



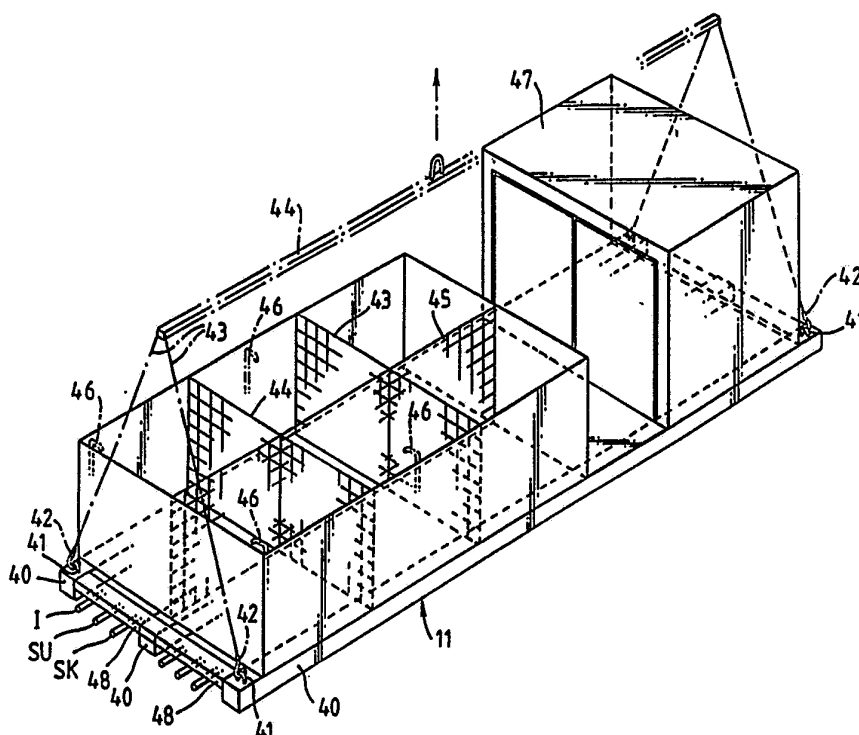
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<p>(21) International Application Number: PCT/AU93/00185 (22) International Filing Date: 29 April 1993 (29.04.93) (30) Priority data: PL 2127 29 April 1992 (29.04.92) AU (71) Applicant (for all designated States except US): AUSTMARINE PTY. LTD. [AU/AU]; Factory 4, 316 Brisbane Road, Labrador, QLD 4215 (AU). (72) Inventor; and (75) Inventor/Applicant (for US only) : HANRAHAN, Michael, Graeme [AU/AU]; Unit 1, 54 Kangaroo Avenue, Runaway Bay, QLD 4216 (AU). (74) Agent: KELLY, Robin, Thomas; Fisher & Kelly, Level One, 349 Coronation Drive, Milton, QLD 4064 (AU).</p>		<p>(81) Designated States: AT, AU, BB, BG, BR, CA, CH, CZ, DE, DK, ES, FI, GB, HU, JP, KP, KR, KZ, LK, LU, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, UA, US, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>

(54) Title: HOLDING TANK SYSTEM

(57) Abstract

A holding tank system (10) suitable for storage of live fish, crustacea and other aquatic animals. There is included a holding tank assembly (12, 12A, 159) and transportable support means such as a skid base (11, 120) for supporting the holding tank assembly (12, 12A, 159) during transportation as well as installation. Thus at an installation site the holding tank assembly (12, 12A, 159) is installed with the skid base (11, 120) forming part of the holding tank system (10). There also may be provided a filter tank assembly (35, 35A, 134) as well as a housing (47) for water conditioning apparatus which may also be supported on the skid base (11, 120). Optionally the filter tank assembly (35, 35A, 134) may be supported on a separate skid base (11, 120) both for transportation and installation if required.



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TITLE

HOLDING TANK SYSTEM

FIELD OF INVENTION

THIS INVENTION relates to a holding tank system
5 suitable for storage of live fish, crustacea and other
aquatic animals.

BACKGROUND ART

One holding tank which is known for the abovementioned
purpose is Australian Patent Specification 595542 and this
10 refers to a holding tank having a layer of particulate
material or shellgrit to function as a biological filter
which is supported on a perforated tray. The shellgrit may
also carry a culture of bacteria which may denitrify
contaminants, e.g. faeces produced by aquatic animals in
15 the holding tank. There is also provided water
conditioning means associated with the holding tank which
includes a pump, a refrigeration unit and water spray unit.
The pump may draw water from the tank through the shellgrit
and into a conduit which passes through the refrigeration
20 unit and subsequently the spray unit which returns the
water to the tank. The water spray may break up any
floating scum material into small pieces which may be
removed by a skimmer associated with the tank. The skimmer
is connected to the water conditioning means by appropriate
25 valving.

The holding tank arrangement shown in Patent
Specification 595542 is efficient in operation and
relatively economic to operate. However, the holding tank
system as described in Patent 595542 was a fixed or
30 permanent installation and this meant that it was necessary
to build a concrete slab so as to support the holding tank
with the filter tank being supported on the ground and the
components of the water conditioning apparatus also being
supported on the ground adjacent the concrete slab. It was
35 a time consuming process to fully install the holding tank
system of Patent 595542 since it was not only necessary to
form the concrete slab but also set up the water

conditioning means including interconnecting the components of the water conditioning means to each other as well as to the filter tank and the holding tank.

The conventional holding tank system as described above especially if a large holding tank was required often needed to be completely installed in concrete and this provided disadvantages to the owner of the holding tank if it was necessary that he transferred his operation to another site. This was frequently necessary if the owner of the holding tank rented or leased the factory which incorporates the holding tank. In such circumstances the demolition which was required to remove the tank could sometimes exceed a week or more and this involved a substantial loss to the owner owing to lack of storage space for the aquatic animals. It will also be borne in mind that it is frequently the case that when a business is expanding or in the reverse situation when a business is contracting that frequent changes of premises may be necessary and this will mean that the abovementioned problems in regard to fixed holding tanks for aquatic animals may be exacerbated.

BROAD STATEMENT OF INVENTION

It therefore is an object of the present invention to provide a holding tank system for marine animals which may alleviate at least to some extent the aforementioned difficulties associated with the prior art.

Accordingly, there is provided a holding tank system for storage of live seafood including:

- (i) a holding tank assembly; and
- (ii) transportable support means for supporting the holding tank assembly during transportation characterised in that installation of the holding tank assembly takes place at an installation site with the transportable support means supporting the holding tank assembly and thus forming part of the holding tank system when installed.

Preferably, however, the transportable support means

may support both the holding tank assembly and a filter tank assembly during transportation whereby both the holding tank assembly and the filter tank assembly are installed at the installation site while still supported by
5 the transportable support means.

In cases where the holding tank assembly is relatively small e.g. less than 2.5 tonne in seafood capacity weight both the holding tank assembly and the filter tank assembly may be supported by a common transportable support means.

10 However, where the holding tank is relatively large e.g. greater than 2.5 tonne in seafood capacity weight the holding tank assembly and the filter tank assembly may be supported by different or separate transportable support means. Thus in this context "transportable support means"
15 may include a common support for both the holding tank assembly and the filter tank assembly as well as separate supports.

The transportable support means suitably comprises a mounting frame or mounting base which may support a holding
20 tank assembly as well as suitably a housing which may accommodate suitable water conditioning apparatus such as a pump, filters such as activated charcoal filters, a pre-filter and cooling apparatus inclusive of refrigeration assemblies.

25 The mounting frame or base is transportable and to that end there may be provided a plurality of attachment points or locations whereby crane hooks, for example, may be attached. Preferably there is provided a unitary base for the holding tank body which may suitably include one
30 but more preferably a plurality of longitudinal frame members interconnected by a plurality of transverse frame members. In another possible arrangement the unitary base may comprise a single sheet or support plate. However, the former arrangement of longitudinal frame members and
35 transverse frame members are preferred.

The unitary base may also include a plurality of longitudinal recesses for accommodation of suitable

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conduits which may form part of the water conditioning apparatus as described above.

The filter tank assembly is preferably formed from fibre glass or other suitable material and this may include
5 shellgrit or other suitable filter media. Suitably when the filter tank assembly is transported separately to the holding tank assembly it is supported by a mounting frame or base of similar characteristics to the mounting frame or base which supports the holding tank body and is thus
10 transportable including a plurality of attachment points or locations for crane hooks and the like.

Both the holding tank assembly and the filter tank assembly may be transported separately from each other or on a common support as described above. However, in the
15 case of separate transportation the holding tank body and the filter tank body may be connected in any suitable manner at the installation site so that the filter tank body may be included in the water conditioning circuit. In one form this may be accomplished by connecting a forward
20 line or conduit and a return line or conduit of the filter tank with a suction line or conduit of the water conditioning circuit of the holding tank body.

