The present invention relates to a grease trap system for wastewater systems, having an inlet pipe with a shut-off valve, an outlet pipe with a shut-off valve and a grease interceptor comprising a replaceable container body including means to trap fats, oils and grease within the body. The body has inlet and outlet slide couplers in opposed walls, and each coupler has an associated connecting means to sealingly fluidly connect the slide couplers to the inlet and outlet pipes. When the container body is disconnected from the pipes the slide couplers may also be sealed by a removable plug for transport. The slide couplers displace inwardly and outwardly relative to the container to give clearance between the pipes to remove the container. A method of replacing full containers with empty containers is also comprehended.
REPLACEABLE GREASE TRAP SYSTEM FOR A WASTEWATER SYSTEM AND
METHOD OF USING THE SAME

FIELD OF THE INVENTION

[0001] This invention relates generally to the field of wastewater systems and in particular to a passive collector of fats, oils and grease of the type that is typically associated with a wastewater drainage system for a food service establishment. Most particularly this invention relates to a grease trap or collector which is used to collect such fats, oil and grease from a sink or drain from a commercial kitchen or the like to prevent the same from being discharged directly into a municipal wastewater system.

BACKGROUND OF THE INVENTION

[0002] Grease traps or interceptors are well known and used extensively to collect fats, oil and grease ("F/O/G") from the wastewater discharge streams from commercial food service establishments such as kitchens and restaurants. In many jurisdictions there are by-laws or other local rules which require the owners or operators to use such devices to prevent the F/O/G from being freely discharged and then fouling the downstream wastewater system.

[0003] Typically in the past these grease interceptors or traps have taken the form of steel containers or vessels which are positioned in the wastewater effluent stream downstream of the food preparation areas. Often they are large volume containers which are sunk into the floor with removable lids at or slightly above grade. They are typically immovable and plumbed into place. Water from the sinks or dishwashers flows, by gravity, into and then out of the devices, and is then carried away by the wastewater or sewer system. Baffles and the like are positioned inside of the container to trap the floating F/O/G within the container to prevent it from entering into the sewer system. However, even with a large container, over time the FOG builds up and then the grease interceptor needs to be emptied.

[0004] Typically such devices are built with a removable lid so that the floating F/O/G can be periodically removed from the top of the container. There are several methods used to empty the F/O/G from the container. In some small volume devices an employee may be asked to remove the top of the container and then bail out the F/O/G into a ladle or bucket and then dump the removed material into a dumpster or other solid waste container. In other cases a service will be utilized to bring a pump out truck to pump out the F/O/G from the container, once the lid is taken off. In this case a long hose is threaded from the truck to the container and the F/O/G is sucked out through the hose. Various other means of emptying the container also exist.

[0005] However, in all cases when the lid is taken off the smell is very strong and noxious. The smell can penetrate clothing, foul the air and will be located deep within the kitchen. Nasty smells within the kitchen can be very off putting for customers of the food service establishment, as well as the employees. Therefore the F/O/G removal operation is often scheduled for late at night or early in the morning when the facility is otherwise closed. However in some cases the food service facility may be open 24 hours per day making this scheduling more difficult. Furthermore, in some applications such as a shopping mall food court, the grease interceptor may be located at such a distance from an outside wall that it can be difficult to stretch the suction hose from the truck to the interceptor. What is desired is a way to accomplish the removal of the F/O/G without exposing the employees and customers to the foul smells associated with the accumulated F/O/G while improving the cost effectiveness and convenience of the F/O/G collection process.

SUMMARY OF THE INVENTION

[0006] Accordingly the present invention provides a grease interceptor system which includes a grease trap that comprises a portable light weight container body, which can be easily connected and disconnected to the wastewater system for pick up and removal, without the need for the container to be opened during this removal step. The present invention provides for an above grade mounting for the container body of the grease interceptor in between opposed inflow and outflow portions of the wastewater drain pipes. The body includes inflow and outflow openings which are sized and positioned to be connectable to the drain pipes. The drain pipes are provided with shut off valves to permit the drain pipes to be closed when the grease interceptor is disconnected from the drain pipes. There is also provided easy to use pipe couplings to fluidly connect to the container body of the grease interceptor to the drain pipes.

[0007] In one embodiment the present invention provides a method whereby a container body which is full of trapped F/O/G may be removed by means of a hand cart placed under the bottom of the grease interceptor container body. Plugs, such as screw thread caps, or valves are provided to permit the inflow and outflow openings of the full grease container to be sealed for transport once the container body is disconnected from the inflow and outflow lines. Means are provided on the body of the grease interceptor to temporarily displace the connecting elements laterally as the body is placed into or pulled out of position between the drain pipes, to protect the seals, o-rings and coupler stems that are present on the container body to provide the hydraulic connection to the wastewater drain.

