Jan. 28, 1947. J. HIRSHSTEIN 2,414,949

INTERCEPTOR WITH FLOW CONTROL

Filed Nov. 17, 1942 3 Sheets-Sheet 1

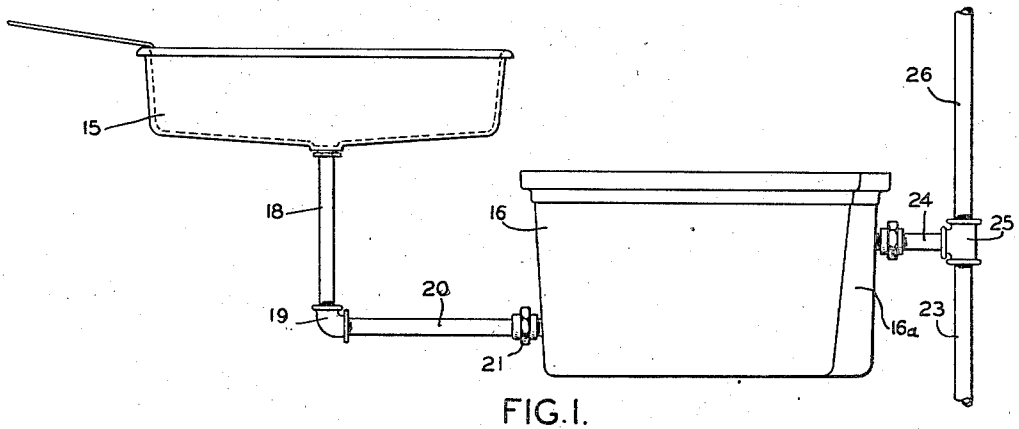

FIG. 1.

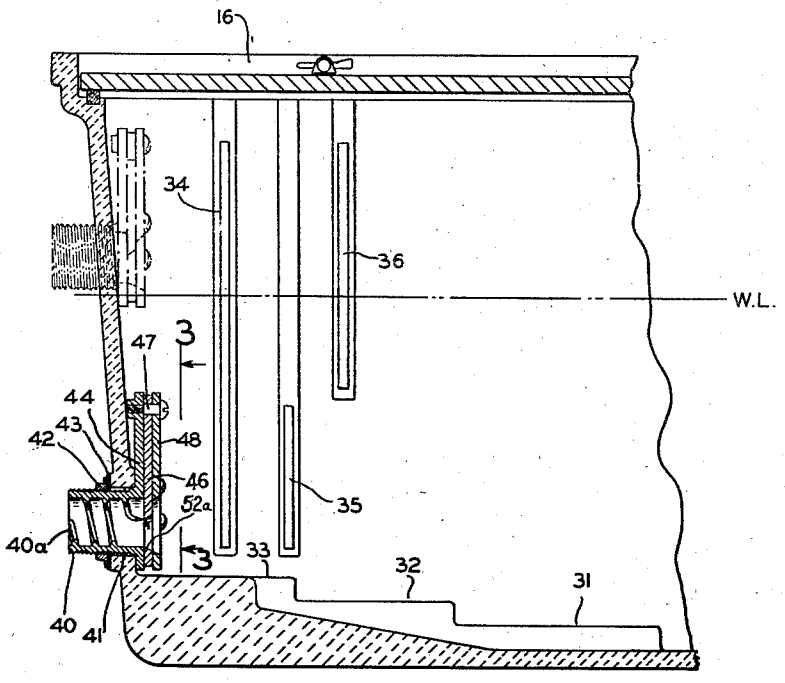

FIG. 2.

INVENTOR.
JOSEPH HIRSHSTEIN

BY Fay, Golrich, Williams
Chilton and Isler.
ATTORNEYS.