BRIEF DESCRIPTION OF THE DRAWINGS

Reference may now be made to a preferred embodiment of
25 the invention as shown in the attached drawings wherein:

FIG 1 is a schematic flow diagram of a holding tank system constructed in accordance with the invention showing the water conditioning circuit;

FIG 2 is a perspective view of the holding tank body
30 and water conditioning apparatus housing carried by a mounting frame or base;

FIG 3 is a perspective view of part of the holding tank showing outlets for the suction return conduits;

FIG 4 is a view of a filter for use in the present
35 invention;

FIG 4A is a perspective view of a valve for use in the water conditioning apparatus;

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FIG 5 is a view of another type of filter for use in the present invention;

FIG 6 is a view of a skimmer assembly for use with the present invention;

5 FIG 7 is a view of a refrigeration unit for use with the present invention;

FIG 8 is a view of the holding tank for use with the present invention;

FIG 9 is a sectional view of the mounting base for the
10 holding tank body;

FIG 10 is a view of the filter tank for use with the present invention;

FIGS, 11, 11A, 11B and 11C show the method of interconnection between the holding tank body and the
15 filter tank; and

FIG 12 is a schematic flow diagram of a holding tank system constructed in accordance with another aspect of the present invention.

FIG 13 is a perspective view of a common support base
20 for both a holding tank assembly and a filter tank assembly;

FIG 14 is a schematic view of a holding tank system including a holding tank assembly, filter tank assembly and associated water conditioning means for support on the
25 common support shown in FIG 13;

FIG 15 is a perspective view of a holding tank assembly supported on the support base shown in FIG 13; and

FIG 16 is a schematic view of a filter tank assembly
30 for support on the support base shown in FIG 13.

BEST METHOD FOR CARRYING OUT THE INVENTION

In the drawings there is shown a holding tank system
10 mounted on mounting frame 11. The holding tank system 10 includes holding tank 12, spray nozzle locations 13,
35 outlets 14, manifolds 15 and 16, inlet conduits 17 as well as inlet conduit 18, pump 19, refrigeration assemblies 20 and associated conduits 21 and 22, valves 23, drain 24,

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suction conduit 25, pre-filter 26, suction lines 27 and 28 and skimmer outlet conduits 29, 30 and 31 and activated carbon filters 32 and 33.

There is also shown filter tank assembly 34 including
5 filter tank 35, mounting frame or base 36, and filter tank return conduit 37 and filter tank forward or exit conduit 38. Both conduits 37 and 38 are shown in phantom and are connected to suction line 25 in a manner described hereinafter. Mounting frame 36 has four attachment points
10 39 for attachment to crane hooks (not shown) in a similar manner as described for mounting frame 11 in FIG 2.

In FIG 2 there is shown holding tank assembly 10 and mounting frame 11 including longitudinal frame members 40. There are also shown attachment points 41 for crane hooks
15 42 attached to crane cables 43 which in turn are attached to spreader bar 44 of a crane (not shown). The holding tank 12 includes mesh screens 43A, 44 and 45 and spray nozzles 46. There is also shown housing 47 for the water conditioning apparatus already described in relation to FIG
20 1. Also shown are longitudinal recesses 48 for inlet conduits (I), suction conduits (SU) and skimmer conduits (SK).

In FIG 3 there is shown an end wall 49 of holding tank 12 having perforated cylinders 50 which function as outlets
25 of the holding tank 12. Skimmer outlets 35A are also shown. Cylinders 50 may be lifted out of tank 12 when required for maintenance purposes.

In the filter shown in FIG 4 there is shown housing 51 provided with an inlet 52 and outlet 53. The inlet 52
30 leads water into housing 51 and into compartment 54 filled with activated carbon. Compartment 54 is separated from central passageway 55 by a perforated wall 56. The perforations in wall 56 serve to allow water to flow therethrough while retaining the activated carbon in
35 compartment 54. The filter housing 51 which is shown in the form of a filter cartridge is provided with a lid or cover 57 screw threadedly attached to the cartridge at 58.

This enables the cartridge to be subject to frequent maintenance checks by removal of cover 57 when required. To allow this to be accomplished valves 23 may be incorporated in the water conditioning circuit with a
5 movable valve stem 23A as shown in FIG 4A which may be pivoted from an ON position to an OFF position and vice versa when required. The valve 23 may also include a valve body 23B and screw threaded ferrules 23D for attachment to conduit 23D. The valve stem 23A has a ball (not shown) at
10 a lower end which may selectively close or open conduit 23D. The flow of water through the filter cartridge is shown by the arrows in full outline in FIG 4.

A modified filter cartridge for use in the invention is shown in FIG 5. This cartridge 59 includes inlet 52,
15 outlet 53 and cover 57 as described above in relation to FIG 4 as well as a perforated inner body 62 located within cartridge 59 and a nylon mesh 63A. The direction of water flow is clearly shown by the arrows in full outline. The filter cartridge 59 is preferred for use over filter
20 cartridge 51 because it reduces the possibility of sludge forming at a top surface of the water level. Activated carbon particles are retained in chamber 64.

The skimmer assembly 65 for use with the holding tank is shown in FIG 6. This includes an upper tube 66
25 telescopically engagable in lower tube 67 in association with O-ring seal 68. Upper tube 66 is provided with a plurality of scallops or recesses 69 which enhance the flow rate of liquid through tubes 66 and 67. The skimmer assembly 65 is thus height adjustable to suit different
30 operative levels of water within holding tank 12. Lower tube 67 is connected to conduit 70 through the base wall 71 of the holding tank 12 as shown. There also may be used a sealing ring or gasket (not shown) which surrounds tube 67 as it passes through base wall 71.

35 In FIG 7 there is shown a typical refrigeration assembly which be used in the water conditioning circuit. This includes a housing 72, inlet 73, outlet 74,

refrigeration evaporator coil 75, temperature probe 76, and barrel 77 having a series of openings 78 which may range from relatively large adjacent end 79 to relatively small adjacent outlet 74. This feature improves the flow water
5 of liquid through housing 72.

In FIG 8 there is shown the holding tank 12 having a perforated tray 80 supported by perforated upstands 81 bonded to base wall 71 by adhesive. The tray 80 supports a layer of filtering material 82 such as shellgrit and the
10 like. The holding tank 12 is also supplied with a number of vertical riser tubes 83 each having a spray outlet nozzle 84.

In FIG 9 there is shown a sectional view of the mounting frame or base 11 with locating recesses 48 for
15 conduits I, SU and SK as previously described.

In FIG 10 there is shown a detailed view of filter tank 35 having inlet 85 and perforated outlet tube 86. A layer of shellgrit 87 is supported on perforated tray 88 which is supported on perforated upstands 89 bonded to the
20 base surface 90 of tank 35.

In some cases it may be appropriate during installation to remove perforated upstands 81 from holding tank 12 and attach them to filter tank 35 by adhesive so that they correspond to perforated upstands 89. This
25 provides more capacity for holding tank 12.

In FIG 11 there is shown how existing conduit 25 of the water conditioning apparatus is structured prior to attachment of conduits 37 and 38 from filter tank 34. Thus, suction conduit 25 includes T pieces 27B and
30 depending portions 27C. Each depending portion 27C includes a barrel union 26A illustrated in detail hereinafter in FIG 11A and conduit 25 includes barrel unions 26A interconnecting conduit 26B with the remainder of conduit 25. Each portion 27C includes upper part 25A
35 and lower part 25B which is plugged at 27D. Barrel unions 26A as shown in FIG 11A comprise a milled outer or female ferrule 93 with internal thread 93A which may be engaged

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with inner or male component 94 having external thread 95. Also shown is sealing ring 96.

There is also shown conduit component 92 having a lower flange 91 and tapered part 91A which engages with
5 sealing ring 96 which is retained in recess 95A of male component 94 surrounding conduit component 94B so that when male component 94 is connected to female component 93, conduit compartment 92 communicates with conduit component 94B. In FIG 11 for example conduit component corresponds
10 with conduit 25A and conduit component corresponds with conduit 25B.

As shown in FIG 11B when it is desired to attach conduits 37 and 38 to conduit 25 the central conduit 26B is removed from conduit 25 by unscrewing male components 94 of
15 barrel unions 26A. Subsequently each lower part 25B is removed by unscrewing inner or male component 94 from a respective female ferrule 93 and discarded. Subsequently central conduit 26B is cut in half at 26C and each remaining portion 26D is attached to upper part 25A by
20 screw threadedly attaching male component 94 to female component 93. Conduits 37 and 38 may then be attached to portions 26D by adhesive or other suitable means.

