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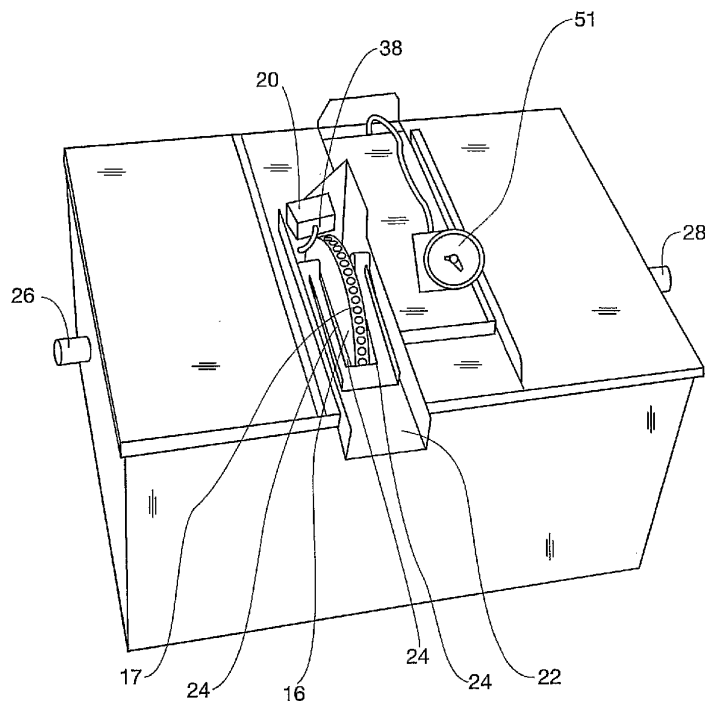
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(54) Title: IMPROVED LOW COST OIL/GREASE SEPARATOR



(57) Abstract: A container for receiving and holding water containing oil/grease to be removed has sectional covers (14a, 14b, 14c). A main sectional cover (14b) supports a partially immersed rotatable disk (16), a drive (20) for rotating the disk, a trough (22) straddling the disk and a scraper blade (24) for discharging oil/grease to a storage container.



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IMPROVED LOW COST OIL/GREASE SEPARATOR

Background of the Invention

[0001] This invention relates to a low cost assembly for the removal and recovery of oil, grease and solid wastes found in drains or effluent discharge of restaurants, food processing, or like facilities, industrial plants, maintenance facilities, or other circumstances involving mixtures of oil, grease and solid waste material to be recovered or removed. This application has subject matter similar to the disclosure of U.S. Patent Application 10/161,814, filed June 4, 2002, the entire disclosure of which is hereby incorporated herein by reference.

[0002] Oil, grease and solid waste contaminant removal or recovery systems are well known in the prior art. Over the past thirty years there has been a steady move towards requiring food handling facilities to have systems for servicing kitchen grease and solid waste bearing water flows. Sewer system lines can become clogged from the oil and grease waste materials (hereinafter referred to as "oil/grease") put into the sewer system from food handling facilities. This has led more and more sewer authorities to implement fats, oils and grease control programs. These programs regulate food handling facilities and the manner in which they process oil, grease and solid waste material. The object of many of these programs is to ensure that food handling facilities remove as much of the oil and grease as possible from the effluent flow, thereby releasing only grey water to the sewer system.

[0003] One method recognized in the prior art of accomplishing such removal is the use of a container including one or more rotating disks formed of a plastic or like applicable material to which oil and grease contaminants are attracted. Typically, the rotation of the disk is in an at least partially immersed condition, which allows the oil to cling to one or both sides of the disk so that contaminants are removed from the body of water upon rotation of the disk. Scrapers are typically used to force the oil contaminants from the opposite sides of the disk and channel such contaminants to a collection or disposal storage unit.

[0004] U.S. Patent 5,133,881 to Miller et al. is representative of such oil and grease removal systems containing one or more rotating disks. The Miller et al. patent discloses an oil/grease removal assembly which removes such contaminants from the surface of the body of water and includes a rotatable disk made of plastic or other material to which such oil contaminants have an affinity so they adhere to the disk. The disk is disposed in cooperative

relation to an elongated trough having scraper blades for engaging the opposite sides of the disk for the removal of the oil contaminants therefrom with the trough disposed and structured to direct such oil contaminants away from the disk and the body of water via the trough to a storage container. The disclosure of this patent, issued to B. Glenn Miller and William C. Batten and
5 assigned to Thermaco, Inc. in Asheboro, North Carolina, is hereby incorporated herein by reference.

[0005] The existing devices may be difficult to service and are very often permanently installed at facility sites. Because many of the parts are coated with oil and grease, servicing can be messy and time consuming. In addition, these systems tend to be expensive and represent a
10 significant capital investment. Accordingly, there is a need in the art for an apparatus for separation of oil, grease and solid waste from wastewater which is simple in design, low in cost and capable of being serviced easily in the field because of the availability of low cost replaceable parts which are easily installed and do not require extensive and costly repair.

Summary of the Invention

5 [0006] The present invention fulfills one or more of these needs in the art by providing a modular oil/grease removal assembly including a container for receiving and holding effluent water containing oil/grease to be removed from the effluent water and having sectional covers. A main sectional cover supports a rotatable disk in a partially immersed position within the body of effluent water and in contact with the oil/grease. A drive is mounted on the main sectional cover in driving engagement to provide rotation of the disk when the drive is engaged. A trough
10 is mounted on the main sectional cover in engaging relation to opposite sides of the rotatable disk, and a scraper blade is mounted on the trough so that the scraper blade extends from the trough into sliding engagement with a side of the disk. The disk, scraper blade and trough are cooperatively disposed and structured to direct oil and grease from the disk along the scraper blade along the trough for collection in a storage container.

15 [0007] In one embodiment the main sectional cover supports an electrical resistance heater that extends downwardly into the container so as to have an operable portion of the heater at least partially immersed within the body of effluent water to cause the oil/grease to be in liquid form. The main sectional cover may also support electrical controls for selectively operating the drive and the heater. A first shield preferably covers the rotating disk, trough and scraper blade,
20 and a second shield covers the electrical controls. The first shield may be provided with vent holes to permit the escape of vapors so as to reduce vapor condensation within the first shield. The first shield may have hinged portion covering at least portions of the rotating disk, trough and scraper blade, so that the hinged portion can be opened for access to clean and/or service the rotating disk, trough and scraper blade.

25 [0008] In one embodiment, a unitary shield covers the rotating disk, trough scraper blade, and the electrical controls. If a single shield is used, preferably, the shield has a partition to separate the rotating disk and trough scraper blade from the electrical controls. The shield may include front and rear sections meeting to form a barrel for a hinge for covers for the rotating disk, trough scraper blade and electrical controls.

30 [0009] The electrical control may include a timer connected to the drive to control the start and stop operation of the drive to permit a selected duty cycle to remove grease at times

when grease is likely to be present, and the second shield may have a hinged portion covering a control for the timer, permitting access to the timer without removal of the entire second shield.

5 [0010]The main sectional cover typically has two pair of opposite sides with one pair of opposite sides adapted to engage the container for support of the main sectional cover by the container and the other pair of opposite sides adapted to engage additional sectional covers. The sides adapted to engage additional sections preferably have a flange extending downwardly and laterally so as to be positioned under a portion of an additional section, with a further downward extension to provide rigidity. The additional sectional cover is typically substantially rectangular with two opposite sides adapted to engage the container for support of the additional sectional cover by the container and one of the two other opposite sides adapted to engage and seal to the main section. The container typically has an inwardly turned upper flange, a gasket on the flange, and clasps to hold the sectional covers to the flange and seal the covers to the flange by compression of the gasket.

15 [0011]The additional sectional cover may have four sides with three sides adapted to engage the container for support of the additional sectional cover by the container and the fourth side has an upper protrusion that has a lower surface with a gasket so the upper protrusion engages and seals to an upper surface of the flange of the main sectional cover that extends downwardly and laterally and a downward ear that engages the further downward extension of the main section.

20 [0012]Alternatively, the protrusion may be downward. In another alternative, a pseudo hinge allows optional joining of sections.

[0013]The container typically has an inlet end, an outlet end and left and right sides, looking in the direction from the inlet to the outlet ends, and the sectional covers have first and second mounting edges so that they can be mounted to the container with a first mounting edge on the left and a second mounting edge on the right or the second mounting edge on the left and the first mounting edge on the right.

25 [0014]In one embodiment there are two or more main sectional covers and one or more additional sectional covers between the main sectional covers having opposite sides to engage the main sections. The opposite sides of the additional sectional cover each having upper and lower protrusions spaced by a spacer of dimension so the upper protrusion engages an upper surface of the flange of the main sectional cover that extends downwardly and laterally and the

lower protrusion engages the further downward extension. The upper protrusion may have a lower surface with a gasket to seal with the flange of the main sectional cover that extends downwardly and laterally.

5 **[0015]** The apparatus may include an additional sectional cover, with the sectional covers configured to provide a hinged but severable relationship between the sectional covers.

[0016] In one embodiment, the additional sectional cover has four sides with three sides adapted to engage the container for support of the additional sectional cover by the container. The fourth side has a lower protrusion and a gasket so the lower protrusion of the additional section abuts the further downward extension of the main sectional cover and the gasket engages
10 and seals to the main sectional cover.

[0017] In one embodiment the disk includes two disk sheets separately formed and subsequently joined together. The two sheets preferably are identical and each include a flat oleophilic surface and a surface having a plurality of spaced peripheral lugs. The lugs of each sheet are preferably odd in number so that upon turning the oleophilic surfaces away from one
15 another and joining the two sheets, the lugs of the opposing sheets may be interleaved to form a periphery for the disk with gaps between the lugs. The sheets may be joined by means selected from the group consisting of screwing, bolting, ultrasonic welding, vibration welding, other welding and adhering. The sheets may have bosses on the same side as the lugs and the sheets are joined at the bosses. The sheets are preferably injection molded plastic. A suitable plastic is
20 polypropylene. The drive may be a sprocket with flattened teeth to engage the lugs. The sheets preferably have central hole with a surrounding rim to form a bearing for an axle extending through the central hole.

[0018] The assembly may include a sensor module mounted to the main sectional cover. The sensor module includes a probe extending downwardly within the body of effluent water to
25 a depth normally below the oil/grease. A sensor in the probe provides electrical indications as to whether the sensor is in proximity to oil/grease or water. An alarm on the sensor module to provide a human-recognizable indication if the sensor senses that the probe is in proximity to oil/grease rather than the normally-present water. The sensor and alarm are typically electrical and are powered by a low voltage power supply to the sensor module separate from power to the
30 drive that rotates the disk. An electrical alarm output from the sensor module may be provided to enable electrical connection to a remote monitoring apparatus to signal alarm conditions to the

remote monitoring apparatus, such as a SCADA monitoring apparatus. The probe is preferably a watertight cylindrical shaft, and the sensor is positioned at a distal end of the cylindrical shaft and held in place at the distal end by a spacer. The sensor module may also include a ready light indicating proper operation.

5 **[0019]**In one embodiment the container has an inlet end and a solids removal module positioned at the inlet end. The solids removal module may be a strainer. Alternatively, the solids removal module may include a hopper having an eductor at a lower portion of the hopper, a water inlet to the eductor to make a jet of water to remove contents of the hopper in proximity to the eductor and an outlet from the eductor to an outlet of the container. The hopper preferably
10 includes a lower portion laterally offset from the eductor, so that excess solids do not block jet action of the eductor.

