

[54] **AREA DRAIN FOR A PROMENADE DECK OR LIKE ENVIRONMENT**

13,964 7/1893 Great Britain..... 210/163

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[57] **ABSTRACT**

As an adjustable drain for promenade decks with a seepage-draining permeable layer, e.g., of gravel, between a waterproofed lower poured concrete structural slab and a finished top poured traffic slab, a bowl body embedded in the lower slab has a wide peripheral top flange affording a large sealing area with the overlying waterproofing layer, receives the lower end of a perforated cylindrical filter collar removably adjustably bolted therein, and supports, through three adjustable threaded rods spaced externally of the filter, a rim for a removable grate at the finish level. From the rim, anchors project obliquely into the top slab and, external of the rods, a transitory top slab-forming and gravel-sand retaining sleeve depends from a rim bottom formation.

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**Related U.S. Application Data**

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[52] U.S. Cl. .... **210/164**

[51] Int. Cl. .... **E03f 1/00**

[58] Field of Search..... 210/163, 164, 165, 210/166, 532, 232; 285/42

[56] **References Cited**

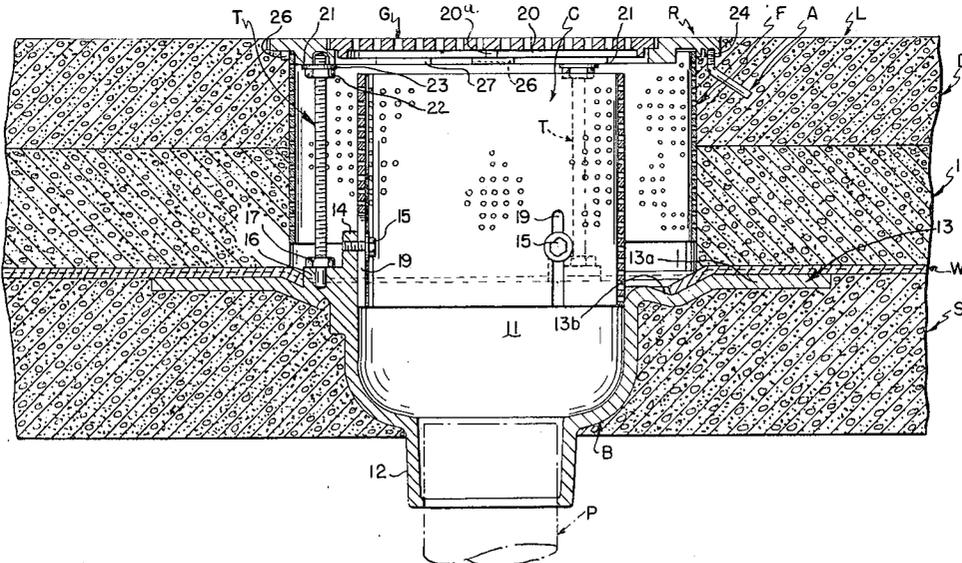
**UNITED STATES PATENTS**

2,898,129 8/1959 Sisk..... 285/42

**FOREIGN PATENTS OR APPLICATIONS**

41,873 1/1933 France..... 210/165

**16 Claims, 4 Drawing Figures**



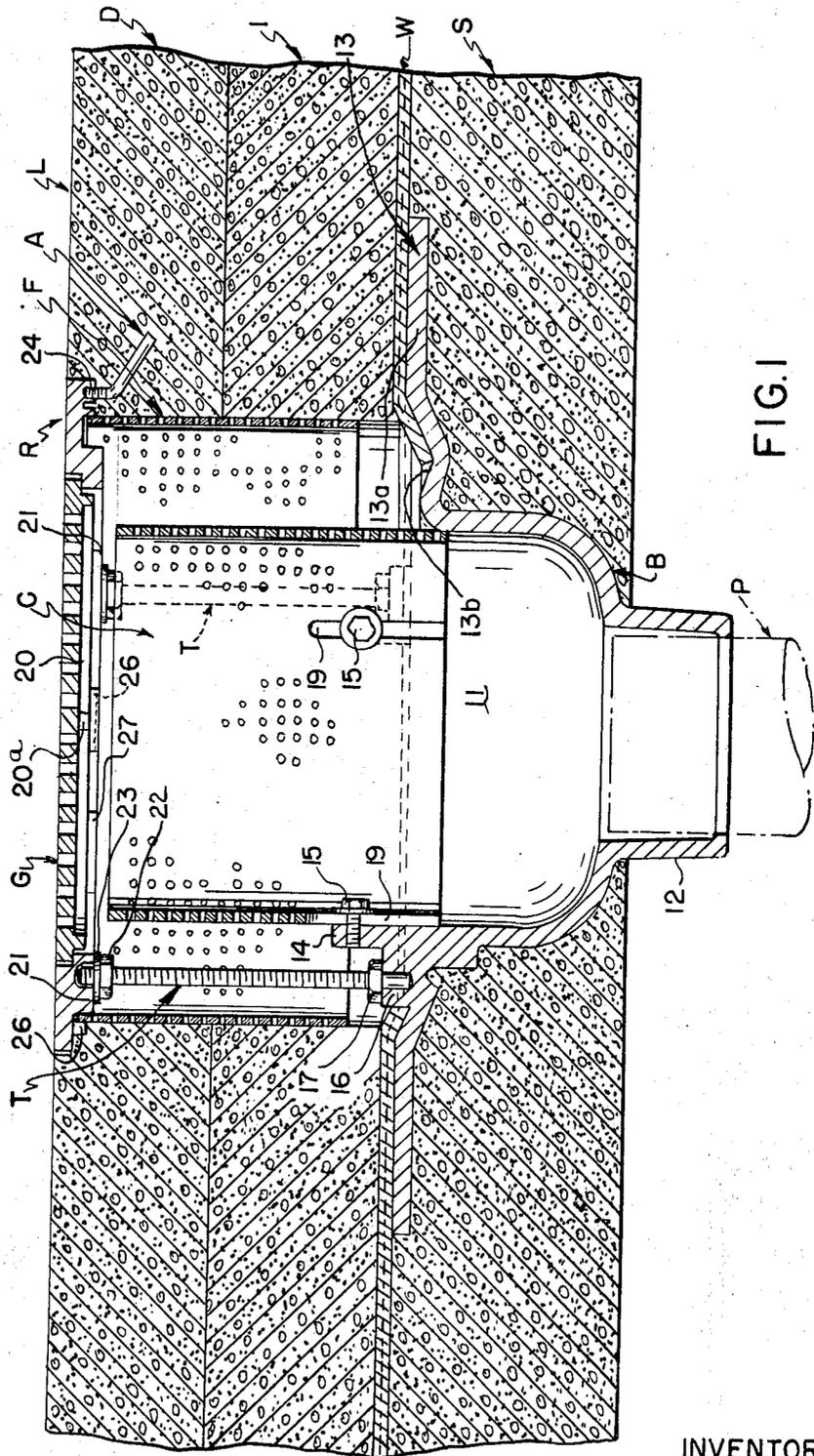


FIG. 1

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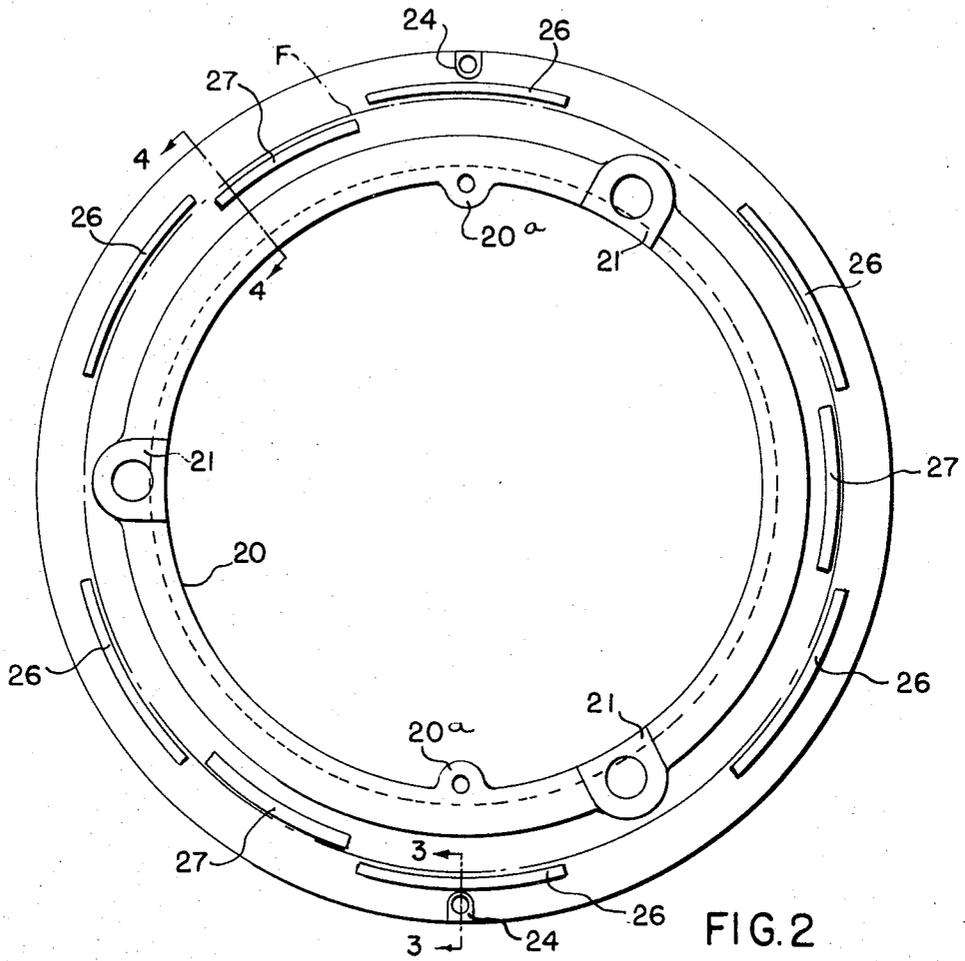


