April 8, 1941. E. W. N. BOOSEY 2,237,545

FLOOR DRAIN

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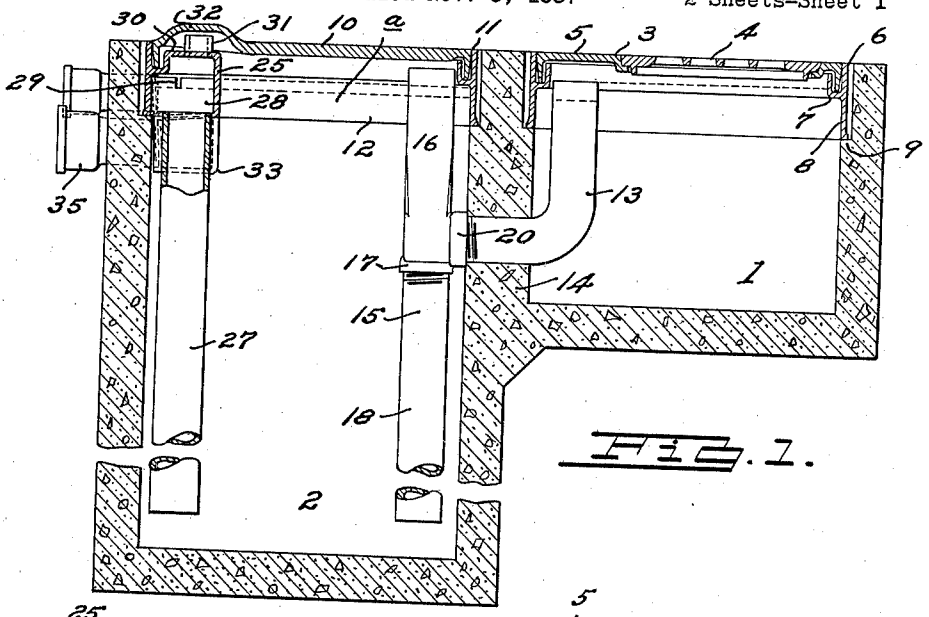


FIG. 1.