[0020]The invention may also be considered as a method of assembly of a modular oil/grease removal assembly including installing a container for receiving and holding effluent water containing oil/grease to be removed from the effluent water and having sectional covers;
15 mounting a main sectional cover supporting a rotatable disk for partial immersion within effluent water in the container and in contact with the oil/grease, a drive in driving engagement to provide rotation of the disk when the drive is engaged; a trough mounted on the main sectional cover in engaging relation to opposite sides of the rotatable disk; a scraper blade mounted on the trough so that the scraper blade extends from the trough into sliding engagement with a side of
20 the disk. The disk, scraper blade and trough are cooperatively disposed and structured to direct oil and grease from the disk along the scraper blade along the trough for collection in a storage container. An electrical resistance heater may be included that extends downwardly into the container so as to have an operable portion of the heater at least partially immersed within the body of effluent water to cause the oil/grease to be in liquid form. Electrical controls for
25 selectively operating the drive and the heater may also be on the main sectional cover. The method includes mounting additional sectional covers to cover the container, and installing a first shield to cover the rotating disk, trough and scraper blade and a second shield to cover the electrical controls.

[0021]The method may also be considered as including installing a container for
30 receiving and holding effluent water containing oil/grease to be removed from the effluent water and having sectional covers. The method includes mounting a main sectional cover that has two

pair of opposite sides with one pair of opposite sides adapted to engage the container for support of the main sectional cover by the container and the other pair of opposite sides having flanges extending downwardly and laterally with a further extension downwardly to provide rigidity and that supports a rotatable disk for partial immersion within effluent water in the container and in
5 contact with the oil/grease, a drive in driving engagement to provide rotation of the disk when the drive is engaged, a trough mounted on the main sectional cover in engaging relation to opposite sides of the rotatable disk, a scraper blade mounted on the trough so that the scraper blade extends from the trough into sliding engagement with a side of the disk. The disk, scraper blade and trough are cooperatively disposed and structured to direct oil and grease from the disk
10 along the scraper blade along the trough for collection in a storage container. An electrical resistance heater extends downwardly into the container so as to have an operable portion of the heater at least partially immersed position within the body of effluent water to cause the oil/grease to be in liquid form. Electrical controls for selectively operate the drive and the heater. The method includes mounting additional sectional covers that have four sides with two opposite
15 sides engaging the container for support of the additional sectional cover by the container and one of two opposite sides engaging the main sectional cover.

[0022] When the container has an inwardly turned upper flange, and a gasket on the flange, this method of assembly may include engaging clasps to hold the sectional covers to the flange and seal the covers to the flange by compression of the gasket.

20 [0023] The method may include installing two or more main sectional covers and one or more additional sectional covers between the main sections, the opposite sides of the additional sectional cover each having upper and lower protrusions spaced by a spacer by engaging the upper protrusion on an upper surface of the flange of the main sectional cover that extends downwardly and laterally and engaging the lower protrusion with the further downward
25 extension. If the upper protrusion has a lower surface with a gasket the method may include sealing the upper protrusion with the flange of the main sectional cover that extends laterally and downwardly.

[0024] If the additional sectional cover has four sides with three sides adapted to engage the container for support of the additional sectional cover by the container and the fourth side has
30 an upper or lower protrusion that has a lower surface with a gasket so the upper protrusion, the method may include engaging and sealing the upper protrusion to an upper surface of the flange

of the main sectional cover that extends downwardly and laterally and engaging a downward ear of the additional sectional cover with the further downward extension of the main sectional cover.

5 [0025] The invention may also be considered as a method of assembly of a modular oil/grease removal assembly for receiving and holding effluent water containing oil/grease to be removed from the effluent water including identifying an inlet source of effluent water and a downstream drain for grey water, installing a container having an inlet, an outlet and left and right sides looking in the direction from the inlet to the outlet ends, installing a main sectional cover that supports the functional apparatus to remove oil/grease from water and discharges
10 oil/grease to one of the left and right sides of the container so that the discharge of oil/grease is convenient for servicing, and mounting additional sectional covers to completely cover the container. Such a method may also include refraining from mounting the main sectional cover from a structurally feasible mounting that would have the discharge of oil/grease be inconvenient for servicing.

15 [0026] The invention also may be considered as a method of making a disk for a modular oil/grease removal assembly including forming two disk sheets separately and subsequently joining the two disk sheets together to form a disk. Preferably, the two sheets are made identical and each include a flat oleophilic surface and a surface having a plurality of spaced peripheral lugs. Especially when the lugs of each sheet are odd in number, the method includes turning the
20 oleophilic surfaces away from one another, interleaving the lugs of the opposing sheets, and joining the two sheets to form a periphery for the disk with gaps between the lugs. The sheets may be joined by means selected from the group consisting of screwing, bolting, ultrasonic welding, vibration welding, other welding and adhering. If the sheets have bosses on the same side as the lugs, the method preferably includes joining the sheets at the bosses. Forming the
25 sheets is preferably by injection molding plastic, particularly polypropylene. Forming preferably includes forming the sheets with a central hole with a surrounding rim to form a bearing and passing an axle through the central hole.

30 [0027] The method may also include mounting a sensor module to the main sectional cover including a probe extending downwardly within the body of effluent water to a depth normally below the oil/grease. A sensor in the probe provides electrical indications as to whether the sensor is in proximity to oil/grease or water, and an alarm on the sensor module

provides a human-recognizable indication if the sensor senses that the probe is in proximity to oil/grease rather than the normally-present water. Such a method preferably includes connecting a low voltage power supply to the sensor module separate from the power to the functional apparatus to remove oil/grease from water. It may also include connecting an electrical alarm
5 output from the sensor module to a remote monitoring apparatus to signal alarm conditions to the remote monitoring apparatus, such as a SCADA monitoring apparatus.

[0028]The method may also include positioning a solids removal module at the inlet end. The solids removal module may be a strainer. As an alternative, the solids removal module may be a hopper having an eductor at a lower portion of the hopper, and the method includes
10 including connecting a water inlet to the eductor to be available to make a jet of water to remove contents of the hopper in proximity to the eductor and connecting an outlet from the eductor to an outlet of the container.

[0029]The invention also may be considered as a method of modifying a modular oil/grease removal assembly including removing one or more of the sectional covers, removing
15 an installed solids removal strainer, and installing a hopper having an eductor at a lower portion of the hopper, and including connecting a water inlet to the eductor to be available to make a jet of water to remove contents of the hopper in proximity to the eductor and connecting an outlet from the eductor to an outlet of the container.

20

Brief Description of the Drawings

5 [0030]The invention will be better understood by a reading of the Detailed Description of the Preferred Embodiments along with a review of the drawings, in which:

 [0031]Figure 1 is a perspective view of an embodiment of the invention;

 [0032]Figure 2 is a perspective view of the container with the shields removed;

 [0033]Figure 3 is a perspective view of the container with one of the additional cover sections removed;

10 [0034]Figure 4 is an enlarged perspective view of the mating of an additional sectional cover with the main sectional cover;

 [0035]Figure 4A is a sectional view of two main sectional covers mated with a further additional sectional cover;

15 [0036]Figure 4B is a view of an alternate embodiment of the additional sectional cover with a downward protrusion;

 [0037]Figure 4C is a perspective view of another embodiment for abutting the covers;

 [0038]Figure 5 is a perspective view of the strainer basket being put in place;

 [0039]Figure 6 is a side view of the main sectional cover with the sensor probe in place, partly broken away;

20 [0040]Figure 7 is a schematic side view of the sensor probe circuit;

 [0041]Figure 8 is a perspective view of one half of an embodiment of the disk;

 [0042]Figure 9 is a perspective schematic view of a hopper and eductor useful in connection with certain embodiments;

 [0043]Figure 10 is a front perspective view of an alternate shield;

25 [0044]Figure 11 is a rear perspective view of the shield of Figure 10;

 [0045]Figure 12 is an enlarged view of a portion of the shield of Figure 10, partially disassembled;

 [0046]Figures 13 and 14 are similar perspective views of an alternate wiring arrangement for the apparatus; and

30 [0047]Figure 15 is a perspective view of a modified junction box usable with the apparatus for Figure 14.

Detailed Description of the Preferred Embodiments

[0048] In the following description, like reference characters designate like or corresponding parts throughout the several figures. It should be understood that the illustrations are for the purpose of describing preferred embodiments of the invention and are not intended to limit the invention thereto.

[0049] As best seen in Figure 1, the oil, grease and solid removal assembly 10 includes a container 12 with sectional covers 14a, 14b, and 14c. In a preferred embodiment as seen in Figure 1, the sectional covers are separate plates, preferably stainless steel. The assembly 10 has at least one rotatable disk 16 (shown in Figure 2) supported by the center sectional cover 14b. Figure 2 also depicts the gear drive motor 20 and the trough 22 which are attached to the center sectional cover 14b. The container 12 also includes an inlet pipe 26 and an outlet pipe 28. The effluent water with waste materials enters through the inlet pipe 26, and after oil, grease and solid waste have been removed, the grey water exits out of the outlet pipe 28. As seen in Figure 2, the trough 22 has scraper blades 24. The gear drive motor 20 supports and rotates the drive sprocket 38 which is cooperatively meshed with peripheral holes in the disk 16.

[0050] The basket support 34 is depicted in Figure 5. The basket support 34 is constructed of rotomolded plastic and is designed to hold a strainer basket 54. The basket support 34 is immediately downstream of the inlet pipe 26 and has a cutout to align with the inlet pipe 26. Basket support openings 37 permits the effluent water with oil and grease to flow downstream of the basket support 34 after the solid waste material has been trapped in the strainer basket 54.

[0051] Referring to Figure 1, the sectional covers 14a, 14b and 14c cover each of the sections of the oil, grease and solid waste removal assembly. In the preferred embodiment, a leading sectional cover 14a provides easy access to the strainer basket 54 within the basket support 34 and a downward stream sectional cover 14c is atop the outlet baffle (not shown) leading effluent from a low portion of the container 12 to the outlet 28.

[0052] The center sectional cover 14b is depicted in Figures 3 and 4. The center sectional cover 14b is constructed of stainless steel and includes a flange 13 extending downwardly and laterally and a further extension 15, seen in Figure 4. The rotatable disk 16 is constructed of oleophilic plastic or is at least covered with an oleophilic material. In one embodiment, the disk

16 has equally spaced indentations 17 on its outer circumferential edge. The sprocket 38 meshes with the holes 17 in the disk 16. The disk 16 is rotated clockwise in the view of Figure 2 when the gear drive motor 20 rotates counter-clockwise.

[0053]As best seen in Figure 2 the center sectional cover 14b supports the trough 22, which is constructed of stainless steel. The trough 22 further includes elongated scraper blades 24 which are constructed of a flexible plastic or rubber material. As seen in Figure 3, the center sectional cover 14b also supports the heating element 50 which is utilized to maintain a sufficiently warm water temperature to melt any grease contained in the grey water, permitting it to flow to and be removed by the rotating disk 16. The heating element 50 seen in Figure 2 is a 300 watt heater with a quick reaction thermostat and is designed to run continuously. The timer 51 is connected to the gear drive motor 20 and controls the start and stop operation of the gear drive motor 16 and ultimately the rotation of the disk 16. It permits a selected duty cycle to remove grease at times when grease is likely to be present.

