

Liquid evacuation device and corresponding liquid guiding device.

The present invention relates to a device for discharging a liquid, in particular rainwater, of the type comprising a discharge pipe which extends along an axis and which forms a discharge inlet, a collection vessel which extends around the discharge inlet and which is provided with a collar, and a liquid guiding device which comprises a covering plate, the covering plate comprising a solid central zone which covers the discharge inlet.

It can be used in particular for devices for discharging rainwater which are installed on horizontal and/or low-pitched roofs.

Document FR-A-2 337 237 describes a water discharge device which is provided with an anti-vortex device. This anti-vortex device is constituted by a cylindrical wall which is provided with a plurality of water inlet holes. The upper end of the cylinder is closed by a solid circular plate in order to prevent air from entering the discharge pipe. The diameter of the cylinder is greater than the diameter of the discharge pipe.

Document GB-A-2,269,402 describes a water discharge device which is provided with an anti-vortex device and a filtering grid. The anti-vortex device comprises three partitions which are arranged radially in a discharge vessel and a substantially conical plate which is arranged above the inlet of the discharge pipe.

Another water discharge device is known from document FR-A-2 747 144. This device comprises an anti-vortex device which is provided with vanes which are arranged radially relative to the axis of the discharge pipe.

The liquid discharge devices of the prior art mentioned above have a low flow rate for given dimensions. Furthermore, they are difficult to produce and have a high cost price, in particular owing to the numerous components from which they are constituted.

Based on this prior art, the object of the invention is to provide a liquid discharge device which has a high liquid flow rate for given dimensions.

To this end, the invention relates to a discharge device of the above-mentioned type, characterised in that the covering plate comprises a peripheral zone which surrounds the central zone and which extends facing the collar, in which peripheral zone there is provided at least one liquid discharge through-hole which delimits an edge, in that for each hole at least one liquid guiding element is provided in the annular space between the covering plate and the collar, the guiding element extending along a portion of the edge and comprising a radial branch which extends substantially radially relative to the axis and a circumferential branch which is an extension of the radial branch and which extends substantially circumferentially relative to the axis.

According to specific embodiments, the assembly according to the invention comprises one or more of the following features:

- for each hole two liquid guiding elements are provided in the annular space between the covering plate and the collar

and extend along a portion of the edge, at each circumferential side of the discharge hole, and each guiding element comprises a radial branch which extends substantially radially and a circumferential branch which is an extension of the radial branch and which extends substantially circumferentially relative to the axis X-X;

- the circumferential branch of the or each guiding element is an extension of the radial branch at the radially inner side;
- the length of the radial branch is substantially identical to the length of the circumferential branch;
- the guiding elements extend from the surface of the covering plate as far as the surface of the collar;
- the discharge hole has an oblong shape whose circumferential extent is greater than the radial extent;
- the covering plate comprises at least two, preferably three discharge holes;
- the covering plate comprises filtering means which are arranged at the side of the plate opposite the collection vessel and which extend above the or each discharge hole;
- the filtering means comprise ribs which extend radially relative to the axis;
- the ribs have a radial width which is greater than a radial width of the discharge hole, in particular between 1.5 and 2.5 times the radial width of this hole;
- the ribs have an axial height which is greater than an axial height of the liquid guiding elements, in particular between 1.5 and 4 times this height;
- the ribs comprise cells which are open towards the discharge hole, in particular circumferentially extending through-holes;
- the ribs comprise lateral ribs which are ribs which are located at the circumferential ends of the discharge holes,

and the lateral ribs comprise cells whose axial height is less than the axial height of the other cells;

- a radial passage for non-filtered liquid extends between two ends of the discharge hole in order to allow liquid to flow towards the central zone; and
- the liquid guiding device and the or each liquid guiding element are produced in one piece, preferably integrally and in particular by means of moulding.

The invention further relates to a guiding device for a discharge device as defined above.

