June 3, 1952 J. H. SCHMID 2,599,205

ROOF DRAIN

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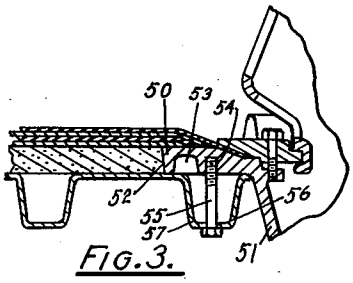

FIG. 3.

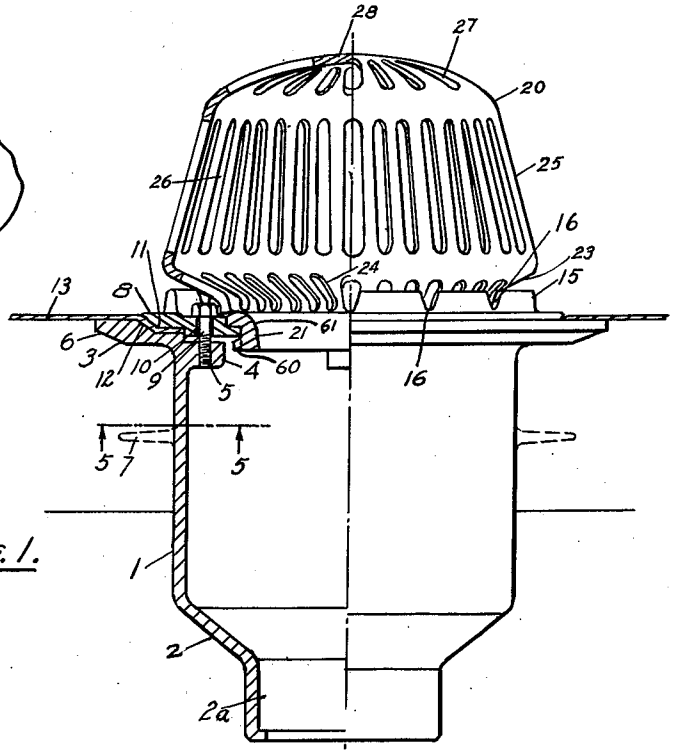

FIG. 1.

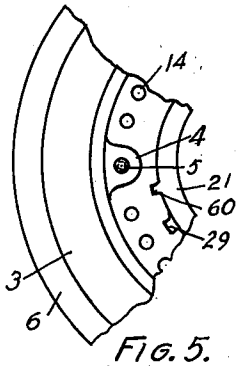

FIG. 5.

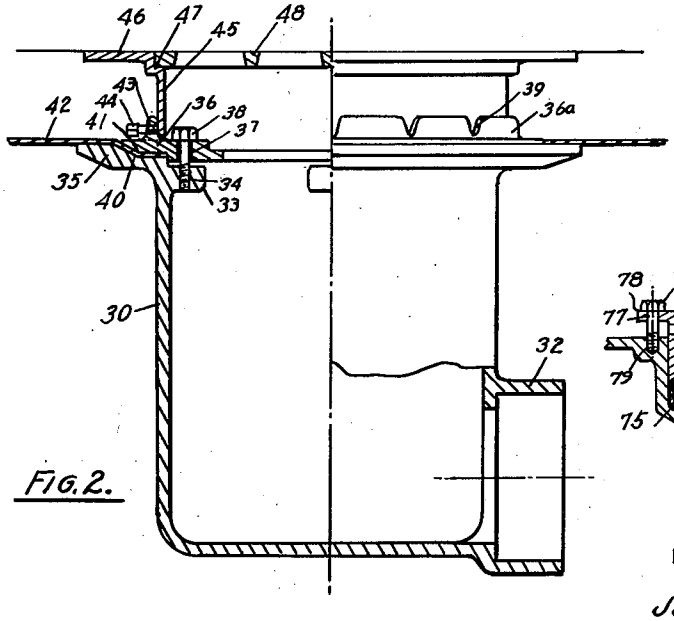

FIG. 2.

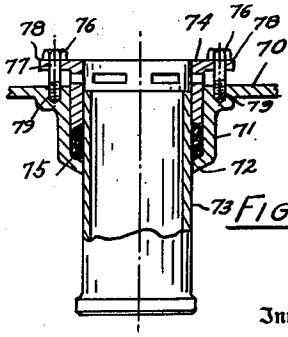

FIG. 4.