[0054]In the preferred embodiment, the oil, grease and solid removal assembly 10 is connected to drain from a sink or other device that discharges effluent water with waste materials to be separated. The water containing waste materials flows from the device's drain into the oil, grease and solid removal assembly 10 through the inlet pipe 26. The effluent water flows into the basket support 34 containing a strainer basket 54 and the solid waste materials are trapped and removed from the effluent water. The effluent water containing oil and grease flows downstream from the basket support 34 through openings 37 into the center section. The center section cover 14b supports the oil and grease removal assembly. In the volume of the container 12 between the basket support 34 and the outlet baffle 46, the effluent has time to reside, permitting oil and grease to rise to the top of the water. The grease is maintained in a liquid state by the heater 50. When the gear drive motor 20 turns the drive sprocket 38, the disk 16 is rotated in a clockwise direction by the counter clockwise rotation of the drive sprocket 38. The disk 16 is positioned in the center cover 14b, so that its lower portion is below the surface of the effluent water having the oil and grease which has floated to the surface. As the disk 16 rotates through the water, oil and grease are picked up on the sides of the disk 16. As the disk 16 rotates, the scraper blades 24 which are attached to the trough 22 remove the oil and grease from the sides of the disk 16. The oil and grease flows down the trough 22 to an oil and grease storage container (not shown). Once the oil and grease have been removed from the effluent water, the grey water

flows downstream under the baffle outlet and exits the oil, grease and solid removal assembly 10 through the outlet pipe 28 into the sewage system.

[0055]The oil, grease and solid removal assembly 10 is easy to maintain. The center section cover 14b containing the gear drive motor 20, the drive sprocket 38, the disk 16, the trough 22 and the scraper blades 24 is a single, low cost unit. If there is a malfunction in any of the components of this unit, it is more cost effective to replace the entire unit than to repair the malfunctioning component. By stocking an extra unit at the facility site, virtually no down time in operation of the low cost oil, grease and solid removal assembly 10 would be experienced. In addition, because the center section cover 14 contains all of the oil and grease removal components, there is a greater flexibility in the installation process. The sectional cover 14b can be installed to have the trough 22 facing in opposite directions by placing the sectional cover one way or the opposite way, depending on the needs of the installation. The sectional covers 14a and 14c are preferably identical and either can be positioned over the strainer basket or the outlet baffle, depending on the selected orientation.

[0056]The container 12 of the low-cost oil, grease and solid removal assembly 10 is constructed of a rotomolded plastic or welded stainless sheets. The container 12 is constructed with an inlet pipe 26 and the outlet pipe 28. The sectional covers 14 can then be installed, although they may well be removed and reinstalled at the jobsite.

[0057]Referring again to Figure 1, the center sectional cover 14b is provided with a first shield 56 and a second shield 58. The shields are molded plastic and are held in place over the trough component and electrical components, respectively. By using separate shields over the two operating components of the center sectional cover 14b, humidity that is generated through the openings around the rotating disk is segregated from the electrical components shielded under the separate shield 58. The two shields 56 and 58 are each provided with hinged components. A hinged component 60 lifts up to expose the rotating disk and trough, so that debris clogging the trough and scraper blades can be removed. The hinged cover 62 of the second shield 58 provides access to the timer 51 so that adjustments can be made to the timer setting.

[0058]Figures 10-12 show an alternate shield embodiment. This embodiment still has two shields, but these are a front shield 156 and a rear shield 158. A hinged component 160 lifts up to expose the rotating disk and trough, so that debris clogging the trough and scraper blades

can be removed. The hinged cover 162 provides access to the timer 51 so that adjustments can be made to the timer setting. Each of the shields 156, 159 has internal partitions that separate the volume under the shield into left and right portions to keep humidity away from the electronics, as above. Preferably, the portion of the shield covering the disk has vents to let humidity escape.

5 The arrangement to join the front and rear shields and simultaneously make a hinge barrel for the hinging covers 160 and 162 is seen in Figure 12. The front shield has upwardly open half-cylinders 164, and the rear shield has downwardly open half-cylinders 166. The half-cylinders are sized and shaped to form nearly complete cylinders when the rear shield and front shield are adjoined. Interposed between the half cylinders are short cylindrical bosses 168 formed on ears
10 of the covers 160 and 162. Edge guards 170 also help restrain the bosses to only rotary motion within the nearly complete cylinders.

[0059]As seen in Figure 1, the top sectional covers have edge mounted hooks 64. Clasp components 66 are positioned on the container 12, so that loops on the clasps can hold the hooks 64 down in compressive relation to the container 12. As seen in Figure 3, the container 12 has
15 an inwardly turned upward flange 68 around the peripheral, capped by a gasket material 70 so that as the sectional covers 14a, 14b, 14c are held onto the container, a seal is formed to prevent the egress of vapors from the container 12. The mounting of additional sectional covers is shown in Figure 4. The main sectional cover 14b is provided with a downwardly and laterally extending flange 13 with a downward extension 15. This downward extension provides
20 longitudinal rigidity to the sectional cover 14b.

[0060]As seen in Figure 4, the additional cover 14c is provided with an upwardly turned flange 72. Once the main sectional cover 14b is in place, the additional sectional cover 14c can be mounted with the flange 72 overlying the downwardly and laterally extending flange 13. A gasket on the underside of the edge of the additional sectional cover 14c forms a seal with the top
25 of the laterally and downwardly extending flange 13. These seals need not be perfect.

[0061]As seen in Figure 4A, for larger volume installations, a larger container 12 can be used and multiple operative main sectional covers 14b can be put in place with an intermediate additional cover 120, having opposite sides adapted to engage the main sectional covers 14c. The opposite sides of the additional sectional cover 120 each have upper 122 and lower 124
30 protrusions spaced by a spacer 126 of a dimension, so that the upper protrusion 122 engages the upper surface of the flange 13 of the main sectional cover that extends downwardly and laterally,

and the lower protrusion 124 engages the further downward extension 15 of the main sectional cover.

[0062]Figure 4B shows an alternate embodiment of the additional cover 14c in which a downward protrusion or flange 72a is provided to abet the downward extension 15 of the main sectional cover. A gasket 73 provides the seal, which again need not be perfect.

[0063]Figure 4C shows another alternative. In this embodiment, one of the sectional covers (the main sectional cover in this example) has slots 75. Tabs 77 on the additional section are sized to fit into the slots to provide a hinged but severable relationship between the sections. The tabs and slots may be put on alternate ones of the sectional covers.

[0064]Referring now to Figure 6, a sensor module 80 is shown mounted to the main sectional cover 14c. the sensor module 80 includes a probe 88 extending downwardly within the body of effluent water to a depth normally below the oil/grease. A sensor 90 within the probe provides electrical indications as to whether the sensor is in proximity to oil/grease or water. Since the sensor 90 that is at a depth that normally is immersed in water, if the oil/grease mat floating on the water becomes unduely thick, because of a malfunction of the unit, the sensor 90 will detect the change in the material in the proximity of the sensor. An alarm 86 on the sensor module provides a human recognizable indication if the sensor senses that the probe is in proximity to oil/grease rather than normally present water. The alarm 86 can be audible or a light, or other suitable alarm indicator. A suitable sensor as is a capacitive sensor such as a K-1 Series Sensor available from IFM Electronic gmbH of Essen, Germany. The sensor 90 is held at the distal end of the probe 88 by a spacer 92 such as a block of foam material. The electrical circuit within the sensor module 80 is powered by a low voltage source 94. It is desirable that the electrical power source be separate from the power to the main separator unit, so that if the source of a malfunction is a failure of power to the entire assembly, it is less likely that the sensor probe will lose power. A remote monitoring output 96 can also be included in the sensor module and it is particularly desired to be of the type that provides connections to SCADA monitoring apparatuses. SCADA systems are well known facilities monitoring systems. A light 84 is provided on the sensor module 80 to show that it is operating.

[0065]The electrical circuit of the sensor module is shown in Figure 7.

[0066]A further improvement in the apparatus can be an improved form of the disk 16, partially seen in respect to Figure 8. Figure 8 shows a disk sheet 100 having spaced peripheral

lugs 102 and radially inwardly positioned bosses 104. A central hole 106 is formed in this sheet and has a surrounding rim 106. Radially extending outward from the rim 106 are a plurality of ribs 108. The lugs 102 are preferably formed in an odd number of themselves and are equally spaced around the periphery of the disk sheet 100. Two of the sheets 100 are made identically and joined to make a complete disk. The side not shown in Figure 8 is flat and is provided with an oleophilic property. This property can be made by making the entire sheet 100 out of injection-molded plastic, preferably polypropylene. By taking the two sheets and putting them together lug side-to-lug side rotated by a suitable amount, an equally spaced even number of peripheral teeth are provided in the combined disk. The bosses 104 are provided equally spaced and permit alignment with holes 110 so that screws can be passed through the holes 110 into the aligned bosses 104 from both sides, forming a combined disk. The ribs 108 provide additional rigidity to the disk, and during the molding process ribs 108 permit the plastic to flow in the mold. The peripheral rim 106 provides a central bearing through which an axle may be passed, so that the disk can rotate smoothly on the axle. Providing the disk in this fashion provides a lower manufacturing cost than making a solid disk and machining peripheral holes. In one embodiment, 29 lugs are provided on each disk sheet, so that the combined sheets form a disk with 58 peripheral lugs. The two sheets can also be joined by ultrasonic or vibration welding, passing screws, rather than bolts into the bosses, or any other suitable method. With this embodiment, the lugs form generally axially oriented flat surfaces which engage the sprocket. Therefore it is desirable to have square teeth on the drive sprocket to engage the lugs as the drive motor drives the disk, to make solid contact.

[0067] In a further embodiment, the strainer basket can be replaced with an eductor assembly 140. A hopper 142 is positioned in place of a strainer basket and having a suitable overflow 144 for the grey water to exit the hopper 142. The hopper 142 has a converging downward configuration terminating in a narrowed portion 146 offset laterally from an eductor 148 near the inlet end of the container. The eductor is offset laterally from the bottom of the hopper, preferably, so that as solids collect at the narrowed portion at the bottom of the hopper, they do not obstruct the eductor and inhibit its initiation of a jet. An inlet 150 to the eductor is provided with a water supply such as a municipal water supply (not shown). The water pressure from a narrowed inlet to an eductor outlet forms a venturi jet effect to draw the solids from the bottom 146 of the hopper through jet actuation. A tube 154 leads from the eductor to the outlet.

28, passing the solids downstream. Preferably the apparatus is made so that it can be equipped either with the strainer assembly or the eductor assembly. The eductor assembly can be retrofitted to an installed system by removing the strainer and installing the hopper 142 with installed eductor 148, connecting a water supply and connecting the tube 154 to the outlet 28.

5 Eductors are known in this art as shown in U.S. Patent 6,491,830 and have proven to be very effective in removing solids upstream of the oil/grease removal disk assembly. The entire disclosure of that patent is hereby incorporated herein by reference.

[0068] Alternate power supply fittings can be seen in Figures 13-15. Figures 13 and 14 show views of plug-in and hardwired arrangements respectively. A customer's choice of one
10 version or another can be easily accommodated by using one or the other of plates 170 or 172 with the components as described herein when assembling the main sectional cover. Both plates are provided with covers 174 over possible future electrical or signaling connections. The plate 170 of the embodiment of Figure 13 is provided with a line cord 176, enabling the apparatus to be plugged into a wall socket. The plate 170 is secured to the remainder of the shield by screws
15 178 passing through drilled and tapped holes 180. The plate 172 of the embodiment of Figure 14 is provided with a recessed male plug 178. At the stage seen in Figure 4, the plate 172 is unsecured to the remainder of the shield by although also drilled and tapped with holes 180. As seen in Figure 14, a junction box 181 is provided with a protruding female plug 182 as well as a plate 186 that has holes 184 positioned to align with holes 180 when the plugs 178 and 182 are
20 joined. At that stage, screws can be inserted to hold the plate and junction box to the cover, securing the electrical connection against a user disconnecting power to the system. Those screws also hold the plate 172 to the remainder of the shield. Of course, conduit and electrical wiring can be used in the junction box 181 in conventional fashion.