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INTERCEPTOR WITH FLOW CONTROL

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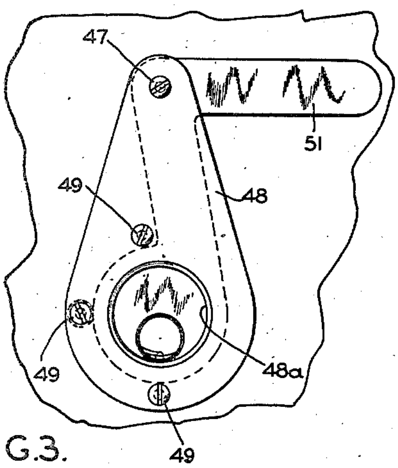

FIG.3.

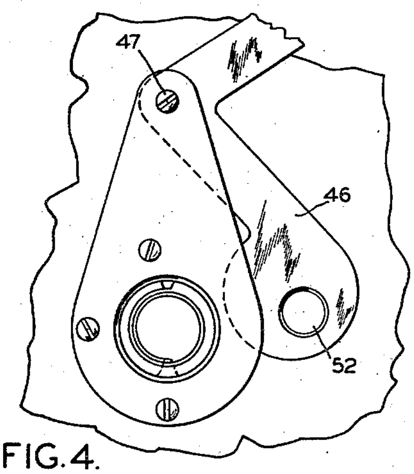

FIG.4.

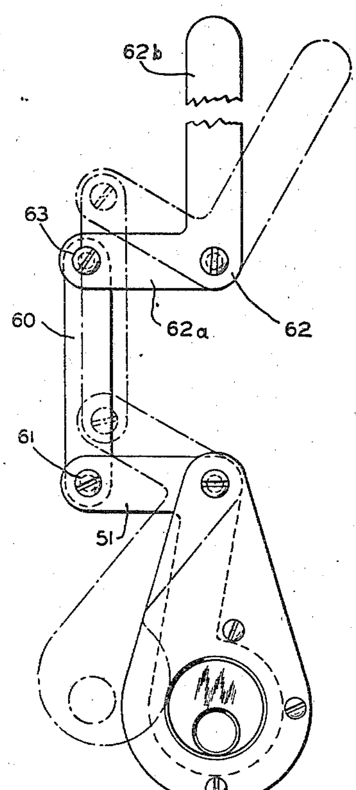

FIG.5.

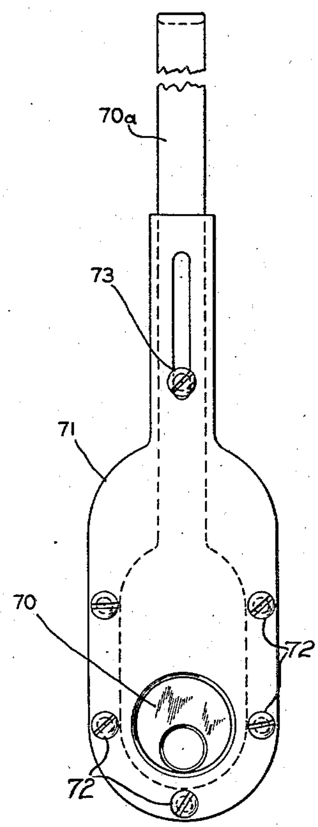

FIG.6.