In FIG 12 there is described a modified water conditioning apparatus for use with the present invention.
25 The water conditioning apparatus as shown in FIG 12 has special application to avoid removal of filtering media in the filter tank when this becomes necessary due to the shellgrit or other filtering media in the filter tank becoming blocked resulting in a restricted flow rate with
30 ocean silts. In this regard, it is to be borne in mind that in filter tanks there is often large amounts of filtering material such as 8 tonne or more. It is not a practical proposition to replace the shellgrit with fresh material or indeed to remove the shellgrit and wash same
35 and then place the washed shellgrit in the filter tank. Such a task is extremely labour intensive and very time consuming and thus is not economic. Washing of existing

shellgrit in a filter tank can often lead to periods of 3 days or more when the filter is idle.

The water conditioning apparatus shown in FIG 12 may assist in overcoming this problem and thus provides a
5 holding tank assembly including -

- (i) a holding tank assembly;
- (ii) a filter tank assembly; and
- (iii) water conditioning apparatus which conditions
10 water flowing between the holding tank assembly and the filter tank assembly characterised in that flow of water through the filter tank assembly which occurs when the water conditioning apparatus is in a normal operative cycle may be reversed to wash the filtering material contained
15 in the filter tank assembly to ensure an unrestricted flow of water through the filter tank assembly.

The reversing of water flow through the filter tank assembly may be accomplished suitably by providing a fresh
20 water intake which may be introduced into a conduit associated with a pump of the water conditioning apparatus and by opening a fresh water intake valve and closing all normal valves of the water conditioning apparatus to allow water to flow through a fresh water conduit so that it may
25 enter the filter tank assembly through the filter tank assembly outlet or other suitable access location and exit from the filter tank assembly the top thereof. This flow of fresh water through the tank may elevate the shellgrit from the base of the filter tank so that the particles of
30 shellgrit are thoroughly cleaned. This also maintains existing bacterial culture in the filter tank assembly which grows on the surface of the shellgrit. If the shellgrit is not cleaned at regular intervals the existing bacterial culture may become impaired or adversely affected
35 by the abovementioned contaminants.

In this aspect of the invention, suitably there is provided a plurality of pumps each having a separate inlet

conduit to the holding tank assembly whereafter the water may exit from the holding tank assembly by a common outlet. Preferably the fresh water intake is introduced into a suction return line of the water conditioning circuit but
5 this is not essential.

In the apparatus shown in FIG 12 there is illustrated holding tank 12A, spray outlets 13A, manifolds 15A, 15B, 15C and 15D and associated inlet conduits 18A, 18B, 18C and 18D each associated with a respective pump 19A, 19B, 19C
10 and 19D as shown. Each pump 19A, 19B, 19C and 19D has associated therewith a respective valve 23A, 23B, 23C and 23D. Also with each manifold 15A, 15B, 15C and 15D is provided a series of inlet conduits 100 as shown. There is also shown suction return conduits 25A and 25B and a
15 skimmer return conduit 29A. Suction return conduits 25A and 25B pass through valves 101 and 102 and subsequently pass through filter tank 35A before passing through outlet conduits 103 and 104 which communicate with refrigerator assembly 20A as shown. There is also shown valves 105, 106
20 and 107. After passing through the refrigerator assembly 20A conduits 103 and 104 communicate with manifold 108 which forms conduits 18E, 18F, 18G and 18H.

The skimmer return line 29A passes through charcoal filter 32A as shown before communicating with line 104 at
25 109. The conduit or line also passes through valves 105A and 106A.

In accordance with this particular aspect of the invention there is provided a fresh water intake 110 and associated conduit 112 which passes through valve 113 into
30 conduit 18E. This is shown in phantom outline to clearly distinguish from the normal operational cycle described above wherein direction of fluid flow is shown by arrows in full outline in the normal operational cycle. The water flow functions in the same manner as already described in
35 detail in FIG 1 and as discussed above.

In contrast, when it is desired to actuate the circuit for flushing out shellgrit in filter tank 35A, valves 23A,

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23B, 23C and 23D are closed as well as valves 110, 101, 102, 107, 106 and 105. This provides a circuit which includes fresh water intake 110, conduit 112, valve 113 which is closed during the normal operative cycle, conduit
5 114, conduit 115, conduit 116, conduit 116A, filter tank 35A, conduit 117, valve 118 which is closed during the normal operative cycle and drain 119. Conduit 116A is part of conduit 103 and is open only when valve 105 is closed.

By the return flow of water which flows along the
10 circuit in phantom outline, as described above, this enables the shellgrit or other filtering material to be easily and efficiently washed and thus this substantially minimises the problems of the prior art holding tank systems as described above.

15

It will also be appreciated from the foregoing that another aspect of the present invention concerns the holding tank assembly per se having the aforesaid fixed base or
20 mounting frame thereby providing a transportable assembly. This assembly may be utilised by a holding tank owner using the existing filters that are included in the water conditioning apparatus (e.g. filters 51 or 59) until such time as the throughput capacity of the holding tank
25 assembly has increased sufficiently to warrant use of an external filter tank assembly (e.g. 34) which may be connected to the holding tank assembly 11 as described above.

Another advantage of the holding tank assembly of the
30 present invention compared to the prior art such as Australian Patent Specification 595542 is that the holding tank assembly described in that specification in practice, especially in relation to wholesale applications, has necessitated the use of two pumps wherein one pump is
35 included in the skimmer line and the other pump in the inlet line. In contrast the present invention, as exemplified in FIG 1, only requires the use of one pump and

thus in terms of capital outlay is a cheaper proposition.

The invention in another embodiment may include a holding tank system which may comprise a mounting frame or mounting base which may support a holding tank assembly, a
5 filter tank assembly, as well as a housing for accommodating suitable water conditioning apparatus such as a pump, filters and cooling apparatus inclusive of refrigeration assemblies. This holding tank system may be used in a retail installation which has a capacity of less
10 than 2.5 tonnes. By contrast the holding tank system shown in FIGS 1-11 suitably has a capacity of greater than 2.5 tonnes.

Preferably a mounting base is utilised on the same type of construction already discussed above in FIGS 1-11.

15 A preferred arrangement of the above described holding tank assembly is shown in FIGS 13-15.

In FIG 13 the mounting frame 120 includes a plurality of longitudinal base frame members 121 supported on support blocks 122. Frame members 121 are interconnected by cross
20 members 123. A transverse frame member 124 separates the mounting frame into sub frames 125 and 126. Sub frame 126 includes cross members 127 which interconnect longitudinal frame members 128. There is also shown end frame member 129 and frame members 130 located between cross members
25 127. There is also shown frame structure 131 for forming a housing for water conditioning apparatus.

In FIG 14 the holding tank assembly 159 supportable on mounting base 120 includes holding tank 133, filter tank 134, lines 135 interconnecting holding tank 133 and filter
30 tank 134, skimmer outlets 136, activated carbon filters 137, base outlet strainers 138, carbon suction 139, pumps 140, 149 and 150, discharge lines 141, 151 and 152, suction lines 142 and 148, refrigeration water manifolds 145-147, refrigerator evaporator housings 146, discharge ball valves
35 155, drain ball valve 144 and associated line 143, isolation ball valves 154, water injector manifolds 153, pre filter media 156 and water injectors 157.

In FIG 15 there is shown holding tank assembly 159 mounted on mounting frame 120. Attachment points 41 are also shown for crane hooks (not shown). The holding tank 133 includes mesh screens 43A, 44 and 45 and water injectors 153A. Housing 47A is also shown for the filter tank 134. Also shown are longitudinal recesses 48 for inlet conduits (T), suction conduits (54) and skimmer conduits already shown in FIG 2.

In FIG 16 there is shown a detailed view of filter tank 134 having inlets 185 which are the skimmer inlets and 186 which is the discharge line coming from the carbon pump, and outlet tubes 187.

A layer of shell grit 188 is supported on perforated tray 189 which is supported on perforated upstands 190 bonded to the base surface 191 of tank 134. Above the layer of shellgrit lays a prefilter media 156 which catches ocean sediments before it enters the filter bed. This in turn keeps maintenance of the filter bed to a minimum by periodically removing the prefilter, washing and placed back on top of the filter bed. At the base of the filter tank underneath the filter tray, there is a water body space 192. This ensures 100 per cent utilisation of the filter bed without causing any dead spots of bacteria to form. Also it allows a clear flow of water to enter the pumps and finally by having the outlets 87 elevated above the base surface 191 it allows any sediments to accumulate at the base surface 191 and therefore the balance of the system is not disturbed.