[0069] Certain modifications and improvements will occur to those skilled in the art upon
25 reading the foregoing description. It should be understood that all such modifications and improvements have been omitted for the sake of conciseness and readability, but are properly within the scope of the following claims.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A modular oil/grease removal assembly including:
 - a container for receiving and holding effluent water containing oil/grease to be removed from the effluent water and having sectional covers;
 - 5 a main sectional cover supporting a rotatable disk in a partially immersed position within the body of effluent water and in contact with the oil/grease;
 - a drive mounted on the main sectional cover in driving engagement to provide rotation of the disk when the drive is engaged;
 - a trough mounted on the main sectional cover in engaging relation to
 - 10 opposite sides of the rotatable disk; and
 - a scraper blade mounted on the trough so that the scraper blade extends from the trough into sliding engagement with a side of the disk, the disk, scraper blade and trough cooperatively disposed and structured to direct oil and grease from the disk along the scraper blade along the trough for collection in a storage
 - 15 container.
2. A modular oil/grease removal assembly as claimed in claim 1 wherein the main sectional cover supports an electrical resistance heater that extends downwardly into the container so as to have an operable portion of the heater at least partially immersed within the body of effluent water to cause the oil/grease
- 20 to be in liquid form.
3. A modular oil/grease removal assembly as claimed in claim 2 wherein the main sectional cover supports electrical controls for selectively operating the drive and the heater.
4. A modular oil/grease removal assembly as claimed in claim 3 wherein a
- 25 first shield covers the rotating disk, trough and scraper blade and a second shield covers the electrical controls.
5. A modular oil/grease removal assembly as claimed in claim 4 wherein the first shield is provided with vent holes to permit the escape of vapors so as to reduce vapor condensation within the first shield.

6. A modular oil/grease removal assembly as claimed in claim 4 wherein the first shield has a hinged portion covering at least portions of the rotating disk, trough and scraper blade, so that the hinged portion can be opened for access to clean and/or service the rotating disk, trough and scraper blade.
- 5 7. A modular oil/grease removal assembly as claimed in claim 4 wherein the electrical control includes a timer connected to the drive to control the start and stop operation of the drive to permit a selected duty cycle to remove grease at times when grease is likely to be present and the second shield has hinged portion covering a control for the timer.
- 10 8. A modular oil/grease removal assembly as claimed in claim 1 wherein the main sectional cover has two pair of opposite sides with one pair of opposite sides adapted to engage the container for support of the main sectional cover by the container and the other pair of opposite sides adapted to engage additional sectional covers.
- 15 9. A modular oil/grease removal assembly as claimed in claim 8 wherein the sides adapted to engage additional sectional covers have a flange extending downwardly and laterally so as to be positioned under a portion of an additional sectional cover, with a further extension downwardly to provide rigidity.
- 20 10. A modular oil/grease removal assembly as claimed in claim 9 wherein the additional sectional cover is substantially rectangular with two opposite sides adapted to engage the container for support of the additional sectional cover by the container and one of two opposite sides adapted to engage and seal to the main section.
- 25 11. A modular oil/grease removal assembly as claimed in claim 10 wherein the container has an inwardly turned upper flange, a gasket on the flange, and clasps to hold the sectional covers to the flange and seal the covers to the flange by compression of the gasket.

12. A modular oil/grease removal assembly as claimed in claim 9 wherein there are two main sections and an additional sectional cover between the two main sections having opposite sides to engage the main sections, the opposite sides of the additional sectional cover each having upper and lower protrusions spaced by a spacer of dimension so the upper protrusion engages an upper surface of the flange of the main sectional cover that extends downwardly and laterally and the lower protrusion engages the further downward extension.

13. A modular oil/grease removal assembly as claimed in claim 12 wherein the upper protrusion has a lower surface with a gasket to seal with the flange of the main sectional cover that extends downwardly.

14. A modular oil/grease removal assembly as claimed in claim 9 wherein the additional sectional cover has four sides with three sides adapted to engage the container for support of the additional sectional cover by the container;

the fourth side has an upper protrusion that has a lower surface with a gasket so the upper protrusion engages and seals to an upper surface of the flange of the main sectional cover that extends downwardly and laterally; and

a downward ear that engages the further downward extension of the main section.

15. A modular oil/grease removal assembly as claimed in claim 1 wherein the container has an inlet end, an outlet end and left and right sides looking in the direction from the inlet to the outlet ends, and the sectional covers have first and second mounting edges so that they can be mounted to the container with a first mounting edge on the left and a second mounting edge on the right or the second mounting edge on the left and the first mounting edge on the right.

16. A modular oil/grease removal assembly as claimed in claim 1 wherein the disk includes two disk sheets separately formed and subsequently joined together.

17. A modular oil/grease removal assembly as claimed in claim 16 wherein the two sheets are identical and each include a flat oleophilic surface and a surface having a plurality of spaced peripheral lugs.
- 5 18. A modular oil/grease removal assembly as claimed in claim 17 wherein the lugs of each sheet are odd in number so that upon turning the oleophilic surfaces away from one another and joining the two sheets, the lugs of the opposing sheets may be interleaved to form a periphery for the disk with gaps between the lugs.
- 10 19. A modular oil/grease removal assembly as claimed in claim 16 wherein the sheets are joined by means selected from the group consisting of screwing, bolting, ultrasonic welding, vibration welding, other welding and adhering.
20. A modular oil/grease removal assembly as claimed in claim 19 wherein the sheets have bosses on the same side as the lugs and the sheets are joined at the bosses.
- 15 21. A modular oil/grease removal assembly as claimed in claim 16 wherein the sheets are injection molded plastic.
22. A modular oil/grease removal assembly as claimed in claim 21 wherein the plastic is polypropylene.
- 20 23. A modular oil/grease removal assembly as claimed in claim 17 wherein the drive is a sprocket with flattened teeth to engage the lugs.
24. A modular oil/grease removal assembly as claimed in claim 16 wherein the sheets have a central hole with a surrounding rim to form a bearing for an axle extending through the central hole.
- 25 25. A modular oil/grease removal assembly as claimed in claim 1 further including a sensor module mounted to the main sectional cover, the sensor module including a probe extending downwardly within the body of effluent water

to a depth normally below the oil/grease, a sensor in the probe providing electrical indications as to whether the sensor is in proximity to oil/grease or water, and an alarm on the sensor module to provide a human-recognizable indication if the sensor senses that the probe is in proximity to oil/grease rather than the normally-present water.

- 5
26. A modular oil/grease removal assembly as claimed in claim 25 wherein the sensor and alarm are electrical and further include a low voltage power supply to the sensor module separate from the power supply to the drive that rotates the disk.
- 10
27. A modular oil/grease removal assembly as claimed in claim 25 further including an electrical alarm output from the sensor module to enable electrical connection to a remote monitoring apparatus to signal alarm conditions to the remote monitoring apparatus.
- 15
28. A modular oil/grease removal assembly as claimed in claim 25 further including an electrical alarm output from the sensor module to enable electrical connection to a SCADA monitoring apparatus to signal alarm conditions to the SCADA monitoring apparatus.
- 20
29. A modular oil/grease removal assembly as claimed in claim 25 wherein the probe is a watertight cylindrical shaft, and the sensor is positioned at a distal end of the 26 cylindrical shaft and held in place at the distal end by a spacer.
30. A modular oil/grease removal assembly as claimed in claim 25 wherein the sensor module further includes a ready light indicating proper operation.
31. A modular oil/grease removal assembly as claimed in claim 1 wherein the container has an inlet end and solids removal module positioned at the inlet end.
- 25
32. A modular oil/grease removal assembly as claimed in claim 31 wherein the solids removal module is a strainer.

33. A modular oil/grease removal assembly as claimed in claim 31 wherein the solids removal module includes a hopper having an eductor at a lower portion of the hopper, a water inlet to the eductor to make a jet of water to remove contents of the hopper in proximity to the eductor and an outlet from the eductor to an outlet of the container.

34. A modular oil/grease removal assembly as claimed in claim 33 wherein the hopper includes a lower portion laterally offset from the eductor, so that excess solids do not block jet action of the eductor.

35. A modular oil/grease removal assembly including:

a container for receiving and holding effluent water containing oil/grease to be removed from the effluent water and having sectional covers;

a main sectional cover supporting a rotatable disk in a partially immersed position within the body of effluent water and in contact with the oil/grease;

a drive mounted on the main sectional cover in driving engagement to provide rotation of the disk when the drive is engaged;

a trough mounted on the main sectional cover in an engaging relation to opposite sides of the rotatable disk; and

a scraper blade mounted on the trough so that the scraper blade extends from the trough into sliding engagement with a side of the disk, the disk, scraper blade and trough cooperatively disposed and structured to direct oil and grease from the disk along the scraper blade along the trough for collection in a storage container,

wherein the main sectional cover supports an electrical resistance heater that extends downwardly into the container so as to have an operable portion of the heater at least partially immersed within the body of effluent water to cause the oil/grease to be in liquid form and the main sectional cover supports electrical controls for selectively operating the drive and the heater, the electrical controls include a timer connected to the drive to control the start and stop operation of the drive to permit a selected duty cycle to remove grease at times when grease is likely to be present and the second shield has a hinged portion covering a control for the timer,

a first shield covers the rotating disk, trough and scraper blade and a second shield covers the electrical controls and the first shield is provided with vent holes to permit the escape of vapors so as to reduce vapor condensation within the first shield and the first shield has a hinged portion covering at least portions of the rotating disk, trough and scraper blade, so that the hinged portion can be opened for access to clean and/or service the rotating disk, trough and scraper blade.

36. A modular oil/grease removal assembly including:

a container for receiving and holding effluent water containing oil/grease to be removed from the effluent water and having sectional covers;

a main sectional cover supporting a rotatable disk in a partially immersed position within the body of effluent water and in contact with the oil/grease;

a drive mounted on the main sectional cover in driving engagement to provide rotation of the disk when the drive is engaged;

a trough mounted on the main sectional cover in engaging relation to opposite sides of the rotatable disk; and

a scraper blade mounted on the trough so that the scraper blade extends from the trough into sliding engagement with a side of the disk, the disk, scraper blade and trough cooperatively disposed and structured to direct oil and grease from the disk along the scraper blade along the trough for collection in a storage container,

wherein the main sectional cover has two pair of opposite sides with one pair of opposite sides adapted to engage the container for support of the main sectional cover by the container and the other pair of opposite sides adapted to engage additional sectional covers, the sides adapted to engage additional sectional covers have a flange extending downwardly and laterally so as to be positioned under a portion of an additional sectional cover, with a further extension downwardly to provide rigidity,

the additional sectional cover has four sides with three sides adapted to engage the container for support of the additional sectional cover by the container and the fourth side has an upper protrusion that has a lower surface with a gasket so the upper protrusion engages and seals to an upper surface of the flange of

the main sectional cover that extends downwardly and laterally and a downward ear that engages the further downward extension of the main section,

the container has an inwardly turned upper flange, a gasket on the flange, and clasps to hold the sectional covers to the flange and seal the covers to the flange by compression of the gasket.

37. A modular oil/grease removal assembly as claimed in claim 36 wherein there are two main sections and an additional sectional cover between the two main sections having opposite sides to engage the main sections, the opposite sides of the additional sectional cover each having upper and lower protrusions spaced by a spacer of dimension so the upper protrusion engages an upper surface of the flange of the main sectional cover that extends downwardly and laterally and the lower protrusion engages the further downward extension,

the upper protrusion has a lower surface with a gasket to seal with the flange of the main sectional cover that extends downwardly.

