

(19)



(11)

EP 4 116 520 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
11.01.2023 Bulletin 2023/02

(51) International Patent Classification (IPC):
E04H 4/12 (2006.01)

(21) Application number: **21382603.5**

(52) Cooperative Patent Classification (CPC):
E04H 4/1272

(22) Date of filing: **06.07.2021**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(71) Applicant: **SACOPA, S.A.U.**
17854 Sant Jaume de Llierca (Girona) (ES)

(72) Inventor: **RAMÍREZ QUINTANA, Marc**
17854 SANT JAUME DE LLIERCA (Girona) (ES)

(74) Representative: **Herrero & Asociados, S.L.**
Cedaceros, 1
28014 Madrid (ES)

(54) **GATE FOR THE SUCTION OF A SWIMMING POOL SKIMMER AND SUCTION MOUTH INCLUDING SUCH GATE**

(57) Gate for the suction mouth (4) of a skimmer (7) of a swimming pool and the suction mouth (4) comprising said gate, which constitute an optimal solution at the hydrodynamic level by allowing, on the one hand, a laminar flow of water towards the interior of the skimmer and, on the other hand, by preventing the return of dirt to the basin, which basically comprises a first portion (1) and a second portion (2) articulated with each other, wherein

the first portion (1) comprises means of connection (3) to the suction mouth (4) and some articulation points (5) for its articulated connection to the second portion (2) and wherein the second portion (2) comprises an upper face and a lower face, a first end (2') with articulation points (5) complementary to the articulation points of the first portion (1) and a second end (2'') with a free edge (6).

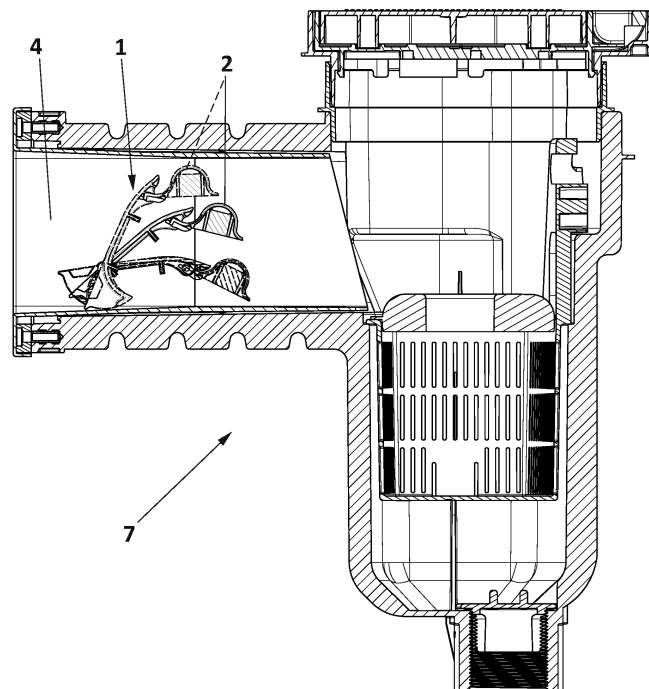


FIG. 1

EP 4 116 520 A1

Description

Technical field of the invention

[0001] The present invention corresponds, as its title indicates, to the technical field of swimming pools, specifically to that of swimming pools under construction or swimming pools having sizes and characteristics such that they require frequent filtering of the surface or sheet of water found in the top of the basin.

[0002] More specifically, the gate of the invention is aimed at those suction mouths installed permanently on the side wall of the swimming pool itself, not those called floating ones that practically do not need installation because they are removable and are generally used in small-sized and/or also removable swimming pools.

Background of the Invention

[0003] The increasing use of swimming pools is known all over the world, both the larger ones installed within sports parks or public or private sports areas, hotels, etc., as well as the smaller swimming pools installed in neighboring communities or even for private use of a single home.

[0004] As a consequence of this, the demands arising therefrom in terms of cleanliness, convenience, safety and comfort are also increasing. Thus, this requirement also extends as regards the suction and filtering systems of the water from the surface or, in other words, from the sheet of water that is in the upper part of the basin when it is full.

[0005] These suction and filtering systems are commonly known as "skimmers" according to their Anglo-Saxon name, which could be translated as "skimmers".

[0006] As has been pointed out, these skimmers have a very important suction and retention function for residues, although their main function is to "suck" the water from the surface of the swimming pool for filtration.