FIG. 2

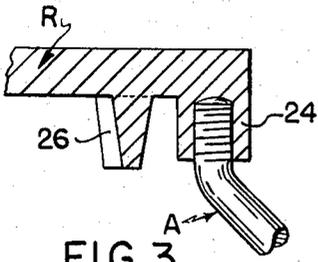


FIG. 3

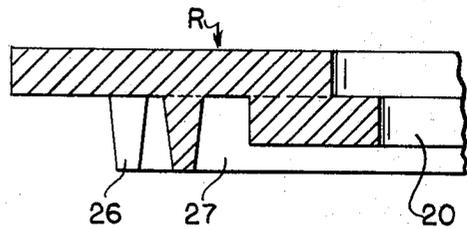


FIG. 4

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## AREA DRAIN FOR A PROMENADE DECK OR LIKE ENVIRONMENT

This application is a continuation of application Ser. No. 38,249 of May 18, 1970, now abandoned.

The present invention relates generally to an area drain, and more particularly to a drain of the type installed in a composite traffic deck above occupied space in a building wherein a finished top layer or slab providing a pedestrian or other traffic bearing surface to be drained is separated from a waterproofed poured concrete structural slab by an intermediate seepage drainage layer usually of sand or gravel for conducting to a main area drain structure the water which may in time leak through the traffic slab.

Drains for installation in environment of the character described have a grate supporting top inlet rim member, to be embedded flush in the finish surface, which preferably is vertically adjustable relative to a bowl body member embedded in the concrete structural slab, not only to meet practical installation requirements for setting the drain inlet flush with the finished surface level desired for the top slab, but also to render a given drain product adaptable for use in decks of different thicknesses, as may be required under different building conditions. The main bowl body casting incorporates an integral circumferentially continuous horizontal top flange to be overlapped by a waterproofing layer applied on the structural slab to conduct leakage water to seepage draining means provided in the drain structure between the flange and the rim. In effect the drain as a whole incorporates between the primary bowl member and the rim a structure preventing the usually granular material of the intermediate layer from washing into the drainage line, while allowing the seepage water to flow into the drainage piping for the primary drainage water flow entering the top inlet.

Drains of the prior art used for such purposes have suffered various disadvantages such as, on the one hand, relatively high cost or complexity of structure used to obtain the seepage drainage and vertical adjustability functions; or on the other hand, where not involving unduly complex or costly structure, in being not readily adjusted, or not easily installed in the described environment with adequate sealing to the waterproofing layer, freedom from obstruction by the deck component materials, and maintenance of the seepage draining function; or in some cases not being readily cleaned or serviced for maintenance of the drainage functions.