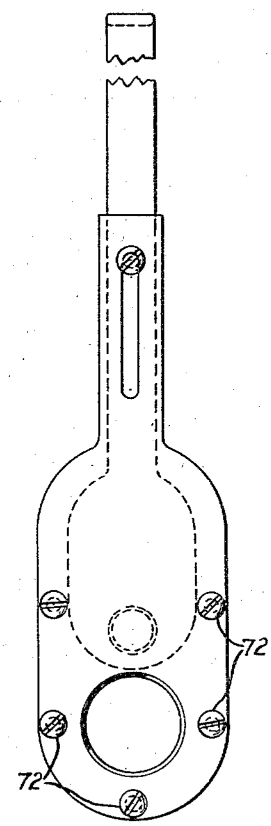

FIG.7

INVENTOR.
JOSEPH HIRSHSTEIN

BY Fay, Golrick, Williams
Chilton and Isler.
ATTORNEYS

Jan. 28, 1947. J. HIRSHSTEIN 2,414,949

INTERCEPTOR WITH FLOW CONTROL

Filed Nov. 17, 1942 3 Sheets-Sheet 3

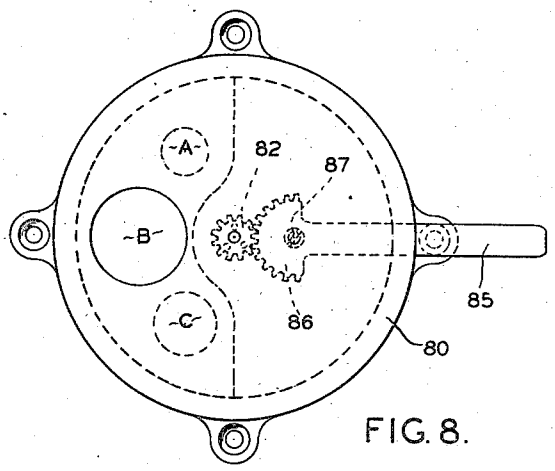

FIG. 8.

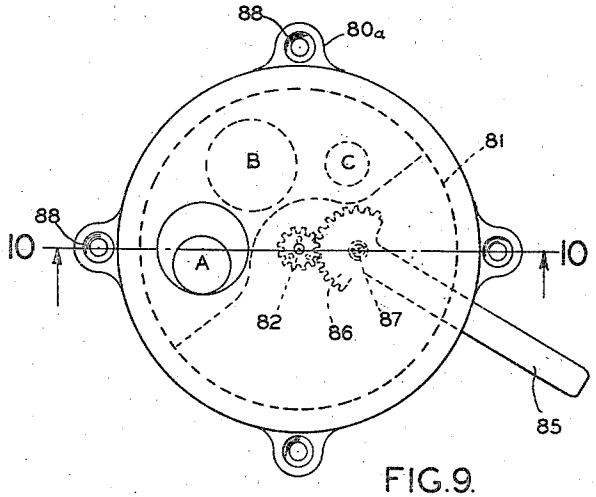

FIG. 9.

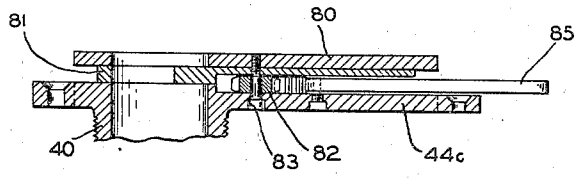

FIG. 10.

INVENTOR.
JOSEPH HIRSHSTEIN

BY Fay, Golrick, Williams & Hilton and Asler.

ATTORNEYS.

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UNITED STATES PATENT OFFICE

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INTERCEPTOR WITH FLOW CONTROL

Joseph Hirshstein, Cleveland, Ohio

Application November 17, 1942, Serial No. 465,939

12 Claims. (Cl. 138—46)

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This invention is concerned with the art of separating grease and oil from an aqueous carrier and more particularly with improvements in grease and oil separators or interceptors in general use for the purpose of preventing the discharge of grease and oil into waste pipes and sewer lines.

Various types of interceptors have been and are now utilized for the foregoing stated purpose. The interceptors are interposed between the waste water source, such as a sink, dish washer tank or other vessel used for cleaning purposes and a waste pipe disengaging to the same line. These interceptors are disposed usually at floor level or below floor level and the conditions or environment of installations vary from one instance to another. The manufacturer of the interceptor has no control over these varying conditions and can only make recommendations as to relative height of sink or tank and size of interceptor to use which frequently are not followed, due to unalterable plumbing and architectural conditions.