[0007] The skimmers are formed, in a general and schematic way, by a hollow body in the shape of an L inclined or tilted where in its vertical branch of greater length, which is embedded or housed in the wall that surrounds the swimming pool, a suction pump is located and, in the horizontal branch, with access to the swimming pool basin, the suction mouth through which the water to be filtered passes. In addition, at an intermediate point of the pathway between the end of the horizontal branch where the swimming pool water enters and the lower end of the vertical branch through which it is sucked out by the pump, a hamper- or basket-shaped filter is placed to collect the objects and dirt that had been sucked in such as hair, leaves, etc. In this way, the water extracted from the swimming pool and treated in the filtration system, will be sent back to the basin through another conduit after conditioning and/or treatment.

[0008] Thus, the larger the dimensions of the swimming pools, the number of these skimmers also increases,

being recommended, according to some manufacturers, to install at least one every 25 m² of water surface. Likewise, these skimmers are available in various sizes, which in turn are determined by their suction capacity in m³/h.

[0009] However, regardless of their size or their lamination capacity, all skimmers have their suction mouth, through which the water from the basin passes inside to be treated, with a floating gate that closes said mouth and which is in charge of regulating its passage so that, as has been said, only allows the passage of water that is on the surface, that is, of the sheet of water that is in the upper part of the basin.

[0010] More specifically, for a correct operation of the skimmer and therefore for a more efficient cleaning of the surface, it is recommended that the swimming pool water level be at a height such that it is between 1/2 and 2/3 the height of the suction mouth.

[0011] A good number of the aforementioned gates are known in the state of the art, generally formed by a rectangular plate of a material with floating capacity such as plastic, which is hinged to the lower part of the suction mouth, submerged in the water. Said hinge allows it to tilt towards the interior of the skimmer to a greater or lesser extent depending on the water level and to allow the passage of the flow of water through said mouth produced by the suction pump.

[0012] The suction mouth usually has upper lower stops opposite the hinge points that prevent the gates from tilting towards the outside of the skimmer, which would allow the retained dirt to return to the basin, since that is precisely the function of the gates, allowing the passage of the sheet of water into the skimmer for treatment when the suction pump is in operation but to prevent, as far as possible, that once said suction pump is turned off, the dirt that remained inside from going back into the basin.

[0013] In the state of the art, this type of system is well known and is widely used. However, they suffer from a series of drawbacks that prevent their use or operation from being optimal.

[0014] For example, one of the main drawbacks of current gates is that they produce an annoying noise or knocking against the referred upper stops of the suction mouth when the water is agitated and bounces inside the skimmer, returning towards the inlet.

[0015] Likewise, the current gates also suffer from the drawback of their poor response in terms of adaptation to fluctuations in the water level. In this sense, document US6453483 is known, whose gate comprises two parts, said parts being hinged together, which gives the assembly a better response thanks to having different degrees of freedom between them and greater capacity to adapt to the water level, which also reduces the amount of particles or dirt that returns to the basin.

[0016] However, all known gates suffer from poor hydrodynamic behavior as they do not guarantee a continuous uniformity of the passage of water through their free

upper vertex, that is, they do not achieve an optimal flow into the skimmer such that it carries the greatest amount of particles towards the filter, because due to their structure they create turbulences that make it difficult to retain the suspended particles that are intended to be filtered on the side of the filter.

[0017] For this reason, in the state of the art a gate for suction mouths is necessary to solve all the aforementioned inconveniences efficiently.

Description of the Invention

[0018] The gate for the suction mouth of a skimmer of a swimming pool of the present invention, as well as the suction mouth that comprises said gate solve the problems of the state of the art mentioned above, constituting an optimal solution at a hydrodynamic level that, on the one hand, allows a laminar flow of water towards the filter area, adapting to the height of the water surface when the pump is running and, on the other hand, when the pump stops and there is no flow of water into the skimmer, avoids or minimizes to the maximum the return of dirt to the basin while avoiding the annoying noises produced by the knocking of the gate in the suction mouth.

[0019] Specifically, the gate of the invention comprises at least two portions, a first portion and a second portion articulated to each other wherein:

- the first portion comprises means of connection to the suction mouth and some articulation points for its articulated connection to the second portion; and wherein
- the second portion forms a flap with an upper face and a lower face, a first end comprising articulation points complementary to the articulation points of the first portion and a second end comprising a free edge.

[0020] Furthermore, said second portion in turn comprises, between its first and second ends and on its upper face, at least one area of greater height than that of said ends and which has a rounded cross portion, in such a way that, when there is a flow towards the interior of the skimmer, said area of greater rounded height allows to obtain a laminar flow by facilitating the circulation or the passage of water over it, where said laminar flow favors an optimal drag of the particles towards the interior.

[0021] This special configuration of the rounded area of the second portion also makes it possible to obtain an additional advantage that improves hydrodynamics that is added to the fact of improving the laminar behavior of the sheet of water that circulates over it. Specifically, the fact that the sheet of water, as it passes through said rounded area, then descends at a higher speed, aided by the slope of said area, allows it to create a speed differential at the point inside the skimmer with respect to the previous point in which it is entering through the suction mouth, differential that creates a swirl or small

turbulence that "traps" the particles in suspension and that helps them to be retained inside the skimmer, thus improving its lamination ability.