The drain of the present invention includes a main bowl body casting having a conventional outlet formation either adapted to a threaded joint or adapted to a caulked joint connection to the drainage piping and an external horizontal, circumferentially continuous flange with a waterproofing -accepting top face at or slightly above the effective bowl inlet mouth level; a grate supporting rim casting with concrete anchor elements; a durable perforated collar, providing a filter or sand and gravel barrier, removable through the drain top inlet, with lower end telescoped and vertically adjustably secured in the bowl mouth by bolts accessible through the inlet rim even after installation; a plurality of equi-angularly spaced vertical rim support rods threaded into the flange top surface immediately adjacent the bowl mouth, and having top ends received in unthreaded rim bottom socket bosses in turn bearing on respective rod nuts for initially vertically adjusted

support of the rim in installation; and a transitory or wasting sleeve element coaxially disposed outside the rods in the region between the flange and the rim, as a temporary form for the top slab pour and also for retaining the intermediate layer material at least until after the drain installation and the deck construction are completed.

Moreover, the body flange in the hereinafter disclosed embodiment affords an outermost continuous flat annular surface of a radial width approximately equal to the radius of the bowl proper thereby providing a comparatively wide area to be sealingly overlapped by the waterproofing layer, for obtaining an effective seal without recourse to clamping rings and like devices even when sheet form waterproofing is used.

For many installations a simple cylindrical cardboard element would be sufficient as the outer sleeve for the stated purposes. However, as in the preferred form of the invention hereinafter disclosed, the latter sleeve may be simply a cheap, perforated thin mild sheet steel cylinder or sleeve which, even though installed with the rim in roughing-in operations, will endure through the period between structural and finish slab pours, and may be left in place rather than being immediately removed after completion of the forming, as would be preferred, if not as in some cases necessary, with the cardboard sleeve. Though ultimately the metal sleeve will corrode away, in the meantime it will not interfere with seepage drainage. In the preferred form, the under side of the grate supporting rim casting includes integral flange formations providing in effect a circumferential groove to receive the top edge of the form sleeve secured by appropriate wedging means.

By drain structure in accordance with the invention, within a designed structural range for the drain, ready adaptability to particular deck thicknesses is achieved by virtue of the vertical adjustability of the inner filter collar, and the rim support by the described threaded rod means, which may be cut from a maximum range size to approximate job lengths, and then more precise rim height setting is possible through the threaded adjustments of the rods and of the level setting nuts. So also the light forming sleeve is readily cut to suitable size and facilitates the proper emplacement of the intermediate and top layers without interfering with the filter collar or seepage drainage function. Also the filter collar is removable easily from the drain inlet for cleaning service as required.

Hence, it is seen that a drain of the invention is relatively simple in its overall assembly, and requires few, relatively simple and inexpensive individual parts; permits easy adjustment or setting to a particular deck thickness, and as well leveling adjustment of the grate supporting rim to a precise desired finished-surface level; and in general requires but simple installation operations.

The general object of the present invention is then to provide an improved area drain construction for the described type of composite deck environments. Another object is the provision of a drain of the type described which is relatively simple and of low cost construction for the purposes achieved. Another object is the provision of a drain of the character described adapted for a sealing connection therewith or waterproofing without need of clamping rings or like retaining devices. A further object is the provision of a drain combination including a wasting or transitory sleeve for

forming and retaining an intermediate and poured top slab in the deck construction. A still further object of the invention is to provide a drain of the character described in which an internal filter collar is readily removed for cleaning and service.

Other objects and advantages will appear from the following descriptions of a particular embodiment, and the drawings thereof, wherein:

FIG. 1 is a generally axial vertical section, though taken somewhat irregularly, through a drain embodying the present invention and the immediately surrounding building environment, for example, a promenade type roof deck;

FIG. 2 is a bottom plan view of a rim member of the drain assembly inverted left to right from its position shown in FIG. 1; and

FIGS. 3 and 4 are enlarged fragmentary radial sections through the rim member taken respectively as indicated by the lines 3—3 and 4—4 in FIG. 2 but oriented as in FIG. 1.

Among the drawings, showing a preferred embodiment of the invention, as a typical environment there appears a traffic deck above an occupied space of a building, for example, a deck in an auto-parking building, or a so-called promenade or terrace type "roof" area of a building subject to pedestrian traffic. Such environmental structure, for simplicity herein at times called simply a "roof structure" or "composite deck structure," includes a lower poured concrete primary or structural slab S top-sealed by a waterproofing layer W, a poured concrete promenade or traffic slab D, the horizontal top surface L of which presents the drained deck or promenade surface, and a water-permeable seepage draining intermediate layer I whereby any water leaking through flaws, cracks or other damage of slab D seeps to the hereinafter described drain structure and thereby enters the drainage system without leakage into the occupied or used building space therebeneath.