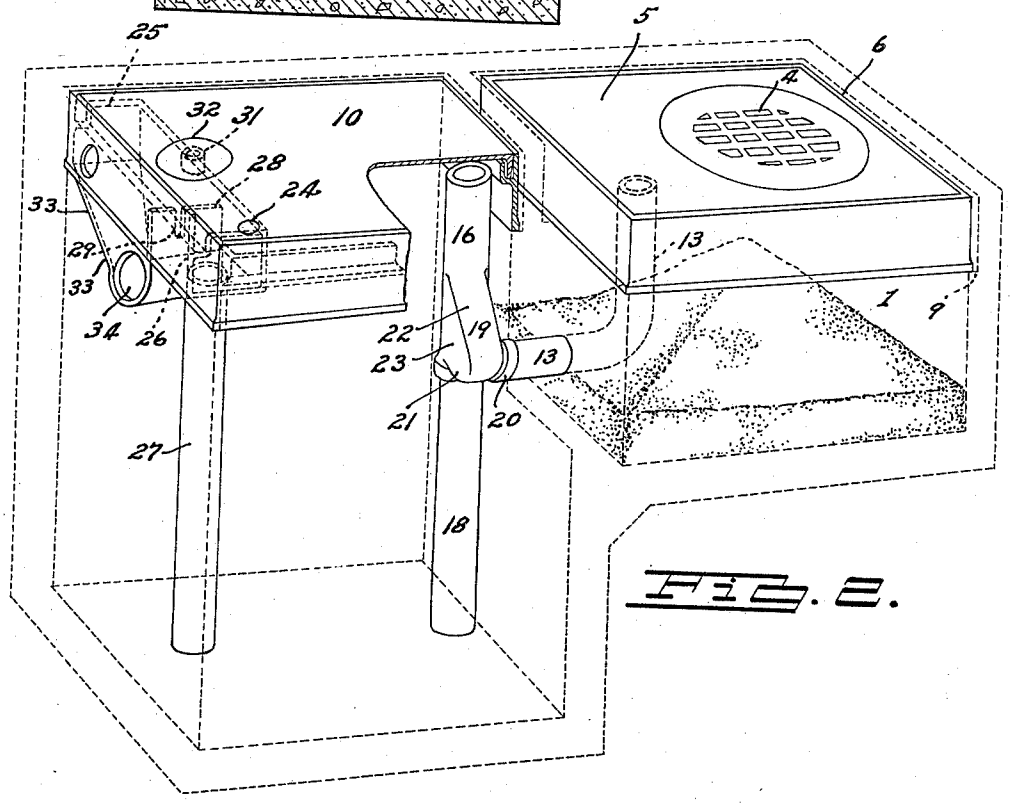


FIG. 2.

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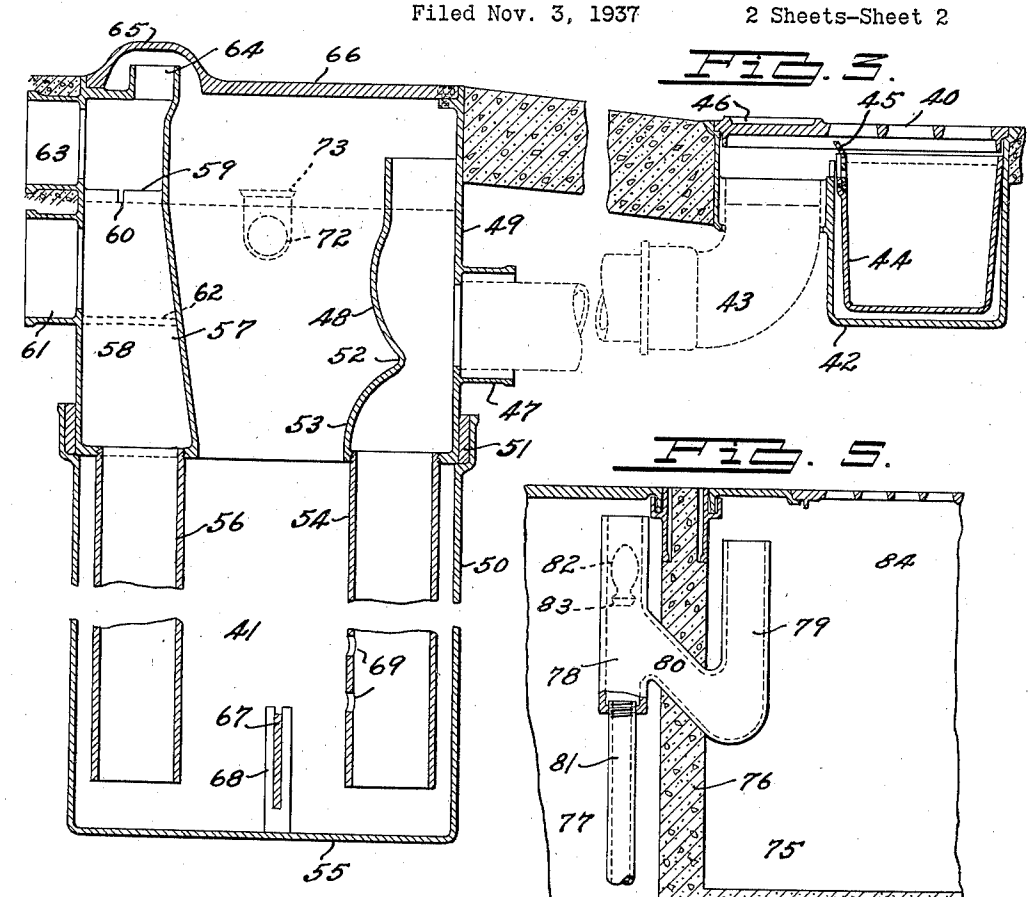


Fig. 3.

Fig. 5.