[0022] On the other hand, when the suction pump is not in operation and therefore there is no water flow into the skimmer, the special configuration of the second portion provides two additional advantages, such as:

- high buoyancy by virtue of the cavity that creates the highest area; and
- optimal retention of the particles that have remained inside the skimmer by virtue of the barrier that the highest area represents for them.

[0023] In addition, as already mentioned, the first portion of the gate is also in charge of connection to the suction mouth. Said joint, however, is produced in a hinged way such that it allows the entire gate to be tilted into the skimmer, allowing water to enter when the suction pump is operating and there is a flow of water into the interior.

[0024] Thus, thanks to the fact that the first portion comprises, on the one hand, means of connection hinged to the suction mouth and, on the other hand, points of articulation for its articulated connection to the second portion, both portions can adopt an endless number of relative positions both between themselves and with respect to said suction mouth, allowing optimal adaptability to the water level, whether it is at minimum or maximum, which translates into an also optimal functional response that allows the hydrodynamic and retention advantages of the aforementioned particles remain, whatever the water level inside the horizontal branch of the skimmer may be.

[0025] Lastly, a suction mouth that incorporates a gate such as the one previously described is also an object of the present invention.

Brief description of the drawings

[0026] In order to help a better understanding of the features of the invention, according to a preferred example of a practical embodiment thereof, a series of drawings is provided as an integral part of said description wherein, with an illustrative and nonlimiting nature, the following has been represented:

Figure 1.- Shows a sectional view of a skimmer to which a gate according to the present invention has been coupled, which is represented in different positions or degrees of actuation.

Figure 2.- Shows an elevation view of the gate of the invention according to a preferred embodiment thereof.

Figure 3.- Shows a perspective view of the gate of the invention where the first and second portions are

unhooked.

Figure 4.- Shows a perspective view of a detail of the previous figure where the shape of the first portion can be seen in the area where it joins the second portion.

Figure 5.1- Shows a schematic sectional view of the interior of the skimmer when the suction pump is stopped and the gate is floating at rest and the water level is the maximum one.

Figure 5.2- Shows a schematic sectional view of the interior of the skimmer when the suction pump is in operation and the gate allows the laminar flow of water into it for a case in which the water level is the maximum one.

Figure 5.3- Shows a schematic sectional view of the interior of the skimmer when the suction pump is in operation and the gate allows the laminar flow of the water into it for a case in which the water level is the minimum one.

Figure 6.- Shows a sectional perspective view of a skimmer in which a suction mouth has been installed according to the present invention, as well as a detail of the connection of the gate to the suction mouth.

Detailed description of a preferred embodiment of the invention

[0027] In view of the figures provided, it can be seen how in a preferred embodiment of the invention, the gate of the invention comprises at least two portions, a first portion (1) and a second portion (2) articulated to each other where:

- the first portion comprises, means of connection (3) to the suction mouth (4) and some articulation points (5) for its articulated connection to the second portion (2); and wherein
- the second portion (2) forms a flap with an upper face and a lower face comprising a first end (2') with articulation points (5) complementary to the articulation points of the first portion (1) and a second end (2'') with a free edge (6).

[0028] As also commented, said second portion (2) in turn comprises, between the first and second ends (2', 2'') and on its upper face, at least one area of greater height (2''') than that of said first and second ends (2', 2'') and which has a rounded cross portion that allows a laminar flow to be obtained into the skimmer (7).

[0029] More specifically, according to the preferred embodiment that can be seen in the figures, said area of greater height (2''') extends along the entire length of the second portion (2), although other embodiments not rep-

resented are not ruled out in which it may be formed by a section of less length, or even by several consecutive sections with depressed or lowered areas of lesser height between them, although preferably the transition between said areas of greater height (2''') and the depressed areas would always be made by curved sections, without sharp edges or edges that could interrupt the laminar flow.

[0030] Specifically, the fact that the sheet of water, as it passes through said curved area, then descends at a higher speed, aided by the slope of said area, allows creating a speed differential of the same at the point inside the skimmer with respect to the previous point in which it is entering through the suction mouth, differential that creates a swirl or small turbulence that "drags" the suspended particles and that helps them to be retained inside the skimmer, thus improving their lamination ability.

[0031] On the other hand, as can be seen in the figures, especially in number 4, the free edge (6) that constitutes the second end (2'') joins the area of greatest height (2''') through a curved transition zone that still improves the lamination capacity of the water flow and retention of the particles or elements in suspension by contributing to the creation of the speed differential that creates the swirl previously explained.