From the foregoing it will be appreciated that the holding tank system of the invention is readily transportable by providing a transportable base or frame for both the holding tank assembly as well as the filter tank assembly and also a housing for the water conditioning means. This means that installation can be carried out in minimal time because the transportable base or frame is an integral part of the holding tank system of the invention

when it is installed. The transportable base or frame may also function as a skid so that it may readily be shifted from one location to another without any dismantling being necessary.

5 The holding tank system of the invention once placed in desired location in a factory or retail establishment mounted on its mounting frame or mounting base only requires that the holding tank be filled with water and also that the holding tank system be electrically connected
10 to an appropriate power source before becoming operational which is in distinct contrast with the prior art.

Another advantage of the present invention is that the holding system may be fabricated in its entirety prior to delivery to the installation site which enables quality
15 control procedures or quality control management systems to be fully utilised prior to delivery.

The invention also includes within its scope a method of installation of a holding tank system which includes the steps of -

- 20 (i) mounting the holding tank assembly onto transportable support means, and
- (ii) installing the holding tank assembly at an installation site so that the transportable support
25 means supports the holding tank assembly and this forms part of the holding tank system.

CLAIMS

1. A holding tank system for storage of live seafood including:
 - (i) a holding tank assembly;
 - 5 (ii) transportable support means for supporting the holding tank assembly during transportation characterised in that installation of the holding tank assembly takes place at an installation site with the transportable support means supporting the holding tank assembly and
10 thus forming part of the holding tank system when installed.
2. A holding tank system as claimed in claim 1 wherein the transportable support means also supports a filter tank assembly during transport and also installation.
- 15 3. A holding tank system as claimed in claim 2 wherein the holding tank assembly and the filter tank assembly are supported by a common transportable support means.
4. A holding tank system as claimed in claim 2 wherein the holding tank assembly and the filter tank assembly are
20 supported by separate transportable support means.
5. A holding tank system as claimed in claim 1 wherein there is further provided a housing for water conditioning apparatus which is also supported by said transportable support means.
- 25 6. A holding tank system as claimed in claim 5 wherein the water conditioning means includes a pump, water filters and cooling apparatus inclusive of refrigeration assemblies.
7. A holding tank system as claimed in claim 4 wherein
30 the holding tank assembly and the filter tank assembly are interconnected so that water may flow between the holding tank assembly and the filter tank assembly for conditioning of said water at the installation site.
8. A holding tank system as claimed in claim 7 wherein a
35 forward line and a return line of the filter tank assembly is connected to a suction line of a water conditioning circuit of the holding tank assembly.

9. A holding tank system as claimed in claim 1 wherein the transportable support means comprises a mounting base or frame.
10. A holding tank system as claimed in claim 9 wherein
5 the mounting base includes a plurality of attachment points for location of crane hooks.
11. A holding tank system as claimed in claim 9 wherein the mounting base includes a plurality of longitudinal frame members interconnected by a plurality of transverse
10 frame members.
12. A holding tank system as claimed in claim 11 wherein the mounting base includes a plurality of longitudinal recesses for accommodation of conduits which form part of water conditioning means.
- 15 13. A holding tank system as claimed in claim 12 wherein the conduits include a suction line, a skimmer line and inlet conduits.
14. A method of installation of a holding tank system including a holding tank assembly which includes the steps
20 of:
- (i) mounting the holding tank assembly onto transportable support means, and
 - (ii) installing the holding tank assembly at an installation site so that the transportable support
25 means supports the holding tank assembly and this forms part of the holding tank system.
15. A method of installation as claimed in claim 14 wherein in step (i) a filter tank assembly is also mounted on the transportable support means.
- 30 16. A method of installation as claimed in claim 15 wherein in step (i) a housing for water conditioning apparatus is also mounted on the transportable support means.
- 35 17. A method of installation as claimed in claim 15 wherein the holding tank assembly and the filter tank assembly are mounted on a common transportable support means.

18. A method of installation as claimed in claim 15 wherein the holding tank assembly and the filter tank assembly are mounted on separate transportable support means.

5 19. A method of installation as claimed in claim 18 wherein the holding tank assembly and the filter tank assembly are interconnected so that water may flow between the holding tank assembly and the filter tank assembly for conditioning of said water at the installation site.

10 20. A method of installation as claimed in claim 19 wherein a forward line and a return line of the filter tank assembly is connected to a suction line of a water conditioning circuit of the holding tank assembly.

21. A holding tank system including -

- 15 (i) a holding tank assembly;
(ii) a filter tank assembly, and
(iii) water conditioning apparatus which conditions water flowing between the holding tank assembly and the filter tank assembly characterised in
20 that flow of water through the filter tank assembly which occurs when the water conditioning apparatus is in a normal operative cycle may be reversed to wash the filtering material contained in the filter tank assembly to ensure an
25 unrestricted flow of water through the filter tank assembly.

22. A holding tank system as claimed in claim 2 further includes water conditioning apparatus which conditions water flowing between the holding tank assembly and the
30 filter tank assembly characterised in that flow of water through the filter tank assembly which occurs when the water conditioning apparatus is in a normal operative cycle may be reversed to wash the filtering material contained in the filter tank assembly to ensure an unrestricted flow of
35 water through the filter tank assembly.

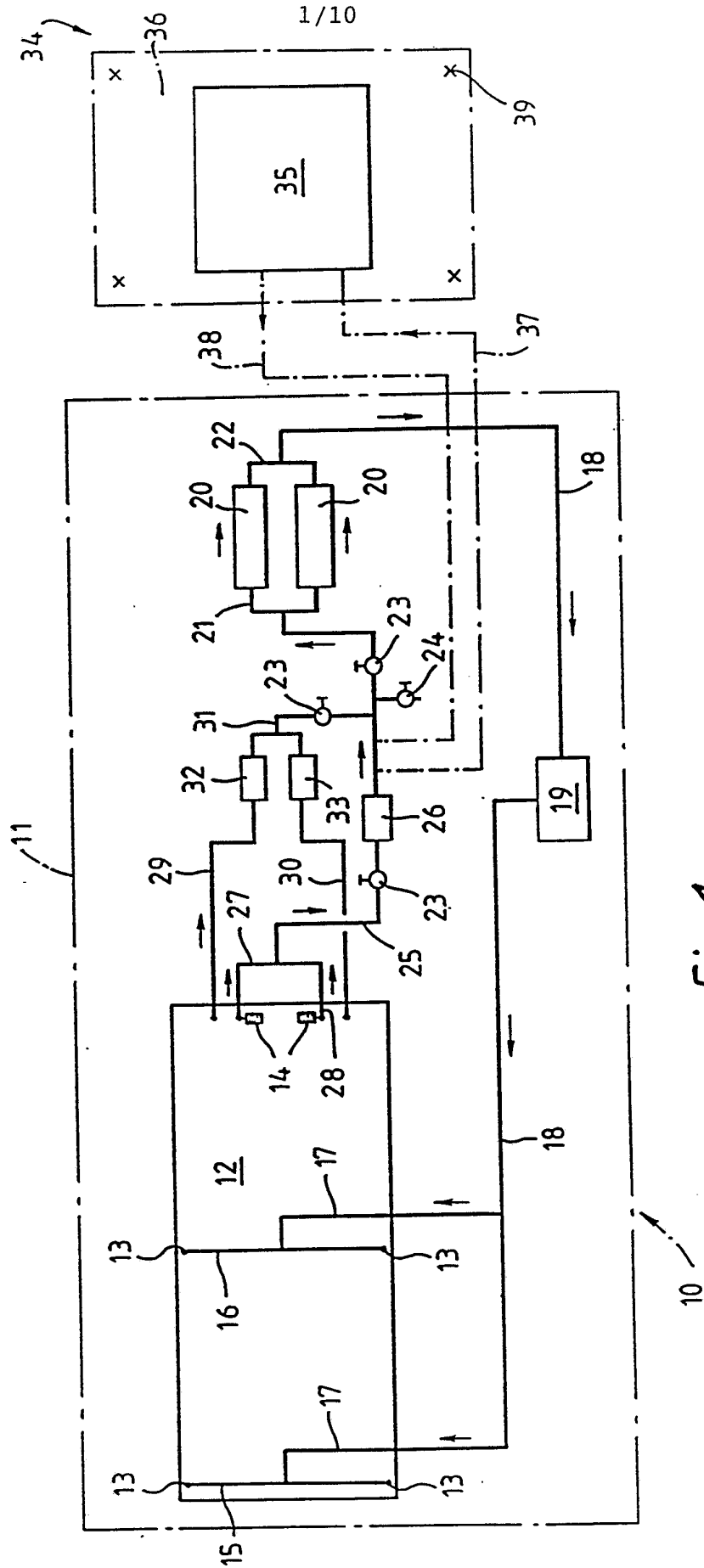


Fig.1.