[0008] Thus according to the present invention a replaceable grease interceptor can be removable secured in place in a wastewater line to collect F/O/G. When full, a service is called and a clean, empty unit is wheeled into the kitchen on a hand cart. The wastewater flow line valves are shut both upstream and downstream of the container body and the couplers are disconnected. Then the full unit can be moved slightly, in a direction generally perpendicular to the axis of the pipe connections, by placing the hand cart under the unit and levering it up and pulling it out slightly, to permit closure members, such as the plugs, stoppers, caps or other sealing means to be threaded, or otherwise secured in place to seal the pipe openings in the body. Then the full unit can be fully removed from between the inlet and outlet drain pipes. It will be noted that this initial movement of the container body can be accomplished without tilting the body side to side thus reducing the chances of causing a spill out of the pipe coupler openings, before the drain plugs are secured in the openings. Once the full unit is removed from between the upstanding pipes the clean unit can be placed in position.

[0009] The clean unit is positioned between the drain pipes and coupled to the drains. Once this is done the valves upstream and downstream on the wastewater lines can be re-opened to permit the water to drain through the unit whereby fresh F/O/G will be captured. The full unit can be wheeled away to a truck or the like for eventual disposal at a
landfill site or the like or for recycling as appropriate. In this way the F/O/G remains substantially enclosed as the container is moved through the kitchen and then out through the commercial establishment and the bad smell is greatly reduced if not eliminated. A single service truck can be provided with multiple replacement containers and can follow a route to service many separate commercial restaurants by pulling the full units and replacing them with empty units as needed. Over time the route can be timed to co-ordinate with the frequency of the haul away need of the establishment.

Thus according to a first aspect the present invention provides a grease trap system for wastewater systems, said grease trap system comprising:

- A ground engaging frame into which a replaceable container body may be inserted,
- An inlet pipe connector with shut off valve on an inlet side of said frame,
- An outlet pipe connector with a shut off valve on an outlet side of said frame;
- A grease interceptor comprising a replaceable container body including means to trap fats, oils and grease within said replaceable container body and further being sized and shaped to be positioned within said frame and connected to said inlet and outlet pipe connectors, said container body including inlet and outlet slide couplers through opposed walls of said body, said inlet and outlet slide couplers having associated connecting means to sealingly fluidly connect said inlet and outlet connectors to said container body, said inlet and outlet slide couplers being further configured to be sealed for transport of said container body by a closure member;
- Wherein said slide couplers laterally displace away from said inlet and outlet connectors when said container body is being replaced.

According to another aspect the present invention provides a method of collecting grease from a wastewater stream comprising the steps of:

- Positioning a replaceable container body between a pair of inlet and outlet connectors mounted on a frame, wherein said connectors are connected to a wastewater drain and fluidly connecting inlet and outlet slide couplers on said body to said connectors so wastewater flows through said container body;
- Capturing fats, oils and grease in said container body over time;
- Shutting inflow and outflow pipe valves to stop the flow of wastewater through said body;
- Displacing one or both of said inlet and outlet pipe connections and said inlet and outlet couplers laterally to permit said container to be removed from between said connectors without interference at said connectors;
- Sealing inlet and outlet slide couplers on said container to ready said container body for transport; and
- Transporting said sealed container to a remote location to be emptied and cleaned.

**BRIEF DESCRIPTION OF THE DRAWINGS**

**0023** Reference will now be made to preferred embodiments of the invention by way of example only to the following illustrative figures in which:

**0024** FIG. 1 is a front view of a container according to present invention in place and fluidly connected to a wastewater flow line;

**0025** FIG. 2 is a close up of an inflow connection portion according to a preferred aspect of the present invention ready to connect to the wastewater flow line;

**0026** FIG. 3 is the same view as in FIG. 2 with the inflow connection portion connected to the wastewater flow line;

**0027** FIG. 4 is a view of the inflow connection portion of FIGS. 2 and 3 disconnected from the wastewater line and with a plug sealing the inflow connection portion so the container may be transported without spilling it contents;

**0028** FIG. 5 is a view from behind showing a support frame according to a preferred aspect of the present invention;

**0029** FIG. 5a is a close up view of a section through an orientation tab on the frame of the present invention;

**0030** FIG. 6 is a cut away view of the full sealed container ready for transport.

**0031** FIG. 7 is an exploded view of a further embodiment of an attachment assembly according to the present invention;