[0032] On the other hand, in order to improve the buoyancy of the second portion (2), it may include housings to house elements (8) to improve buoyancy, preferably of low density, said housings being located within hollow areas inside the highest area (2''') that would be accessed through the lower face of said second portion (2). However, a possible embodiment is not ruled out, in which said higher height area would be closed both on its upper face and on its lower face to define a hollow or partially hollow interior cabin that alone would increase buoyancy or even house elements (8) inside of it to improve buoyancy.

[0033] Likewise, as already mentioned, the first portion (1) of the gate is also in charge of the connection to the suction mouth (4) through hinged means of connection (3) so that the gate can be tilted inward of the skimmer (7) and fluctuate or float freely with a greater or lesser inclination depending on the water level and allowing the entrance thereof when the suction pump starts working and there is a flow of water towards the interior.

[0034] This hinge is also carried out in the lower part of the suction mouth (4), where it has joining means (3') complementary to those of the gate.

[0035] On the other hand, as can be seen in figure 6 and its detail, the gate comprises a skirt (10) present on at least one of the sides of the first portion (1) of the gate, skirt (10) in which end has a stop (9) intended to interfere with the suction mouth (4) when the gate approaches verticality. In other words, in the upward movement of the gate and before it exceeds the vertical, a lock occurs between said stop (9) present in the skirt (10) of the first portion (1) of the gate and the suction mouth (4), pre-

venting said gate from tilting outwards.

[0036] This solves the aforementioned problem of the repeated knocking that conventional gates produce when hitting on the suction mouth, since the aforementioned stop is placed up to now on the upper part of said suction mouth, which is never covered by water and, therefore, not preventing the sound produced by the impact of the gate and said stop from spreading to the outside, further amplified by the resonance box effect that the cabin has formed by the horizontal and vertical branches of the skimmer (7).

[0037] Therefore, and as mentioned, the assembly of the suction mouth (4) and the gate of the present invention has the added advantage of eliminating the usual noise that causes the knocking of one against the other in conventional systems.

[0038] Finally, as previously mentioned, the first portion (1) comprises, on the one hand, means of connection (3) hinged to the suction mouth (4) and, on the other hand, points of articulation (5) for its articulated connection to the second portion (2), which allows that between both first and second portions (1, 2) a large number of relative positions can be adopted with each other and with respect to said suction mouth (4) allowing optimal adaptability to water level.

[0039] However, in the case of the junction between the first and second portions (1,2), it is essential for the maintenance of the laminar flow that is sought to be achieved and that has already been widely described, that it occurs without interference or elements that damage this laminar flow by breaking it.

[0040] For this, the gate of the invention has a special configuration at the junction between said first and second portions (1, 2) and, therefore, at the articulation points (5) that allow their articulated joint.

[0041] Specifically, and as can be seen in the preferred embodiment shown in the figures, especially in figures 2 to 4, the articulation points (5) which the first portion (1) has are located away from the end or flank (11) of said first portion (1) and on the lower face thereof, in such a way that, above said articulation points (5) the upper face of the first portion (1) runs continuously up to the aforementioned flank (11), which is located above the first end (2') of the second portion (2) and the junction between both portions (1, 2), achieving a surface continuity through which the laminar flow of water can flow without interruption.

[0042] In other words, although the articulation points (5) of the second portion (2) are arranged at its first end (2'), the complementary articulation points (5) located in the first portion (1) are not located at its end or flank (11), but located at a certain distance from it and on its lower face, so that said flank (11) overlaps or superiorly covers the articulation points (5) between both portions (1, 2) of the gate and, therefore, the articulated joint between them, thus facilitating the passage of water.

[0043] In addition, so that the laminar flow of water is even more favored in its course through said surface con-

tinuity that constitutes the upper face of the first portion (1) until it reaches the flank (11), according to a preferred embodiment shown in the said figures, said upper face comprises in the vicinity of said flank (11) a slight curvature that allows it to better adjust to the starting slope of the area with the highest height (2'') of the second portion (2), minimizing the separation of both portions (1, 2) in the transition zone from one to another so that the sheet of water maintains laminar flow.

[0044] This solution eliminates the problem of the state of the art of those gates that, although having several sections or portions to gain adaptability to the water level, suffer from the problem that the points of connection of said sections also constitute shock points for the water flow, which create significant turbulence that prevents an optimal hydrodynamic response.

[0045] Furthermore, yet another additional advantage of the configuration of the present invention is that by overlapping or covering the flank (11) the articulation points (5) are protected from blockages caused by the particles that the water carries in suspension.