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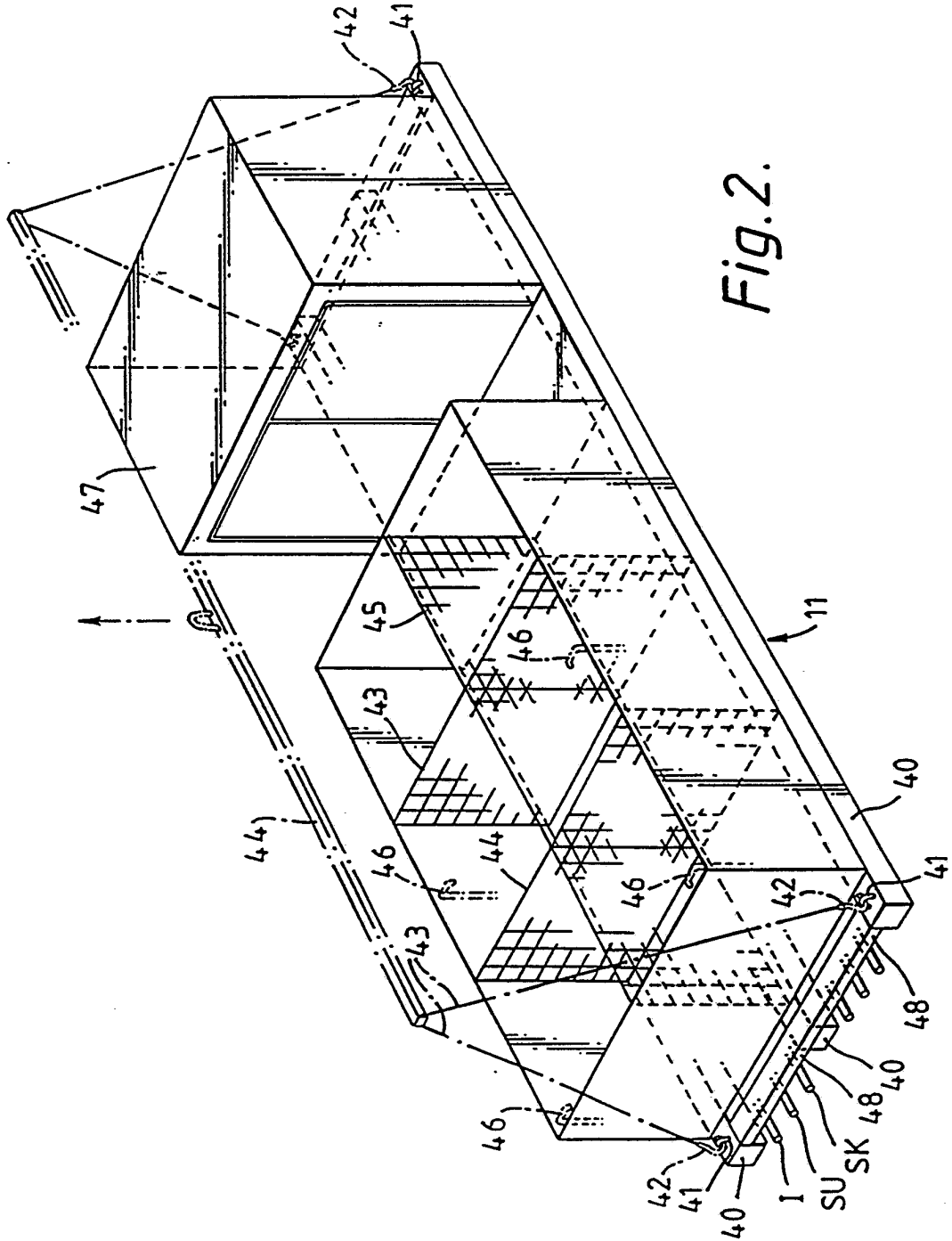


Fig.2.

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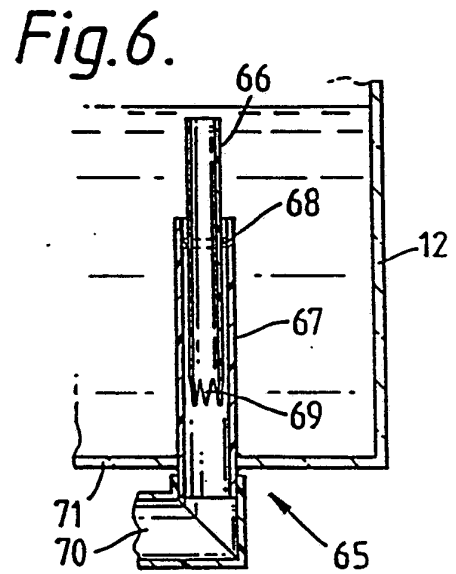
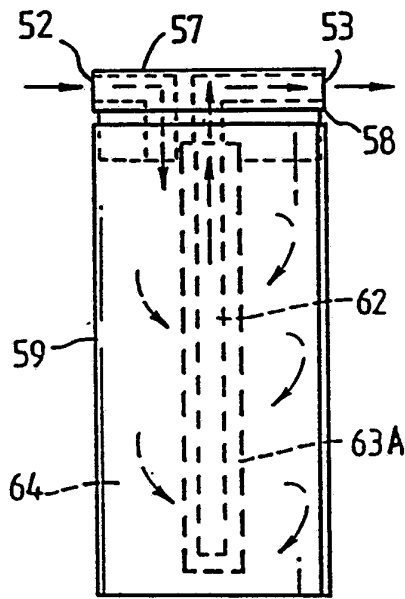
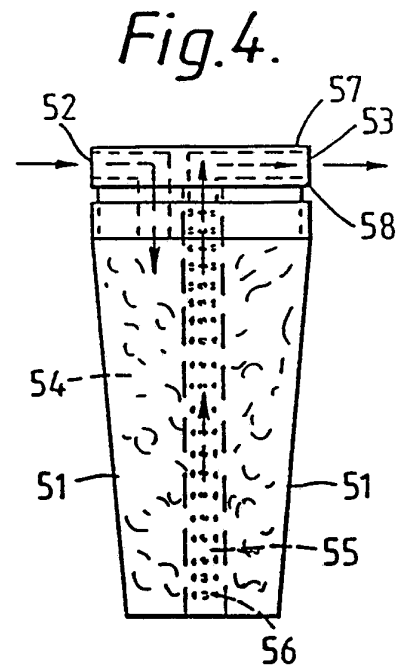
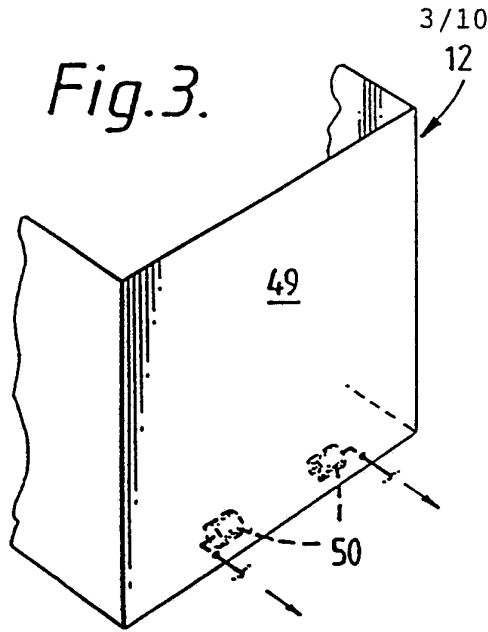
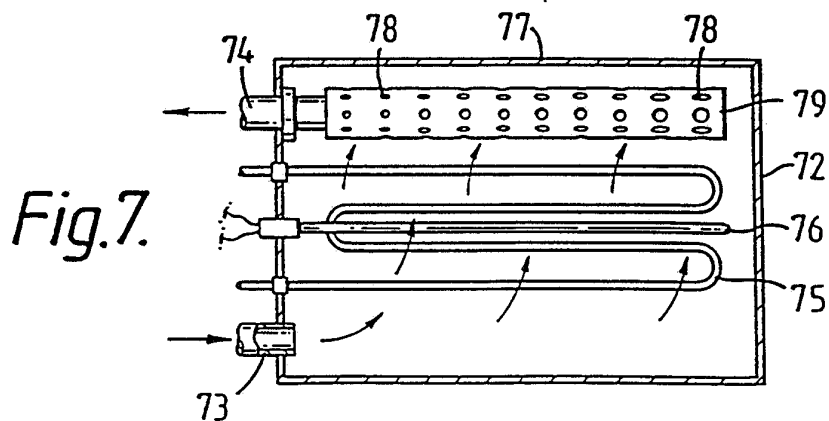


Fig.5.