38. A modular oil/grease removal assembly including:

a container for receiving and holding effluent water containing oil/grease to be removed from the effluent water and having sectional covers;

a main sectional cover supporting a rotatable disk in a partially immersed position within the body of effluent water and in contact with the oil/grease;

a drive mounted on the main sectional cover in driving engagement to provide rotation of the disk when the drive is engaged;

a trough mounted on the main sectional cover in engaging relation to opposite sides of the rotatable disk; and

a scraper blade mounted on the trough so that the scraper blade extends from the trough into sliding engagement with a side of the disk, the disk, scraper blade and trough cooperatively disposed and structured to direct oil and grease from the disk along the scraper blade along the trough for collection in a storage container,

wherein the container has an inlet end, an outlet end and left and right sides looking in the direction from the inlet to the outlet ends, and the sectional covers have first and second mounting edges so that they can be mounted to the

container with a first mounting edge on the left and a second mounting edge on the right or the second mounting edge on the left and the first mounting edge on the right.

39. A modular oil/grease removal assembly including:

5 a container for receiving and holding effluent water containing oil/grease to be removed from the effluent water and having sectional covers;

a main sectional cover supporting a rotatable disk in a partially immersed position within the body of effluent water and in contact with the oil/grease;

10 wherein the disk includes two injection molded plastic disk sheets separately formed and subsequently joined together, wherein the two sheets are identical and each include a flat oleophilic surface and a surface having an odd number of spaced peripheral lugs, so that upon turning the oleophilic surfaces away from one another and joining the two sheets, the lugs of the opposing sheets may be interleaved to form a periphery for the disk with gaps between the
15 lugs, the sheets have bosses on the same side as the lugs and the sheets are joined at the bosses, and the sheets have a central hole with a surrounding rim to form a bearing for an axle extending through the central hole;

a drive mounted on the main sectional cover in driving engagement to the lugs of the disk to provide rotation of the disk when the drive is engaged;

20 a trough mounted on the main sectional cover in engaging relation to opposite sides of the rotatable disk; and

a scraper blade mounted on the trough so that the scraper blade extends from the trough into sliding engagement with a side of the disk, the disk, scraper blade and trough cooperatively disposed and structured to direct oil and grease
25 from the disk along the scraper blade along the trough for collection in a storage container.

40. A modular oil/grease removal assembly including:

a container for receiving and holding effluent water containing oil/grease to be removed from the effluent water and having sectional covers;

30 a main sectional cover supporting a rotatable disk in a partially immersed position within the body of effluent water and in contact with the oil/grease;

a drive mounted on the main sectional cover in driving engagement to provide rotation of the disk when the drive is engaged;

a trough mounted on the main sectional cover in engaging relation to opposite sides of the rotatable disk;

5 a scraper blade mounted on the trough so that the scraper blade extends from the trough into sliding engagement with a side of the disk, the disk, scraper blade and trough cooperatively disposed and structured to direct oil and grease from the disk along the scraper blade along the trough for collection in a storage container; and

10 a sensor module mounted to the main sectional cover, the sensor module including a probe in the form of a watertight cylindrical shaft extending downwardly within the body of effluent water to a depth normally below the oil/grease, an electrical sensor positioned at a distal end of the cylindrical shaft and held in place at the distal end by a spacer and providing electrical indications
15 as to whether the sensor is in proximity to oil/grease or water, an electrical alarm on the sensor module to provide a human-recognizable indication if the sensor senses that the probe is in proximity to oil/grease rather than the normally-present water, a low voltage power supply to the sensor module separate from power to the drive that rotates the disk, an electrical alarm output from the sensor module
20 to enable electrical connection to SCADA remote monitoring apparatus to signal alarm conditions to the SCADA remote monitoring apparatus, and an electrical ready light indicating proper operation of the sensor module.

41. A modular oil/grease removal assembly including:

25 a container for receiving and holding effluent water containing oil/grease to be removed from the effluent water and having sectional covers and an inlet end and a solids removal module positioned at the inlet end including a hopper having a lower portion and an eductor laterally offset from the lower portion of the hopper, so that excess solids do not block jet action of the eductor, and a water inlet to the eductor to make a jet of water to remove contents of the hopper in
30 proximity to the eductor and an outlet from the eductor to an outlet of the container;

a main sectional cover supporting a rotatable disk in a partially immersed position within the body of effluent water and in contact with the oil/grease;

a drive mounted on the main sectional cover in driving engagement to provide rotation of the disk when the drive is engaged;

5 a trough mounted on the main sectional cover in engaging relation to opposite sides of the rotatable disk; and

a scraper blade mounted on the trough so that the scraper blade extends from the trough into sliding engagement with a side of the disk, the disk, scraper blade and trough cooperatively disposed and structured to direct oil and grease
10 from the disk along the scraper blade along the trough for collection in a storage container.

42. An apparatus as claimed in claim 1 further including an additional sectional cover and the sectional covers are configured to provide a hinged but severable relationship between the sectional covers.

15 43. A modular oil/grease removal assembly as claimed in claim 9 wherein the additional sectional cover has four sides with three sides adapted to engage the container for support of the additional sectional cover by the container, and the fourth side has a lower protrusion and a gasket so the lower protrusion of the additional section abuts the further downward extension of the main sectional
20 cover and the gasket engages and seals to the main sectional cover.

44. A modular oil/grease removal assembly as claimed in claim 3 wherein a shield covers the rotating disk, trough scraper blade, and the electrical controls.

45. A modular oil/grease removal assembly as claimed in claim 44 wherein the shield has a partition to separate the rotating disk and trough scraper blade from
25 the electrical controls.

46. A modular oil/grease removal assembly as claimed in claim 44 wherein the shield includes front and rear sections meeting to form a barrel for a hinge for covers for the rotating disk, trough scraper blade and electrical controls.

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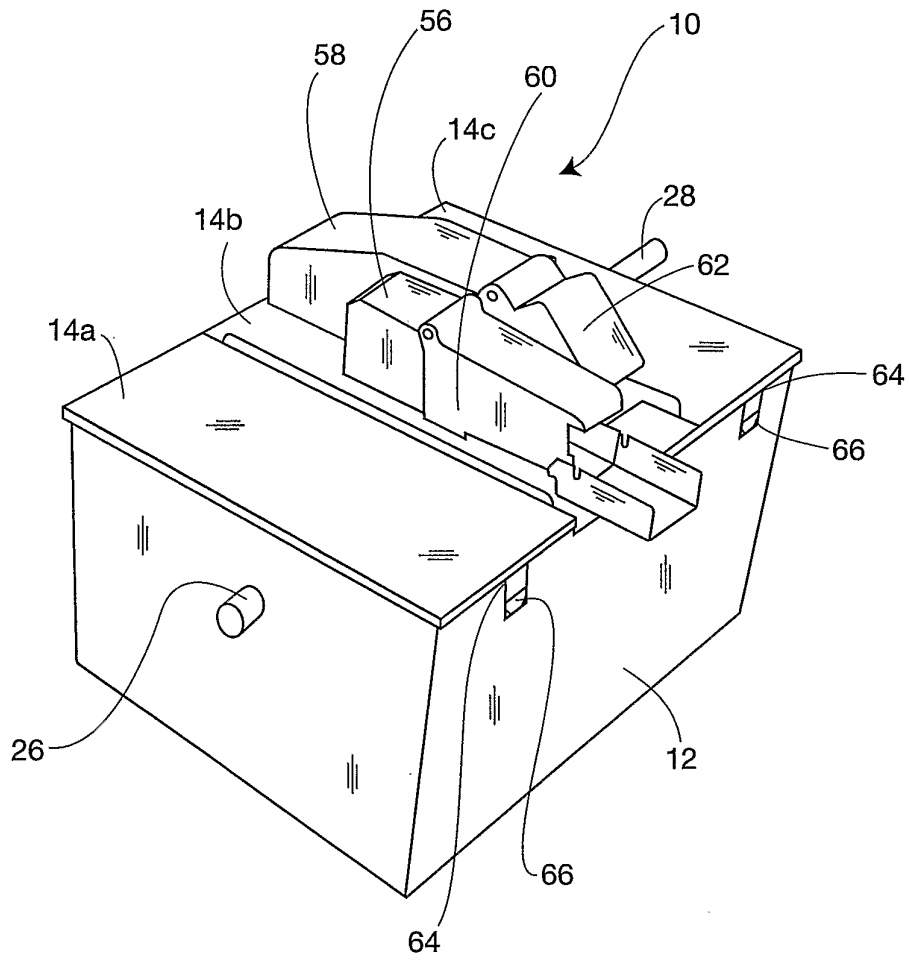