Claims

1. Gate for the suction mouth (4) of a skimmer (7) of a swimming pool comprising at least two portions, a first portion (1) and a second portion (2) articulated to each other wherein:

- the first portion (1) comprises means of connection (3) to the suction mouth (4) and points of articulation (5) for its articulated connection to the second portion (2); and wherein
- the second portion (2) comprises an upper face and a lower face, a first end (2') with articulation points (5) complementary to the articulation points of the first portion (1) and a second end (2'') with a free edge (6),

characterized in that

the second portion (2) in turn comprises, between the first and second ends (2', 2'') and on its upper face, at least one area of greater height (2'') than that of said first and second ends (2', 2'') that has a rounded cross-section such that it allows a laminar flow of water to be obtained into the skimmer (7).

2. Gate for the suction mouth (4) of a skimmer (7) according to claim 1, **characterized in that** the articulation points (5) of the first portion (1) are located on the lower face thereof and away from the end or flank (11) closest to the second portion (2), in such a way that the first portion (1) runs continuously above said articulation points (5) and that said flank (11) is located above the first end (2') of the second portion (2) and the junction between both portions (1, 2).

3. Gate for the suction mouth (4) of a skimmer (7) according to claim 2, **characterized in that** the upper face of the first portion (1) comprises a slight curvature in the vicinity of the flank (11), minimizing the separation of the portions (1, 2) in the transition zone from one to another so that the sheet of water maintains the laminar flow. 5
4. Gate for the suction mouth (4) of a skimmer (7) according to any of claims 1 to 3, **characterized in that** the area of greatest height (2'') extends along the entire length of the second portion (2). 10
5. Gate for the suction mouth (4) of a skimmer (7) according to any of claims 1 to 3, **characterized in that** the highest height area (2''') is formed by several consecutive sections and depressed areas of lower height between them, where the depressed areas are formed by curved sections. 15
20
6. Gate for the suction mouth (4) of a skimmer (7) according to any of the preceding claims, **characterized in that** the free edge (6) that constitutes the second end (2'') joins the highest area (2''') through a curved transition zone. 25
7. Gate for the suction mouth (4) of a skimmer (7) according to any of the preceding claims, **characterized in that** the second portion (2) comprises at least one housing to house at least one element (8) for improving buoyancy. 30
8. Gate for the suction mouth (4) of a skimmer (7) according to any of the preceding claims, **characterized in that** the first portion (1) of the gate comprises means of connection (3) to the suction mouth (4), where said means of connection (3) are hinged to allow it to be tilted into the skimmer (7) and float freely depending on the water level. 35
40
9. Gate for the suction mouth (4) of a skimmer (7) according to any of the preceding claims, **characterized in that** the first portion (1) comprises a skirt (10) on at least one of its sides, at the end of which it has a stop (9) intended to interfere with the suction mouth (4) when the gate approaches the verticality in such a way that it prevents it from collapsing towards the outside of the skimmer (7). 45
10. Suction mouth (4) of a skimmer (7) of a swimming pool, **characterized in that** it comprises a gate as described in claims 1 to 9. 50
11. Suction mouth (4) of a skimmer (7) of a swimming pool according to claim 10, **characterized in that** its lower part comprises means of connection (3') complementary to the joining means (3) of the gate. 55
12. Skimmer (7) of a swimming pool **characterized in that** it comprises a suction mouth (4) as described in claims 10 to 11.