**0032** FIG. 8 is a top view of the attachment assembly of FIG. 7 in an attached position where wastewater can flow through the assembly;

**0033** FIG. 9 is a top view of the attachment assembly of FIG. 8 partially uncoupled from the fixed wastewater plumbing;

**0034** FIG. 10 is a top view of the attachment assembly in a fully disconnected position; and

**0035** FIG. 11 is a view of an alternate embodiment of a container according to the present invention.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

**0036** FIG. 1 shows a preferred embodiment of a grease trap system 10 according to the present invention from the front, having a grease collector or container body 11. The system includes an inlet pipe connector 12 having a drain pipe receiving collar 14 to which a conventional drain pipe 15 from a sink or the like can be joined in the usual manner such as by solvent welding. The inlet pipe connector 12 is preferably carried on a frame 16, which holds the connector 12 in position even when the connector 12 is not connected to a drain pipe 15 or a container 11. As will be explained in more detail below the present invention requires the inlet connector be carefully positioned so that a connection can be made to the container 11. Thus, the frame 16 is useful to position the inlet coupler in the right position for the installer, who merely has to connect the pipe 15 to the inlet connector, without having to worry about putting the connector in the right place in space. The inlet pipe connector 12 includes a shut off valve 18 and ends with a threaded pipe end 20 having a groove 21 with an o-ring seal 22. A manually operated gate valve 19 with a twist lock feature to prevent accidental release has provided good results. Most preferably the grease trap system 10 is positioned below or close to a sink so the drain pipe 15 has a minimum run and does not form an obstruction to movement of employees within the kitchen. The threaded pipe end 20 can be molded in as part of the valve 18, or can be as shown, namely, a separate sleeve that is threaded or solvent welded onto the valve 18.

**0037** The threaded pipe end 20 is sized and shaped to engage with and seal with a slide coupler 22 mounted in an inlet sleeve 24 of the container 11. The slide coupler 22 defines an inlet opening 26 in an upstream side 28 of the container body 11. The slide coupler 22 is comprised of an internally threaded collar 30 rotatably mounted on an outside stem portion 32, in a channel 34. The channel is formed by
shoulders 33, 35 (FIGS. 2 and 3) which trap the collar 30 in place relative to the slide coupler 22. The threaded collar 30 can be manually turned onto and off of the threaded pipe end 20. The outside stem portion 32 is secured to an internal stem portion 36 that includes a limit stop lip 38 and a pair of O-ring seals 40 and 42 (FIG. 2) secured in channels 44 and 48 (FIG. 2) respectively. The inside and outside stem portions 32, 36 may be threaded together as shown at 37, solvent welded or joined in any other manner that ensures a secure liquid tight connection.

[0038] The container body 11 is preferably made from molded plastic and sized and shaped to hold a reasonable amount of liquid inside. Plastic has the advantage of being reasonably light weight, easy to clean and inexpensive to manufacture, but the present invention comprehends that other materials may also be used without departing from the scope of the invention. The container body 11 includes a removable top or lid 50, which can be secured to the container body 11 in a liquid tight manner, such as through the use of fasteners clips and seals or the like as is known in the art. Most preferably the container body 11 includes the usual baffles and grease separating structures (not shown) within to allow the container body 11 to trap grease oil and the like over time as wastewater flows through the body 11. As will be understood wastewater will enter through an upstream side 28 and then exit the container body 11 through a downstream side 52 and then be carried away by an outlet drain pipe 54.

[0039] As well as the inlet pipe connector 12 there is provided an outlet pipe connector 60 on the frame 16 on the downstream side 52 of the container body 11. As can now be better understood the frame holds both the inlet and outlet connectors in the correct position to accommodate a container 11 there-between and so greatly helps in installing and connecting the connectors in the correct position when they are first plumbed into the wastewater drain pipe. The outlet pipe connector 60 is preferably the same as the inlet pipe connector 12 previously described, only in reverse. There is an outlet sleeve 62 which most preferably is at a height relative to the inlet sleeve 24 that allows the wastewater flowing into the container body 11 to the flow out of the container 11 by gravity drainage with the F/O/G trapped inside.

[0040] Located within the outlet sleeve 62 is an outlet slide coupler 64 which is comprised of an internal stem portion 66 and an external stem portion 68. Again these may be joined together by threads, solvent welding or the like. The internal stem portion 66 includes a stop lip 70, and a pair of O-ring seals 72, 74 located within channels 76, 78 respectively to seal against an inside surface of the outlet sleeve 62. The external stem portion 68 includes a receiving channel 80 in which an internally threaded collar 82 is rotatably received. Once again the slide coupler 64 may move back and forth within the outlet sleeve 62, by means of the difference in distance between the internal side of the collar 82 and the end of the sleeve 62.