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ROOF DRAIN

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7 Claims. (Cl. 182—31)

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This invention relates generally to roof drains and more particularly to roof drains accommodating abnormally large amounts of water resulting from cloud bursts, abnormally heavy rains, and the like.

Roof drains made in accordance with the teachings of the prior art, and with which I am familiar, do not provide for any appreciable head of water to form on the upper end of the drain line with the result that water is backed up on the roof and flooding occurs. Furthermore, prior roof drains permitted air to be entrained with the water in passing through the straining surfaces of the drain and this air, carried with the water, reduced the head, overloaded the drain line, and greatly impeded the flow of water to the drain. Prior roof drains have been so designed that the debris collected in the recessed pockets impeded the flow of water to the drain. Prior roof drains permitted a sudden contraction of the water causing a relatively high entrance loss in pressure which greatly decreased the flow of fluid.

It is, accordingly, an object of my invention to overcome the above and other defects in roof 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 roof drain which provides a maximum hydraulic head above the drain line to increase the flow of water from the drain to a maximum.

Another object of my invention is to minimize any sudden contraction of water.

Another object of my invention is to provide a roof drain wherein the air entrained by the water passing from the drain to the drain line 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 side elevational view with one side thereof broken away on the center line of my novel roof drain;

Fig. 2 is a side elevational view with one side thereof broken away on the center line of a modified form of my roof drain;

Fig. 3 is a fragmentary enlarged cross-sectional view showing a modified form of flashing flange for use on a pre-fabricated roof deck;

Fig. 4 is a sectional view of a water tight slip joint between the drain body and drain pipe to accommodate movement of the drain pipe relative to the drain; and

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Fig. 5 is a fragmentary view taken on the line 5—5 of Fig. 1.

It has been found that in certain parts of the country where many cloud bursts occur yearly and there is much abnormally heavy rainfall, present roof drains have not been able to drain the water from roofs upon the occurrence of a cloud burst or a heavy rainfall. I have found that a relatively large hydraulic head of water is necessary to increase the flow of fluid to the drain line and furthermore, it is necessary to minimize the entrainment of air with the water which seriously impedes the flow of water through the drain and in the drain line. The flow rate of a fluid varies directly with the square root of the hydraulic head available. I have provided in my drain means for obtaining a high hydraulic head to greatly increase the flow of water. I have also changed the contour of my novel drain from that causing a sudden contraction to a design similar to a Venturi thereby minimizing the entrance loss in pressure due to contraction of the water.

Prior drains have entrained a considerable amount of air with the water entering the drain causing what 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. I have designed a roof drain which eliminates this condition by permitting the air to vent as the result of a deep body and a large reservoir. By providing a deep body and a large reservoir, a greater length of time is given for the air to vent and a lower lineal velocity through the body results which permits a maximum separation of the air from the water before it enters the drain line. My novel roof drain will handle approximately two times the flow of the best roof drains now on the market.

Referring now to the drawings, I show in Fig. 1 a relatively deep, cylindrically shaped reservatory 1 having an inwardly directed tapered portion 2 terminating in an outlet 2a, an outwardly directed flange 3 on the upper end thereof, and inwardly directed ears 4 having threaded apertures 5. The bottom of the flange 3 is tapered at 6 and is adapted to engage a roof for support thereby. Anchorage lugs 7 are shown intermediate the reservatory 1 in dotted lines, the use of which are optional. A clamping ring 8 is secured to the reservatory 1 by screw bolts 9 which extend through apertures 10 in the clamping ring 8 and

threadably engage the threaded apertures 5 in the ears 4. The clamping ring 8 has an offset portion 11 corresponding to an offset grooved portion 12 in the flange 3 between which is clamped a conventional roofing paper 13. The clamping ring 8 has circumferentially spaced drain openings 14 which provide for initial drainage of water therethrough. The offset portions 11 of the clamping ring 8 and the flange 3 respectively are so designed that the upper side of the clamping ring 8 is substantially merged with the upper surface of the paper 13 on the roof (not shown). A guard ring 15 extends upwardly from the clamping ring 8 to form a stop for gravel and other heavy particles. Circumferentially spaced V-slots 16 are formed in the upper side of the ring 15 to permit the flow of water therethrough.

