

Aug. 4, 1959

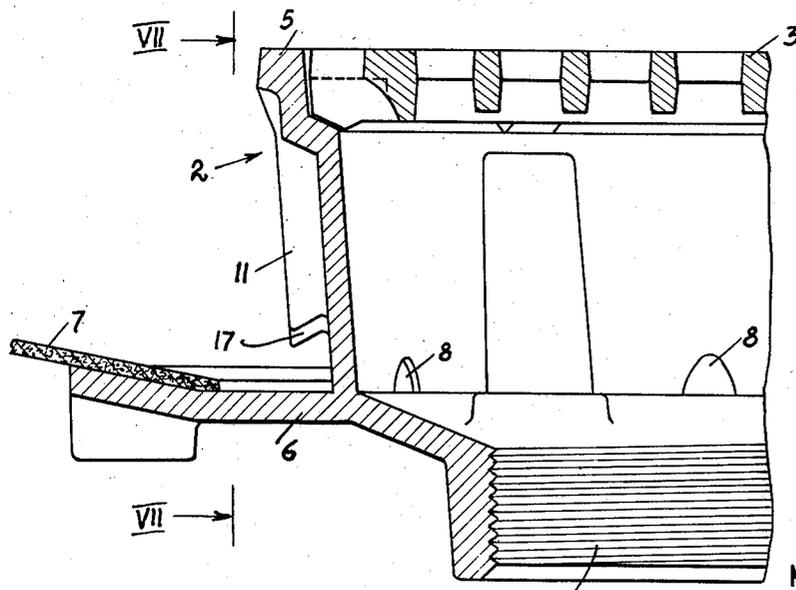
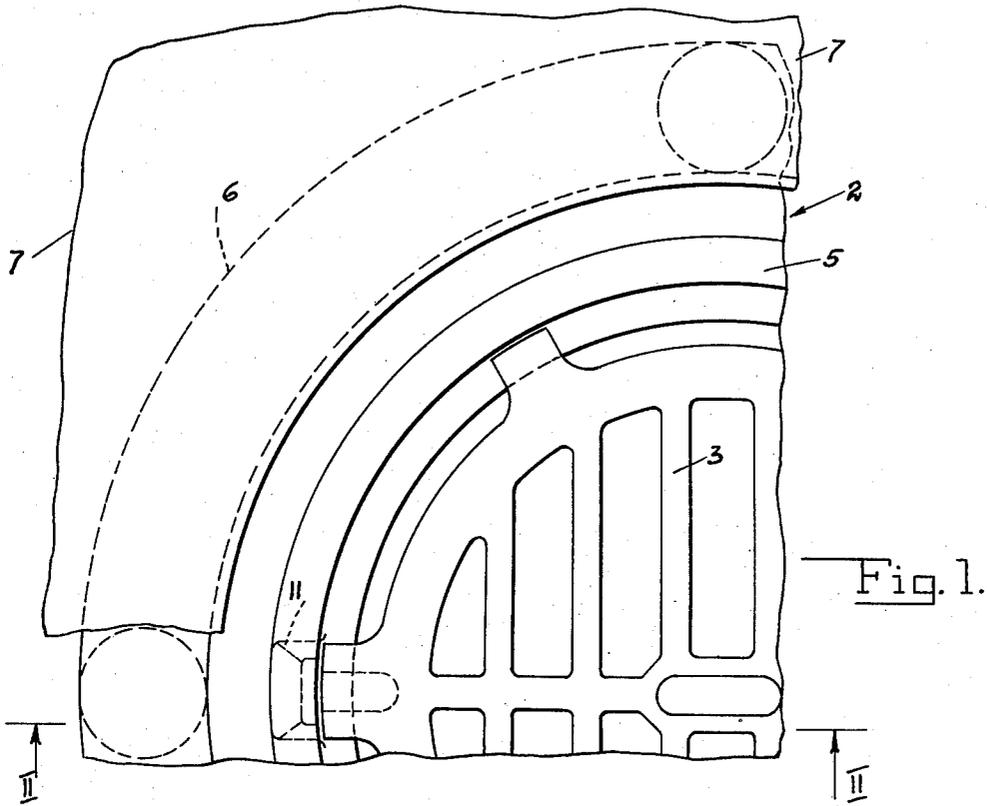
M. A. SISK

2,898,129

CLAMPING DEVICE FOR FLOOR DRAINS WITH REMOVABLE CLAMPS

Filed May 23, 1956

2 Sheets-Sheet 1



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Fig. 2.