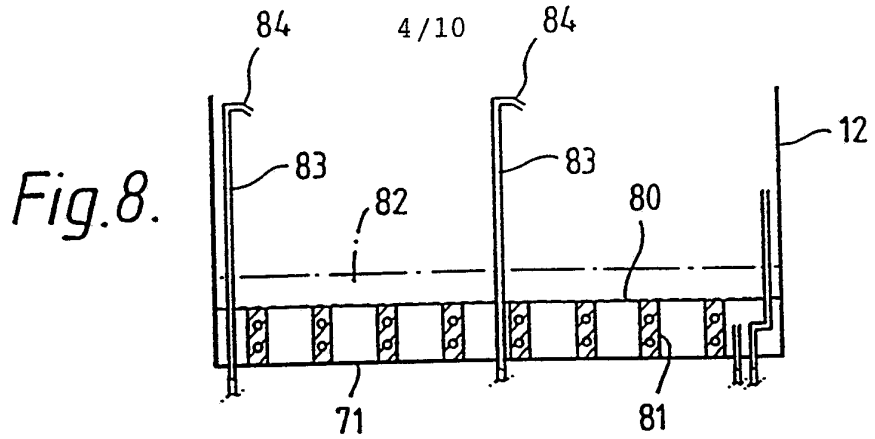


Fig. 9.

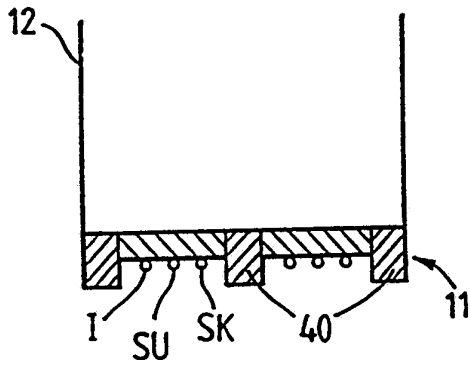


Fig. 10.

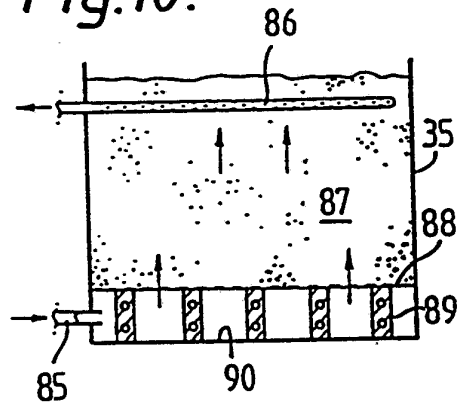


Fig. 11.

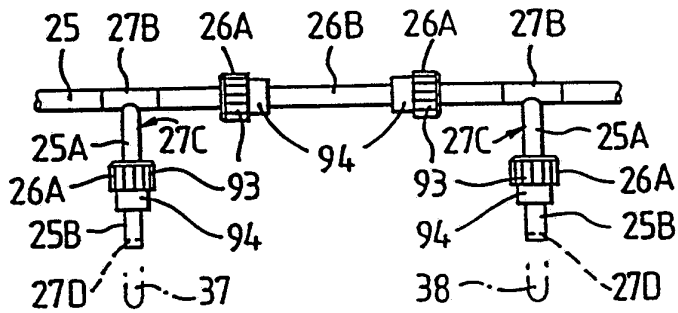


Fig. 11B.

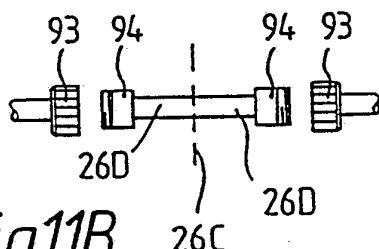
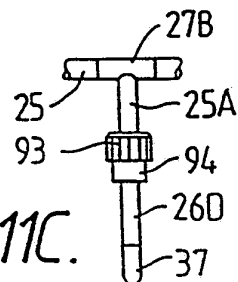
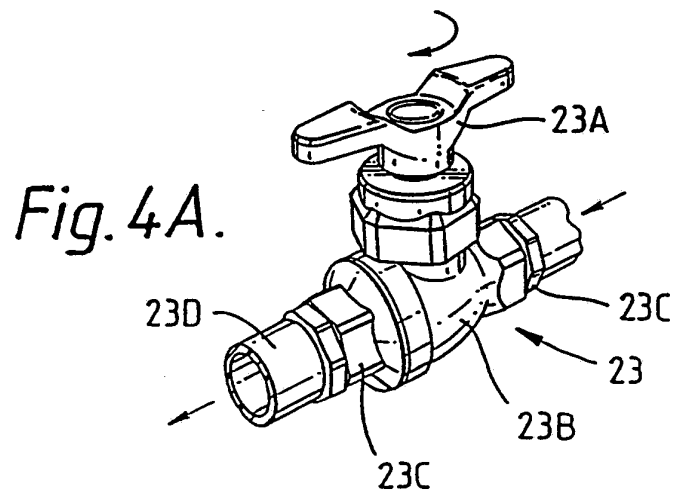
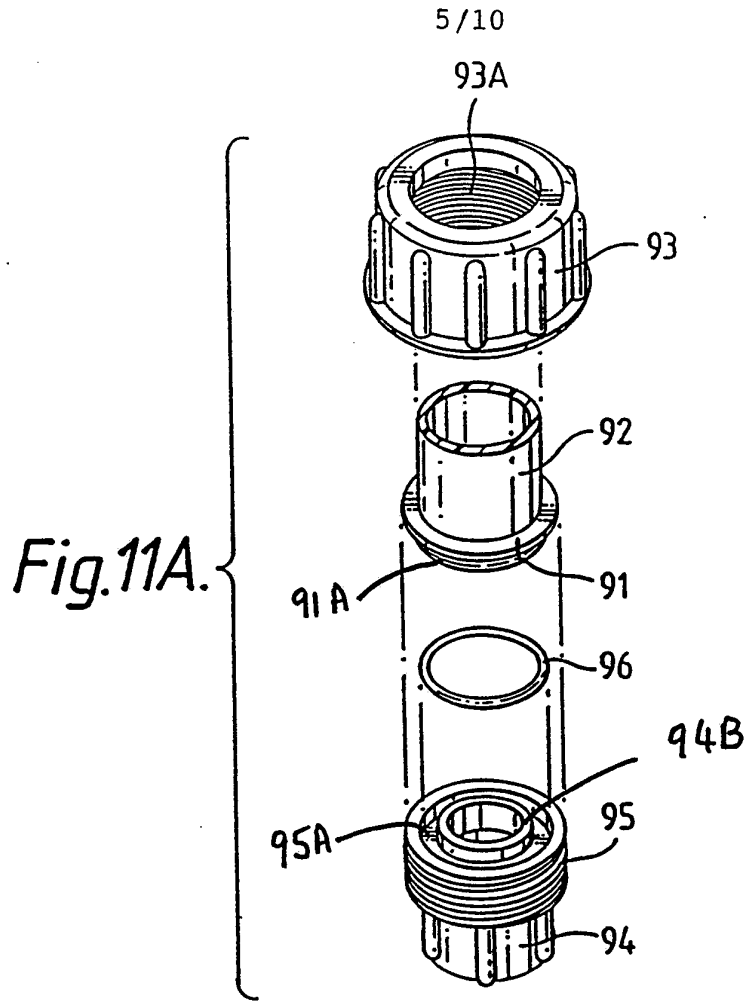
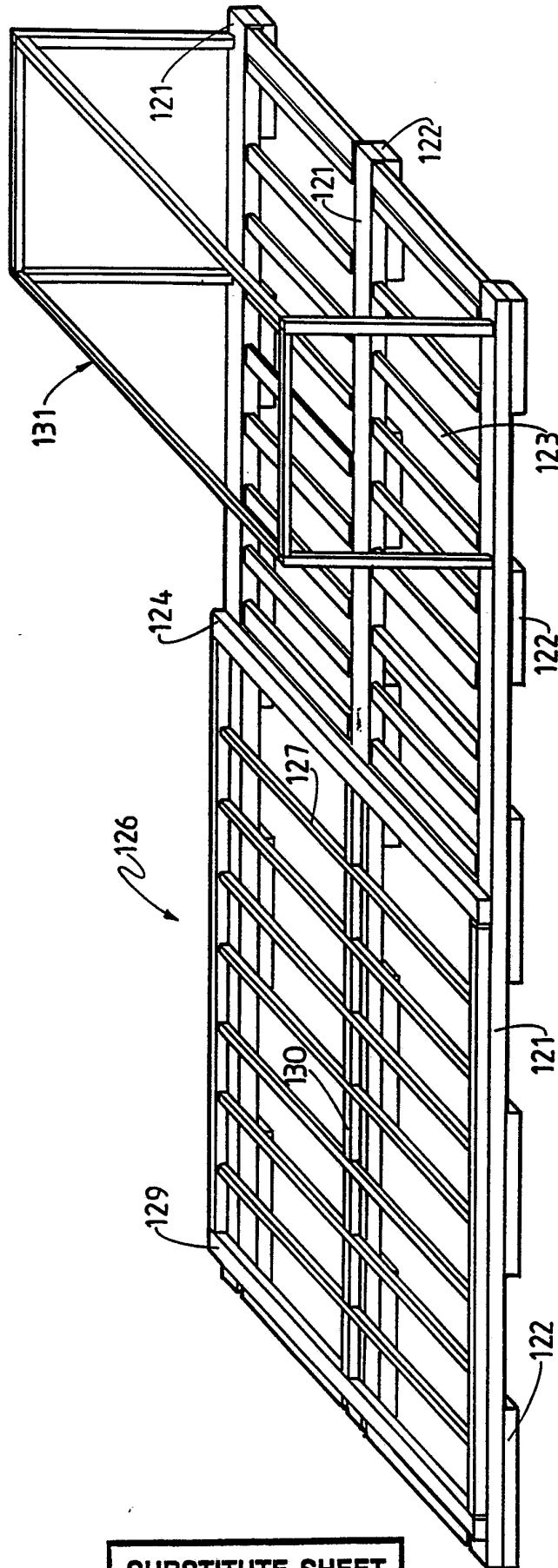