[0041] Downstream of the outlet slide coupler 64 is the outlet pipe connector 60. As with the inlet pipe connector 12 the outlet pipe connector 60 includes an externally threaded tube which forms an outlet pipe 86 onto which the threaded collar 82, may be secured. Again an O-ring seal 88 may be used to seal the slide coupler 64 to the outlet pipe 86. Also the outlet pipe connector 60 includes a manually operable shut off valve 90 to shut off the water flow through the pipe 86 when the valve is shut.

[0042] As shown in FIG. 1 both the inlet and outlet pipes 15, 54 are in the form of a gravity drainage wastewater pipes and need to be plumbed with the drainage slope as is required by code or the like to ensure good drainage of the wastewater through the pipes. FIG. 1 also shows support rails or posts 65 which raise the bottom 67 of the container body 11 off the floor to permit lifting forks 69 of a dolly or lift truck (not shown) to fit underneath the bottom 67. An orientation tab 214 is also shown which is explained in more detail below.

[0043] Turning to FIGS. 2, 3 and 4 there is shown a close up view of the inlet connector 12 and the slide coupler 22 according to the present invention in three different positions. Although showing only the inlet side, it will be understood that the outlet side will be substantially the same. In FIG. 2 the slide coupler 22 is displaced inwardly towards the container 11 to permit the container 11 to be inserted or removed from between the inlet and outlet connectors 12, 60. In FIG. 3 the slide coupler 22 is extended outwardly and connected to the connector 12 to permit wastewater to flow through the connection to permit the collection of F/O/G within the container 11. In FIG. 4 the slide coupler 22 is shown with a seal or plug, which is used to contain the fluids inside of the container 11 when transporting a full container.

[0044] It will be appreciated by those skilled in the art that although threaded engagements are shown between the slide couplers 22, 68 and the connectors 12, 60 and have been found to work well, other types of connection can also be used, such as a bayonet type mount or the like. All that is required is for the components to be manually coupled together in a manner that permits them to be easily connected and disconnected as and when required, preferably without the need for any tools or the like. As well, although there is reference to the sealing ring 21 being placed on the threaded pipe end 20 of the connector it will be understood that the sealing ring could also be placed on the other component as a matter of design choice without departing from the spirit of the present invention.

[0045] FIG. 2 shows the present invention configured for insertion or removal of a container 11 into position between the connectors 12, 60 on the frame 16, with only the inlet side being shown. In this view the slide coupler 22 is displaced inwardly towards the container 11 and a gap is shown at 100 between the stop lip 38 and an inside wall of the container 11. This gap 100 permits there to be a smaller gap at 102 which allows the threaded collar 22 to be displaced away from the threaded pipe end 20. As can now be more clearly understood the slide couplers of the present invention provide a certain amount of axial movement along a centerline axis of the wastewater pipe or generally orthogonal to the inlet and outlet sides 28 and 52 of the container 11. The present invention comprehends a number of ways of providing this axial movement, such as by using flexible pipes or the like, but good results have been achieved through the slide couplers as described above. What is desired is to allow the inlet and outlet couplers to connect to the inlet and outlet sleeves of the container but to have enough space between the connecting elements to permit the connection elements to be out of contact with each other to permit the container 11 to be easily removed from between the connectors at both ends along an axis generally perpendicular to the direction of the axial movement of the slide couplers. In this way there is no interference between the inlet and outlet couplers and the container when the container is being moved.
Most preferably the external ends of the slide couplers will be displaced away from the connectors (i.e. towards the container 11) when disengaged as described above. This will allow the container 11 to be lifted up, for example, on a lift cart or dolly with lifting forks 51 and moved back from between the pipes. Ideally the present invention allows the lifting and movement of the container to occur in a plane perpendicular to the plane of the pipes. This avoids a problem of the prior art where the lifting of one end of the container, while the other end was still partially engaged with the pipes might lead to tipping the container and accidental spilling before the container is fully disengaged from the pipe connections.