The grease or oil separating efficiency of such interceptors is related directly to the rated flow capacity of any given size of separator and the rate of flow of the effluent to the interceptor will vary in accordance with variation in the height of the sink or tank above the inlet point of the separator. It frequently occurs that interceptors of improper size and capacity are installed which fail to function efficiently, in that grease or oil in harmful quantities is discharged into the waste and sewer lines. It frequently occurs also that the length of the connection as well as the number of plumbing fittings, such as L connections, will vary, thus varying the rate of discharge from the sink or tank to the separator. The foregoing are a few of the many vexations variable conditions influencing the flow rate of the effluent to the interceptor.

The general object of the present invention, therefore, is to provide a flow control device in combination with a grease separator or interceptor of the continuous flow type which will function in conjunction with the inlet end of the separator in such manner as to prevent the discharge of grease or oil laden effluent to the main separating chamber of the interceptor at a flow rate which is not greater than the efficient flow rate of the trap regardless of the particular plumbing and architectural environment of the installed separator.

Another object of the present invention is the provision of a flow control device which will fulfill the foregoing stated purpose while being

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adaptable to various makes of grease interceptors of the continuous flow type.

A still further object of the present invention is the provision of a flow control device which is adaptable to installation within the main chamber of the grease separator at the inlet end of the chamber and in immediate association with the inlet connection to the separator and in such manner that the device can be set to the desired rate of flow after the interceptor has been installed.

A still further object is the provision of a flow control device for grease and oil interceptors that can be combined with the inlet fitting of the interceptor and interiorly of the body of the interceptor so as to be accessible for adjusting and cleaning purposes without necessitating the opening of the plumbing line extending from a sink or tank to the interceptor.

Other aspects of my invention will become apparent to those skilled in the art through the disclosures of the following specification which includes descriptions of various embodiments thereof as shown in the drawings. The essential characteristics of the invention are summarized in the claims appended hereto.

In said annexed drawings:

Fig. 1 is a side elevation of a sink, an interceptor and plumbing connections to illustrate the general relation of these elements relative to the drain line or waste line of the installation;

Fig. 2 is an enlarged cross-sectional elevation of the inlet end of the interceptor structure outlined in Fig. 1;

Fig. 3 is a view of the flow control device as viewed from the plane indicated by the line 3—3 of Fig. 2;

Fig. 4 is a view similar to Fig. 3 but with the flow control device adjusted to a different position;

Fig. 5 is an elevational view of a modified form of flow control device shown in Figs. 2, 3 and 4;

Figs. 6 and 7 show another form of the flow control device which can be utilized for the purposes of this invention;

Figs 8 and 9 illustrate a third form of flow control device; and

Fig. 10 is a cross-sectional view taken along the line 10—10 of Fig. 9.

Grease interceptors of the general type to which the utilization of my invention is directed usually comprise an air sealed container provided with an inlet connection to a plumbing line extending from the sink or tank or other source of greasy or oily water and an outlet connection to the

drain or waste line of a plumbing system. The effective cross-sectional area of such grease interceptors is relatively large as compared to the cross-sectional area of the inlet thereof, whereby effluent or waste water, when discharged into the interceptor at considerable velocity, will be brought to a relatively quiescent condition before the waste water escapes from the interceptor through the outlet thereof. During this relatively quiescent period, the grease and oil particles are afforded an opportunity to rise to the top of the body of water within the grease interceptor and thus become separated before the effluent passes to the sewer line.

Heretofore, various shapes of interceptor bodies or vessels have been used as well as various types of baffle arrangements within such bodies to prevent the effluent from passing out of the interceptor too rapidly and until substantially all of the grease particles have had an opportunity to separate therefrom and thus be retained within the top region of the interceptor body.

It is now known that the volumetric capacity of the interceptor must be such that the rate of flow of the effluent will be greatly reduced. Nevertheless, the outlet is in most instances substantially of the same size as the inlet, whereby the grease separation may be effected under so-called continuous flow conditions, that is, where the outlet flow is substantially equal to the inlet flow.