FIG. 1

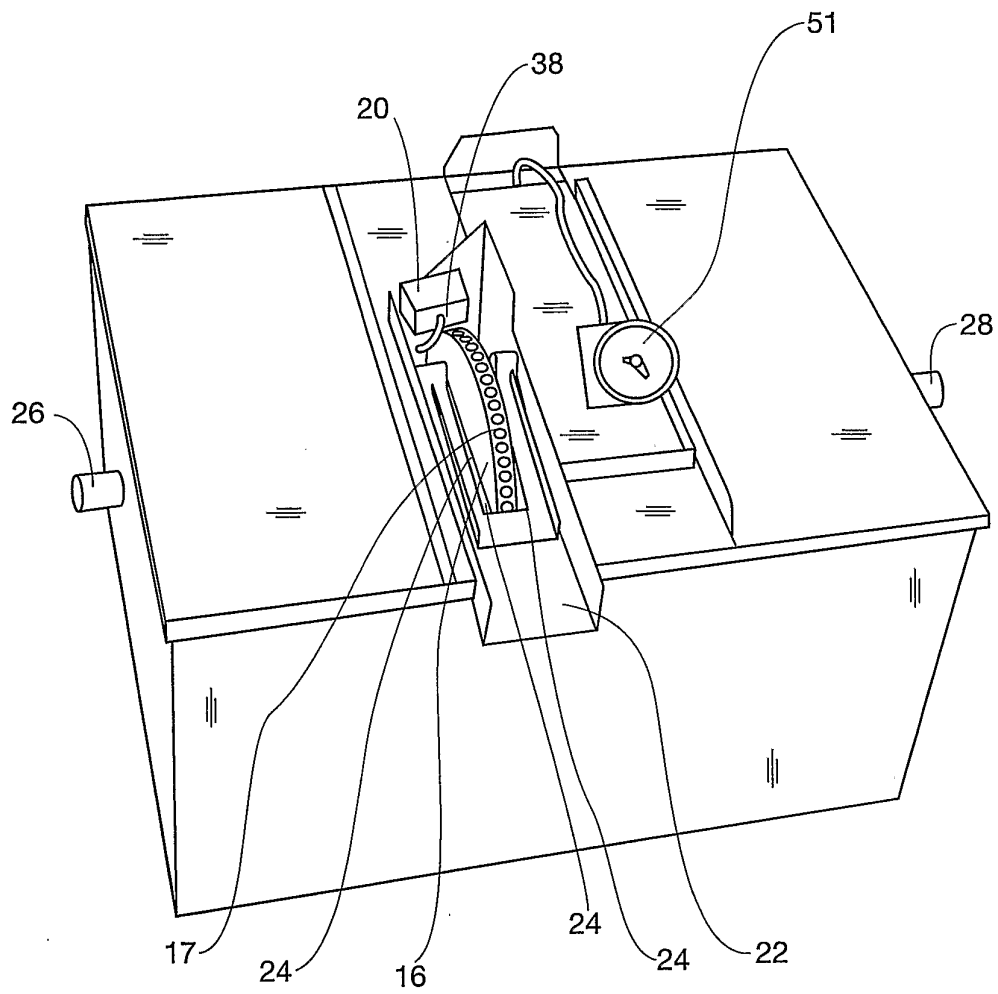


FIG. 2

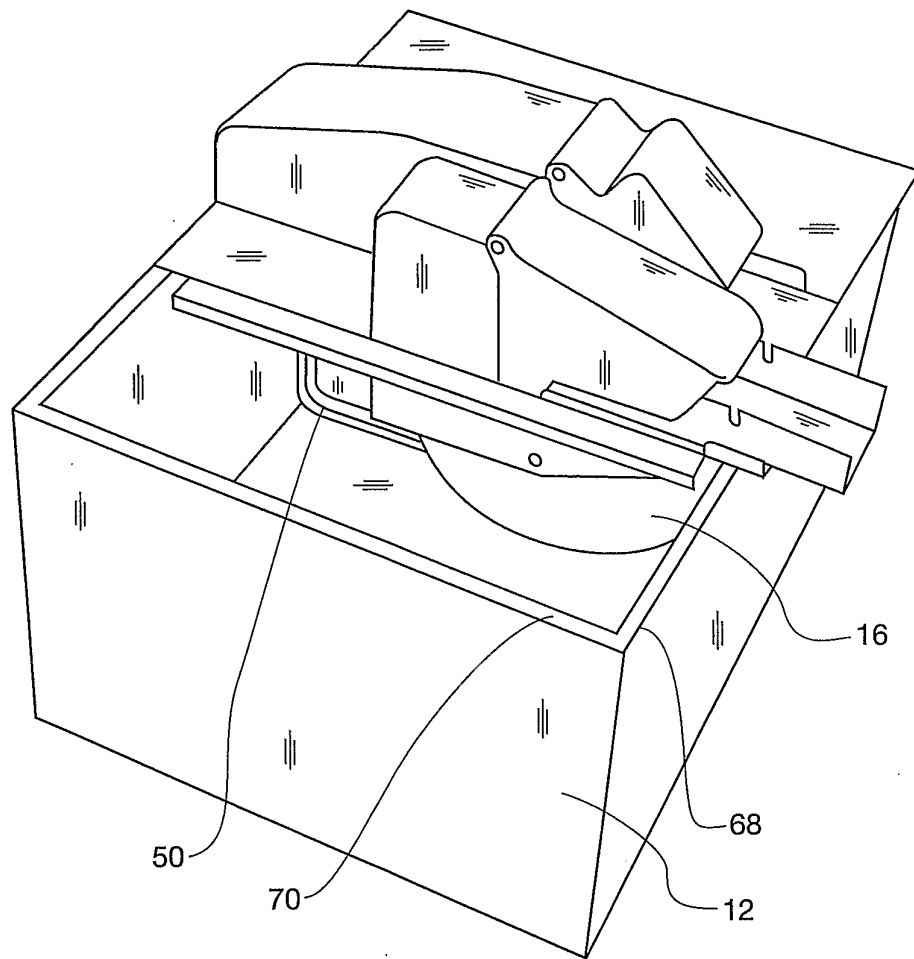


FIG. 3

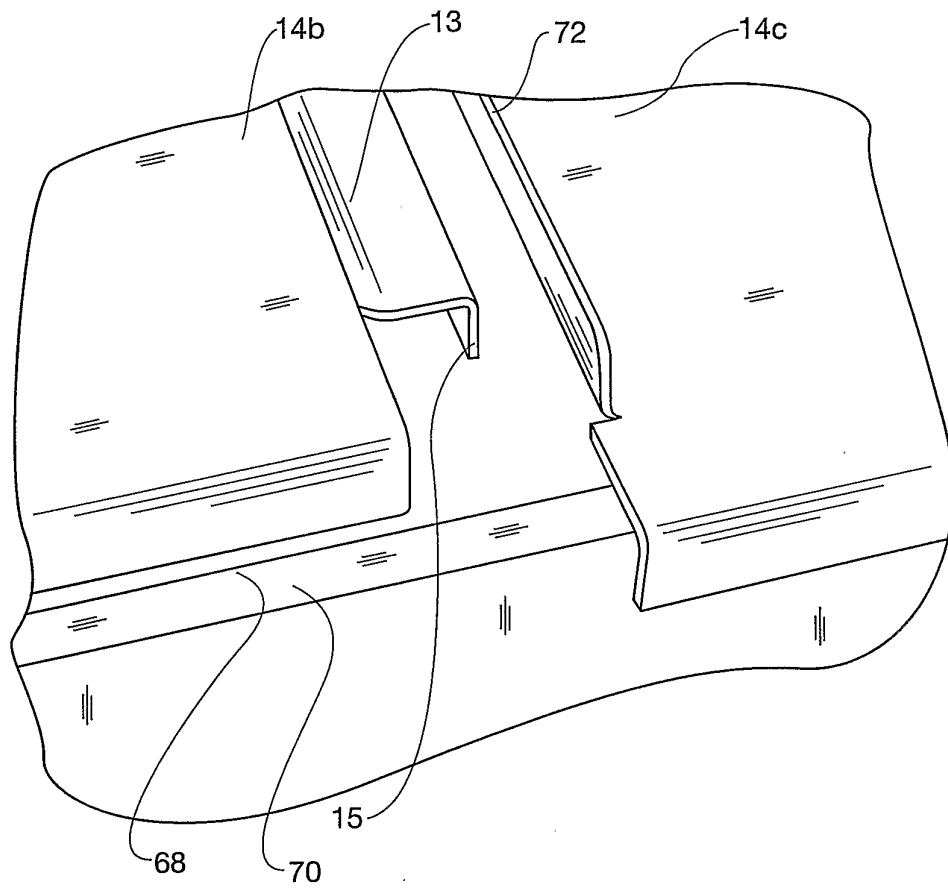


FIG. 4

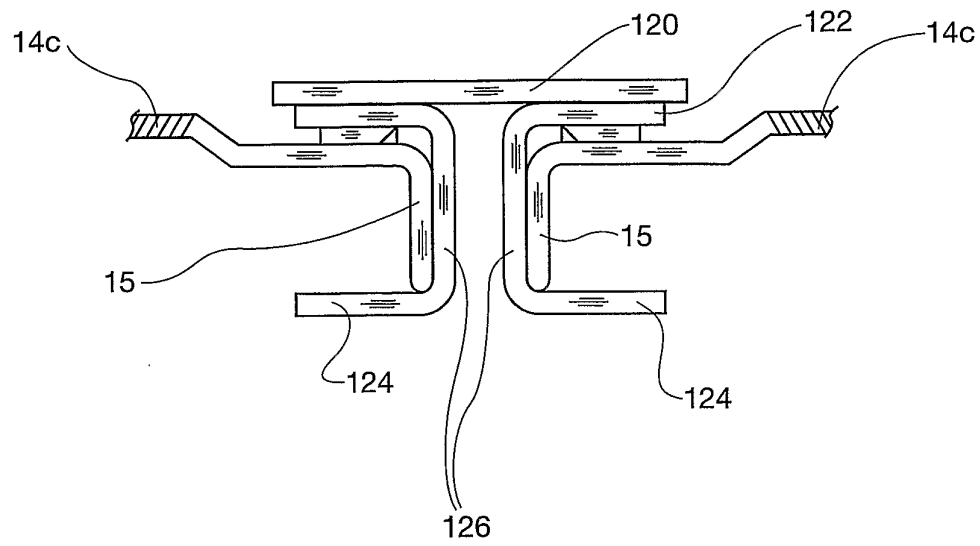


FIG. 4A