The invention will be better understood from a reading of the following description, given purely by way of example and with reference to the appended drawings, in which:

- Figure 1 is a broken-away axial section along line I-I of Figure 2 of a water discharge device according to the invention;
- Figure 2 is a plan view of the discharge device according to the invention;
- Figure 3 is a bottom view of the liquid guiding device of the device according to the invention; and
- Figure 4 is a perspective view of the guiding device of Figure 3.

Figure 1 illustrates a liquid discharge device which is generally designated 2.

The device 2 is installed on a horizontal or low-pitched roof 4 of a tower block and serves to discharge rainwater which accumulates on this roof when it exceeds a first level N1.

The device 2 comprises a discharge pipe 6, a collection vessel 8 and a liquid guiding device 10.

The discharge pipe 6 extends vertically along a vertical axis X-X and delimits, at the upper end thereof, a circular discharge inlet 12 having a diameter D_1 .

In the following, the terms "axial", "radial" and "circumferential" will be used in relation to the axis X-X.

The collection vessel 8 comprises a basin 14. The discharge inlet 12 opens at the centre of the base of the basin 14. A collar 16 is connected to the upper edge of the basin 14. The collar 16 extends to the level N1 and forms an annular surface which has an inner diameter D_2 and an outer diameter D_3 .

Three threaded rods 18 protrude on the surface of the collar 16, at the side opposite the pipe 6.

The pipe 6 and the collection vessel 8 are generated by means of revolution about the axis X-X.

The guiding device 10 serves to guide the water into the discharge inlet 12 with no air being included, and to retain foreign matter, such as leaves.

The guiding device 10 comprises a planar circular covering plate 20. It extends perpendicularly relative to the axis X-X at a level N2. The diameter of the plate 20 is identical to the outer diameter D_3 of the collar 16. The plate 20 is spaced-apart from the collar 16 by a distance $\underline{d}$. The distance $\underline{d}$ is the filtering distance which is, for example, 15 mm. In

this manner, the objects whose smallest dimension is greater than $\underline{d}$ are retained. The edges of the plate 20 and of the collar 16 together delimit a flow mouth 21 which extends circumferentially around the axis X-X.

As illustrated in Figure 2, the plate 20 is constituted by a central zone 22 which extends away from the discharge inlet 12 and a peripheral zone 24 which surrounds the central zone 22. The central zone 22 is formed by a solid wall and has a diameter which is equal to the diameter D2.

The peripheral zone 24 is provided with three discharge through-holes 26 and three fixing holes 28 (Figure 3).

The discharge holes 26 are located entirely facing the collar 16 and have an oblong shape which extends along the periphery of the plate 20. Viewed axially, each hole has a circular ring shape in cross-section. Each hole has a constant width and has an arced shape which is centred on the axis X-X. The holes 26 are distributed regularly about the axis X-X and each hole extends over the same angular range α which is 90° . The discharge holes 26 preferably extend in total over an angular range of between 240° and 300° . The width L1 measured radially from the hole 26 is less than the radial width $\frac{D3-D2}{2}$ of the collar 16. The circumference designated 30 of each hole 26 is constituted by two radial end portions 32, 34 and an outer circumferential portion 36 and inner circumferential portion 38.

Liquid guiding projections 40 protrude from the face of the plate 20 directed towards the vessel 8. They extend as far as the collar 16 (Figure 1) through the mouth 21. As illustrated in Figure 3, each hole 26 is provided with two of these

projections 40. Each projection 40 comprises a radial branch 44 which extends along the corresponding radial end portion 32, 34 and a circumferential branch 48 which extends along a portion of the inner circumferential periphery portion 38. The circumferential branch 48 is adjacent to the radial branch 44. The length of these two branches 44, 48 is substantially identical so that each projection 40a, viewed axially, is generally L-shaped.

The guiding device 10 further comprises filtering means which are suitable for filtering the liquid which flows in the holes 26. As illustrated in Figures 2 and 4, these filtering means comprise a plurality of radial ribs 50 which are arranged on the plate 20 and which protrude axially from the side opposite the vessel 8.

The ribs 50 extend above the discharge holes 26 and at a mutual distance $\underline{d}$, at their radially outer ends. This distance $\underline{d}$ is therefore equal to the filtering distance. The radial width L_2 of the ribs 50 is preferably between 1.5 times and 2.5 times the radial width L_1 of the discharge hole 26. In practice, the radial width L_2 is substantially twice the width L_1 .