In FIG. 3 the slide coupler 22 has been slid out until the internal threads of the collar 30 can engage the threaded pipe end 20, and then the collar 30 is turned to cause it to engage with the threaded pipe end 20. As the collar 30 is turned on, the slide coupler 22 is moved along the inlet sleeve axis away from the container 11 by the turning action of the collar 30 on the threads 20 until the collar 30 is fully threaded on the pipe 20. At this point the o-ring seal 21 is engaged with a sealing surface 104 on the slide coupler 22. As can be seen the gap 106 is much smaller than the gap 100 shown in FIG. 2 as the collar has pulled the slide coupler out almost the full distance of the gap 100. During this movement the two o-ring seals 40, 42 remain in contact with the inner surface of the inlet sleeve 24 and maintain a sliding sealing engagement therewith.

FIG. 4 shows a view of the container 11 with a closure member, in this case a plug 130 in place in the slide coupler 22. This occurs once the container 11 has been removed from between the inlet and outlet couplers as described above. The plug 130 is threaded and mates with the threads on the collar to form a liquid tight joint. An o-ring 140 is provided to seal against the sealing surface 104 of the slide coupler 22. With the plug 130 in place the full container may be easily transported around without spilling or losing any of the contents of a full container 11. It will be appreciated by those skilled in the art that while the drawings show plugs being used to close the openings on the grease interceptor, other closure members such as stoppers, caps, valves or the like are comprehended by the present invention. Further, such devices can be threaded, frictionally fit, bayonet mounted, or otherwise secured to the open ends without departing from the scope of the present invention.

The frame 16 can now be understood in better detail. The frame 16 is shown from behind in FIG. 5. As shown the inlet and outlet connectors are held in position by the frame in the exact locations where they can be connected to the slide couplers of a container. Thus they have to be spaced and positioned in the correct locations so that a standard sized container 11 can be easily connected and disengaged to the couplers as described above. The frame 16 is configured to allow the container to slide into place between the connectors and is provided with a pair of support rails 65 upon which the container rests. This provides a space under the container into which the forks or edge of a lifting truck can be inserted. As well, the present invention comprehends that the frame will include an orientation tab 214, which fits into an indentation 216 formed into the container 11 to ensure that the container 11 is inserted between the inlet and outlet connectors in the correct orientation for the capturing of the FOG within the container 11. The orientation tab is offset from the center of the container so that if the container is reversed the parts won’t fit and the container cannot be connected to the slide couplers as required. As will be understood by those skilled in the art, the interceptor is designed to capture FOG that flows through in a preferred direction. If the unit was mounted in reverse orientation, this would affect the ability to collect and trap FOG. Thus the restricted orientation is believed desirable.

FIG. 6 shows a sectional view of a container 11 which is full and being replaced. The inlet and outlet features are shown as 82 and 84 and the plugs are in place to seal the container. There is a layer of trapped FOG at 90 and a layer of water at 92 underneath. All that is required to clean the unit is to take it to a solid landfill site, remote the top, dump out the contents and wash with a pressure sprayer or the like. Since this can be done at a location remote from the food service establishment, there is no risk of the strong odours offending the customers.

Having now described the various components of the invention the operation of the invention can now be more clearly understood. First a clean container is put into place between a pair of connectors as described above. The container will sit up slightly on supports that are positioned in such a way to permit conventional lift truck, or dolly forks, to be inserted under the container 11 to easily manipulate it when full. Various forms of lift truck are available so the present invention comprehends various forms of supports positioned and configured for the type of lift truck to be used. According to the present invention therefore the supports are positioned under the container to allow easy access for lifting forks under the container and to center the lifting to avoid tilting the container, which is important as explained below.

Then both on both sides the wastewater drain pipes, inlet and outlet, are coupled to the container 11 by extending the slide couplers out of the containers until they are sealed with the connectors. Then the valves are opened and wastewater is allowed to flow into and then out of the grease trap in the usual hydraulic flow fashion. Over time grease and oil will collect and at a certain point it will be necessary to empty the container 11. In this case a service is called. The service will bring a fresh clean and empty container body to the site. They will then shut off the flow of wastewater through the pipes by turning off or closing the inlet and outlet valves. Next they will position a dolly under the full container and get ready to lift the same. Then they will unscrew the threaded sleeves, the action of which moves the slide couplers in towards the container 11 and then gently lift the container 11 up with the dolly, and back slightly, without tilting it so much that it spills. At this point it is only necessary to move the container 11 enough to provide access to the slide couplers to screw in a drain plug on either side of the container. The next step is to continue to guide the container from out between the inlet and outlet connectors and the frame 16 until the full container is clear. Since it is now sealed it will not be emitting any odours. Once the full container is out of the way, the fresh clean container can be positioned on the frame 16 between the threaded pipe ends and fluidly connected to the upstream and downstream pipes by means of the collar connectors. The next step is to open the valves to get the wastewater flowing again through the empty container body. Then the full container, which is sealed by reason of the plugs, is taken out to a waiting truck for transport. In this sealed state it can be easily wheeled out of the food service establishment without offending any staff or patrons.
Now that the container is sealed and moveable it may be taken to a remote site, by truck for example to be emptied and cleaned. Alternatively, the restaurant staff may disconnect and remove the unit and take it to their grease collection bin usually located behind the restaurant where they will remove the grease manually. Then it can simply be reinstalled in place. A preferred form of cleaning includes using water such as a hose or pressure sprayer to clean out the container of any solids collected in the container. The plastic will easily wash clean. By providing a removable top or cover it will make the container easier to clean and empty and the container top need not be opened until the container is at a disposal site such as a land fill disposal site. Thus the bad odours that are emitted will not be in close proximity to the food service areas.