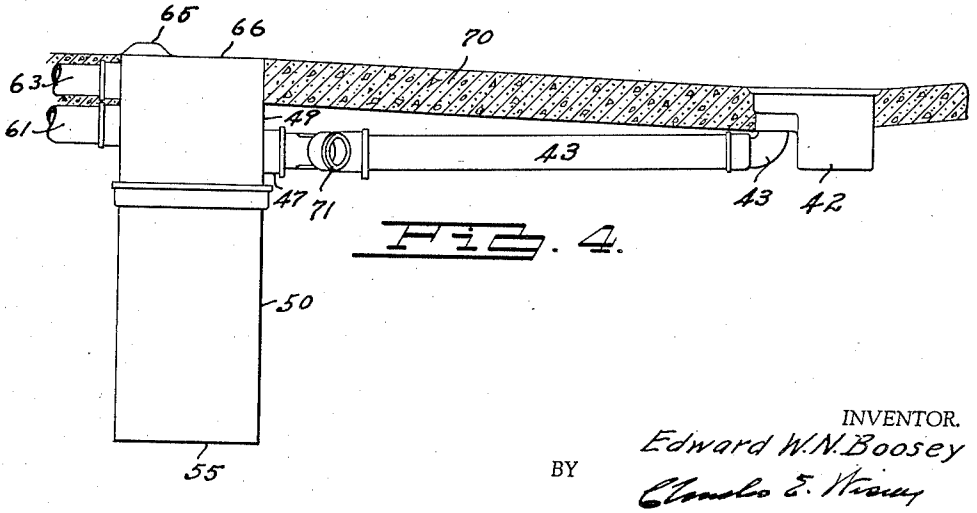


Fig. 4.

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2,237,545

FLOOR DRAIN

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8 Claims. (Cl. 210—56)

This invention relates generally to floor drains, specifically a floor drain or sump in which oils and greases as well as water are discharged as, for instance, in a garage floor drain.

The purpose of the invention is to provide a floor drain or sump to which both oil and water are discharged and from which water is discharged and the oil retained in the sump.

In addition to the said principal object, it is further an object of the invention to provide a floor drain in which the normal water level in the sump is above the level of the outlet and in which both the sump and the outlet are open to a vent line wherein gases in the sump may pass to the vent and siphonage of water from the sump is prevented.

A further object and feature of the invention is to provide a floor drain for the general purpose stated in which oil and water are discharged together to a receiving chamber or drain head and an outlet provided from the said chamber terminating above the normal water level of the sump whereby oil at each flushing of the drain is first discharged to the sump and as flow continues into the receiving chamber, water and oil, gasoline, and floating greases are all discharged indiscriminately to the sump and the water discharged from the sump.

A further object of the invention is to provide in conjunction with a sump and drain head and a conduit therebetween, separator means tending to cause oil and floating greases, etc., to pass to the top of the sump while water and liquid of like specific gravity is discharged directly to the bottom of the sump.

A further feature and object of the invention is to provide an oil retaining sump and a receiving chamber or drain head to which material is first supplied and means in the sump for removing the water from the bottom thereof and retaining the oil on the surface of the water in the sump and means whereby as the oil level is raised to a predetermined height in the sump, it may discharge backwardly to the receiving chamber to thereby become visible on the floor surface notifying occupants of a building that oil should be removed from the sump, it being a feature of the construction to so arrange the parts of the drain as to provide a normal water level in the receiving chamber above the normal water level of the sump.

It is further a feature and object of the invention to provide a sump and associated drain head in which the level of the inlet to the floor drain is below the top of the sump and above the normal water level in the sump and an outlet from the drain head to the sump and means tending to separate the water and oil passing to the sump, the water tending to pass to the bottom of the sump and a water outlet opening to the bottom of the sump and means between the water inlet and water outlet of the sump permitting oil in the water discharged to the bottom of the sump to rise to the surface of the liquid in the sump prior to discharge of the water to the sump outlet.

These and other objects and novel features of the invention are hereinafter more fully described and claimed, and the preferred form of construction of an oil retaining sump embodying my invention is shown in the accompanying drawings in which—

Fig. 1 is a vertical section showing my improved sump and associated drain head.

