Oct. 22, 1968 J. P. VANDE BOSCHE 3,406,829

FLOOR DRAIN

Original Filed Nov. 21, 1966

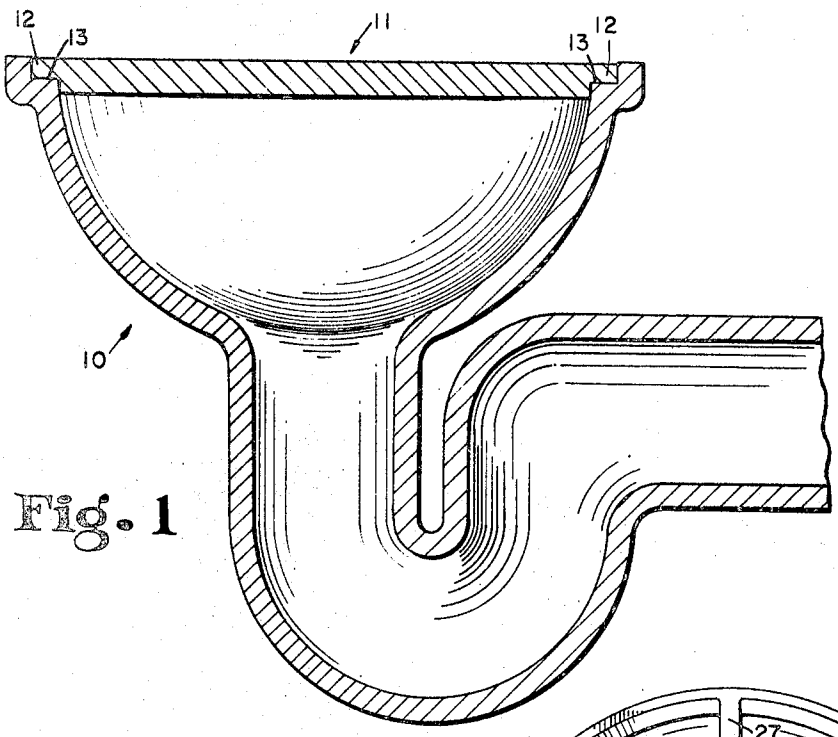


Fig. 1

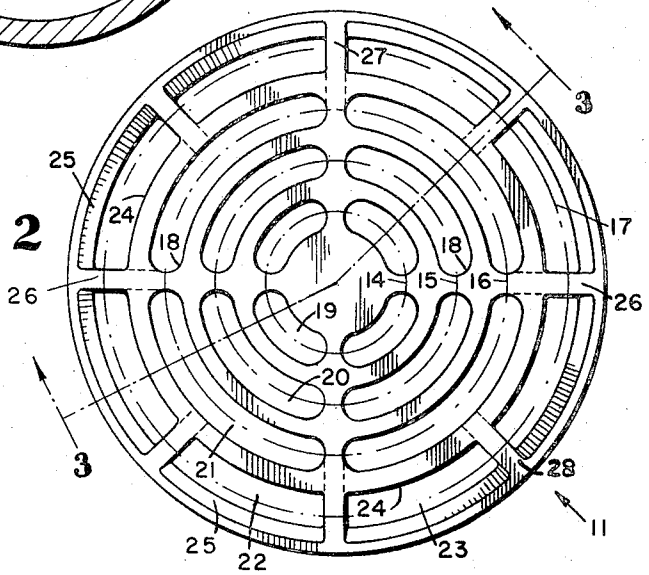


Fig. 2

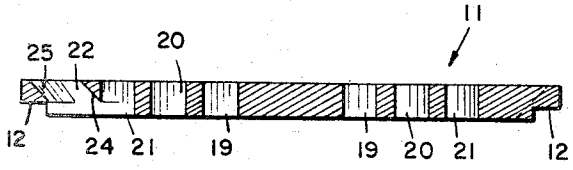


Fig. 3

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FLOOR DRAIN

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Continuation of application Ser. No. 595,953, Nov. 21, 1966. This application Oct. 20, 1967, Ser. No. 676,982

2 Claims. (Cl. 210—164)

ABSTRACT OF THE DISCLOSURE

A floor drain, including a grate, said grate being so constructed as to provide a plurality of passages into the drain proper, the passages including a series located near the periphery of the drain opening and so inclined as to to direct liquid emerging from them toward the axis of the drain.

This application is a continuation of application Ser. No. 595,953, filed Nov. 21, 1966 and now abandoned.

This invention relates to surface drains for use as in floors, or roofs, or in other situations where the rapid draining of accumulated water or other liquid is desirable. The invention is primarily concerned with a grate for the opening in such a drain.

