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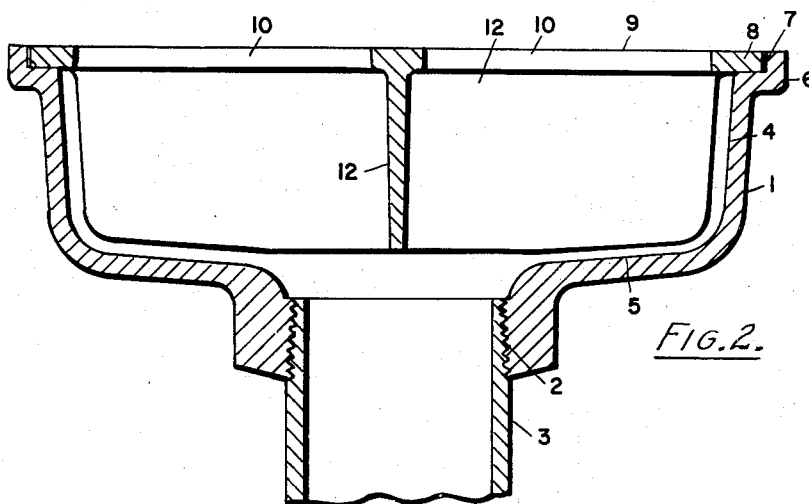
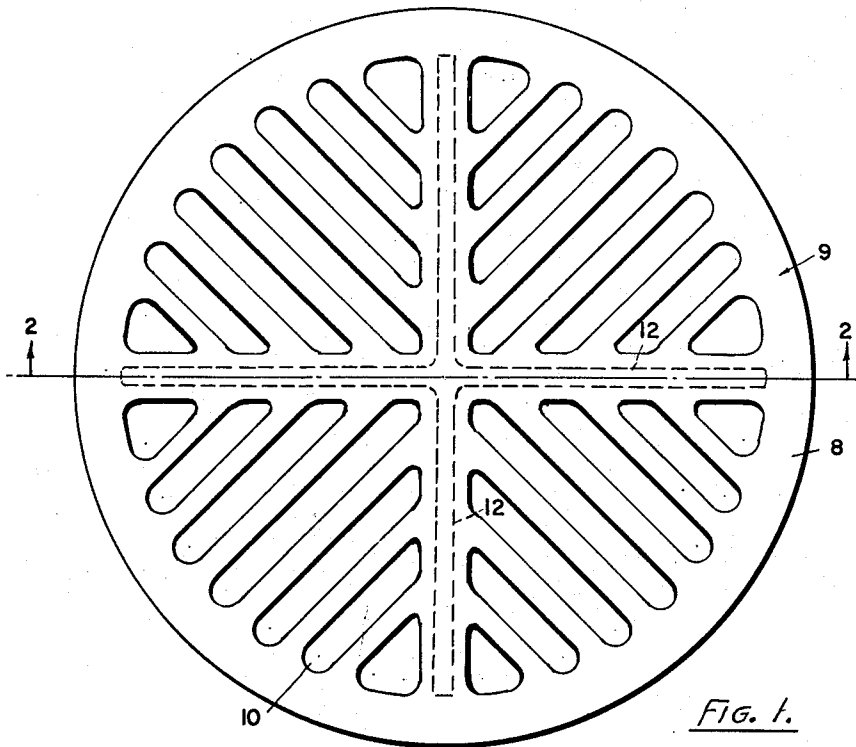
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SURFACE DRAIN

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2 Sheets-Sheet 1



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SURFACE DRAIN

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This invention relates generally to surface drains and more particularly to roof drains adapted to accommodate abnormally large amounts of water.

Roof drains, made in accordance with the teachings of the prior art, and with which I am familiar, do not provide for the breaking up of air entrapped with the water in the reservoir of the drain and the outlet pipe leading therefrom. In these prior roof drains, there is an eddy formed in the center of the drain by the water passing therein; in other words, the water moves spirally as in a whirlpool upon entering the drain. When water flows into a surface opening, there is a whirling rotating motion so that as it passes down through an outlet pipe, it is movable in a spiral whirling motion so that there is a considerable amount of air entrapped and carried with the water into the reservoir of the drain and into the outlet pipe. This entrapped air reduces the head and greatly impedes the flow of water to the drain outlet pipe. It also tends to overload the drain line with the result that water is backed up on the roof or surface being drained and flooding occurs. Prior roof drains also permit a sudden contraction of the water, causing a relatively high entrance loss in pressure which greatly impedes the flow of water to the drain outlet.