Fig. 2 is a phantom perspective view of the drain head and sump.

Fig. 3 is a vertical section of another structural form of a sump and drain embodying my invention.

Fig. 4 is a general elevation of the structure shown in Fig. 3 and showing means providing more than one inlet for the sump.

Fig. 5 is an elevation of a form of construction of the conduit from the drain head to the sump adaptable for use where heavier oils or greases are discharged to the drain head and sump.

The invention in its primary form is illustrated more clearly in Figs. 1 and 2, the drain head or receiving chamber 1 and the sump 2 being shown as having a concrete body. The material of which the body is formed is not essential but is convenient in many installations. In case such structural form is used, I provide a cover member 3 for the drain which includes a grating 4 on one side and an imperforate portion 5 on the other. The cover member 3 has a downwardly extending flange 6 engaging in a recess formed by an inwardly and upwardly extending flange 7 on a tubular casing element 8, the bottom end of which rests on a ledge 9 provided in the concrete body. Likewise the sump is provided with a cover member 10 flanged in a similar manner to that of the cover member 3 with a flange 11 received in a recess in a peripheral collar or casing 12 supported in the concrete structure.

There is an outlet to the drain head from the sump which consists of a pipe 13 having a vertical portion providing a horizontal inlet open to flow from the drain head 1. The pipe 13 has a hori-

zontal portion extending through the wall 14 between the receiving chamber and sump which discharges into a separator element 15. This separator element is here shown as formed of two parts, the upper part 16 being formed with a threaded hub 17 to receive a depending tubular element 18 which terminates above the bottom of the sump 2. The member 16 is formed to provide an integral offset portion 19 having a hub 20 to receive the outlet end of the pipe 13. The offset portion 19 is formed with a lower horizontal wall 21 and a sharply inclined upper wall 22 and the recess formed by these walls is open from its top to bottom to the tubular pipe 16. Water and oil passing from the receiving chamber 1 through the pipe 13 strikes the vertical wall 23 of the offset portion 19 and as the oils tend to rise to the surface, the upwardly inclined wall 22 gives opportunity for such separation of the oils from the water which being of greater specific gravity discharge through the bottom pipe 18. Oil is of less specific gravity than water and a twelve inch column of water will support a thirteen inch column of oil on its surface having a specific gravity of eighty, or fifteen and three-eighths inches of gasoline and thus, at each flushing of the sump from the drain head, the oil will be raised in its level due to the height of the flow water level in the sump.

When sufficient oil has accumulated in the sump, it will pass into the horizontal inlet end of the pipe 16 which is above the normal liquid level in the drain head or receiving chamber and, as oil accumulates on the surface of the water in the sump, it will be discharged back into the drain head and become visible at the grating 4 thus indicating to the attendant that the oil should be removed from the sump. For this purpose, I have provided an aperture 24 in the cover member 10 of the sump to receive a pump connection (not here shown) by which the oil is to be pumped out.

The discharge side of the sump 2 is provided with an outlet of unique structural form which includes a casing 25 of substantially rectangular form in cross section and having an inlet section 26 to the bottom of which is connected the upper end of the outlet pipe 27, the lower end of which terminates above the bottom of the sump practically at the same level as the inlet pipe 18. The chamber formed by the casing 25 is provided with a wall 28 having a slot 29 therein. This wall 28, as will be understood more clearly from Fig. 1, terminates below the upper wall 30 of the casing 25 and the chamber is provided with a vent tube 31 which extends above the level of the cover 10, said cover being formed with an upwardly curved portion 32 forming a recess for the vent tube 31 and by this arrangement, the oil level being raised to the level of the top end of the pipe 16 may flow back into the receiving chamber but cannot pass out through the vent 31. The casing 25 forming the chamber has a bottom inclined wall 33 with a threaded opening 34 to receive an outlet pipe. This opening 34 and the outlet pipe 35 are below the upper end of the outlet pipe 27.