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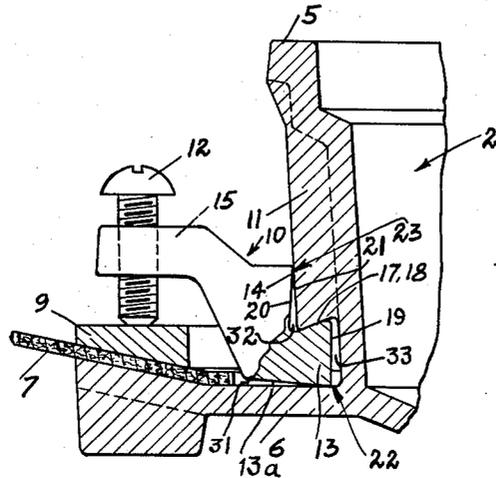


Fig. 3.

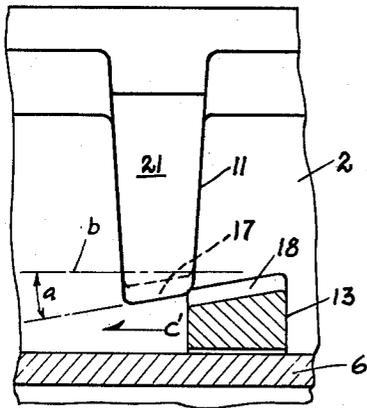


Fig. 7.

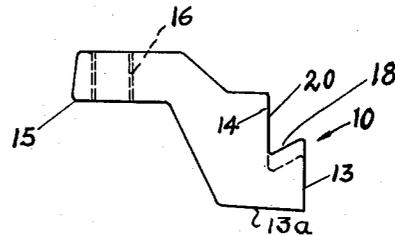


Fig. 4.

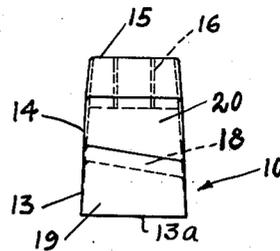


Fig. 5.

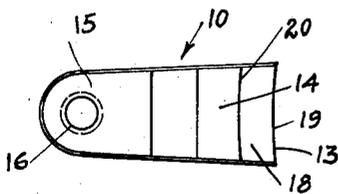


Fig. 6.

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2,898,129

**CLAMPING DEVICE FOR FLOOR DRAINS WITH
REMOVABLE CLAMPS**

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Application May 23, 1956, Serial No. 586,798

1 Claim. (Cl. 285—42)

My invention relates to surface drains, or the like, of the type which are provided with a flange to which a water-proof membrane or flashing is secured by means of a clamping ring.

It is customary to water-proof floors in which surface drains are installed, in order to prevent leakage of waste or surface water through cracks or breaks which, due to expansion and contraction of the floor, or to the settling of the building, may develop in certain floor constructions formed of such materials as concrete, tile, terazzo, or the like. For such purpose the body of a surface drain, usually formed of a cast metal, is provided with an outwardly extending circumferential flange. The flange is integral with the drain body and is located at an interval below the top or rim of the body.

The drain body is installed with its flange set flush with the top of the sub-floor structure, after which the flashing is laid over the sub-floor. A circular hole is formed in the flashing, and through this hole the portion of the drain body above the flange extends upwardly, with the margin of the flashing around said hole positioned upon the top surface of the flange. A clamping ring is secured upon the top of the said margin of the flashing, thereby uniting the flashing in a water-proof joint with the flange of the drain body. Thereafter, the floor "finish" material is applied upon the flashing and around the drain body, up to the top of the drain body rim.