The intermediate layer may have also an insulation function, e.g., when constituted of closed cell styrofoam, but more usually is merely permeable granular material such as sand or gravel; but hereinafter will be referred to at times as "gravel" or "gravel layer" for simplicity and not by way of limitation.

The waterproofing layer W may be any of the well known long standard waterproofing layer materials, or the more recently introduced tough synthetic plastic elastomeric sheeting or liquid-applied polymer waterproofing.

The drain structure of the present invention includes as principal components the flanged bowl body member main casting B; a plurality of like threaded rods T; an inlet rim member casting R supported by rods T and secured in the top slab by anchor elements A to define a main drain inlet and support grate G; the perforated heavy metal filter collar or casting C; and the light forming sleeve F.

The bowl body member casting is embedded in the slab S and has a bottom outlet 12 connected to a drain line pipe stub end P (indicated by dashed outline). In body B, as an integral casting, the bowl portion 11 provides a vertical cylindrical side wall receiving the lower end of collar C and at its bottom curving down to a caulked type bottom outlet formation 12 receiving the drainage pipe stub end P (shown in dashed outline) telescoped therein. On the integral outwardly extend-

ing circumferentially continuous peripheral flange 13 and proximate to the bowl inlet or mouth, there are three 120°-spaced, like vertical lug formations 14, having inner vertical faces as continuations of the bowl internal cylindrical surface and tapped radial holes receiving respective collar securing bolts 15. Outward and continuous with each lug 14, a shorter boss 16 has a threaded vertical blind hole for a respective rod T locked in adjusted threaded position by a nut 17 thereon.

It will be observed that the flange 13 includes, slightly above the bowl mouth level and outward of the shallow broad sloped-walled groove 13b, an annular wide flat horizontal top surface 13a affording a wide sealing surface area for the overlapping circular margin of the waterproofing layer W adhesively bonded thereto when sheet material or adherent when a liquid applied type; and further in the groove 13b receives the free turned down circular edge of the layer W. As the groove margins are no higher than surface 13a this ensures ready complete draining of seepage water from the intermediate layer I into body mouth and hence into the line P.

The collar C may be a tubular section formed of suitable corrosion resistant heavy sheet metal or plate stock, or a casting, and has, over substantially its entire vertical extent, a multiplicity of uniformly distributed perforations or apertures of size appropriate to retain the material to be used in the intermediate layer I. Vertical upward end slots 19, at 120° spacing in the lower end for the respective bolts 15, permit collar end securement in the body mouth in vertically adjusted telescoped relation as required for the actual total deck thickness in the particular installation, and thereby also the collar may be easily removed through the wider rim mouth for service cleaning.

The flat topped rim member R (see FIG. 2), either annular as shown or square in its external peripheral outline, is embedded flush in slab D; and its internal circular periphery 20, defining the drain inlet, is rabbeted to support the flat grate G the top grate and rim surfaces flush or coplanar with the finish area or level L of the traffic slab D. The grate G is secured by any appropriate means, e.g., by screws (not shown) there-through threaded into underlying apertured threaded inward lugs 20a on the rim inner periphery 20, which in diameter is larger than the outside diameter of collar C. A plurality of at least two equi-angularly spaced anchor elements A project from the rim into and are embedded in the slab D.

On the bottom side of the rim casting, unthreaded 120° spaced blind sockets in boss formations 21 respectively receive, slightly loosely, the upper ends of the threaded rods T, with respective adjusting nuts 22 and washers 23 providing the actual initial adjusted bearing support for the rim in roughing in and holding the rim vertically spaced above and coaxial to the drain body at an at least approximate desired finish level position.

Each anchor element A, as shown more clearly in detail FIG. 3 is simply a short end-threaded 45° bent rod, screwed into a threaded blind hole in an integral boss 24 at an outer marginal rim bottom location, to extend downwardly obliquely outwardly well into and affording good purchase and securement in the poured slab D. Somewhat similar anchors could be threaded in suitable bosses on the bottom of the flange 13.