The normal liquid level in the sump is determined by the bottom of the slot 29 in the partition or wall 28. The flow water level is determined by the upper edge of the wall 28. When the water and oil are discharged into the sump 2 in any appreciable quantity, the water will flow through the outlet pipe 27 into the section 26 and thence over the top of the wall 28 to the outlet 34 to which the hub 35 is connected. This rapidly raises the liquid level in the sump to the floor level and causes discharge of the gases in the top of the sump through the vent and also will cause the oil to pass into the separator section 16 on the inlet side as previously stated and the water will drop back to a normal level due to the provision of the slot 29. It is to be noted that the top of the wall 28 is below the upper end of the vertical portion of the outlet 13 from the receiving chamber and as shown by the dotted lines *a*, the normal water level is also below the upper end of the said vertical portion 13. By this construction therefore, I provide a device which will retain the oil in the sump until such body of oil accumulates therein that the water will maintain the body of the oil at a height above the top end of the separator section 16. The oil, under such condition, flows back into the receiver section and becomes visible at the grating 4 notifying attendants that the oil must be removed from the sump in order that it may properly function. In fact it forces the attendants to remove the oil before it accumulates to such depth as may permit the same to pass to the outlet 27.

An alternative form of construction of a device embodying my invention is shown in Fig. 3 in which the drain head has a grating 40 positioned in the floor below the level of the top of the sump 41. The drain head is formed to provide a casing 42 having at the right side a greater depth that at the left side which is formed to receive the outlet 43 shown in dotted lines. The upper end of the outlet is above the bottom of the portion 42 and in the said portion 42 is provided a removable basket 44 which has a perforate lip 45 through which liquid may pass from the basket to the outlet side and conduit 43. This perforate lip acts as a strainer and the basket 44 serves as a receptacle for dirt and non-liquid materials may pass into the basket 44. The grating 40 has an imperforate portion 46 directly over the outlet to the drain head which provides the inlet element for the sump. The outlet side of the casing 42 is provided with a hub 47 to receive an end of the pipe 43.

In the sump and preferably integrally formed therewith is a wall 48 providing a water and oil separator functioning after the manner of the separator 15 shown in Fig. 1. However, in the form shown in Fig. 3, the sump and the drain are provided by metal walls and the sump itself is formed of two parts, the upper part being indicated at 49 and the lower part at 50 which at its upper end is flanged to receive the bottom end of the upper portion and a lead packing is provided between the two parts as indicated at 51.

The separator 48 has an inwardly inclined portion 52 just above the lowermost point of the inlet conduit 43 and from this point 52 extends upwardly and outwardly a curved portion and also downwardly and outwardly curved portion 53. Oil and water discharging into the sump through the pipe 43 have a tendency to flow upwardly along the upper curved portion of the separator element 48 thus giving opportunity for the oils to separate from the water and pass upwardly in the separator 48 while the water will pass downwardly and through a pipe 54 forming an extension of the separator member 48 terminating above the bottom 55 of the sump 41. On the opposite side of the sump from the separator element 48 is the outlet element which consists of the pipe 56 terminating at about the same

level as the pipe 54. This opens to the bottom of a chambered and preferably integral element 57 having a vertical wall 58 therein. This wall 58 has an upper end 59 terminating below the upper end of the separator pipe 48 and has a slot 60, the bottom of which determines the normal level in the sump. To the portion 57 on the opposite side wall 58 to which the pipe 56 discharges is provided an outlet hub 61. The bottom of this chambered section to which the pipe 61 opens is indicated by the dotted lines 62 and the upper end of the section is provided with a vent outlet 63 to which a vent pipe (not shown) may be connected. At the top of the member 57 is provided a vent 64 which extends upwardly into the recess 65 provided in the cover 68. The upper end of this vent 64 for the sump is above the floor level and gases rising in the sump may pass to the vent which is also open to the section to which the water outlet pipe 56 is connected. There is thus no possibility of siphonage of water from the sump.

