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INTERCEPTING DRAIN

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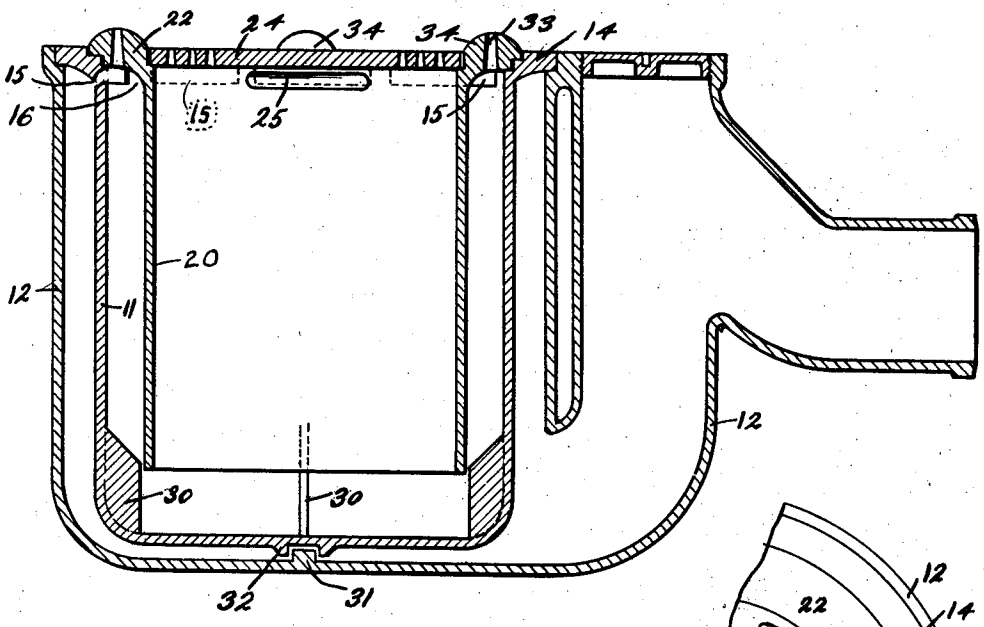


Fig. 1

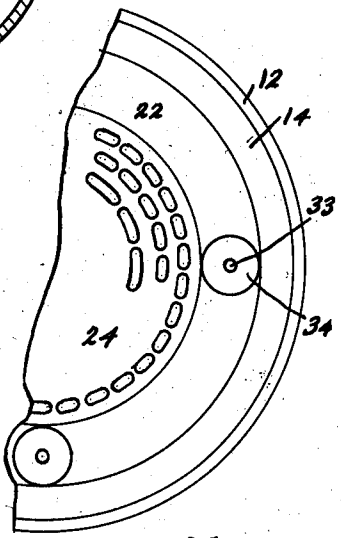


Fig. 3

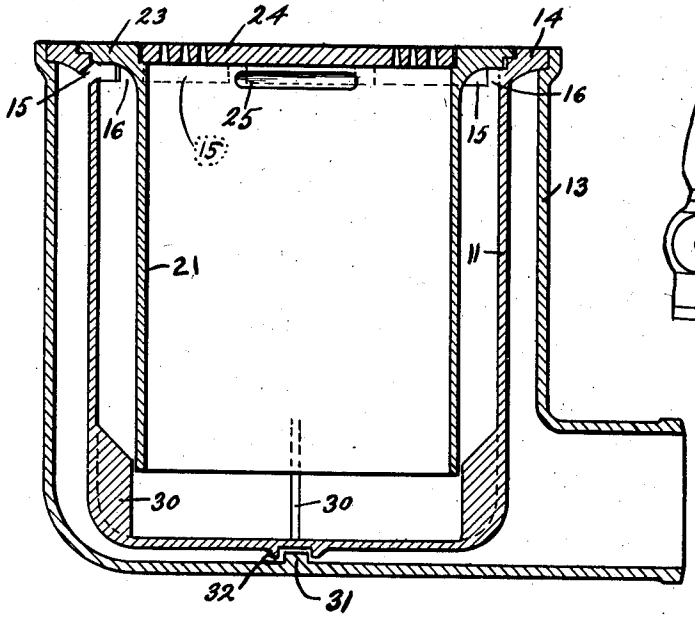


Fig. 2

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INTERCEPTING DRAIN

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9 Claims. (Cl. 210—56)