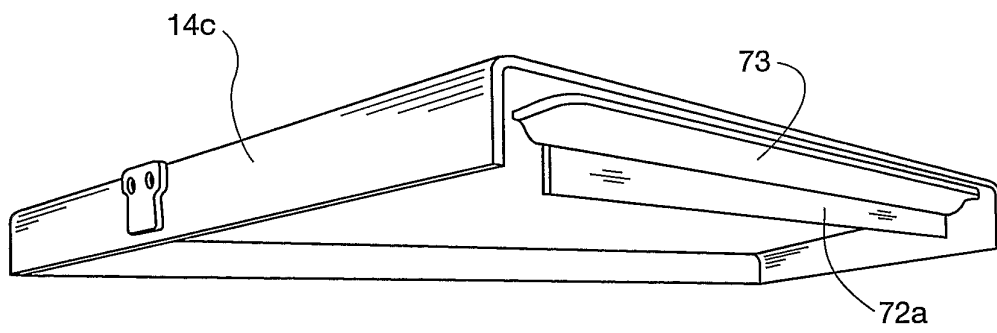


FIG. 4B

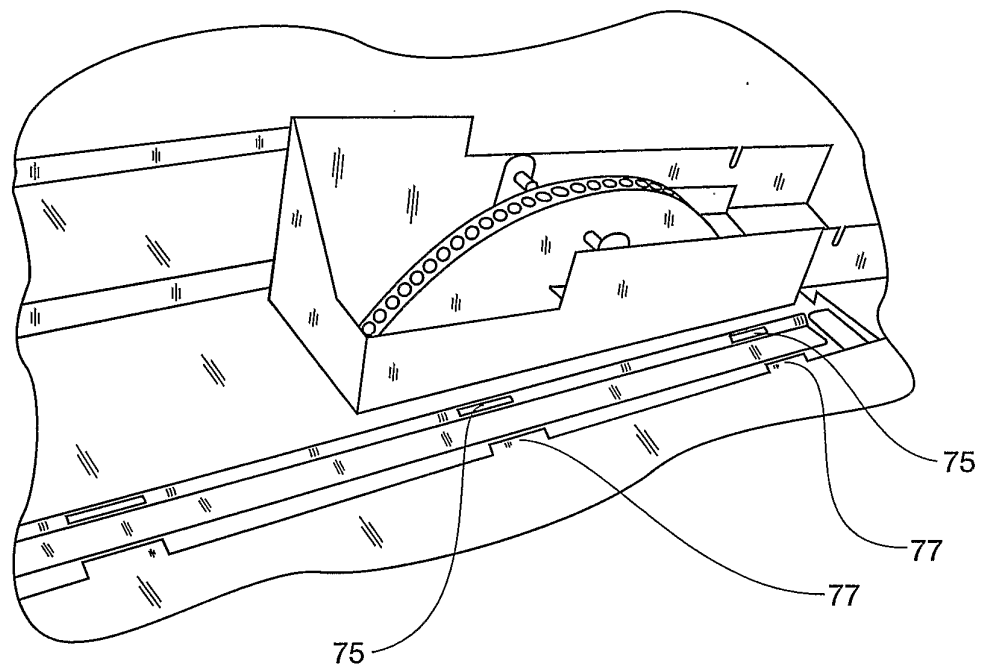


FIG. 4C

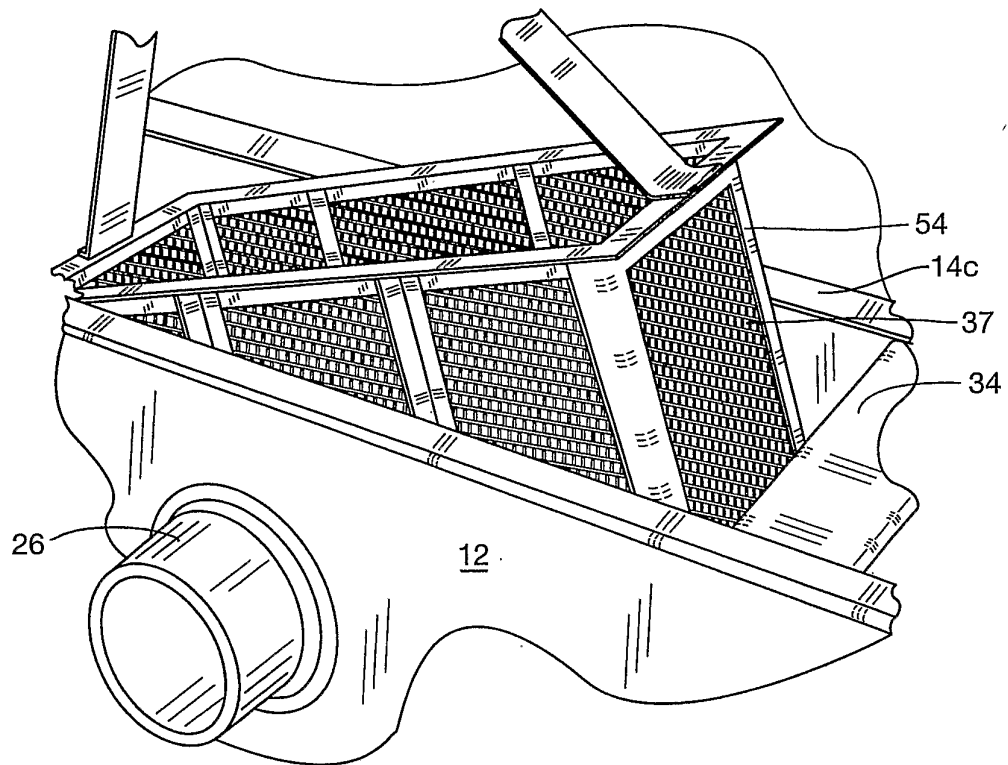


FIG. 5

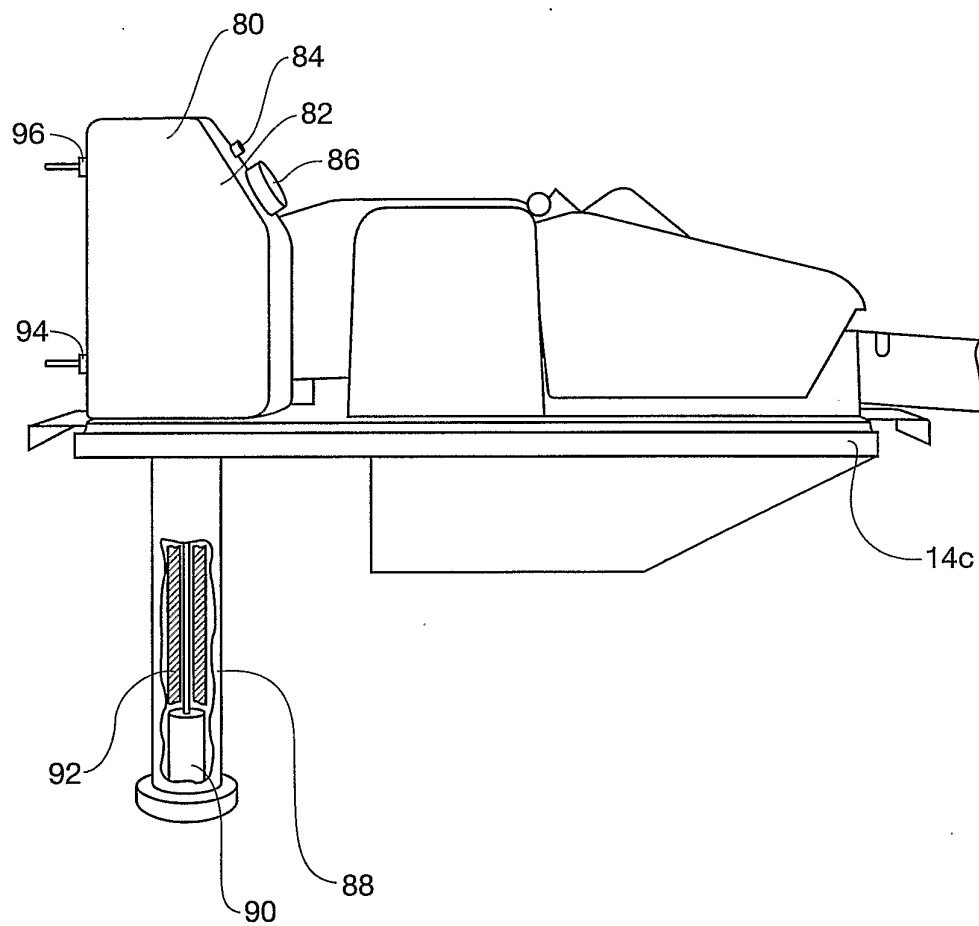
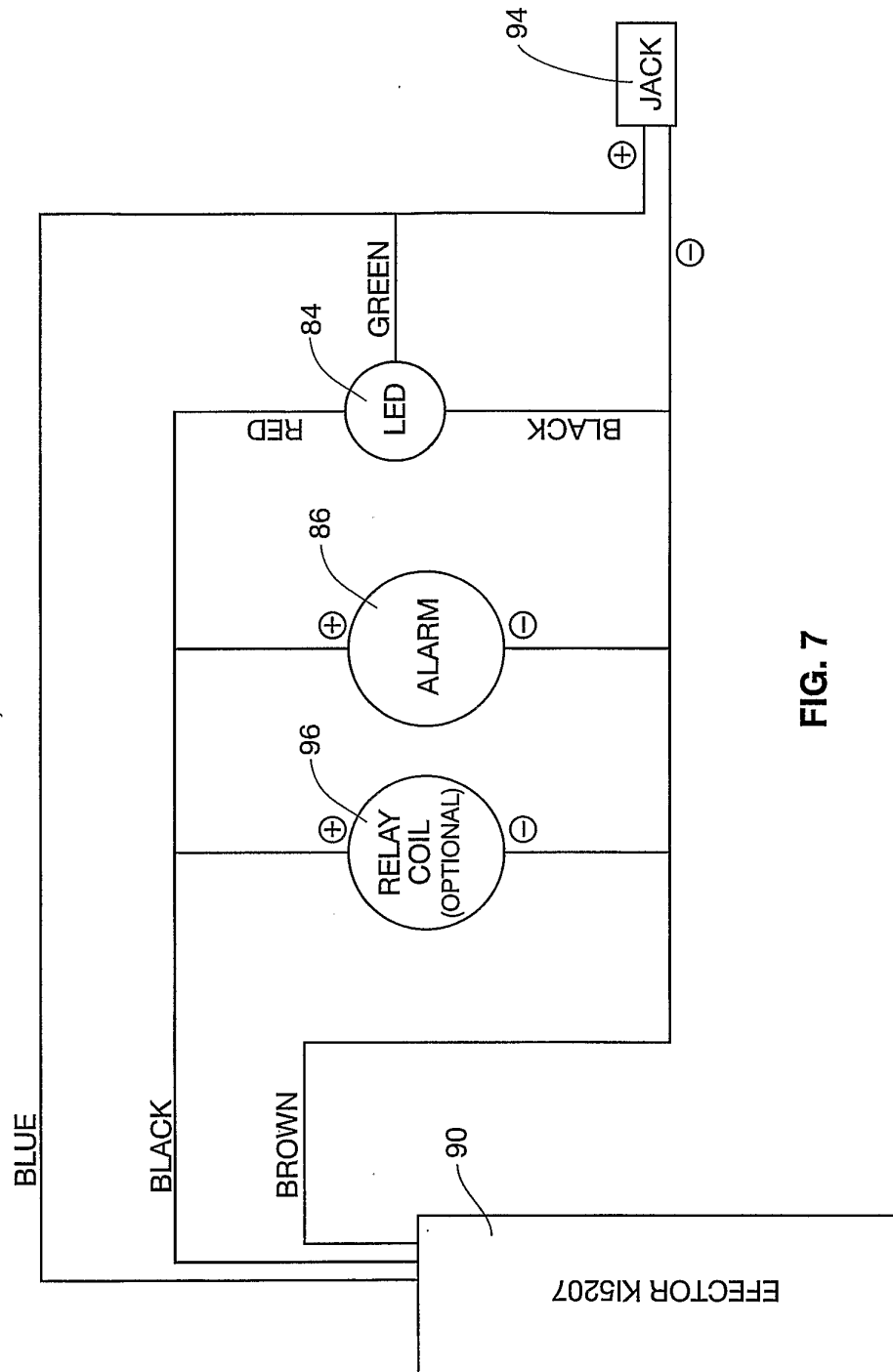