As previously stated, water is discharged downwardly through a pipe 54 of the separator 48 and thence may pass laterally across the bottom of the sump to the outlet 56. I preferably place a plate 67 at the bottom of the sump supported in a slot formed by ribs 68 which support the bottom edge of the plate 67 above the bottom of the sump 55 and below the lower ends of both the pipes 54 and 56. This plate will be engaged by the liquid passing out of the bottom of the pipe 54 and any oil therein given an opportunity to rise to the surface of the water in the sump. This passage of oils to the outlet pipe 56 is prevented. There is thus no possibility of siphonage of water the pipe 54 on the side facing the outlet and these apertures or holes are provided to permit oil to pass into the pipe from the sump when the oil has accumulated to a sufficient depth therein and may thence pass upwardly to the inlet 43. Under this condition, the sump is practically filled with oil which will also flow over the top of the member 48 and thence into the pipe 43 to the drain head. As shown in Figs. 3 and 4, the grating of the drain head is provided in the downwardly sloping portion of the floor 70 and thus provision is here made whereby oil will accumulate on the floor when the sump has become filled and force the attendants to remove the oil.

There is also shown in Fig. 4 another form of sump inlet which may be provided with a hub 71 in addition to the hub to which the line 43 from the drain head is connected. Thus this sump may be used with several drain heads or receiving basins and the oil accumulated in a single group.

There are many installations in which it is undesirable to accumulate oil to such point that it will be visible on the floor and while primarily, this invention is directed to a drainage structure of an oil retaining type, the oil may be skimmed off the top of the water in the body by connecting a pipe 72 to the sump as shown by dotted lines in Fig. 3 having an upturned end portion 73 open to the interior of the sump just above the normal water level which is determined by the slot 60 in the wall member 58, this wall and slot functioning in the same manner as described relative to the wall 28 and slot 29 of Fig. 1. With this arrangement, the oil may continuously pass from the sump to another conveniently located receiver.

In Fig. 5, I have shown a slightly different construction of the oil separator within the sump and inlet discharging thereto from the drain head. The receiving chamber 75 is similar to that of the chamber 1 in Fig. 1 and on the opposite side of the vertical wall 76 is indicated a part of the sump 77 which is to be understood as having an outlet conduit such as is provided by the conduit 27 and chambered member 28 at the top thereof shown in Fig. 1. The separator element 78 is connected with the outlet 79 of the receiving chamber by an upwardly inclined portion 80 which enters the upper portion of the separator while the lower portion 81 thereof extends to and terminates near the bottom of the sump 77 in the same general manner as that indicated by the pipe 18 in Fig. 1. This pipe 81, however, extends upward into the casting forming the upper part of the separator and in this upper separator chamber is a floating valve 82, the lower end 83 of which is shaped to enter and seat upon the upper end of the pipe 81 under certain conditions and thus close the pipe 81 to flow.

The device functions as a separator in the same general manner as the separator shown in Figs. 1 and 3, the upwardly inclined portion 80 tending to permit the oil to rise in the upper part of the separator and the water to fall therebelow. This particular form of my improved drain is desirable where oils of greater specific gravity than is normally the case are discharged into the sump. The valve is of such weight that it will float in the water but will not float in oil of less specific gravity and thus as the oil accumulates in the sump and the oil level becomes lowered due to the accumulation of oil, the valve member 82 will close the pipe 81 so that on further discharge of material into the receiving chamber 75, which will first tend to skim off the oil in the receiving chamber, the oil will not pass into the outlet portion 31 and will continue to accumulate on the upper surface of the liquid in the receiving chamber and therefore become visible through the grating 84 at the upper end thereof. In this latter view, the grating and covers for the receiving chamber and sump are similar to that shown in Fig. 1 and in all other respects, except as to use on the floating valve, this separator structure, sump and receiving chamber arranged shown in Fig. 5, functions substantially the same as in the structures previously described.