The axial height H of each rib 50 is between 1.5 times and 4 times the axial height $\underline{d}$ of the projections 40. The axial upper end of the ribs 50 defines a level N_3 .

Each rib 50 is provided with a cell 52 which is axially open towards the discharge hole and which is a through-hole circumferentially.

The ribs 50 of each hole 26 comprise two lateral ribs 50A which are arranged at the circumferential end of each hole 26. The height of the cell 52A of each of these ribs 50A is equal to $\underline{d}$, and therefore identical to the filtering distance.

The height of the cells 52A of these lateral ribs is less than the height of the cells 52 of the ribs 50 which are located between the lateral ribs 50A.

The cells 52, 52A allow the quantity of material required to produce the guiding device 10 to be reduced.

The lateral ribs 52A of two adjacent holes 26 are arranged at a mutual distance which is greater than the filtering distance $\underline{d}$. The guiding device thus forms a radial liquid passage 54 which is not provided with filtering means. When the liquid level is between levels N2 and N3, non-filtered liquid can flow in the central zone 22 and is filtered by the radially inner portion of the ribs 50.

The device 2 further comprises three nuts 60 which are screwed onto the rods 18 and which clamp the guiding device against the collar 16.

The guiding device 10 is produced by means of moulding in one piece.

The discharge device is produced in the following manner:

The guiding device 10 is moulded in one piece.

The collection vessel 8 is welded to the upper end of the discharge pipe 6.

The guiding device 10 is then positioned on the collar 16 and fixed thereto by means of the nuts 60.

It has been found that the assembly 2 is simple and quick to assemble.

The discharge assembly operates in the following manner.

The ribs 50 form a large filtering surface.

When the water level is above the collar 16 and below the plate 20, therefore, between level N1 and level N2, the water flows in a laminar manner between the collar 16 and the plate 20 and is discharged via the inlet 12. In this operating state, the discharge holes 26 and the ribs 50 are not in contact with the water.

When the water level is above the plate 20 but below the upper end of the ribs 50, therefore between levels N2 and N3, a first portion E1 of the water flows radially between the collar 16 and the plate 20. A second portion E2 flows radially inwards through the gaps between the ribs 50. A third portion E3 flows radially inwards through the passages 54 then radially outwards through the gaps between the ribs 50.

After having passed through the gaps between the ribs 50, the water flows axially through the discharge holes 26, then is diverted radially towards the axis X-X (arrow E).

If the water level is higher than level E3, the side of each rib 50 located opposite the plate 20 also contributes to the filtering.

The radial branches 44 of the projections 40 prevent the production of a vortex, whilst the circumferential branches 48 lead to a uniform distribution of the water pressure on the plate 20. Consequently, the water flows in a laminar manner between the plate 20 and the collar 16 and does not introduce air into the pipe 6. The device 2 therefore has a function which is referred to as siphon-like.

The device 2 according to the invention is simple to produce and assemble owing to the guiding device 10 being produced in one piece. Furthermore, the device 2 allows a high water flow rate to be achieved for a given diameter of the pipe owing to the laminar flow of the liquid and the large filtering surface.

The arrangement of the ribs 50 further facilitates the cleaning of the device.

Furthermore, the liquid guiding device 10 according to the invention allows pipes of different diameters to be used whilst maintaining good discharge properties.

CLAIMS

1. Device for discharging a liquid, in particular rainwater, of the type comprising a discharge pipe (6) which extends along an axis (X-X) and which forms a discharge inlet (12), a collection vessel (8) which extends around the discharge inlet (12) and which is provided with a collar (16), and a liquid guiding device (10) which comprises a covering plate (20), the covering plate (20) comprising a solid central zone (22) which covers the discharge inlet (12), characterised in that the covering plate (20) comprises a peripheral zone (24) which surrounds the central zone (22) and which extends facing the collar (16), in which peripheral zone (24) there is provided at least one liquid discharge through-hole (26) which delimits an edge (30), in that for each hole (26) at least one liquid guiding element (40) is provided in the annular space between the covering plate (20) and the collar (16), the guiding element (40) extending along a portion of the edge (30) and comprising a radial branch (44) which extends substantially radially relative to the axis (X-X) and a circumferential branch (48) which is an extension of the radial branch (44) and which extends substantially circumferentially relative to the axis (X-X).