Fig. 11C.







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FIG.13.

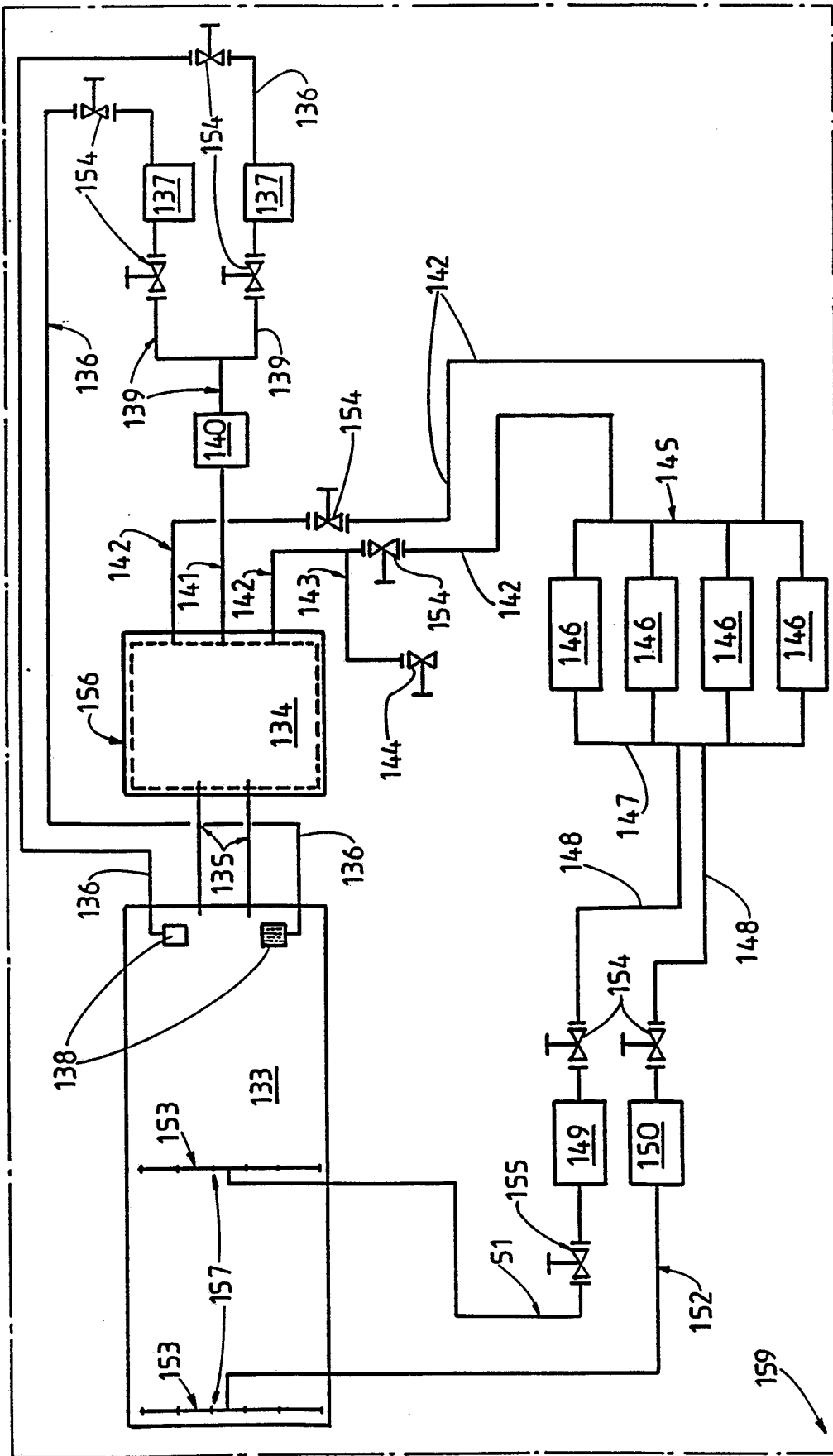


FIG. 14.