From the foregoing description of the several forms of construction embodying my invention, it is believed evident that the various features and objects of the invention are attained by either of the same and that, by such structures, I have provided an oil retaining sump preventing passage of oil to the sewer from the sump and, on the contrary, taking the water from the bottom of the chamber beneath the oil and discharging the same to the sewer; that the sump is vented to permit free escape of gases therefrom, and that the vent is open to the outlet line at the top of the discharge column and preventing siphonage or in cases where it is desired to discharge the oil fro mthe sump as well as the water, the drainage fitting provides for such function and thus may be used to separately discharge the oil and the water from the sump or to retain the oil and discharge the water. Under such latter condition, there will be caused an accumulation of oil at the drain head when the sump has become filled to warn the attendants that oil has accumulated to such depth as to require removal from the sump.

Having thus fully described my invention, its utility and mode of operation, what I claim and

desire to secure by Letters Patent of the United States is—

1. In a floor drain, a drain head providing a receiving chamber for sewage containing oil and water, a sump, a conduit leading from the drain head and discharging to the sump below the normal water level in the sump and drain head whereby, as the drain head is flushed, floating oil is first discharged to the sump and then mixed oil and water, an oil separator means in the sump to which the outlet conduit from the drain head discharges, said separator member being constructed to permit oil to pass upwardly in the separator and the water, oils and greases of greater specific gravity tending to pass downwardly to discharge to the sump adjacent the bottom, the upper end of the separator terminating above the flow water level in the sump, a discharge conduit for the sump comprising a tubular element opening to adjacent the bottom of the sump and extending upwardly therefrom, an outlet for the upper end of the said discharge conduit positioned to discharge water from the sump at a point below the normal water level, means associated with the outlet for determining the normal and the flow water level in the sump, and a vent common to the sump and to the outlet conduit whereby gases may be discharged from the sump and siphonage of the sump prevented.

2. In a floor drain, a drain head, a sump, a conduit extending from the drain head to the sump and having an inlet opening above the normal water level of the sump and drain head and through which water and oils may discharge to the sump, an outlet element for the sump comprising a chambered element, an outlet conduit extending to near the bottom of the sump and discharging at its upper end to the chambered element, said chambered element having a wall practically separating the chamber into two compartments, the upper edge of the wall determining the flow water level, said wall being constructed to provide for seepage thereby determining the normal water level in the sump and drain head, said chambered element having a portion on the discharge side of the said wall extending to below the normal water level, means for connecting a discharge conduit to the said portion chambered element below the normal water level, and a vent conduit connected with the said portion chambered element above the said last named means, said chambered element having an inlet opening to the top of the sump above the possible oil level therein.

3. In a floor drain, a drain head having a grating, a sump having a cover above the level of the grating of the drain head, a conduit extending from the drain head to the sump, the inlet end of which is above the normal water level in the drain head and the outlet of which to the sump is below the normal water level, an outlet member for the sump having a vertical portion within the sump extending to near the bottom thereof, a chambered element at the top of the sump to which the upper end of the said vertical portion is connected, an outlet for the said chambered element, a wall in the chambered element between the connection of the said vertical portion thereto and the outlet whereby liquid must flow over the wall to the outlet, the said wall being formed to determine the flow water level and the normal water level in the sump, and a vent for the chamber, the said chamber having an opening in communication with the top of the sump extending to a point above the level of the grating for the drain head.

4. In a floor drain, a drain head and a sump having a common separating wall, the drain head being of shallow depth and the sump having its bottom below that of the drawing head, a grating for the drain head, an imperforate cover for the sump, a conduit extending from the drain head through said separating wall into the sump, said conduit having an inlet opening to the drain head above the normal water level of the sump, an oil and water separator in the sump to which the said conduit discharges intermediate its upper and lower open ends, said separator comprising a tubular element in the sump so arranged that water and oil discharging thereinto from the drain head are caused to separate with the oils and material of lighter specific gravity tending to pass upwardly in the separator through the open upper end to the sump and the material of greater specific gravity discharging downwardly through the open lower end to the bottom of the sump, the said separator having an open upper end in the sump above the flow water level thereof, and an outlet conduit including means therein determining the flow water level and normal water level in the sump and drain head.