A dome strainer 20 has a supporting ring 21 formed integral with the bottom portion thereof. The strainer 20 is so designed that the lower portion 23 thereof flares outwardly and upwardly and the spaced, radially extending slots 24 therein extend downwardly to substantially the same horizontal plane as that of the paper 13, thereby providing a drainage of water from the roof under ordinary conditions. The outer portion of the lower end 23 of the strainer 20 is spaced from the upper side of the ring 15 a predetermined distance thereby providing an annular strainer for preventing debris from passing into the pocket formed by the ring 15.

The intermediate portion 25 of the strainer 20 has circumferentially spaced, vertically extending slots 26 which permit the maximum flow of water to the reservatory 1. The intermediate portion 25 is flared inwardly in a direction substantially at right angles with the lower portion 23 of the strainer 20 to permit the maximum flow of fluid therethrough. The upper side 27 of the strainer 20 is rounded and spaced, radially extending slots 28 are formed therein. The inner portion 61 of the supporting ring 21 is rounded so as to prevent a sudden contraction of the fluid by greatly decreasing the entrance loss in pressure due to the sudden contraction of the water as in conventional drains.

The supporting ring 21 of the strainer 20 has lugs 60 extending radially outwardly therefrom which engage slots 29 on the inner edge of the clamping ring 8, the lugs 60 and slots 29 forming a bayonet joint by means of which the strainer 20 may be detachably secured to the clamping ring 8. The slots 26 in the strainer 20 are at an elevation with relation to the reservatory 1 and the top of the roof to substantially increase the head of the fluid in the reservatory 1 to carry off heavy rainfall due to cloud bursts and the like, and they are particularly useful where paper, leaves, and other material clog the drain openings formed in the lower part 23 of the strainer 20 and the opening between the lower portion of the strainer 20 and the top of the guard ring 15.

Under normal operating conditions, the drain apertures 14 in the clamping ring 8 and the slots 24 in the lower portion 23 of the strainer 20 carry off the normal rainfall and the guard ring 15 prevents gravel and like material from passing to the drain line. Likewise, the space between the lower portion 23 of the strainer 20 and the upper side of the ring 15 acts as a strainer to retard the passage of sticks, leaves, and the like and prevents them from entering the reservatory 1. Upon the occurrence of a cloud burst or an abnormal rainfall, the slots 26 in

the upper portion 25 of the strainer 20 come into play. The water passing through the slots 26 is directed through the inner side of the supporting ring 21 by the tapered lower portion 23 of the strainer 20 thereby minimizing the entrance loss in pressure. The deep reservatory 1 permits a high head of water to form therein and inasmuch as the water passing through the slots 26 in the strainer 20 must pass a substantial distance through the strainer 20 and reservatory 1 to the discharge outlet, substantially all of the air is vented from the water through the slots 28 in the strainer 20. Furthermore, because of the great distance that the water must travel through the reservatory 1 and strainer 20 and the lower lineal velocity thereof through the reservatory 1, a maximum separation of air from the water results. The tapered portion 2 in the lower part of the reservatory 1 further prevents sudden contraction of the water and permits greater flow thereof. Thus, the high hydraulic head provided by my novel drain and the susbtantial elimination of entrained air in the water increases the flow approximately twice the amount from the drain or discharge outlet 2*a* as in the best designed conventional roof drains now on the market.

In Fig. 2, I show a roof drain similar to the roof drain shown in Fig. 1 in which a flat grate is provided for use on tile or promenade deck surfaces. Fig. 2 shows a reservatory 30 having a discharge outlet 32, inwardly extending ears 33 with threaded apertures 34, and an outwardly extending flange 35. A clamping ring 36 is disposed on the flange 35 and it has apertures 37 for receiving screw bolts 38 which threadably engage the threaded apertures 34 in the ears 33. A guard ring 36*a* is disposed on the clamping ring 36 and it has circumferentially spaced V-slots 39 for the passage of fluid therethrough. The flange 35 and clamping ring 36 have offset portions 40 and 41 corresponding to each other for clamping the edges of a ply or plies 42 of roofing paper or the like. The ring 36 has threaded apertures 43 for threadably engaging locking bolts 44 to lockingly engage the lower end of a cylindrical member 45 having an outwardly flanged portion 46 adapted to align with the deck surface provided by tile or the like. The member 45 has an offset inner shoulder 47 for seating a grating 48 having the upper surface thereof in the same horizontal plane as the upper surface of the flange 46 of the member 45. In this modification of my invention, I increase the hydraulic head of the water substantially by adding the cylindrical member 45 to the upper end of the reservatory 30.