A cardboard sleeve extending between flange 13 and rim R sometimes could be used as a temporary forming element F sufficient for suitable emplacement of the material of the layer I and the slab D, being torn out after slab hardening. However, in general far preferably, there is used a perforated thin mild sheet steel sleeve F appropriately dependently secured on the rim bottom, as by integral rim bottom formations 26, 27 and also bosses 21 (see particularly FIGS. 2-4) forming in effect a circumferentially extended groove wherein the sleeve top edge is received and secured, for example, by the simple expedient of small driven lead wedges (not shown) or other suitable means.

With an outer series of six like elongated arcuate dependent flanges 26, each of say 27° angular extent and equally spaced on 60° radial centers, there alternates an inside series of six dependent formations also spaced on 60° radial centers, thus respectively spaced 30° from those of the first series, and comprised of the set of three 120°-spaced similar 27° elongated arcuate flanges 27 and, alternating with flanges 27, the set of the 120°-spaced bosses 21. For foundry purposes an appropriate draft requires a tapering across section in the flanges 26, 27, apparent in FIGS. 3-4 though not shown in FIG. 2. The radii of the inner coaxial surfaces of flanges 26 and of the coaxial outer surfaces of 27, so also of the extreme outer line of the bosses 21 are such as provides a radial staggered spacing to receive the sleeve edge.

Upon initial installation, the concrete-forming and gravel-retaining sleeve F, coaxially disposed relative to the drain body and collar C, defines a cylindrical spacing of the emplaced intermediate layer I and the poured concrete of slab D from the collar C.

As the sleeve F need not be long lasting, it may be fabricated of a perforated mild steel sheet, low in cost and relatively easily cut to shorter length as required, and of merely sufficient weight and rigidity to be held in position, and to hold and form the materials of the layers D and I as emplaced. The perforations ensure ample and ready drainage even with a new sleeve, and especially as the latter is spaced from layer W, so that this sleeve need not be removed after the drain and deck construction is completed.

In installation, by usual practices the drain is roughed in to appropriate position in the forms set up for the slab S, the connection is made to pipe end P, and the slab S is poured embedding and thereby securing body B. In the roughing in, the rim is positioned at the required level by adjustment of the rods T and associated elements. After slab S has hardened the water-proofing layer W is applied; and when in due time the layers I and D are emplaced, as noted final rim height and level adjustments can easily be made.

The wide flange affords a broad surface for effecting a seal with the waterproofing layer of whatever nature, advantageous with sheeting which thus may be bonded thereon over a large area by an adhesive appropriate to the sheeting; also advantageous with a thixotropic liquid applied polymer to produce the layer, again in providing a large "overlap" and bonding area of the layer carried onto the flange from the adjacent slab. The liquid applied type layer also conveniently and readily produces a seepage surface carried not only onto the flange flat, but also substantially smoothly sloping to the body mouth edge, without cutting to fit, e.g., between bolt receiving bosses. Also notable is the basic drain structure utility where either or both of the slabs

are pre-cast; or where the seepage layer in effect is little more than the waterproofing layer, as well as where it includes insulation. Where S is pre-cast, body clamping means would be preferable, e.g., secured by bolts to body flange bottom bosses.

We claim:

1. For composite decks comprised of a bottom structural slab, waterproofing on the top of the structural slab, a seepage -draining intermediate layer and a finish traffic slab on the intermediate layer, an area drain structure comprising:
  - a body member including a bowl with an upwardly open mouth as a bowl inlet and adapted to be secured in the bottom slab,
  - said body member having a circumferentially continuous external top flange about the bowl mouth, and said top flange adapted to receive a circular margin of the waterproofing thereon in sealing relation and located at least as high as the bowl mouth;
  - a rim member centrally apertured to define a drain inlet above the bowl mouth and adapted for supporting a removable drain inlet grate in vertically spaced alignment above the bowl mouth, said rim member adapted to be embedded in the concrete of and at the finish level of the finish slab;
  - means for anchoring the rim member in the concrete of the finish slab;
  - a filter collar with its lower end supported by the body member coaxial to the bowl mouth providing, from the level of the bowl mouth at least upwardly toward said rim member, a filtering barrier to material of the intermediate layer,
  - said collar having a lower end portion disposed within the said bowl mouth and means removably centering the collar relative to the bowl;
  - a finish-slab-forming, and intermediate-layer-retaining, sleeve externally coaxial of said collar and beneath the said rim member; said rim member having an inside diameter affording a drain inlet opening larger than the outside diameter of the filter collar and supporting said removable grate; and means on at least one of the said members for supporting said sleeve coaxially with respect to said collar.
2. For composite decks comprised of a bottom structural slab, waterproofing on the top of the structural slab, a seepage -draining intermediate layer and a finish traffic slab on the intermediate layer, an area drain comprising:
  - a body member providing a bowl with an upwardly open mouth as a bowl inlet, and adapted to be secured in the bottom slab, said body member having a circumferentially continuous external top flange about the bowl mouth, said top flange adapted to receive a circular margin of the waterproofing thereon in sealing relation and located at least as high as the bowl mouth;
  - a rim member centrally apertured to define a drain inlet above the bowl mouth and for supporting a drain inlet grate above the bowl mouth and at the finish level of the finish slab;
  - a plurality of vertical rim support rods with lower and upper ends engaged respectively in an upper portion of said body member external of the bowl mouth and in the lower side of said rim;