This invention relates to a floor drain particularly adapted for use in garage floors where the drainage comprises a mixture of oil, gasoline and water, it being the purpose of the invention to prevent the oil and gasoline from passing over into the general sewerage system while permitting free overflow of water. The invention also contemplates features whereby necessity for emptying the apparatus will be automatically indicated, whether the emptying is necessary on account of the separating capacity having been reached or on account of the collection of silt in the intercepting means. Another purpose of the invention is to provide such an assembly that when it is first installed or after it has been taken out for cleaning it is physically impossible to assemble it otherwise than in completely operative relationship of parts. A further purpose is to make a strong, simple and inexpensive construction, adapted for use with any type of sewer connections, in various situations. To the accomplishment of the foregoing and related ends, said invention, then, consists of the means hereinafter fully described and particularly pointed out in the claims.

The annexed drawing and the following description set forth in detail certain structure embodying the invention, such disclosed means constituting, however, but one of various structural forms in which the principle of the invention may be used.

In said annexed drawing, Fig. 1 is a central vertical section of a form of my invention for use with a trap; Fig. 2 is a similar section of a form for use without a trap, and Fig. 3 is a partial floor plan view of the form shown in Fig. 1.

For convenience hereafter the oil and/or gasoline to be separated out is at times referred to as "oil".

Referring now particularly to Figs. 1 and 2, it will be seen that the intercepting drain comprises a bucket 11 which is seated in the top of a floor drain pipe fitting 12 or 13 by an outward horizontal flange 14. Any conventional floor drain fitting of suitable shape, having whatever form of outlet is required by the local plumbing code or necessitated by other conditions, may be used to hold the bucket. A trapped fitting, such as 12, or a fitting having a plain outlet, such as 13, may be used, according to circumstances.

Spillway openings 15 permit overflow all around the top of the bucket. There are no other bucket openings. Webs 16 connect the bucket body to the flange at intervals. The bucket diameter is sufficiently less than that of the fitting to allow water which flows freely over the spillway openings 15 to run down freely between the pipe fitting and the side of the bucket.

An inlet sleeve 20 or 21, open only at top and bottom, and stopping a little short of the bucket bottom is set inside the bucket. The details of connection between sleeve and bucket might be variously made, but the preferred form is a horizontal outward top flange 22 or 23 in the grooved inner edge of the bucket flange 14. A floor grating 24 covers the inlet sleeve top. Convenient handles such as 25 are provided on the inside of the inlet sleeve.

Webs 30 and lugs 31, 32 are formed as shown to help hold the parts in place when the entire assembly is handled, as during shipment.

If a trapped fitting, such as 12, is used, the flange 22 is vented, as by openings 33 to prevent air binding at the bucket overflow. Raised buttons 34 keep floor water from entering the vent openings.

The operation of this intercepting drain is based upon the differences of specific gravity between water and the hydrocarbon liquids to be separated out. It will be seen that the flanges 14 and 22 or 23 direct all liquid from the floor to inside the sleeve. When the drain is first installed enough water is put in to fill the bucket 11 above the top of the inlet sleeve 20 or 21. Since the cross sectional area of the sleeve is substantially greater than either the total area of apertures in the strainer 24 or the cross sectional area of the outlet of the drain fitting, the flow through the inlet sleeve will always be at low velocity, giving time for gravity separation of the water and oil. The water in the lower part of the bucket thus prevents oil from passing under the sleeve. When mixed liquid runs from the floor into the inlet sleeve, the hydrocarbon liquids rise to the top within the sleeve. When the bucket is filled up to the overflow level, water only will flow out around the top, being supplied from the bottom of the column in the inlet sleeve, the oil and gasoline remaining on top. In the course of time the height of the liquid column within the sleeve will increase, the upper part of the column consisting of entrapped hydrocarbon liquids.