It can now be appreciated that the present invention permits the replacement of full containers with empty containers without the need to expose the trapped fats oil and grease to the open air. Thus, by means of the dolly and the closure members or plugs, the present invention compends an easy, clean and smooth exchange of empty containers for full containers according to a service schedule that can be determined based on the usage and need of the food service establishment. Further the positioning of the inlet and outlet opening on opposite side walls of the device permits the initial lifting of the full container body to occur without tilting, ensuring that there is no spillage before the plugs can be put in place.

A second embodiment of an attachment assembly for connecting the container 11 to the fixed wastewater piping 15, 54 is shown in exploded view in FIG. 7. The second embodiment permits the container to be sealed and disconnected from the fixed piping or conversely unsealed and connected to the fixed wastewater piping with a simple one handed motion as explained below. As shown an upper actuator plate 300 and a lower actuator plate 302 are connected together by, among other things, push/pull handles 304 and 306 at either end, which fit into holes 305 and 307 respectively. As described below, the handles may be used to push or pull the upper and lower actuator plates laterally between a first position forming liquid tight sealing connection between the container and the piping and a second unsealed position to allow the full container 11 to be replaced. In the sealed position the container 11 can be used to collect grease and the like and in the other position the container will be separated from the piping and sealed against spillage to allow the full container to be removed and replaced with an empty one. The handles 304 and 306 straddle the inlet/outlet pipe assembly portion 308. Although the drawings only show one side of the container it will be understood by those skilled in the art that a similar assembly will be provided on each side of the container to permit the quick connect and disconnect method to be used at both the upstream and downstream connections for the container 11. Further although the discussion focuses on the upper actuator plate 300, it will be understood that the lower actuator plate 302 is the same and operates the same way.

An outwardly extending sleeve 310 is formed on the container 11 onto which is surmounted an outer sleeve 312. A guide pin 314 is positioned on the sleeve 312 and is retained in a slot 316 of the upper plate 300. A similar guide pin 318 extends from the bottom of the sleeve 310 into a guide slot 320 of lower plate 302. A slide coupling element 322 is slideably engaged in the outwardly extending sleeve 310. The slide coupling element 322 has two o-rings 390 and 392 mounted thereon. As in the previous embodiments the element 322 slides in and out relative to the sleeve 310 to seal and unseal with an end of the fixed wastewater piping. The slide coupling element 322 slides within an inner sleeve member 321 which seals against an inside of the container by means of gasket 319 and is secured in place by nut 317. The nut 317 also secures the outer sleeve 312 in place.

Adjacent to the other end of the assembly 308 is a wastewater piping shut off valve 324 having a handle 323 for opening and closing the shut off valve 324. The shut off valve 324 is attached to an end of the fixed wastewater pipe (not shown) such as 15, 54, and is permanently fixed at that location. The valve 324 can be opened and closed by pulling or pushing of the handle 323. As previously described the shut off valve 324 allows the pipes 15, 54 to be sealed during the replacement and removal of a full container with an empty one. On the container side of the valve 324 is located a sleeve 325 having upper and lower locking pins 326 which engage with locking arms 327 of the upper and lower pivoting locking plates 328 in a manner as described below. Because the locking pins 326 are located on the shut off valve, which is fixed in position, the locking pins 326 do not move during coupling and decoupling of the container to the fixed wastewater piping.

A further pair of pins 330 are provided extending from the sliding coupling element 322. The pivoting locking plates 328 have curved slots 336, which interact with pins 330 to extend and retract slide coupler 322, and a locking slot 338 which helps define the locking arm 327 to secure the slide coupler 322 into sealing engagement with shut off valve assembly 342 and in particular with the sleeve 325. It will be understood that similar slots and pins exist with respect to both the upper and lower plates 300 and 302, so that the slide coupler is secured in diametrically opposite positions about the pipe to ensure a good fit and seal. Also shown is pin 344 which extends into upper plate 300 and lower plate 302 through slots 346 which controls the movement of the pivoting locking plates 28 as described below.