a filter collar with its lower end secured to the top of the bowl around its inlet providing, from substantially the level of the bowl mouth upwardly toward said rim member, a filtering barrier to material of the intermediate layer; and a finish-slab-forming and intermediate-layer-retaining, coaxial sleeve external of said rods and collar within the external periphery of said rim member.

3. A drain as described in claim 2, with threaded means including said rods and cooperatively engaging at least one of said members for adjusting the height of said rim member above said bowl.

4. A drain as described in claim 3, wherein said rods are threaded into said body member adjacent the bowl mouth and have top ends received in rim bottom sockets, said means including adjusting nuts threaded on the rods and supporting the rim member.

5. A drain as described in claim 2, wherein said rim member has an inside diameter larger than the outside diameter of the filter collar and supports a removable grate, and said collar has a lower end portion telescoped into the said bowl mouth, said collar removably secured by bolts therethrough threaded outwardly into the body member.

6. A drain as described in claim 5, wherein to receive said bolts the body member is provided with upward integral threaded lugs equi-spaced around and at said inlet, and

said collar has respective upwardly extending end slots for the respective bolts; to facilitate vertical collar adjustment and service cleaning of said collar through said drain inlet.

7. A drain as described in claim 2, wherein said rim member is provided with a plurality of anchor elements disposed to project in a retaining relation into said finish slab.

8. A drain as described in claim 2, wherein said sleeve is a wasting element.

9. A drain as described in claim 2, wherein said sleeve is a cardboard element interposed between said flange and said rim member.

10. A drain as described in claim 2, wherein said sleeve is a perforated water corrodible sheet metal sleeve.

11. A drain as described in claim 2, wherein the radial annular width of the said top flange is on the order of the radius of the bowl.

12. A drain as described in claim 2, wherein said sleeve is supported dependently from sleeve-top-edge

engaging formations on the bottom side of said rim member.

13. A drain as described in claim 12, wherein said formations include coaxially arcuate depending flange formations at slightly different radial spacings from the center of the rim member to define in effect a receiving groove for the sleeve top edge.

14. A drain as described in claim 13, wherein said depending flange formations are comprised of a first plurality of angularly spaced flanges having arcuate radially inward surfaces at one radial spacing from the rim center and a second plurality of angularly spaced formations having arcuate radially outward surfaces at a slightly different second radial spacing from the center, with formations of the first plurality alternating with those of the second plurality in angular position.

15. A drain as described in claim 14, wherein said sleeve is formed of mild sheet steel of sufficient weight to form and withstand the emplacement of the material to constitute said intermediate layer of said traffic slab, and has a multitude of perforations substantially effectively uniformly distributed circumferentially and vertically in a pattern extending from the bottom end upwardly over a major part of the sleeve length.

16. A drain as described in claim 2, wherein said rim member has an inside diameter larger than the outside diameter of the filter collar and supports a flush, removable grate;

said filter collar has a lower end portion telescoped into the said bowl mouth and a plurality of upward slots, said collar removably secured by bolts through respective said slots and threaded outwardly into upstanding integral lugs on the body member extending above the bowl mouth, whereby the collar is vertically adjustable and removable through the rim to facilitate service cleaning of said collar through said drain inlet; said rim member is provided with a plurality of anchor elements disposed to project in a retaining relation into said finish slab;

said sleeve is a sheet metal sleeve with a multitude of perforations substantially uniformly distributed circumferentially and from the bottom edge upward at least over its major length; said rods are threaded into said top flange adjacent the bowl mouth and have top ends received in rim bottom sockets, said means including adjusting nuts on the rods and supporting the rim member.

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