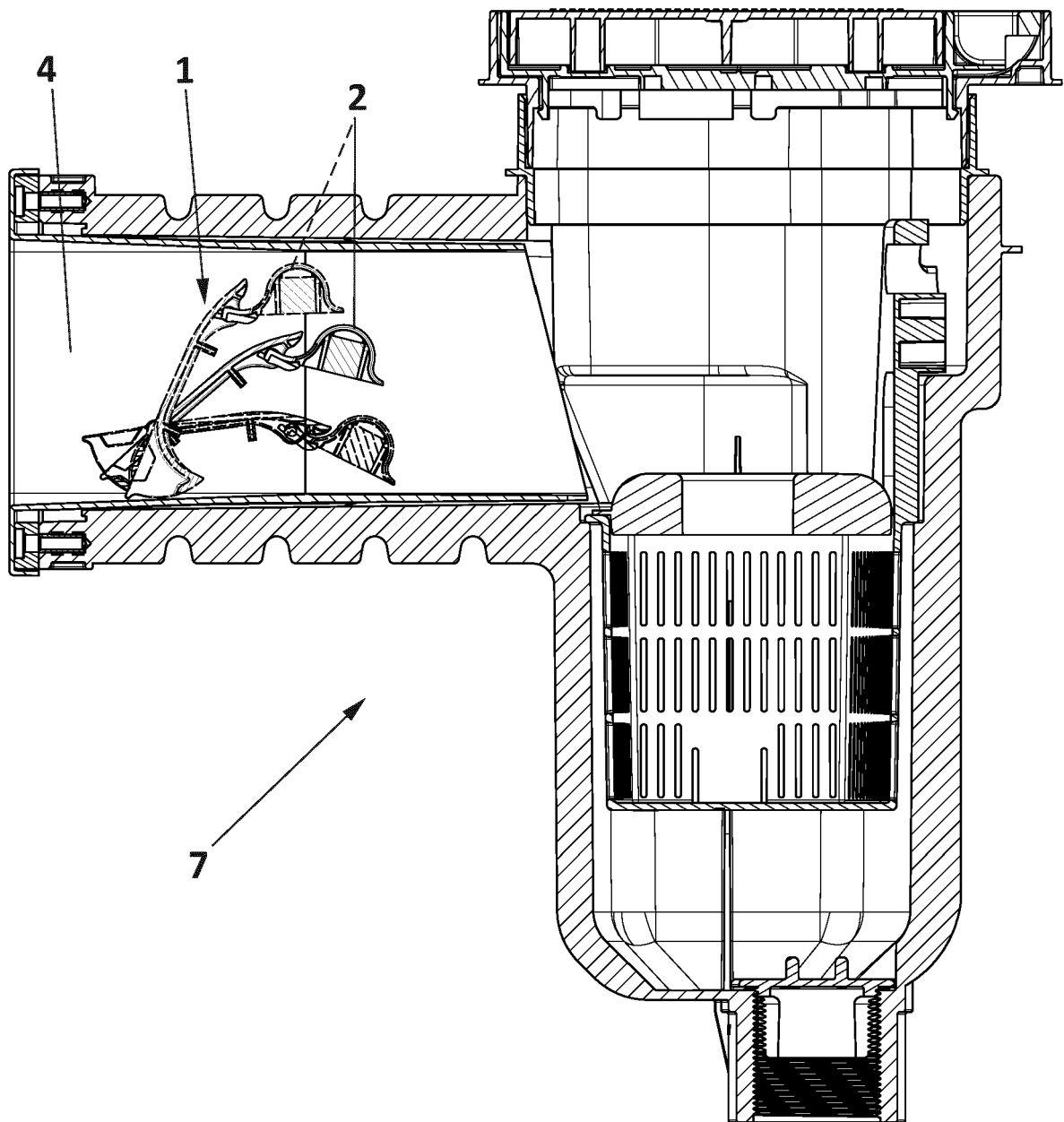


FIG. 1