More particularly, my invention consists in certain new and useful improvements in a clamp for use in securing the clamping ring in such service position, together with a lug formed on the drain body for cooperation with the clamp.

My object is to provide a clamping device including a clamp which may be inexpensively formed of cast metal, say cast iron, and yet may be more readily installed and more firmly secured by the mechanic than has been the case with pre-existing devices of this sort. And incidental to the use of my improved clamp, the cooperating portions of the drain body are simplified, whereby the molds, cores and foundry costs are minimized.

The invention will be understood upon reference to the accompanying drawings, in which an exemplary embodiment of the invention is illustrated, as follows:

Fig. 1 is a fragmentary view in top plan of a surface drain of one of the many forms in which my improved clamp finds utility;

Fig. 2 is a fragmentary view of the drain in vertical section, as seen on the plane II—II of Fig. 1, but with the clamping ring and clamp omitted from the assembly;

Fig. 3 is a view comparable with Fig. 2, showing the flashing, clamping ring and clamp in assembly with the drain;

Fig. 4 is a view in side elevation of the clamp;

Fig. 5 is a view in end elevation of the clamp, as seen from the right of Fig. 4;

Fig. 6 is a view in top elevation of the clamp; and

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Fig. 7 is a fragmentary view of the drain body, as seen on the plane VII—VII of Fig. 2, and showing in front elevation the particular form of one of the several lugs formed integrally on the drain body for cooperation with the clamp.

Referring to Figs. 1 and 2 of the drawings, a surface drain is shown fragmentarily, a quarter section of the drain being shown in this case. The drain comprises a body 2 having an open top covered by a removable grate 3. The peripheral side wall of the drain body extends downwardly from the rim 5 to an outlet 4 that is connected in usual way to a drain pipe, not shown. The drain body is installed within the body of a floor structure, in such fashion that the top or rim 5 of the drain body will ultimately lie flush with the "finish" surface of the floor (or roof, or deck, or other surface) to be drained, and in the case of the type of grate here shown the top of the grate will also lie flush with the surface to be drained.

Encompassing the drain body at a substantial interval below its rim 5 is an integral flange 6, and upon this flange a membrane or flashing 7 of known water-proof sheet material is peripherally secured. The flashing may be formed of sheet lead, sheet copper, water-proof fabric, or a built-up membrane of sheets of roofing felt united by means of pitch or tar. The flashing extends in the floor structure beneath the surface thereof to be drained, whereby any water or other liquid leaking from the floor surface downwardly is caught by the flashing, where it evaporates, or whence it flows to the surface of the flange 6 and finds escape through weep holes 8 formed in the side wall of the drain body, and thence flows into the drain pipe connected to outlet 4.

The particular details of construction of the drain body and of the grate admit of a wide variety in form, and except as hereinafter specified such details need not be relied upon to provide characteristic features of my present invention. The invention is centered in the clamping means for securing the flashing 7 in water-tight assembly upon the flange 6.

Referring to Fig. 3, the flashing 7 includes a hole of larger diameter than the body 2 of the drain, but of less diameter than the flange 6, wherefore the margin of the flashing surrounding said hole overlies the flange, as shown. A metal ring 9, of substantially equal diameter to the flange 6, overlies the margin of the flashing, and a plurality of clamps 10, secures the ring 9. Each clamp is engaged to a single lug 11 integral with the wall and rim of the drain body. Each clamp has a screw 12 that is run downwardly on top of the flashing ring and tightened, thereby pressing and securing the margin of the flashing in liquid-tight contact with the flange 6 of the drain body. While the precise number of clamps employed may exceed three, it will be understood that in this case, while only a single lug and clamp assembly is illustrated, I provide three lugs 11 that are circumferentially equi-spaced on the side wall of the drain body. I am aware that clamps for the purpose of securing clamping rings have been known and used heretofore in the art, but my invention consists, as already mentioned, in certain new and useful improvements in such clamps, as follows:

