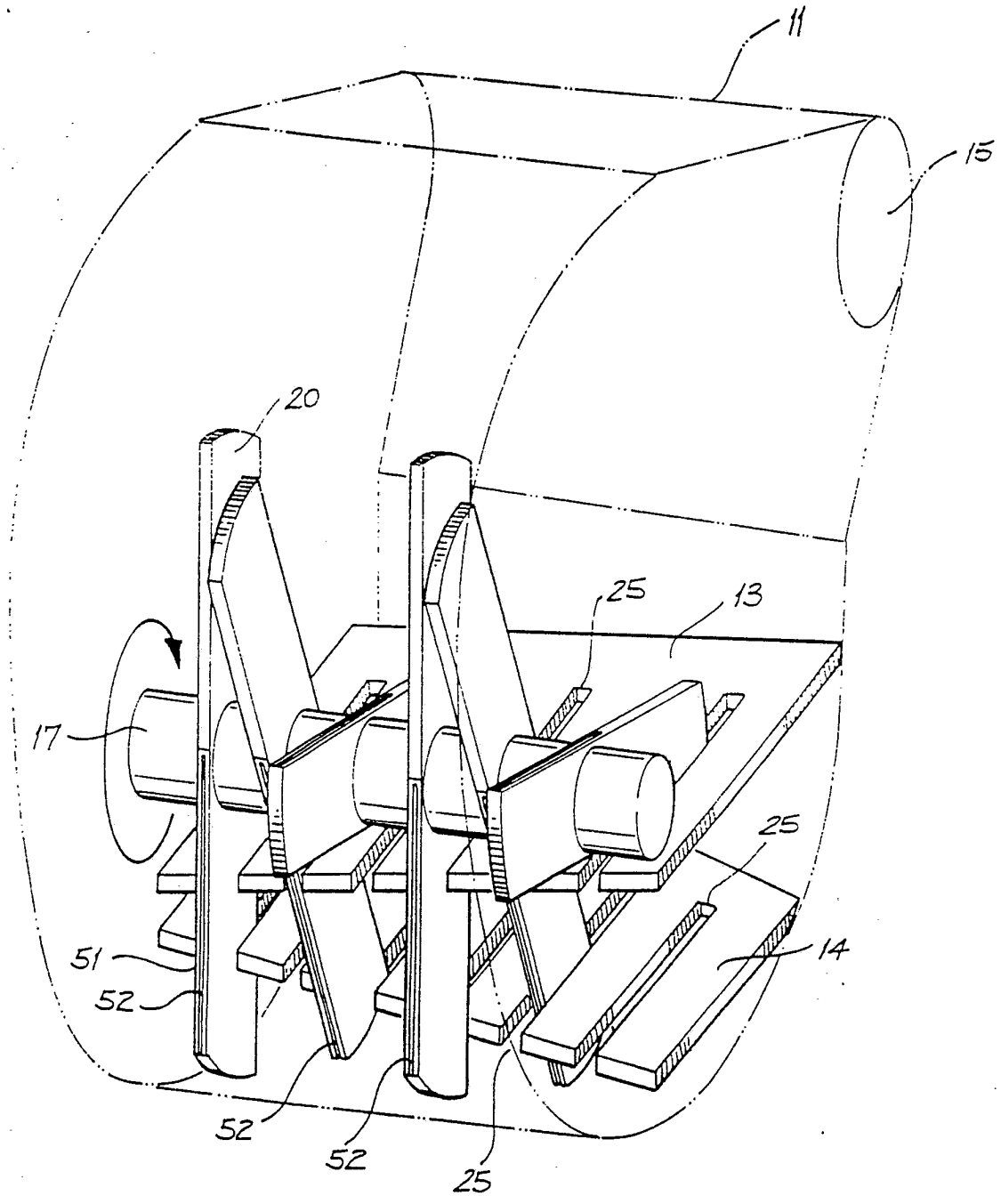

FIG. 12

INTERNATIONAL SEARCH REPORT

International Application No. PCT/AU 89/00277

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) 6

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl.[4] A61M 5/00, 5/32, B26D 1/28 // A61B 19/02, B02C 18/14

II. FIELDS SEARCHED

Minimum Documentation Searched 7

Classification System	Classification Symbols
IPC	A61M 5/32, B26D 1/28
U.S. CL.	206/366

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched 8

AU:IPC as above

III. DOCUMENTS CONSIDERED TO BE RELEVANT 9

Category*	Citation of Document, 11 with indication, where appropriate, of the relevant passages 12	Relevant to Claim No 13
A	EP,A, 80882 (OWEN et al) 8 June 1983 (08.06.83)	(1,12,19)
A	EP,A, 267776 (A.C. DANIELS & CO. LTD.) 18 May 1988 (18.05.88)	(1,19)
A	US,A, 4580688 (HARRIS et al) 8 April 1986 (08.04.86)	(1,19)
A	US,A, 4657139 (HANIFL) 14 April 1987 (14.04.87)	(1,19)
A	AU,A, 82386/87 (LOBBERT) 1 June 1988 (01.06.88)	(1,19)
A	AU,B, 36384/58 (230164) (SASSI) 24 September 1959 (24.09.59)	(12)
A	GB,A, 1302851 (SAYERS (CONFECTIONERS) LIMITED) 10 January 1973 (10.01.73)	(12)

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
25 September 1989 (25.09.89)	13 October 1989
International Searching Authority	Signature of Authorized Officer
Australian Patent Office	J.P. ELIJAH J.P. Elijah

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

V. [] OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE 1

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.[] Claim numbers , because they relate to subject matter not required to be searched by this Authority, namely:

2.[] Claim numbers , because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3.[] Claim numbers , because they are dependent claims and are not drafted in accordance with the second and third sentences of PCT Rule 6.4 (a):

VI. [X] OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING 2

This International Searching Authority found multiple inventions in this international application as follows:

Please see attached sheet

1.[X] As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. [] As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the international application for which fees were paid, specifically claims:

3.[]No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. [] As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

[] The additional search fees were accompanied by applicant's protest.

[X] No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

Box VI

OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING.

The invention as defined in Claims 1-11, 19-24 and the invention as defined in Claims 12-18 do not possess a single general inventive concept and neither are they so linked as to form a single general inventive concept. In particular the first mentioned set of claims are directed to a sharps collection container with a primary lid (having latch means) which is automatically detachable when the container is brought into cooperation with the receptacle of an apparatus which is adapted to operate said latch means. The invention defined in the second set of claims resides in a sharps destructor comprising cutter blades and plates which operate so as to cut into tiny pieces the sharps fed into the apparatus. The two sets of claims are not linked by any special technical features.

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON
INTERNATIONAL APPLICATION NO. PCT/AU 89/00277

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report	Patent Family Members		
EP 267776	GB 2198410		
US 4580688	ZA 8501402	AU 39295/85	CA 1245189
	DK 932/85	EP 156517	EP 221378
	FI 850822	NO 850782	NO 872839
AU 82386/87	EP 290538	WO 8803416	

END OF ANNEX