FIG. 6



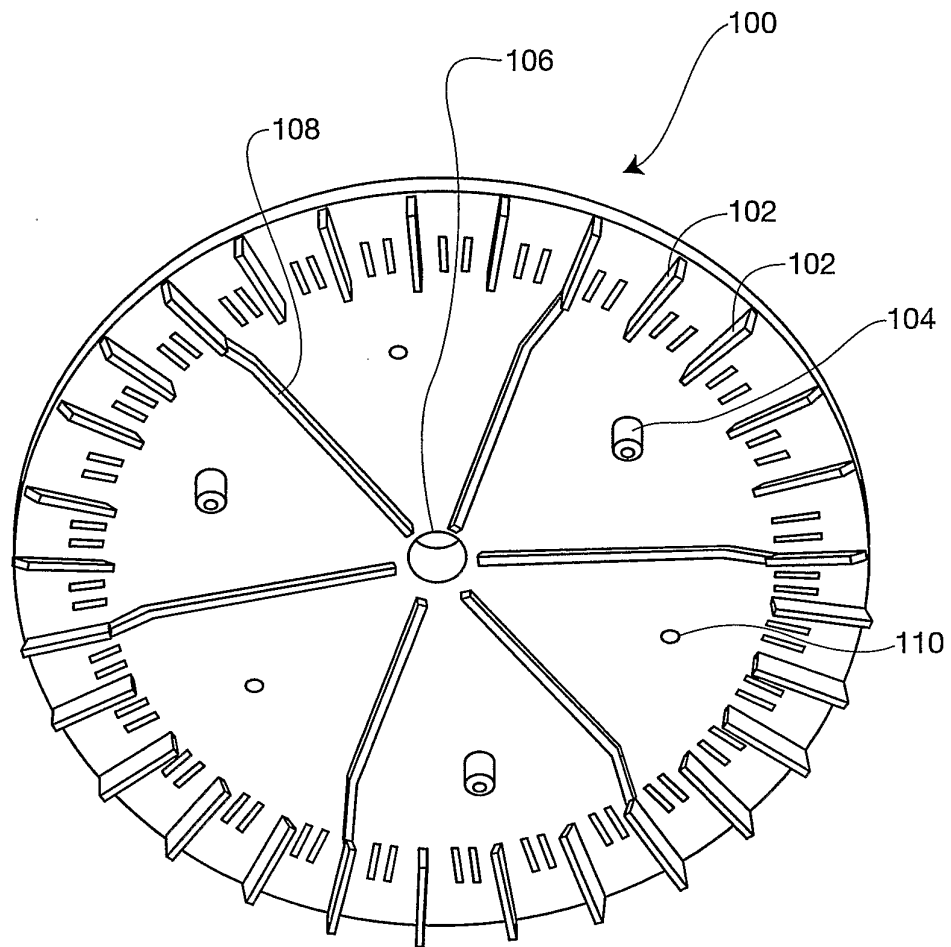


FIG. 8

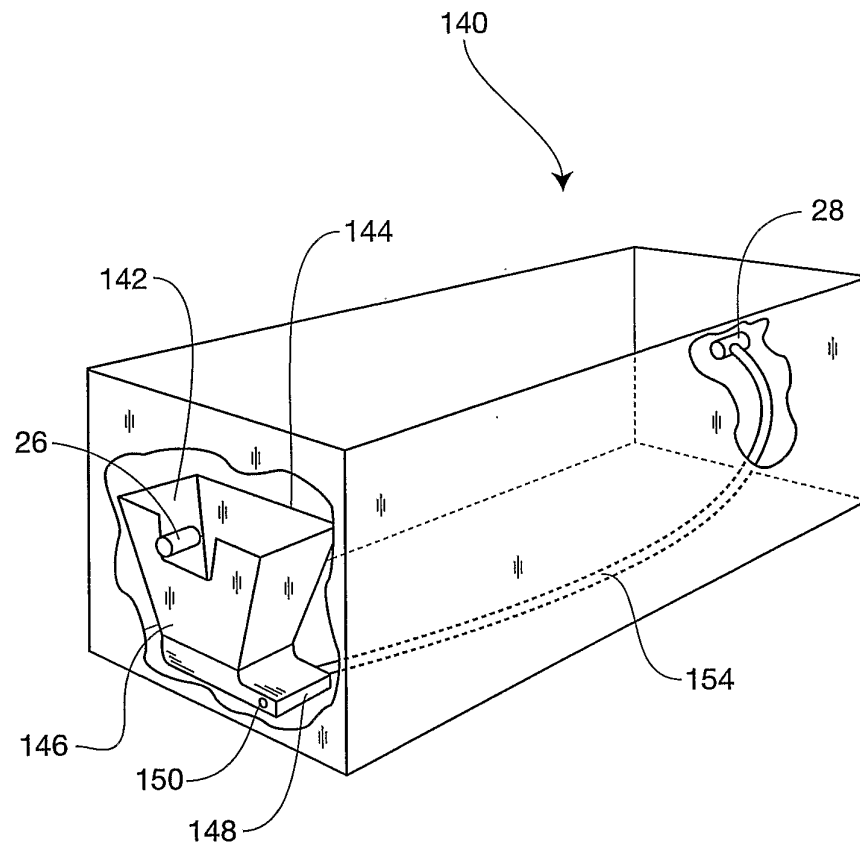


FIG. 9

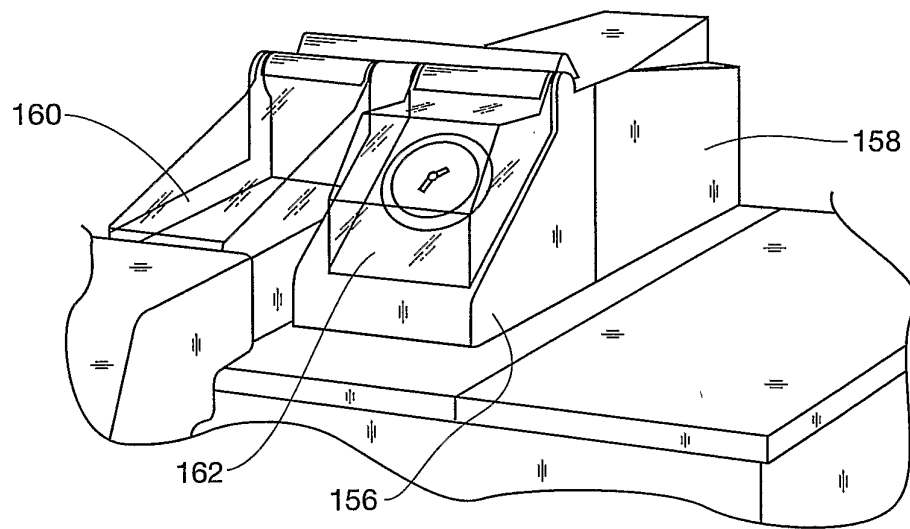


FIG. 10

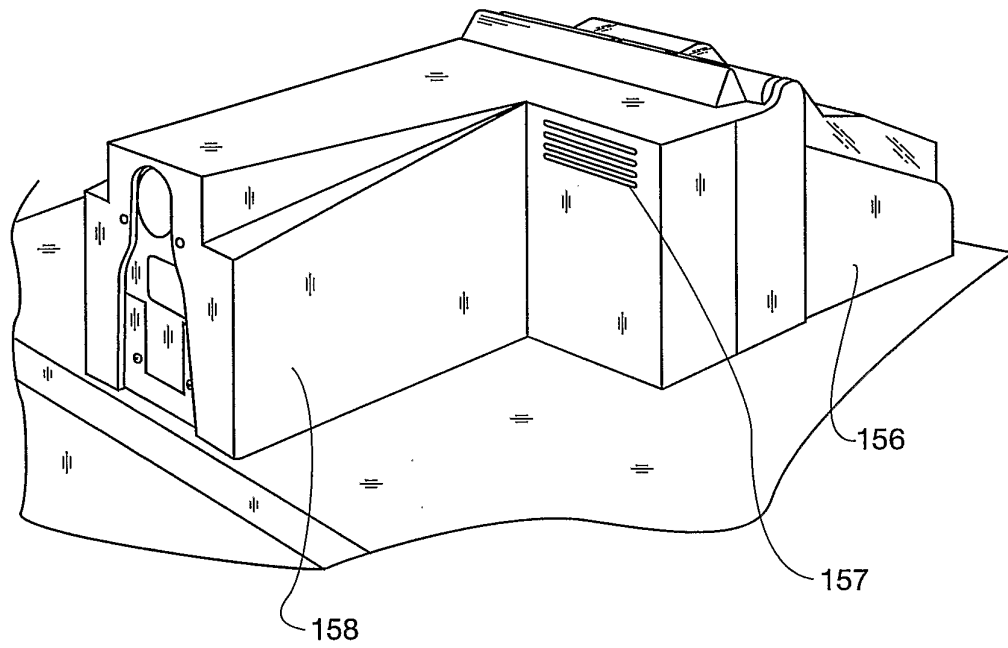


FIG. 11

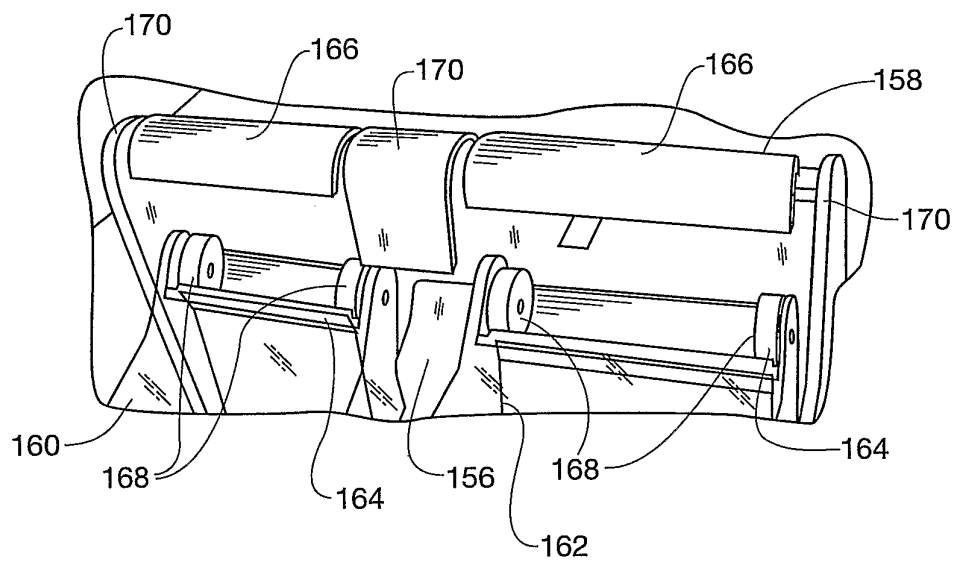


FIG. 12

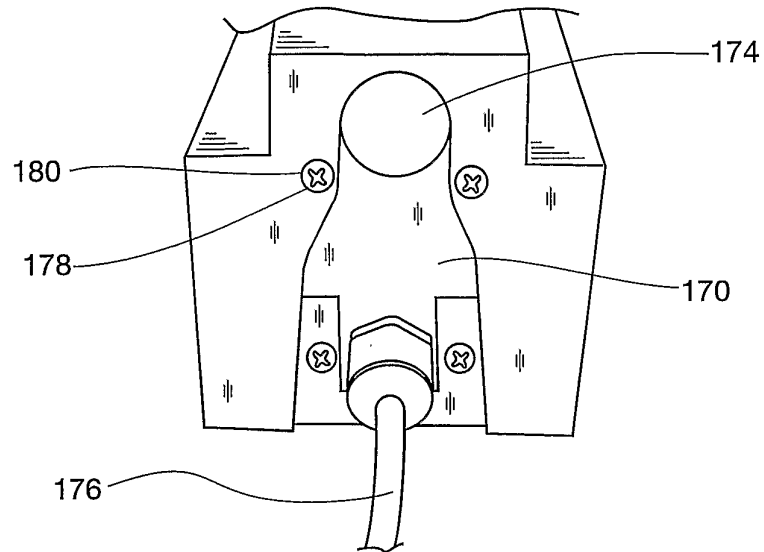


FIG. 13

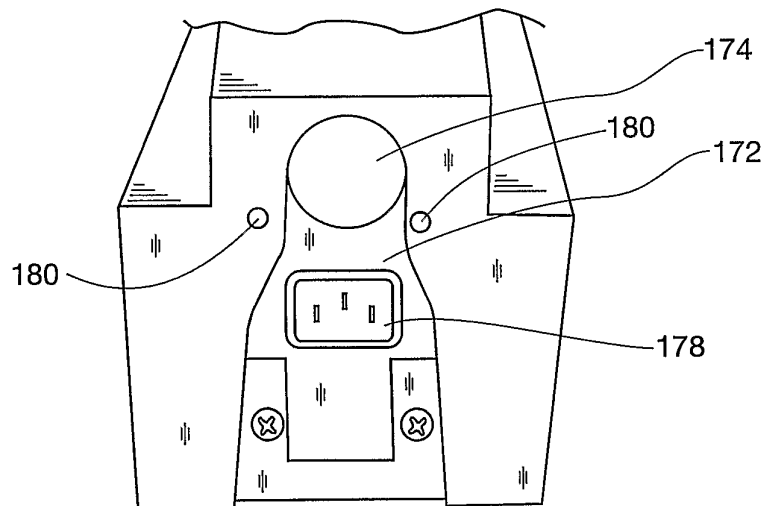


FIG. 14

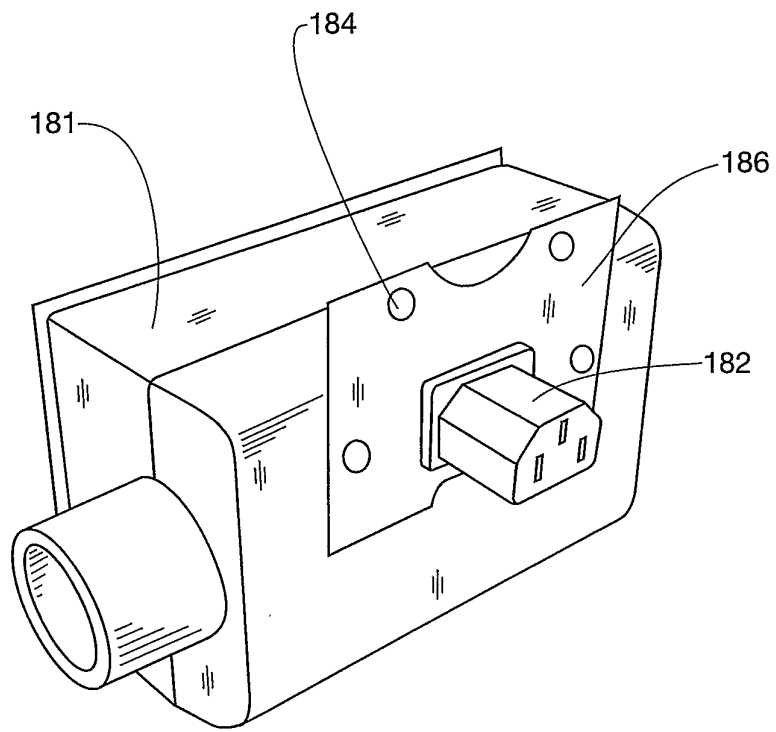


FIG. 15