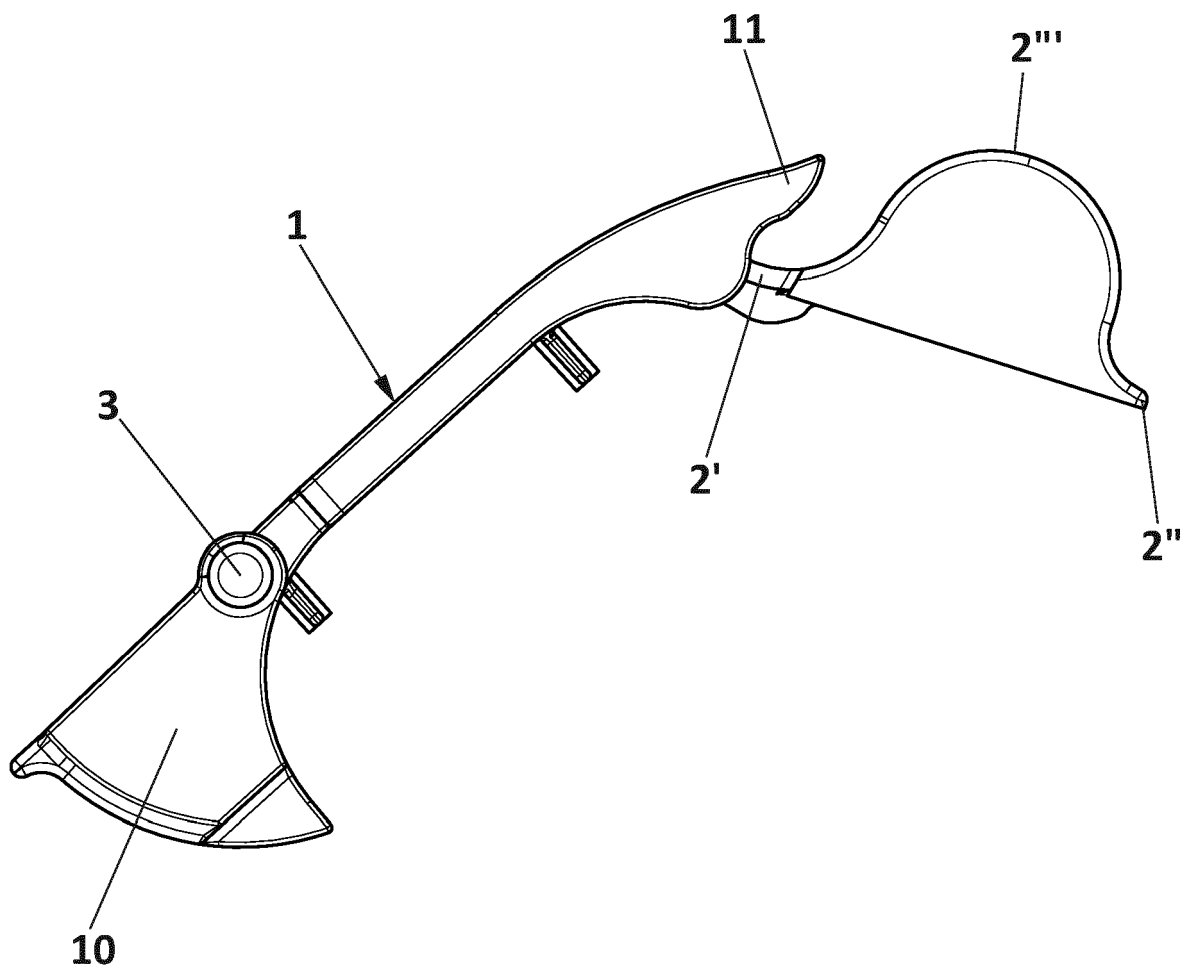


FIG. 2

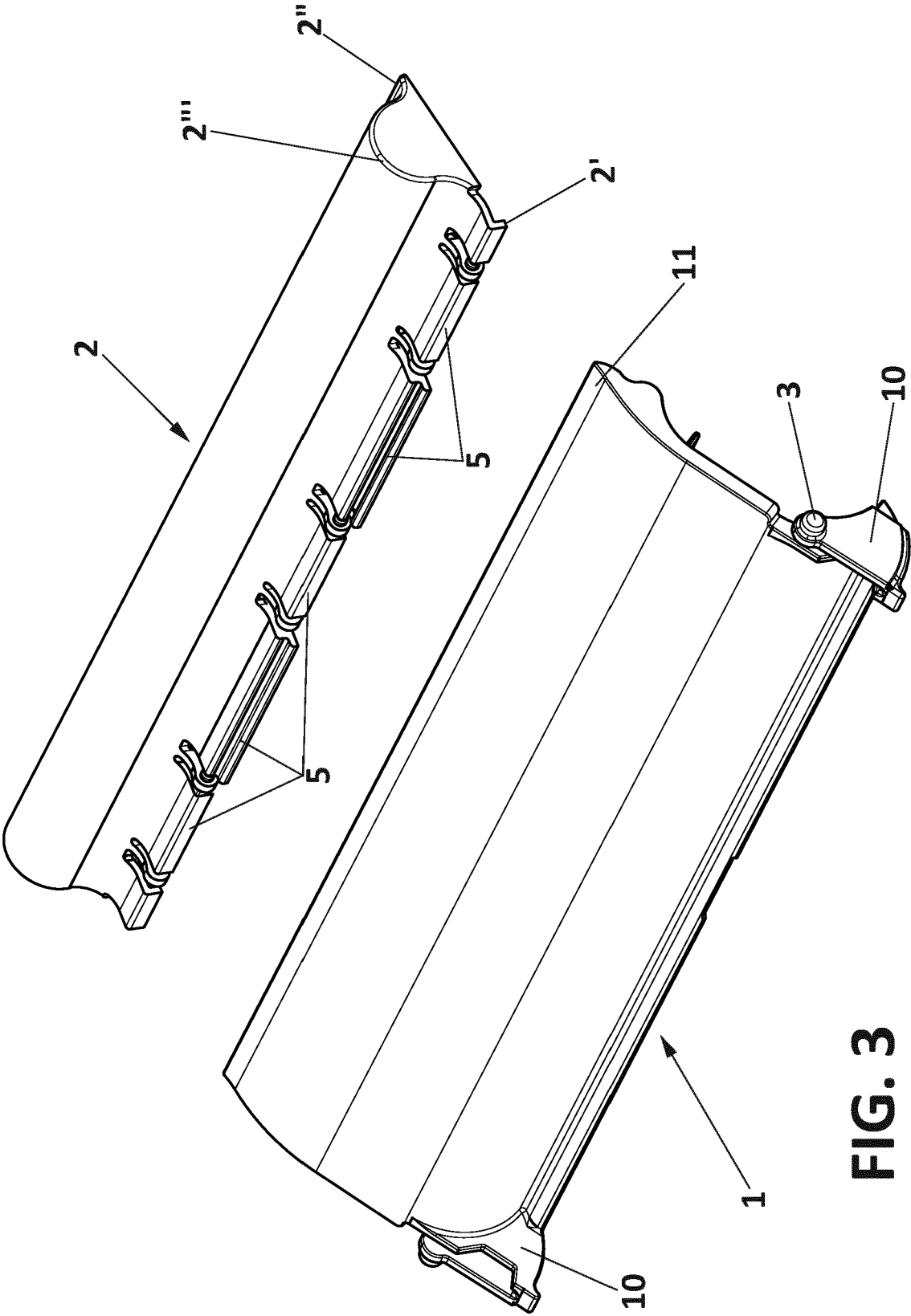