It is, accordingly, an object of my invention to overcome the above and other defects in surface drains and it is more particularly an object of my invention to provide a roof drain which is simple in construction, economical in cost, economical in manufacture, and efficient in operation.

Another object of my invention is to provide a surface drain which breaks up the formation of an eddy centrally of the drain.

Another object of my invention is to minimize any sudden contraction of water entering a surface drain.

Another object of my invention is to increase the head of the water in a drain and minimize the impedance to the flow of water through the drain.

Another object of my invention is to provide a surface drain wherein the air entrained by the water passing to the drain outlet is minimized.

Other objects of my invention will become evident from the following detailed description taken in conjunction with the accompanying drawings, in which

Fig. 1 is a plan view of a flat topped surface drain with a flat grate thereon;

Fig. 2 is a sectional view taken on the line 2—2 of Fig. 1;

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Fig. 3 is a vertical sectional view of my novel surface drain with a dome type strainer mounted thereon having cross webs cast integral with the lower section of the dome type strainer;

Fig. 4 is a plan view of the dome type strainer and webs shown in Fig. 3 with the top of the dome type strainer removed;

Fig. 5 is a perspective view of cross baffles adaptable for use as an insert in present surface drains with a flat grate as shown in Fig. 1; and

Fig. 6 is a perspective view of independent cross baffles or webs insertable in a standard dome type surface or roof drain similar to the drain shown in Fig. 3.

It has been found necessary to minimize the entrainment of air with the water in a surface drain to obtain a maximum flow of water through the drain. This entrainment of the air seriously impedes the flow of water through the drain to the drain outlet and in the drain outlet pipe. The flow rate of a fluid varies directly with the square root of the hydraulic head available. Entrainment of air which enters the drain outlet with the water caused chiefly by the whirling of the water spirally or eddying is known in the field as air binding. This causes a considerable decrease in the flow of fluid from the drain to the drain line because there is no place for the air to vent. By providing cross baffles centrally of my novel reservoir in my novel drain, the velocity of the water through the drain is decreased and a maximum separation of air from the water results before it enters the drain line.

Referring now to the drawings, I show in Figs. 1 and 2 a drain made up of a cup shaped, cylindrical reservoir 1 having a flanged outlet opening 2 on the bottom side thereof for threadably engaging the threaded end of an outlet pipe 3. The reservoir 1 has the inner sides 4 and the bottom 5 thereof tapered terminating in the outlet opening 2. The upper marginal L-shaped portion 6 of the reservoir 1 is flanged outwardly and upwardly to form a peripheral L-shaped groove 7 for seating the outwardly directed flanged portion 8 of a flat strainer member or grate 9 having spaced openings 10. The flat strainer member 9 has cross baffles or webs 12 depending therefrom, the bottoms and sides of the webs 12 being spaced a predetermined distance from the inner sides 4 and the bottom 5 of the reservoir 1. The reservoir 1 is adapted for mounting on a roof or any surface to be drained. The grate 9 may be reversed with the webs 12 extending upwardly or the webs 12 may be ex-

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tended upwardly from the top surface of the grate 9.

Insertable cross webs 13 with feet 14 shown in Fig. 5 may be inserted in a reservoirary such as the reservoirary 1 where a flat grate is disposed over the top of the reservoirary, the feet 14 of the members 13 seating on the bottom 5 of the reservoirary 1. With cross webs 12 or 13 in a reservoirary 1, it will be evident that when water passes through the reservoirary 1, it will not move in a spiral path. The spiral motion of the water will be broken up and the lineal velocity of the water to the drain will be decreased by the webs 12 or 13 so that a minimum amount of air will be entrained with the water when it passes to the outlet 3.