Also shown in top plate 300 is angled slot 350 which carries a pin 352 attached to a container shut off valve 354. The actuation of the container shut off valve 352 is controlled by the movement of the pin 352 in the slot 350 as described below as well as the movement of the plates during the coupling or decoupling steps. The slot 350 includes a bend as shown to accommodate the inward and outward motion of the slide coupler 322 during the coupling uncoupling steps as described below.

Having described the elements the operation of the present embodiment can now be understood. FIG. 8 is a view from above of the attachment assembly 308 attached to a container and a fixed wastewater piping system (not shown) such as 15, 54 ending is a shut off valve 324 and capable of having liquid flow through the attachment assembly 308 out of the container. As shown the handle 323 of the shut off valve 324 is pulled out permitting liquids to flow through the valve 324.

As shown the top plate 300 and the bottom plate 302 are positioned to the left which has a number of effects. The first is that the pin 352 has carried the container shut off valve 354 to an open position. The second is that pivoting locking plate 328 has pivoted about the guide pin 314 to a position
where the locking arm 327 has engaged fixed locking pin 326 to help draw the slide coupler 322 into sealing engagement with the sleeve 325. As well, the curved slot 336 has interacted with pin 330 to help draw the slide coupler out and into sealing engagement with the sleeve 325.

[0063] The following sequence is used to detach the assembly 308 from the valve 324 as shown in FIGS. 9 and 10. First the piping shut off valve 324 is closed in direction C by pushing in the handle 323 and closing the pipe 15 to the flow of liquid. Then a user grips the handle 300 and draws it towards the right as shown by arrow O in FIG. 8 as shown in FIG. 9. As the handle is pulled and the top and bottom plates 302 and 304 are displaced to the right the following things happen: the pin 352 of the container shut off valve 354 moves along the angled slot 350 until it is an end of the slot 350 and after that further movement of the top plate 300 to the right will cause the container shut off valve 354 to slide in valve housing 360 (FIG. 7) until eventually it covers an open end of the sliding sleeve 322. During this time, the pivoting locking plate 328 pivots about the fixed guide pin 314 to allow the locking arm 327 to disengage from locked pin 326. As well, the pin 330 on the slide coupler 322 is forced along the curved slot 336 whereby the slide coupler is forced to the present invention comprehends that other mechanical structures can be used to implement the desired functionality of an easy to use quick disconnect and quick connect design. What is most desired is a structure that translates a simple hand motion into causing the slide coupler to displace axially in a direction into or out of the container while at the same time forming a seal or plug against spillage out of the container 11 through the slide coupler during movement of the full container as it is replaced and taken away to be emptied. For example, instead of using a lateral motion as shown the present invention comprehends using a lever to cause a rotational motion about an axis defined by the centreline of the slide coupler. In this case a screw thread or the like can be used to advance and withdraw the slide coupler. Further, while the design shown includes a seal against spillage being formed on an outside of the container it is also comprehended that the seal against spillage can be formed within the container such as by overlapping slots in an inlet sleeve which can rotate open and closed. However, the lateral movement design described above is the most preferred at present.

[0064] FIG. 11 shows a further embodiment of the container which includes a toe space 510 formed at the bottom edge 502 of the container 11. The present invention needs to be placed in a position, for example in a kitchen, where there is easy access to it to permit the containers to be changed as needed. Convenient locations include under a sink or under a counter. However, in such a location the bottom edge of the container may represent an ergonomic issue to those needing to use or work in the sink or counter. As such a toe space formed in the container as shown permits ergonomic access to the sink or counter above by kitchen staff or the like by allowing the user to move closer and reducing the amount of bending over and reaching. In an alternative embodiment the present invention comprehended using the frame or other spacer elements to create a toe space under the container body where there is enough head room under the sink or counter to permit the same.

[0065] While the foregoing description has been in respect of preferred embodiments of the invention it will be understood that many variations and alternatives are possible without departing from the scope of the invention as defined by the appended claims. Some of these have been discussed above and others will be apparent to those skilled in the art. For example, although plastic is preferred for both the container and the pipes, these could be made from other materials that were light weight and flexible.

We claim:
1. A grease trap system for wastewater systems, said grease trap system comprising:
   a ground engaging frame into which a replaceable container body may be inserted,
   an inlet pipe connector with shut off valve on an inlet side of said frame;
   an outlet pipe connector with a shut off valve on an outlet side of said frame.