The conditions of installations of such interceptors vary. The plumbing and architectural conditions associated with the interceptor use are determined by the architect quite frequently without regard to the provision of a proper environment for the interceptor when subsequently installed. As an example, the disposition of the inlet end of an interceptor relative to the bottom of a sink or tank, cannot be controlled by the interceptor manufacturer despite catalog recommendations. Slight variations in the effective head pressure at the inlet end of an interceptor brings about marked variations in the rate of flow of the effluent into the interceptor. Manufacturers have striven to meet such variable conditions by manufacturing interceptors of various sizes or body capacity and each size was rated in flow gallons per hour. The body capacity of each interceptor was such that the device would function to effect the retrieving or recovery of about 90% of the grease or oil from the effluent before the effluent escapes into the drain line providing the proper flow rate could be obtained.

Nevertheless it is now known that a great many interceptors have been installed without any consideration being given to the rate of flow of the effluent thereto, usually with the result that an interceptor was installed which was not of sufficient body capacity to efficiently separate the grease or oil from the waste water. Some attempts have been made to connect a flow regulator into the plumbing line at a point between the sink or tank and the inlet connection to the interceptor which, when clogged, necessitated opening the fitting with resulting escape of greasy water about the premises.

My invention contemplates the conditioning of the inlet cross-section of the interceptor whereby a uniform flow rate can be obtained per given size of interceptor, regardless of variations in the hydrostatic head of the interceptor installation and I have shown in the drawings three forms of means whereby the rate of flow through the inlet connections leading to the interceptor

can be definitely controlled. I have illustrated the invention as being incorporated in a device disposed entirely within the interceptor body whereby, should any clogging of this flow control device take place, the same may be cleaned without necessitating the breaking of any of the plumbing connections extending between a sink or tank and the interceptor.

In the drawings, in Fig. 1 I diagrammatically illustrate a tank or sink 15 at one level and an interceptor body 16 at a lower level. A simple form of plumbing connection between the sink 15 and interceptor 16, is shown in the drawings as comprising a down pipe 18, elbow 19, horizontal pipe 20 and an inlet connection 21. As will be noted, the inlet connection leads into the body of the interceptor near the bottom thereof, although the inlet may be disposed at a higher position than shown if desired. An outlet connection between the interceptor 16 and the drain pipe 23 comprises a horizontally disposed connection 24 and a T-fitting 25. Extending upwardly from the T-fitting 25 is a vent pipe 26 extending to a main vent or directly to the outside of the building.

In Fig. 2, in cross-section, I show the interceptor 16 as being of a generally rectangular shape and provided with a so-called cascade bottom formed by stepped levels 31, 32 and 33, although the bottom structure may merely slope through the inlet to the outlet end of the body or be of some other structure insofar as the present invention is concerned. The outlet end of the interceptor usually is shaped to comprise a riser or trap leg portion 16a opening to the interior of the interceptor body near the bottom thereof. As shown in Fig. 2, a series of baffles comprising plates or members 34, 35 and 36 extend from side wall to side wall within the interceptor body and are disposed across the direct line of flow of the effluent from inlet to outlet to reduce the velocity of the effluent.

The flow control device is disposed within the main chamber of the interceptor body and in the instant case is constructed to be combined in and form a part of the inlet plumbing connection. The flow control device comprises, in the first example shown in Figs. 2, 3 and 4, a threaded sleeve member 40 extending through the inlet opening 41 of the end wall of the interceptor body. A clamping nut 42 and packing washer 43 serve to hold the sleeve 40 in place and in liquid-tight relation to said end wall. An inner vertically extending flange 44 formed on the sleeve 40 reacts against the inside surface of an inlet boss on the end wall of the interceptor body. Flange portion 44 serves as a mounting for a swingable gate member 46 pivotally mounted about the screw or bolt member 47 and in sliding engagement with the base of flange 44. A plate 48, conforming generally in shape to the flange 44, is held in slidable engagement with the member 46 by shouldered screw members 49. The plate 48 is spaced from the flange 44 a distance substantially equal to the thickness of the gate 46, whereby a slot is provided into which the swingable gate 46 can be positioned.