2. Discharge device according to claim 1, characterised in that for each hole (26) two liquid guiding elements (40) are provided in the annular space between the covering plate (20) and the collar (16) and extend along a portion of the edge (30), at each circumferential side of the discharge hole (26), and in that each guiding element (40) comprises a radial branch (44) which extends substantially radially and a circumferential branch (48) which is an extension of the

radial branch (44) and which extends substantially circumferentially relative to the axis X-X.

3. Discharge device according to claim 1 or 2, characterised in that the circumferential branch (48) of the or each guiding element is an extension of the radial branch (44) at the radially inner side.

4. Discharge device according to any one of claims 1 to 3, characterised in that the length of the radial branch (44) is substantially identical to the length of the circumferential branch (48).

5. Discharge device according to any one of claims 1 to 4, characterised in that the guiding elements (40) extend from the surface of the covering plate (20) as far as the surface of the collar (16).

6. Discharge device according to any one of claims 1 to 5, characterised in that the discharge hole (26) has an oblong shape whose circumferential extent is greater than the radial extent.

7. Discharge device according to any one of claims 1 to 6, characterised in that the covering plate (20) comprises at least two, preferably three discharge holes (26).

8. Discharge device according to any one of claims 1 to 7, characterised in that the covering plate (20) comprises filtering means (50) which are arranged at the side of the plate (20) opposite the collection vessel (8) and which extend above the or each discharge hole (26).

9. Discharge device according to claim 8, characterised in that the filtering means comprise ribs (50, 50A) which extend radially relative to the axis (X-X).

10. Discharge device according to claim 9, characterised in that the ribs (50, 50A) have a radial width (L2) which is greater than a radial width (L1) of the discharge hole (26), in particular between 1.5 and 2.5 times the radial width of this hole.

11. Discharge device according to claim 9 or 10, characterised in that the ribs (50, 50A) have an axial height (H) which is greater than an axial height (d) of the liquid guiding elements (40), in particular between 1.5 and 4 times this height.

12. Discharge device according to any one of claims 9 to 11, characterised in that the ribs (50, 50A) comprise cells (52, 52A) which are open towards the discharge hole (26), in particular circumferentially extending through-holes.

13. Discharge device according to claim 12, characterised in that the ribs comprise lateral ribs (50A) which are ribs which are located at the circumferential ends of the discharge holes (26), and in that the lateral ribs (50A) comprise cells (52A) whose axial height (d) is less than the axial height of the other cells (52).

14. Discharge device according to any one of claims 8 to 13, characterised in that a radial passage (54) for non-filtered liquid extends between two ends of the discharge hole (26) in order to allow liquid to flow towards the central zone (22).

15. Discharge device according to any one of claims 1 to 14, characterised in that the liquid guiding device (10) and the or each liquid guiding element (40) are produced in one piece, preferably integrally and in particular by means of moulding.

16. Liquid guiding device (10) comprising a covering plate (20), the covering plate (20) comprising a solid central zone (22) which is intended to cover the discharge inlet (12) of a discharge pipe (8), characterised in that the covering plate (20) comprises a peripheral zone (24) which surrounds the central zone (22) and which is suitable for extending facing a collar (16) of a collection vessel (8), in which peripheral zone (24) there is provided at least one liquid discharge through-hole (26) which delimits an edge (30), in that for each hole (26), at least one liquid guiding element (40) is provided, the guiding element (40) extending along a portion of the edge (30) and comprising a radial branch (44) which is suitable for extending substantially radially relative to an axis (X-X) of the discharge pipe (8) and a circumferential branch (48) which is an extension of the radial branch (44) and which is suitable for extending substantially circumferentially relative to the axis (X-X).