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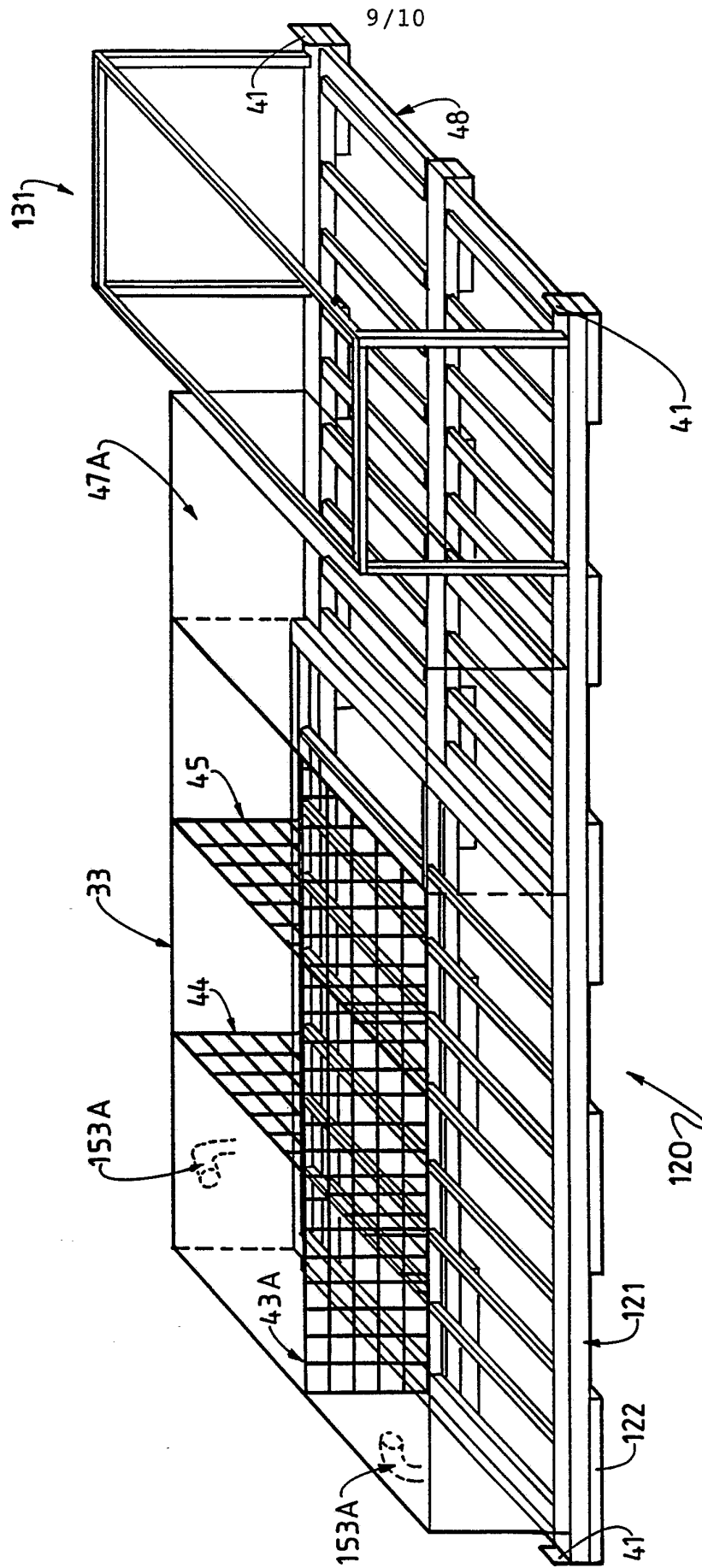
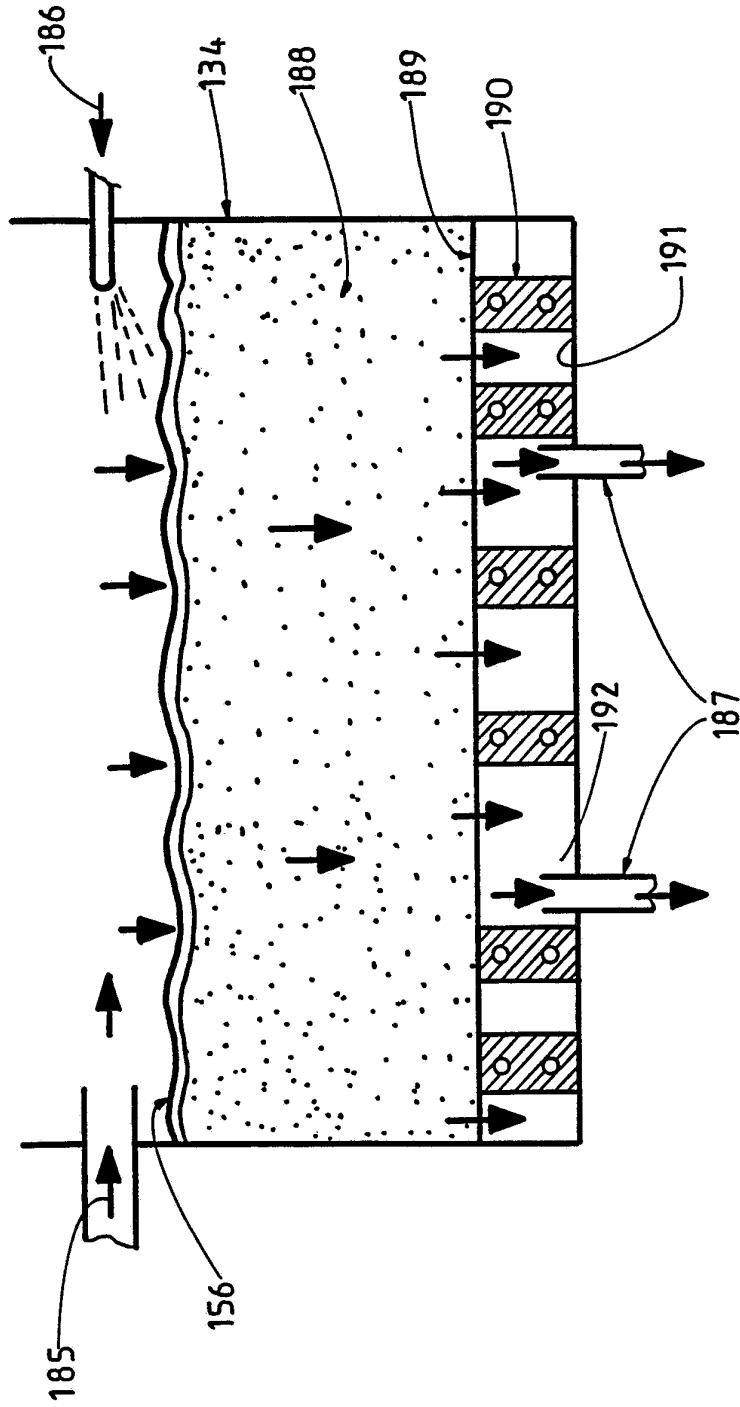


FIG.15.

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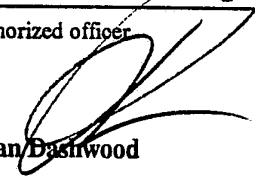
SUBSTITUTE SHEET

FIG.16.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU 93/00185

<p>A. CLASSIFICATION OF SUBJECT MATTER Int. Cl.⁵ A01K 63/00, 63/02, 63/04, B65D 85/50</p> <p>According to International Patent Classification (IPC) or to both national classification and IPC</p>														
<p>B. FIELDS SEARCHED</p> <p>Minimum documentation searched (classification system followed by classification symbols) IPC A01K 63/00, 63/02, 63/04</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched AU:IPC as above</p> <p>Electronic data base consulted during the international search (name of data base, and where practicable, search terms used)</p>														
<p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1" style="width:100%; border-collapse: collapse;"> <thead> <tr> <th style="width:10%;">Category*</th> <th style="width:70%;">Citation of document, with indication, where appropriate, of the relevant passages</th> <th style="width:20%;">Relevant to Claim No.</th> </tr> </thead> <tbody> <tr> <td style="text-align:center;">X</td> <td>US,A,3557753 (DANTONI) 26 JANUARY 1971 (26.01.71) Column 2 line 31 to Column 3 line 75 and Figures 1, 5-7</td> <td style="text-align:center;">1-22</td> </tr> <tr> <td style="text-align:center;">X Y</td> <td>FR,A,2550917 (TOULOUSE) 1 March 1985 (01.03.85) Page 2, lines 4-9 and Figure 1</td> <td style="text-align:center;">1,9,14 2-8,10-13,15-22</td> </tr> <tr> <td style="text-align:center;">X Y</td> <td>GB,A,2194121 (CHIANG) 2 March 1988 (02.03.88) Page 1 lines 47-79 and Figure 5</td> <td style="text-align:center;">1-8,14-22 9-13</td> </tr> </tbody> </table>			Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to Claim No.	X	US,A,3557753 (DANTONI) 26 JANUARY 1971 (26.01.71) Column 2 line 31 to Column 3 line 75 and Figures 1, 5-7	1-22	X Y	FR,A,2550917 (TOULOUSE) 1 March 1985 (01.03.85) Page 2, lines 4-9 and Figure 1	1,9,14 2-8,10-13,15-22	X Y	GB,A,2194121 (CHIANG) 2 March 1988 (02.03.88) Page 1 lines 47-79 and Figure 5	1-8,14-22 9-13
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X	US,A,3557753 (DANTONI) 26 JANUARY 1971 (26.01.71) Column 2 line 31 to Column 3 line 75 and Figures 1, 5-7	1-22												
X Y	FR,A,2550917 (TOULOUSE) 1 March 1985 (01.03.85) Page 2, lines 4-9 and Figure 1	1,9,14 2-8,10-13,15-22												
X Y	GB,A,2194121 (CHIANG) 2 March 1988 (02.03.88) Page 1 lines 47-79 and Figure 5	1-8,14-22 9-13												
<p><input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C.</p>														
<p><input checked="" type="checkbox"/> See patent family annex.</p>														
<p>* Special categories of cited documents :</p> <table style="width:100%;"> <tr> <td style="width:50%;"> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </td> <td style="width:50%;"> <p>"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</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"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</p> <p>"&" document member of the same patent family</p> </td> </tr> </table>			<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"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</p> <p>"&" document member of the same patent family</p>										
<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone</p> <p>"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</p> <p>"&" document member of the same patent family</p>													
<p>Date of the actual completion of the international search 3 September 1993 (03.09.93)</p>		<p>Date of mailing of the international search report 10 SEP 1993 (10.09.93)</p>												
<p>Name and mailing address of the ISA/AU AUSTRALIAN INDUSTRIAL PROPERTY ORGANISATION PO BOX 200 WODEN ACT 2606 AUSTRALIA Facsimile No. 06 2853929</p>		<p>Authorized officer  Brian Dashwood Telephone No. (06) 2832121</p>												

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate of the relevant passages	Relevant to Claim No.
X Y	EP,A,0192577 (YARDIN) 27 August 1986 (27.08.86) Page 1 and Figure 2	1,14 2-13, 15-22
X Y	Patent Abstracts of Japan, C-777, Page 152, JP,A,2-215330 (COLPO CO LTD) 28 August 1990 (28.08.90)	1,14 2-13, 15-22
Y	GB,A,2226940 (NIHON SUIISO INDUSTRY CO LTD) 18 July 1990 (18.07.90), Claim 1	8,11
Y	WO,A,87/01010 (MANRAHAN) 26 February 1987 (26.02.87) Claim 1, abstract and Figure 2	1-22

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Patent Document Cited in Search Report	Patent Family Member					
EP	192577	FR	2577384			
GB	2226940	JP	2186928	AU	62828/86	
WO	8701010					END OF ANNEX