The gate 46 is provided with a handle portion 51 and the lower end thereof is provided with an opening or orifice 52 of predetermined cross-sectional area, but of less cross-sectional area than the interior of the sleeve 40. The location of the orifice 52 in the gate member 46 is such that when the gate is swung to the position shown in Fig. 3, the bottom of the orifice will be substantially

tangential to the bottom of the interior of the sleeve 40. The plate 48 is provided with an opening 48a which is of greater area than the orifice 52 and preferably equal to or greater than the cross-section area of the sleeve 40, whereby the interior of sleeve 40 can be exposed fully for flushout or cleaning purposes.

It will be noted that the foregoing described flow control device is quite simple in its parts and that the gate member 46 can be conveniently removed by removal of the pivot screw 47, whereby a gate member having an orifice of a different and desired size may be incorporated in the device after all of the plumbing connections have been made and without disruption thereof should it be found that a change in the flow rate of the effluent to the installed interceptor was required.

As shown in Fig. 2, the interior surface of the sleeve 40 may be provided with a helical screw formation or ribbing 40a to assist in the reduction of the flow rate of the effluent passing from sink 15 through the plumbing lines 18, 19 and 20 to the interior of the interceptor and that the apparent obstructing means is accessible from the inside of the interceptor body.

It will be obvious that in many instances when the flow control device is in use, it will be completely submerged by the effluent within the interceptor, since the general level thereof would be determined by the height of the outlet connection 24. If desired, an additional lever arrangement may be provided whereby a manually operated part thereof will be disposed above the normal liquid level in the body. I show such an arrangement in Fig. 5, which may comprise a link 60 pivotally connected to arm 51 by stud or screw member 61 and an L-shaped lever 62 having a horizontal leg 62a thereof pivotally connected to the link 60 by a stud screw member 63. The vertically extending leg 62b of lever 62 may be of any desired length which can be confined within the interceptor body when the body is air sealed by a clamp cover 16b. In some instances the inlet is disposed at substantially the same level as the outlet, as indicated by the dot and dash lines in Fig. 2, in which instance the auxiliary levers just described are omitted.

In Figs. 6 and 7 I show a different gate structure in which a gate member 70 is arranged to slide vertically between a plate member 71 and the flange 44 of the flow control device, it being understood that the flange 44 would conform in shape to the plate 71. Shouldered screw members 72 serve to space the plate 71 a distance equal to the thickness of the sliding gate 70. An extension 70a of the gate structure may project in a vertical direction any desired height within the confines of the closed interceptor body. A screw stud 73 is attached to the extension 70a of the gate and is disposed in a vertically extending slot formed in the plate 71 as a stop.

In Figs. 8, 9 and 10 I show a further form or embodiment of my invention. In this instance, the gate of the device is provided with a plurality of orifices of different sizes whereby the gate may be set to the desired flow rating without necessitating removal and refitting of gate members having different size orifices. In this form the flange 44c may be round with a retaining plate 80 mounted thereon to retain a revolvable gate member 81. The flange 44c (see Fig. 10) also forms a support for a pinion member 82 which revolves on a stud or screw member 83 carried by the flange member. A lever member 85, having the inner end thereof provided with a fan

gear formation 86, is carried by a stud or screw member 87, which in turn is carried by the flange 44c.

It will be noted that the gate member 81 and the flange 44c are cut back to provide a space for the cooperating gear members described so that the thicker portion of the gate will be in slidable engagement with the face of the flange 44c at the inlet region thereof. As shown, the gate is provided with three orifices A, B and C of different areas whereby manipulation of the lever 85 will cause the fan gear 86 thereof to swing the gate to bring the desired orifice size into cooperative relation with the inlet bore of the sleeve 40. The plate 80 may be held in sliding relation to the gate 81 and in spaced relation to the flange 44c by studs or bolt members 83 extending through lugs 80a formed on the plate member.