As the quantity of oil and gasoline entrapped increases, the column in the sleeve gradually rises and eventually stands higher than the overflow level of the surrounding annular column in the bucket outside the sleeve on account of the greater specific gravity of water. The overflow level of the bucket is at a distance below the top surface of the floor strainer such that when the inlet

sleeve needs to be emptied, the oil will stand above the level of the grating. However, the height relations are such that even in this condition the bottom of the oil column will not be entirely down to the bottom of the sleeve. Consequently oil will not flow out into the sewer under any conditions.

The appearance of oil above the top of the floor strainer serves as an indication that the bucket must be taken out and emptied. The length of the sleeve and the relative heights of the strainer top and bucket overflow level are such that even with heavy crank case oil with a specific gravity of 0.90, the indication will occur before the oil flows under the bottom of the sleeve. In the ordinary mixture of oils with or without gasoline, met with around a garage, the specific gravity will be less and the indication for emptying the bucket will occur earlier. Thus, with reasonable attention, there is no possibility of running even the heaviest grades of oil into the sewerage system.

The bucket can be emptied very quickly because it is not necessary to clean out the silt each time. When the bottom silts up enough to need cleaning, water will not readily run under the sleeve bottom. Consequently the bucket will quickly fill so that the run-off from the floor will be slow. This can be distinguished from the inlet sleeve filling up with oil because the latter will be indicated by a gradual rise of oil not mixed with water but will not cause sluggish action.

Since the diameter of the sleeve flange is considerably less than the diameter of the seat on the outside casing in which the bucket flange fits, and since the grating is in turn of less diameter than the seat for the sleeve flange, it is manifestly physically impossible to put the elements together in the first instance, or to put them back after cleaning, except in the proper arrangement. Thus there is no danger of a careless or stupid workman leaving out the sleeve or leaving out the bucket, and thus the fact that the assembly is closed at the top is automatically an assurance that it is assembled in working order.

It will be seen from the foregoing that I have invented a simple and rugged intercepting drain readily constructed of cast metal and which will prevent the escape of liquids lighter than water into the general sewerage system with a degree of efficiency sufficient for all practical purposes; that such drain automatically indicates its need of servicing and the sort of servicing needed, whether mere emptying or emptying and cleaning, that the drain is readily serviced by unskilled labor and is so constructed that the only possible way in which the parts can be replaced after emptying or cleaning is the right way.

What I claim is:

1. In an intercepting drain device, in combination, an inlet passage surrounded by a sleeve having an imperforate side wall, said passage being adapted for a downward flow of drainage for mixed light and heavy liquids, a top grating on said sleeve of less passage capacity than said sleeve, an outlet passage surrounding said sleeve, a bucket surrounding said outlet passage and having top discharge openings only, the upper portion of said sleeve having sealing contact with said bucket, a sediment pocket in the bottom of said outlet passage, and drainage means adapted to receive the flow of drainage from said discharge openings, said inlet passage and said outlet passage being adapted to collect in said inlet passage a column of light liquid separated by flotation from the heavy liquid of said drainage and counterbalanced by a column of said heavy liquid in said outlet passage, and to bring said light liquid to a predetermined level above said discharge openings before said light liquid column reaches the bottom of said sleeve, and when said sediment pocket becomes filled.

2. An intercepting drain comprising an assembly of a floor drain fitting, a bucket adapted to be received therein leaving a passage space between the bucket and the fitting and an inlet member adapted to be set within said bucket; said fitting, said bucket, and said inlet member being successively supported, each by a flange within the upper rim of the next outer member, said inlet member open at top and bottom only, having uniform flow capacity throughout its length and extending from the top to near the bottom of said bucket, a grating covering the top of said inlet member, overflow edges adjacent the top of said bucket and below the top of said inlet member, protuberances raised above the general level of the top of said assembly, and air vents through said protuberances for venting the space between said inlet member and said bucket.

3. In an intercepting drain adapted to separate light liquids from a mixture, a casing having a top adapted to be set at floor level, a bucket having a top fitting the casing top, overflow passages at the top of said bucket into said casing, a sleeve having a top fitting within the bucket top, said sleeve extending to near the bottom of said bucket, and a grating fitting the sleeve top, said grating having a plurality of openings of aggregate area substantially less than the cross section defined by said sleeve, whereby a relatively quiet body of liquid is maintained within said sleeve.