As is well known, liquid draining through an opening in a relatively large horizontal surface tends to form a vortex. Under conditions of relatively low discharge head, such a vortex may extend downwardly far enough to reduce the effective area of the liquid-escape path or paths thus reducing the rate at which the liquid is discharged into the drain. It is therefore an object of this invention to produce an improved drain grate providing passages discharging into the drain and so arranged as to tend to inhibit the formation of a vortex, thereby increasing the discharge rate.

I have found that the tendency of liquid escaping through the passages provided by a drain-grate to form a vortex can be substantially reduced if the passages at or near the periphery of the grate are so formed as to impart a substantial inward component of velocity to the liquid passing through them. In a preferred form of the invention, such passages are formed wholly in the grate, each passage having a circumferential extent greater than its radial extent and being defined at its inner and outer sides by walls which slope inwardly and downwardly, preferably at an angle of about 45°. Inside of the circular series of passages just described, the grate has additional discharge passages which may have any desired shape and may be arranged in any desired pattern; but most desirably, the latter passages are arranged in a series of circles concentric with each other and with the circle on which the first mentioned passages are located.

Other objects and features of the invention will become apparent from the more detailed description which follows and from the accompanying drawings, in which:

FIG. 1 is a sectional side elevation of a floor drain and grate;

FIG. 2 is a plan view of a drain grate embodying my invention; and,

FIG. 3 is a sectional view taken along lines 3—3 of FIG. 2.

As shown in FIG. 1 a cup shaped floor drain **10** supports a grate **11** about its circumference. A lip **12** on the grate rests on a ledge **13** on the drain **10**.

The drain grate **11**, as shown in FIG. 2, is disc shaped and has a series of passages disposed on four concentric circles **14**, **15**, **16** and **17**. Each of the first three circles **14**, **15** and **16**, contains four passages, and the spacing between them is the same on each circle. The walls of the passages on these three circles may be substantially perpendicular to the upper and lower surfaces of the grate, and the ends **18** of each passage are rounded.

The passages in the grate are arranged in four identical quadrants, and each quadrant contains five passages. Passages **19**, **20**, and **21** are on inner circles **14**, **15**, and **16**, respectively, and passages **22** and **23** are on the outer circle **17**. The circumferentially extending walls **24** and **25** of the two passages on the outer circle **17** are slanted downwardly and inwardly, as shown in FIG. 3. These slanted walls impart a radial component of velocity to the water which passes through passages **22** and **23**, thereby tending to destroy the vortex effect created in the water entering the drain. As a result of this tendency to inhibit formation of a vortex, the discharge rate of the drain is substantially increased. For example, imparting a 45° slant to the inner and outer walls of the peripheral passages in a 9" grate on a 3" drain increased the discharge rate from about 180 gallons of water per minute to about 218 gallons per minute at a 6" discharge head.

By the arrangement of the passages in four quadrants, the grate is left with uninterrupted, solid metal portions **26** and **27** extending across the grate on two perpendicular diameters, thus imparting strength to the grate. Further strength is imparted to the grate by the bridge or brace **28** which separates the outer passages **22** and **23** of each quadrant.

I am aware that it has heretofore been proposed, as in Patent 2,695,677 to M. A. Sisk, to employ for a floor drain a grate providing peripherally disposed passages having inner and outed walls which, for an intermediate portion only of the thickness of the grate, slant inwardly and downwardly. In the Sisk patent however, the lower portion of the inner wall of each such passage is substantially vertical and thus serves to deflect downwardly the liquid emerging from the passage and to prevent such liquid from possessing the inward component of velocity which I have found helpful in inhibiting vortex formation.

Obviously, the vortex-inhibiting effect of the inwardly directed liquid emerging at the lower surface of the grate will depend to an extent upon the relation between the aggregate cross-sectional area of the outer passages **22**, **23** and the aggregate cross-sectional area of the inner passages. I find that for best results the cross-sectional area of the outer passages should be at least more than 25%, and preferably more than 30% of the total cross-sectional area of all passages.

I claim:

1. In combination with a floor drain or the like having an unobstructed bowl-like interior and, at its top, a circular inlet opening disposed in a generally horizontal plane, a grate for said opening, said grate providing a plurality of substantially concentric, arcuate passages through which liquid can flow into the drain, said passages including a first set circumferentially distributed throughout and adjacent the periphery of the drain opening and angularly spaced from each other and a second set located in the grate inside of said first set, each passage of said first set having circumferentially extending inner and outer spaced walls both of which slope downwardly and inwardly with respect to the drain, each pas-

sage of said first set joining a passage of the second set above the lower face of the grate with both passages discharging into a circumferentially extending recess provided in the lower face of the grate whereby liquid discharged into said recess from the first-set passage will impinge upon and urge inwardly liquid discharged into the recess from the second-set passage before the latter emerges from the recess at the lower face of the grate.

2. The invention set forth in claim 1 wherein the aggregate cross-sectional area of said first set of passages is at least 25% of the aggregate area of both sets of passages.

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