It will be noted that should the flow control mechanism become clogged with solids or semi-solids usually carried by the effluent being discharged from the sink or tank, cleaning may be effected by simply shifting the orificed gate member to expose the entire cross-sectional area of the inlet structure whereupon the solids will be flushed into the interceptor body. Such a clogged condition is indicated usually by an increase in the time required for the effluent to be discharged from the tank or sink. It is obvious that any necessity of opening or breaking the plumbing connection between sink and interceptor is eliminated, together with the consequent escape of waste water into the room.

In each of the gate and orifice arrangements shown a Venturi effect upon the inflowing liquid may be effected by tapering the orifice wall as shown at 52a in Fig. 2 by tapering the orifice wall outwardly. This effect can be increased by increasing the thickness of the orificed gate member and the cooperating surface of the opening in plate 48 could also be tapered as shown.

An alternate form of the invention could comprise a sleeve structure with a restricting orifice arranged all in a one-piece plug structure replaceably inserted in the inlet opening of this interceptor wall or in the inlet pipe end connected thereto and which I consider within the scope of my invention, as defined by the claims appended hereto.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the structure herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention:

1. A waste liquid control device for use with grease and oil interceptors comprising a body structure adaptable for disposition within the inlet opening of a grease interceptor, said body structure being formed to provide a slide structure for cooperation with a gate member, an orificed gate member in sliding engagement with said slide structure, a threaded sleeve in association with the body structure and adapted to extend through the inlet opening of the grease interceptor, a nut in threaded engagement with the sleeve whereby the sleeve and body structure may be clamped to a wall of the interceptor with the sleeve extending through such wall with the gate member disposed interiorly of the interceptor and said sleeve having a liquid passageway formed therein with which the orifice of the gate member cooperates and the surface of said pas-

sageway adjacent the gate member being formed to retard the flow of waste liquid passing to the orifice of the gate member.

2. A waste liquid flow control device for use with grease and oil interceptors comprising a body structure adaptable for disposition within the inlet opening of a grease interceptor, said body structure being formed to provide a gate structure for cooperation with a shiftable orificed member, an orificed member in shiftable engagement with said gate structure, a threaded sleeve in association with the body structure, a nut in threaded engagement with the sleeve whereby the sleeve and body structure may be clamped to a wall of the interceptor with the sleeve extending through an inlet opening in said wall with the gate structure disposed interiorly of the interceptor, said sleeve having a liquid passageway formed therein for connecting said interceptor to a plumbing line, said orifice of the shiftable member cooperating with said passageway to control the rate of flow through the plumbing line and the interceptor inlet.

3. A waste liquid flow control device for use with grease and oil interceptors comprising a body structure having a sleeve formation adaptable for disposition within the inlet opening of a grease interceptor, said body structure being formed also to provide a gate structure with a liquid passageway formed in the sleeve, an orificed gate member in cooperative engagement with said body structure for determining the rate of flow of liquid through the sleeve, a nut in threaded engagement with the sleeve whereby the sleeve and body structure may be clamped to a wall of the interceptor with the sleeve extending through such wall and the gate structure disposed interiorly of the interceptor, said sleeve passageway adjacent the gate member being formed to retard the flow of liquid passing to the orifice of the gate member.

4. A waste liquid flow control device for use with grease and oil interceptors comprising a body structure having a hollow sleeve formation adaptable for disposition within the inlet opening of a grease interceptor, a gate member, said body structure serving to support said gate member the latter having an orifice formed therein, and a nut in threaded engagement with the sleeve whereby the sleeve and body structure may be clamped to a wall of the interceptor with the sleeve extending through such wall and connecting said interceptor to a plumbing line with the gate member disposed interiorly of the interceptor and across the inlet opening thereof.

5. A waste liquid control device for use with grease and oil interceptors comprising a body structure adaptable for disposition within the inlet opening of a grease interceptor, said body structure being formed to provide a liquid flow control gate structure, including a gate member positionable on said gate structure for determining the rate of flow of a liquid passing through the gate structure, a sleeve in association with the body structure adapted for attachment to a wall of a grease interceptor, with the gate member disposed interiorly of the interceptor and said sleeve having a liquid passageway formed therein with which the gate member cooperates.