4. In an intercepting drain adapted to separate light liquids from a mixture, a casing having a top adapted to be set at floor level, a bucket having a top fitting the casing top, a sleeve having a top fitting within the bucket top, said sleeve extending to near the bottom of said bucket, a flat grating fitting the sleeve top, overflow passages from the top of said bucket into said casing below said grating, the difference in level between the lowest level of said overflow passages and the top of said grating being less than the additional height of light liquid supportable in said sleeve by heavy liquid up to said overflow level.

5. An intercepting drain device comprising a casing member, a bucket member positioned within said casing member, and a sleeve member positioned within said bucket member adapted for the separation and removal of floating substances and suspended sedimentary substances from the carrying liquid with which said substances are mixed and drainage means associated with said members, all of said members extending upwardly to a substantially common surface and being constructed and arranged to provide visible indication that said members are in operative position, said sleeve having an imperforate side-wall and serving as the inlet to said device, and said casing having an outlet therein substantially above the bottom thereof, said sleeve communicating with said bucket at a level below that of said outlet and said bucket communicating with said casing at a level above that of said outlet.

6. In an intercepting drain device adapted to separate mixed liquids of different specific gravities, in combination, a casing having an outlet, a removable bucket positioned within said casing, a separating member having an imperforate side wall positioned within said bucket to form an

inlet passage for mixed liquids and to form with said bucket an outlet passage for separated liquid, the upper portion of said separating member having sealing contact with said bucket, and a perforated cover positioned upon said separating member, said bucket having top discharge openings below the level of said perforated cover and having a sediment pocket below said inlet passage and said outlet passage, said perforated cover having a total cross-sectional area of perforations substantially less than the minimum cross-sectional areas of both the inlet passage and the outlet passage, the ratio of the vertical distance between the highest level of underflow from said inlet passage and the lowest overflow level of said top discharge openings to the vertical distance between said lowest level of underflow and the top surface of said perforated cover being greater than the ratio of the average specific gravity of the lighter liquids to the specific gravity of the heavy liquid.

7. In an intercepting drain adapted to be set in a floor and to separate liquids of different specific gravities, an outer casing, an outflow connection from said casing, a bucket within said casing and a sleeve having an imperforate side wall within said bucket but stopping above the bottom thereof, the upper edge of said bucket being in substantially the same plane as the upper edge of the outside container, said bucket engaging within the rim of said outside container, said sleeve engaging within the rim of said bucket, and a grating engaging within the rim of said sleeve and covering the top thereof, drainage openings near the upper edge of said bucket but below the upper edge of said sleeve and leading into said outside container.

8. An intercepting drain device comprising a casing member, a bucket member positioned within said casing member, and a sleeve member positioned within said bucket member adapted for the separation and removal of floating substances and suspended sedimentary substances from the carrying liquid with which said substances are mixed and drainage means associated with said members, said members extending upwardly to a substantially common surface and being constructed and arranged to provide visible indication that said members are in operative position, said sleeve having an imperforate side-wall and serving as the inlet to said device, and said bucket having overflow passages adjacent its top, the length of said sleeve being equal to a major portion of the length of said bucket and being such that a column of heavy liquid between said bucket and sleeve will raise a column of light liquid within said sleeve to said common surface before said light liquid column reaches the bottom of said sleeve and said casing having an outlet below the level of said overflow passages.

9. In an intercepting drain device, in combination, an inlet passage surrounded by a sleeve having an imperforate side wall, said passage being adapted for a downward flow of drainage for mixed light and heavy liquids, a top grating on said sleeve of less passage capacity than said sleeve, an outlet passage surrounding said sleeve, a bucket surrounding said outlet passage and having top discharge openings only, the upper portion of said sleeve having sealing contact with said bucket, a sediment pocket in the bottom of said outlet passage, and drainage means adapted to receive the flow of drainage from said discharge openings, said inlet passage and said outlet passage being adapted to collect in said inlet passage a column of light liquid separated by flotation from the heavy liquid of said drainage and counterbalanced by a column of said heavy liquid in said outlet passage, and to bring said light liquid to a predetermined level above said discharge openings before said light liquid column reaches the bottom of said sleeve, and when said sediment pocket becomes filled, said bucket and said sleeve extending upwardly to a substantially common surface and being constructed and arranged to provide visible indication that said members are in operative position.

WILLARD J. LUFF.