2. A grease interceptor comprising a replaceable container body including means to trap fats, oils and grease within said replaceable container body and further being sized and shaped to be positioned within said frame and connected to said inlet and outlet pipe connectors, said container body including inlet and outlet slide couplers through opposite walls of said body, said inlet and outlet slide couplers having associated connecting means to sealingly fluidly connect said inlet and outlet connectors to said container body, said inlet and outlet slide couplers being further configured to be sealed for transport of said container body by a closure member;
   wherein said slide couplers laterally displace away from said inlet and outlet connectors when said container body is being replaced.

3. The grease trap system of claim 1 wherein said slide couplers may be moved by hand.

4. The grease trap system of claim 1 wherein each of said slide couplers include a threaded collar and said slide couplers may be extended and retracted by said threaded collar as the threaded collar engages and disengages said inlet and outlet connectors.

5. The grease trap system of claim 2 further including a coupling assembly at each of said inlet and outlet having a manually actuable handle for coupling and decoupling said container body to said inlet and outlet couplers.

6. The grease trap assembly of claim 4 wherein closure member comprise a container shut off valve and said manually actuable handle simultaneously actuates said container shut off valve to open and close said container to liquid flow through said inlet and outlet slide couplers during said coupling and decoupling.

7. The grease trap assembly of claim 4 wherein said manually actuable handle also actuates said slide coupler to cause said slide coupler to seal and unseal against said respective inlet and outlet couplers.

8. The grease trap assembly of claim 4 wherein said manually actuable handle also actuates a pair of diametrically opposed locking elements for locking and unlocking said inlet and outlet slide couplers to said inlet and outlet couplers.

9. The grease trap assembly of claim 7 further including two handles and wherein each of said handles extends between an upper and a lower actuator plate.

10. The grease trap assembly of claim 8 wherein said upper and lower actuator plates are guided during actuation by said handle by guide pins fixed to said container.
11. The grease trap system of claim 1 wherein the container body includes inlet and outlet sleeves in which said slide couplers are housed.

12. The grease trap system of claim 11 wherein at least one o-ring is mounted on said slide couplers to form a sliding seal between said couplers and said sleeves.

13. The grease trap system of claim 12 wherein said slide couplers include an internal stop lip to prevent said slide couplers from extending out too far from said container.

14. The grease trap system of claim 13 wherein said collar is rotatably retained within a channel to limit axial movement of said collar relative to said slide coupler while allowing the rotation of said collar to cause the lateral displacement of the slide coupler.

15. The grease trap system of claim 1 wherein said frame positions said inlet and outlet connectors in position relative to said container.

16. The grease trap system of claim 11 wherein said slide couplers include a sealing face and each of said threaded pipes include an o-ring mounted to seal against said sealing surfaces when said collars are fully engaged with said threaded pipes.

17. The grease trap system of claim 16 wherein said frame includes an orientation tab to prevent said container from being mounted within said frame in a reverse position.

18. The grease trap system of claim 17 wherein said container includes a recess for receiving said orientation tab.

19. The grease trap system of claim 1 wherein the container body is made from molded plastic.

20. The grease trap system of claim 11 wherein the inlet and outlet sleeves are molded in place.

21. The grease trap system of claim 1 wherein said frame further includes support elements to provide enough space beneath the container above a surface to position lifting forks under said container.

22. The grease trap assembly of claim 21 wherein said space is sized and shaped to provide a toe space under said container body.

23. The grease trap system of claim 1 wherein said inlet and outlet sleeves are positioned on opposite sides of said container to permit said container body to be lifted without tilting the container side to side to permit said plugs to be installed without spilling.

24. The grease trap assembly of claim 1 wherein said container body further includes a toe space molded into at least one of said sides of said container body.

25. A method of collecting grease from a wastewater stream comprising the steps of:

- positioning a replaceable container body between a pair of inlet and outlet connectors mounted on a frame, wherein said connectors are connected to a wastewater drain and fluidly connecting inlet and outlet slide couplers on said body to said connectors so wastewater flows through said container body;
- capturing fats, oils and grease in said container body over time;
- shutting inflow and outflow pipe valves to stop the flow of wastewater through said body.

26. The method of claim 25 further including the step of placing a clean empty container between said inlet and outlet pipes, while said slide couplers are displaced inwardly towards said container body, sealing slide couplers to said connectors and opening said valves to permit wastewater to flow into through and the out of said clean empty container.

27. The method of claim 25 further including the step of simultaneously sealing the inlet and outlet of said container as said container is decoupled from said connectors.

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