6. A waste liquid control device for use with grease and oil interceptors comprising a body structure adaptable for disposition within the inlet opening of a grease interceptor, said body structure being formed to provide a liquid flow

control gate structure, including a gate member positionable on said gate structure for determining the rate of flow of liquid passing through the gate structure, a sleeve in association with the body structure adapted for attachment to a wall of a grease interceptor, with the gate member disposed interiorly of the interceptor and said sleeve having a liquid passageway formed therein to connect said interceptor with a plumbing line, said gate member and said passageway cooperating in controlling the rate of flow from said plumbing line to said interceptor, the surface of said passageway adjacent the gate member being formed to retard the flow of liquid passing to the orifice of the gate member.

7. A waste liquid control device for use with grease and oil interceptors comprising a tubular member; means carried by said member for sealingly connecting said member in a liquid inlet opening of a grease interceptor and for connecting one end of the member with a plumbing line; an orificed gate disposed at the other end of the tubular member whereby the gate may be disposed on the inside of the interceptor; and means carried by said member for movably supporting said gate with the orifiice therein in alignment with the end of the tubular member.

8. A waste liquid control device for use with grease and oil interceptors comprising, a tubular member having ridges extending inwardly from the inside walls thereof; means carried by said member for sealingly connecting said member in a liquid inlet opening of a grease interceptor and for connecting one end of the member with a plumbing line; an orificed gate disposed at the other end of the tubular member whereby the gate may be disposed on the inside of the interceptor; and means carried by said member for movably supporting said gate with the orifice therein in alignment with the end of the tubular member.

9. A waste liquid control device for use with grease and oil interceptors comprising, a tubular member adapted to extend through a liquid inlet opening in a wall of an interceptor, said member having a laterally extending portion at one end thereof for engaging the inside of said wall adjacent the liquid inlet opening for cooperating with said wall to secure the tubular member in said opening; and an orificed gate member supported on said laterally extending portion.

10. A waste liquid control device for use with grease and oil interceptors comprising, a tubular member adapted to extend through a liquid inlet opening in a wall of a grease interceptor, said member having a laterally extending portion at one end thereof for engagement with the inside wall of the grease interceptor adjacent said inlet for positioning the tubular member in the inlet; a plate supported by said laterally extending portion in spaced relation from said portion, said plate having an orifice in alignment with said one end of the tubular member; and a plate having an orifice of smaller diameter movably mounted between the laterally extending portion and the first mentioned plate and being movable to align the opening therein with the end of said tubular member and the orifice in the first mentioned plate.

11. A liquid control device for use with grease and oil interceptors comprising, a tubular body member adapted to be disposed in an inlet opening in the wall of an interceptor, said member having a laterally extending part at one end for extending along the inside wall of the inter-

ceptor; and a plate carried on said portion, said plate having an orifice, said plate being positionable for disposing the orifice in registration with the end of the tubular member, said orifice having the walls thereof diverging from the side of the plates adjacent the tubular member for causing a Venturi effect upon liquid passing through the tubular member.

12. A waste liquid control device for use with grease and oil interceptors comprising, a tubular body member adapted to be disposed in an inlet opening in the wall of an interceptor, said member having a laterally extending part at one end for extending along the inside wall of the interceptor; a plate supported by said laterally extending part in spaced relation from said part, said plate having an orifice in alignment with said one end of the tubular member; and a plate interposed between said part and the first mentioned plate, the second mentioned plate having an orifice of lesser diameter than the first mentioned orifice, said second mentioned plate being positionable for disposing the orifice therein in registration with said one end of the tubular member and with the orifice in the first mentioned plate, both of said orifices having the walls thereof diverging from the side of the plate adjacent the tubular member for causing a Venturi effect upon liquid passing through the tubular member.

JOSEPH HIRSHSTEIN.