Referring to Figs. 4, 5, 6 and 7, each of my clamps comprises a rear toe portion 13, a middle breast portion 14 extending above the toe portion, and a front arm portion 15 extending above and beyond the breast portion. A threaded hole 16 is provided in the arm portion 15 to receive a clamping screw 12. Each of the lugs 11 integrally cast on the side wall of the drain body has at its lower end a clamp-receiving surface 17 which is located at a substantial interval above and overhangs the flange 6. The surface 17 is doubly inclined; that is, as seen in

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front elevation (Fig. 7) the surface 17 is inclined at an angle a to a normal circumferential line b . The surface 17 is also inclined from its tip upwardly to the side wall of the drain body, as seen in side elevation or in section (Fig. 3), the latter inclination giving a reentrant or half-dovetail form to the bottom of the lug for engagement by a complementary, half-dovetail sectioned upwardly-open hook portion having a surface 18 on the toe 13 of the clamp, as seen in Fig. 3. The surface 18 of said hook portion on the toe of the clamp is also doubly inclined, as seen in cross section (Figs. 7 and 3), to correspond with the similar inclinations of the surface 17 at the lower end of the lug 11. The toe portion 13 of the clamp is shown diagrammatically in vertical section in Fig. 7, where a comparison of the inclined surface 18 on the toe portion 13 with the inclined surface 17 at the lower end of lug 11 will reveal the cooperative forms of these portions. The vertical face 19 of the toe portion 13 (Fig. 6) is curved, to correspond to the curvature of the side wall of the drain body 2, while the vertical face 20 of the breast portion 14 of the clamp may also be curved, to match the outer face 21 of the lug 11 (Fig. 7) which may be curved to parallelism with the said side wall. In the event that the drain body is of polygonal form in plan, with the side wall of the drain body comprised of a plurality of flat wall sections, the faces 19 and 20 of the clamp may, of course, be flat.

In making an installation, the drain body is arranged with its flange 6 seated upon the sub-floor, through which sub-floor a drain pipe extends and is united to the outlet 4 of the drain body. The flashing 7 is then laid upon the sub-floor, with the upper portion of the drain body extended upwardly through the hole in the flashing 7, and with the margin of the flashing overlying the flange 6. If desired a coating of water-proof cement may be applied between the top surface of the flange 6 and the margin of the flashing seated thereon. The installation is such that the rim 5 of said drain body is positioned level with the plane of the final floor surface or finish later to be applied. The ring 9 is lowered upon the margin of the flashing, and then three clamps 10 are engaged, one to each of the three lugs 11 on the drain body, and the screws 12 of the clamps are turned into tight engagement with top of the ring 9, thereby forcing and securing the margin of the flashing in liquid-tight engagement with the top of the flange 6. The ease with which the three clamps are installed and secured will be understood upon a consideration of the installation of one of the clamps, as follows:

When the ring 9 has been placed on the margin of the flashing 7, a clamp 10 is placed on the right-hand side of the lug 11 as seen in Fig. 7, with the toe portion 13 of the clamp supported on the top surface of the flange 6 which is exposed within the margin of the flashing, as seen in Fig. 3. At this stage of the procedure the bottom surface 13a of the toe portion 13 bears substantially flat upon the flange 6, with the body of the clamp tilted downwardly at space 31, and with screw 12 withdrawn upwardly in the arm portion 15 of the clamp. Then the toe portion 13 is inserted under the lower end of the lug 11, and the clamp is tilted upwardly, as at 31, until it bears properly upon the flange 6, as at 22, and upon the lug 11, as at 23, with the screw 12 positioned to bear perpendicularly upon the clamping ring 9, and with the hook portion 13 in latched engagement with the lower end of lug 11, as seen in Fig. 3. Finally, while being held in such position, the clamp is thrust or tapped with a hammer laterally into wedged engagement with the lug 11; that is, the clamp is forced in the direction of the arrow c' in Fig. 7, until the inclined surface 18 of the hook portion of the clamp becomes latched and wedged in tight engagement with the inclined surface 17 on the lug 11. Due to the spaces 31, 32 and 33, the clamp 10 may be adjusted or shifted variously upon its bearing points 17, 22 and 23, in order to level the arm portion 15 and thus