In Fig. 3, I show a modified form of flashing flange 50 on the upper end of a reservatory 51 which has the outer end thereof substantially square at 52 rather than tapered as the tapered portion 6 of flange 3 in Fig. 1. The flange 50 has a peripheral groove 53 and circumferentially spaced, threaded recesses 54 for threadably engaging screw bolts 55 which extend through an aperture 56 in a corrugated portion 57 of a steel roof.

In Fig. 4, I show an integral expansion joint which may be used in conjunction with a reservatory. The reservatory 70 has a depending cylindrical portion 71 with an inwardly directed flange portion 72 for receiving the end of a drain pipe 73. A cylindrical gland 74 is telescopically disposed in the cylindrical portion 71 and receives the end of the drain pipe 73. Packing 75 is dis-

posed between the lower portion of the gland 14 and the inwardly directed flange portion 12 of the cylindrical portion 11 to provide a seal. Screw bolts 16 extend through apertures 17 in the ears 18 on the gland 14 and threadably engage threaded recesses 19 in the upper end of the reservatory 10 to adjustably secure the gland 14. The drain pipe 13 is free to move relative to the reservatory 10 in this construction.

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, and one in which the construction and assembly is 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 roof drain comprising a reservatory having a restricted discharge outlet, means for sealingly engaging roofing paper in engagement with the upper end of said reservatory, and a dome type strainer mounted on the upper end of said reservatory having the lower portion thereof flared laterally outwardly and upwardly and the intermediate portion thereof extending upwardly and inwardly from the outer end of said lower portion, the lower portion and the intermediate portion each having circumferentially spaced, vertically extending slots, said bottom portion being spaced a predetermined distance above said means for sealingly engaging roofing paper defining an annular strainer opening.

2. A roof drain comprising a reservatory having a discharge outlet, an outwardly directed flange on the upper end of said reservatory, a clamping ring for engaging roofing paper between said flange on said revervatory and said clamping ring, means for securing said clamping ring to said reservatory, a guard ring on said clamping ring, and a dome type strainer detachably secured to said clamping ring having the lower portion thereof flared outwardly and upwardly and the intermediate portion thereof extending upwardly and inwardly from the outer end of said lower portion, the lower portion and the intermediate portion each having circumferentially spaced, vertically extending slots, said lower portion being spaced a predetermined distance above said guard ring defining an annular straining aperture.

3. A roof drain as set forth in claim 2 wherein said dome shaped strainer has a supporting ring with spaced, outwardly extending lugs for engaging cut-out portions on said clamping ring and defining a bayonet joint.

4. A roof drain comprising a relatively deep reservatory having a discharge outlet and an outwardly directed flange on the upper end thereof, a clamping ring for clamping roofing paper between said flange and said clamping ring, inwardly extending threaded lugs on said reservatory, screw bolts for engaging said threaded lugs for securing said clamping ring on to the flange of said reservatory, an upwardly extending guard ring on said clamping ring having circumferentially spaced slots, and a dome strainer detachably secured to said clamping ring having the lower portion thereof extending upwardly and outwardly and slotted and having the intermediate portion thereof extending upwardly and inwardly with circumferentially spaced, vertically extending slots, the lower portion of said straining member being spaced a predetermined distance from said guard ring defining an annular straining aperture.

5. A roof drain as set forth in claim 4 wherein said clamping ring has circumferentially spaced apertures for initial drainage of fluid.

6. A roof drain comprising a relatively deep reservatory having a restricted discharge outlet and an outwardly extending flange on the upper end thereof, a clamping ring for clamping roofing paper between said flange and said clamping ring, a guard ring extending upwardly on said clamping ring, and a strainer connected to said clamping ring having the lower portion thereof slotted and flared laterally outwardly over said clamping ring and spaced a predetermined distance above said guard ring defining a predetermined annular opening between said guard ring and said strainer.

7. A roof drain comprising a reservatory having a restricted discharge outlet, a clamping ring on said reservatory, means for securing said clamping ring on said reservatory, and a dome type strainer on said reservatory having a slotted bottom portion flared laterally outwardly over said clamping ring and upwardly, the bottom portion thereof being spaced a predetermined distance above said clamping ring defining an annular opening, and the intermediate portion of said dome type strainer extending upwardly and inwardly toward the vertical axis thereof from the outer end of said bottom portion, the intermediate portion having circumferentially spaced slots.

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