5. In a floor drain, a drain head and a sump, the drain head being of shallow depth and the sump greater in depth, a grating for the drain head, an imperforate cover for the sump, a conduit extending from the drain head into the sump, said conduit having an opening to the drain head above the normal water level of the sump, an oil and water separator in the sump to which the said conduit discharges, said separator comprising a vertical tubular element and means therein so arranged that water and oil discharging thereinto from the drain head are caused to separate with the oils and material of lighter specific gravity tending to pass upwardly in the separator and the material of greater specific gravity discharging downwardly to the bottom of the sump, the said separator having an open upper end in the sump above the flow water level thereof, and an outlet conduit including means determining the flow water level and normal water level in the sump and drain head, an outlet conduit for the sump comprising a chambered element near the top of the sump, a tubular element opening thereto at its upper end and at its lower end opening to near the bottom of the sump, a wall in the chambered element terminating below the top of the chamber and determining the flow water level, a hub connection for the outlet conduit opening to the chambered element on the side of the wall opposite the inlet to the chambered element, a vent tube open to the chamber at the top and extending to above the level of the drain head grating, and a vent conduit connected with the said chambered element on the same side as and above the outlet therefrom, the arrangement of the vertical tubular element and the point of connection of the conduit from the drain head thereto providing that, under a flow water level in the sump, oils accumulating in the top of the separator to a depth to flow into the outlet line from the drain head and attains a level in the drain head approaching the grating of the drain head to thereby become visible and indicate the oil level condition in the sump substantially as shown and described.

6. In a floor drain, a drain head having a grat-

ing at the top thereof providing for an inlet of liquid, a sump having a top at the general floor level, a conduit leading from the drain head to the sump, said conduit having an inlet end in the drain head above the normal liquid level therein and opening to the sump below the normal liquid level, an oil separator in the sump to which the discharge end of the said conduit opens, the said separator having a wall formed to deflect liquid upwardly providing opportunity for the oils and greases to rise in the separator and the water to discharge downwardly, said separator having an open end adjacent the bottom of the sump and an open end below the top of the sump and above the level of the inlet end of the conduit discharging from the drain head, an outlet for the sump comprising a conduit having a bottom end adjacent the bottom of the sump, a chambered element to the bottom of which the upper end of the outlet conduit discharges, said chambered element having an outlet below the normal liquid level in the sump, means in the chamber for determining the normal liquid level at a point below the inlet end of the conduit in the drain head and a flow water level also below the said inlet end, and a vent for the chambered element opening to the top of the sump above the upper end of the separator and above the grating of the drain head whereby, when the sump is flushed, the flow water level may raise oils and greases accumulated on the surface to flow backwardly into the separator and thence to the drain head.

7. In a floor drain, a drain head having a grating, a sump, a conduit leading from the drain head to the sump, the inlet end of which is above the normal water level in the drain head, an oil separator on the conduit leading from the drain head to the sump, said oil separator comprising a tubular element opening to the sump above the flow water level of the sump and opening at the bottom to near the bottom of the sump, the said conduit leading from the drain head opening to the separator materially below the normal water level, a float valve in the separator of such weight as to float only in water, and a seat for the valve in the separator below the outlet end of the inlet conduit from the drain head and providing a structure wherein, as oil accumulates on the surface of the water in the sump to a depth approximately level with the valve seat, the valve may seat therein to thereby, in subsequent flushings, prevent discharge of liquid to the sump and raise the level of the liquid in the drain head to above the grating therefor.

8. In a drain, a chambered body, an inlet for the body and an outlet therefor opening to the body near the bottom, means separating the inlet from the main body of the drain, said means including a vertical conduit within the body and having an upwardly inclined wall therewithin intermediate its ends so constructed and positioned relative to the direction of flow through the inlet that the liquid flowing thereinto is deflected upwardly in a body to thereby provide time interval for liquids of less specific gravity to rise to the top and of the heavier liquids to pass to the bottom, said means being open to the top and to the bottom of the chambered body.

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