In Figs. 3 and 4, I show another form of my invention operable upon the same principle as my novel surface drain shown in Figs. 1 and 2. Referring now to Figs. 3 and 4, I show a cup shaped cylindrical reservoirary 20 having an internally threaded outlet opening 21 in the bottom thereof for threadable engagement with the threaded end on an outlet pipe 22 leading therefrom. The reservoirary 20 has an outwardly directed marginal flange 23 on the upper end thereof and inwardly directed ears 24 with threaded apertures 25 on the inner side thereof. The bottom of the flange 23 is tapered at 26 and is adapted to engage a roof for support thereby. A clamping ring 28 is secured to the reservoirary 20 by screw bolts 29 which extend through apertures 30 in the clamping ring 28 and threadably engage the threaded apertures 25 in the ears 24. The clamping ring 28 has an offset portion 31 corresponding to an offset grooved portion 32 in the flange 23 between which is clamped a conventional roofing paper 33. The offset portion 31 of the clamping ring 28 and the flange 23, respectively, are so designed that the upper side of the clamping ring 28 is substantially merged with the upper surface of the paper 33 on the roof. An upwardly extending guard ring 35 extends upwardly from the clamping ring 28 to form a shield against gravel and other heavy particles.

A dome strainer 38 comprises a lower mating section 39 and an upper mating section 40 secured together by screw bolts 41. The lower portion 39 of the dome strainer 38 flares outwardly and upwardly and the spaced, radially extending slots 43 therein extend downwardly to substantially the same horizontal plane as that of the roofing paper 33, thereby providing a drainage of water from the roof under normal conditions. The outer portion of the lower mating section 39 of the strainer 38 is spaced from the upper side of the ring 35 a predetermined distance, thereby forming an annular opening of predetermined width to provide a strainer for preventing debris from passing into the pocket formed by the ring 35.

The upper section 40 of the strainer 38 has circumferentially spaced, vertically extending slots 46 in the lower portion thereof which permit the maximum flow of water to the reservoirary 20. The upper section 40 of the strainer 38 is flared upwardly and inwardly toward the vertical axis of the dome strainer 38 in a direction substantially at right angles to the lower section 39 of the strainer 38 to permit the maximum flow of fluid through the strainer 38. The top 47 of the upper section 40 of the strainer 38 is rounded, and spaced, radially extending slots 48 are formed therein. The inner portion 49 of a supporting

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ring 50 on the lower half 39 of the strainer 38 is rounded so as to prevent a sudden contraction of the fluid through the dome strainer 38 and to greatly decrease the entrance loss in pressure due to the sudden contraction of the water as in conventional drains.

The supporting ring 50 of the strainer 38 has lugs 51 extending radially outwardly therefrom which engage slots (not shown) on the inner edge of the clamping ring 28, the lugs 51 and the slots in the clamping ring 28 forming a bayonet joint by means of which the dome strainer 38 may be detachably secured to the clamping ring 28. The slots 46 in the upper section 40 of the strainer 38 are at an elevation with relation to the reservoirary 20 and the top of the roof to substantially increase the head of the fluid in the reservoirary 20 to carry off heavy rainfall due to cloudbursts and the like, and they are particularly useful where paper, leaves, and other material clog the drain openings formed in the lower section 39 of the strainer 38 and the opening between the lower portion of the strainer 38 and the top of the guard ring 35.

Now coming to the gist of my invention, I form integral with the bottom section 39 of the strainer 38 cross webs or baffles 60 having a depending portion 61 which extends to nearly the bottom of the reservoirary 20, the depending portion 61 of the members 60 being of greater width than the diameter of the outlet opening 21 in the reservoirary 20. The upper section 62 of the baffle members 60 is spaced from the inner sides of the upper section 40 and from the top 47 of the upper section 40 as shown in Figs. 3 and 4.

The cross webs or baffles 65 shown in Fig. 6 are insertable in a reservoirary and dome type strainer of the type shown in Figs. 3 and 4 without the baffle members 60. The feet 66 on the lower portions 67 sit on the bottom of a reservoirary and the upper portion 68 thereof extends through the throat of the clamping ring of a dome type strainer the same as that shown in Figs. 3 and 4 without the baffle member 60 being formed integral therewith.