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align the screw 12 vertically, whereby said screw will bear perpendicularly upon the top of the clamping ring 6. With the hook portion of the clamp thus secured in final wedged engagement between the top surface of the flange 6 and the end of the lug 11, as will be understood upon reference to Figs. 3 and 7, the screw 12 is run downwardly and tightened against the top of the ring 9. As seen in Fig. 3, the toe portion 13 bears downwardly, as at 22, upon the flange 6, and the breast portion 14 of the clamp bears inwardly, as at 23, against the body of lug 11. By virtue of the bearing engagement at the points 22 and 23, together with the latched and wedged engagement of the hook portion of the clamp with the lower end of the lug 11, absolute security of engagement of the clamp with the drain body is obtained, and the more the screw 12 is tightened the greater is the locked engagement of the clamp with the drain body.

Each of three clamps is installed in the manner described, whereby the ring 9 is clamped to provide the desired water-tight engagement of the flashing 7 with the flange 6.

The angle a of the inclined end of the lug 11 (Fig. 7) and the identical angle of the surface 18 on the toe portion of the clamp is less than the angle of slip of the material of which the clamp 10 and lug 11 is formed—rough cast iron in this case. The angle a may be about $8\frac{1}{2}$ degrees, as it is shown to be in the drawings. The transverse inclination of the hook portion 13 of the clamp 10, complementary to the lower end of the lug 11, permits the hook portion to travel transversely across the lower end of the lug 11 before it enters into tight wedged engagement therewith, thus providing compensation for variations in the engaging surfaces of lug 11, clamp 10 and flange 6, such variations as may be created in manufacture by imperfections in the sand molds or by undue shrinkage of the castings.

Various modifications in the structure of my present invention may be made within the essence of the invention defined in the appended claim. For facility of expression of the appended claim, the half-dovetail shaped end of the toe portion 13 of the clamp will be referred to as a hook portion which enters first into a latched engagement and finally into a wedged engagement with the lower end of the associate lug 11 on the drain body. As viewed longitudinally of the clamp body (Fig. 4), or as viewed in longitudinal section (Fig. 3), the hook portion is inclined from its tip downwardly and outwardly to the breast portion 14 of the clamp for latched engagement with the end of lug 11. The hook portion, viewed diagrammatically in vertical section in Fig. 7, as well as the main body of the clamp itself, is of substantial transverse extent, and in the direction of such transverse extent the effective surface of the hook portion is inclined (as indicated by the angle a in Fig. 7) for final wedged engagement with the complementary end of lug 11. For further facility of expression in the appended claim, the complementary half-dovetail shaped rabbet at the lower end of the lug 11 will be referred to as a recess, adapted first for latched engagement and finally for wedged engagement with the hook portion 13 of the associate clamp 10. That is, as shown in cross-section in Fig. 3, the lower end of the lug 11 is inclined from its outer edge or tip upwardly and inwardly to the side wall of the drain body for latched engagement with the complementary hook portion of the clamp 10. The lower end of lug 11, as viewed in front elevation in Fig. 7, is of substantial transverse extent and in the direction of such transverse extent the effective surface of the lug is inclined for final wedged engagement with the complementary hook portion of clamp 10.

In order to realize the value of the improvements herein described, the following manufacturing details should be mentioned: The drain body is cast in a mold consisting of a cope (female) section, and a drag (male) section,

together with a ring core which sets within a core print formed by the pattern within said drag section, as well known in the art. The ring core is disposed wholly within the drag section and extends downwardly to the parting line between the drag and cope sections.

To provide draft for the molding and casting process, the side wall of the drain body and the face and sides of the lug 11 are inclined inwardly and downwardly from the rim 5.

The ring core is formed of sand, molded within a core box of conventional design.