With cross baffle members 60 or 65 as shown in Figs. 3, 4, and 6, the drain will carry off the normal rainfall without any trouble. Upon the occurrence of an abnormal rainfall or a cloudburst, the slots 46 in the upper section 40 of the dome strainer 38 come into play. The water passing through the slots 46 is broken up by the cross webs 60 or 65 and the spiral or rotational velocity of the water passing through the drain is thereby greatly impeded without impeding the downward velocity of the water axially of the drain outlet. The water, after striking the baffles 60, is directed through the rounded inner side 49 of the supporting ring 50 of the strainer 38, thereby minimizing the entrance loss in pressure. The baffles 60 prevent eddying. The comparatively deep reservoirary 20 permits a comparatively high head of water to form therein and inasmuch as the water passing through the slots 46 in the strainer 38 must pass a substantial distance through the strainer 38 and reservoirary 20 to the discharge outlet 21 of the drain, substantially all of the air is vented from the water. Furthermore, because of the great distance that the water must travel through the reservoirary 20 and strainer 38 and the lower lineal velocity thereof because of contact with the cross webs or baffles 60 or 65, a maximum separation of air from the water results. The water is prevented from moving spirally so as to entrain air therewith. The water hits the

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baffle members 60 or 65 and moves downwardly directly to the drain opening 21 in the reservoirary 20. The substantial elimination of entrained air in the water increases the flow through my novel drain approximately twice the amount as that of a drain or discharge outlet in the best designed conventional roof drains now in use.

My novel baffles may be used in a conventional surface drain with a flat grate or a dome type strainer. These baffles may be inserted in present drains with a flat grate or a dome type strainer with members such as shown in Figs. 5 and 6. A grate member 9 as shown in Fig. 2 may also be disposed in present drains utilizing a flat grate by replacing the present flat grate with the grate 9 with the depending baffles 12 as shown in Fig. 2.

Although I have described my novel baffles for use in roof drains, it will be evident that they apply equally to any surface drain used for draining water from any flat, curved, or angular surface.

Cross baffles may be disposed in a reservoirary with a strainer at the discharge outlet (not shown) without departing from the spirit of my invention.

It will be evident from the foregoing description that I have provided a novel roof drain with a maximum flow capacity provided by a maximum hydraulic head, which practically eliminates the entrainment of air with the water passing to the drain line through the drain, which has a maximum straining action, which decreases the entrance pressure drop of fluid passing to the drain, which breaks up eddying of the water, and one in which the construction and assembly are very simple and economical.

Various changes may be made in the specific embodiment of my invention without departing from the spirit thereof or from the scope of the appended claims.

What I claim is:

1. A surface drain comprising an open cup shaped cylindrical reservoirary, a dome type strainer having a discharge outlet mounted on said reservoirary, and a transversely extending cross baffle disposed in said reservoirary having a portion thereof extending upwardly into said strainer and terminating in spaced proximate relation to the bottom of said reservoirary.

2. A surface drain comprising a cylindrical, open, cup shaped reservoirary with a discharge outlet, a dome type strainer having a lower and an upper section mounted on said reservoirary, and transversely extending cross baffles integral with the lower section of said strainer and depending therefrom to a point adjacent the bottom of said reservoirary.

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3. A surface drain comprising an open cup shaped reservoirary having a discharge outlet, and a strainer disposed over said open cup shaped reservoirary, and a transversely extending cross baffle in said reservoirary, said baffle having feet extending downwardly from the baffle, said feet engaging the bottom of said cup shaped reservoirary whereby the edge of said baffle nearest the bottom of said reservoirary is held in spaced relation to the bottom of said cup shaped reservoirary.

4. A surface drain for handling large quantities of water comprising an open cup shaped reservoirary and a strainer therefor supported thereon, said reservoirary having a discharge outlet in the bottom thereof, said discharge outlet being substantially smaller in transverse cross sectional area than the transverse cross sectional area of the reservoirary, a transverse cross baffle disposed in said reservoirary, and means to support said baffle on said drain in said reservoirary in spaced relation to the bottom of said reservoirary, said baffle extending from the strainer and terminating in proximity to the bottom of the reservoirary but providing a substantial space between said baffle and the bottom of said reservoirary whereby debris will be unobstructed by said baffle.

5. A surface drain for handling large quantities of water comprising an open cup shaped reservoirary and a strainer therefor, said reservoirary having a discharge outlet in the bottom thereof, said discharge outlet being substantially smaller in transverse cross sectional area than the transverse cross sectional area of said reservoirary, and a transverse cross baffle disposed in said reservoirary, said baffle being attached to said strainer whereby said baffle is supported in spaced proximate relation to the bottom of said reservoirary.

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