Ordinarily the ring core forms only the exterior of the drain body side wall and the top of the flange 6, but in accordance with my invention the ring core also forms the lugs 11 integral on said side wall, as will be seen later.

The core box, usually constructed of wood or metal, has inner core forming surfaces which correspond with the top surface of the flange 6 and with the inclined exterior surfaces of the drain body side wall. Inclined protuberances, corresponding to lugs 11 on the drain body, are formed on the core box. In turn, the protuberances form complementary recesses within the molded ring core, and said recesses provide means whereby the lugs 11 are cast integral on the side wall of the drain body, without employing separate cores therefor.

Since all vertical inner surfaces of the core box are inclined, the ring core may be molded in the core box, and thereafter the core box may be withdrawn from the ring core without disturbing the sand surfaces of the core.

The weep holes 8 are also formed or cast in the side wall of the drain body by the ring core, and for this purpose the core box is provided with recesses corresponding to said weep holes. In turn, the recesses form complementary protuberances on the ring core, and the protuberances form the weep holes in the drain body castings.

Any desired number of lugs 11 and weep holes 8 may be provided by the ring core.

The formation of the recess, or clamp receiving surface, at the lower end of the lug 11 is such that each clamp is secured upon the drain body by a single lug.

This feature is a distinct improvement over the prior art wherein each clamp is secured upon the drain body by an engagement between a set of two or more lugs, so arranged as to prevent drawing the core box or the pattern from the sand if the lugs were formed on said core box or pattern.

Consequently, each set of lugs for each clamp must be formed by a separate core, which is set in a core print formed in either the ring core or in the drag section of the mold. Thus, a number of additional cores must be provided and set in the mold for casting each drain body, entailing considerable additional manufacturing cost, together with shifting of these additional cores in the mold, which tend to form the lugs imperfectly for proper engagement with clamp.

As seen in Fig. 3, the bottom face 13a of the clamp 10 is inclined downwardly toward the rear face 19 to a point 22, and said point bears downwardly upon the top surface of the clamping ring 6, thus providing a space 31 which diverges outwardly from said bearing point 22. The face

20 of the breast portion 14 is vertical and bears inwardly upon the outer face 21 of lug 11 at a point 23, said outer face being inclined inwardly and downwardly, thus providing a space 32 which diverges downwardly from said bearing point 23. The vertical rear face 19 of the toe portion 13 is spaced apart from the inclined side wall of the drain body, thus providing a space 33 between said rear face and said side wall.

I claim:

10 In a surface drain comprising a body formed with a peripheral side wall extending from an inlet rim to an outlet, an external integrally formed flange extending circumferentially of said side wall at a substantial interval below said rim and having a flat annular portion extending
15 a substantial radial distance from said side wall and a radially outward and upwardly sloping top clamping surface outward from said flat portion, a plurality of circumferentially spaced lugs integrally formed on said side wall and extending outwardly therefrom, each lug having a
20 lower end surface overhanging said flange and disposed an interval above said flange, said lug lower end surface sloping downwardly from one side of said lug to the other and having an inwardly upwardly inclined bottom
25 face, a ring for marginally clamping a flashing membrane upon said top clamping surface of said flange, a clamp cooperating with each said lug and the clamping ring, each clamp having an upwardly extending breast portion overlapping the associated lug for bearing engagement therewith, a rearwardly extending toe portion on said
30 breast portion underlying said lug bottom portion, the upper face of said toe portion having an inclined hook portion substantially complementary to said lower lug surface and adapted to engage said lower lug for slidable clamping engagement with said lug bottom face and of
35 less width than the spacing between said lugs, the inner face of said toe portion being disposed beneath said lug in spaced relation to said peripheral side wall, the bottom face of said toe portion being substantially flat and of less radial width than said flat portion of said flange and having sliding bearing engagement with said flange
40 beneath said lug whereby said clamp may be laterally inserted between said lower lug surface and said flat flange face for interlocking engagement therebetween, an arm portion extending outwardly from the front of said breast portion and an adjustable member extending downwardly from adjacent the outer end of said arm portion in clamping
45 engagement with said ring.

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