FIG. 3

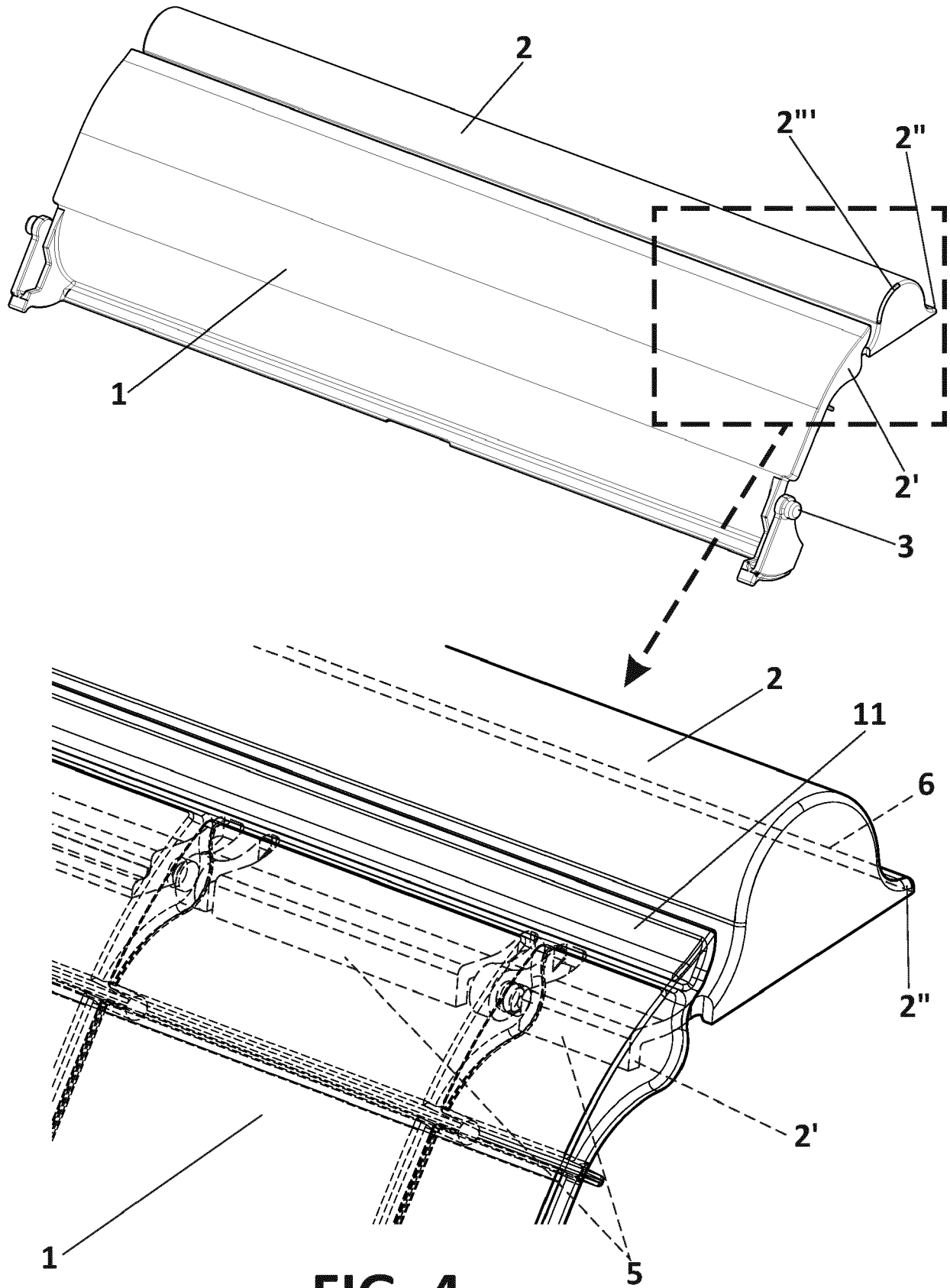


FIG. 4

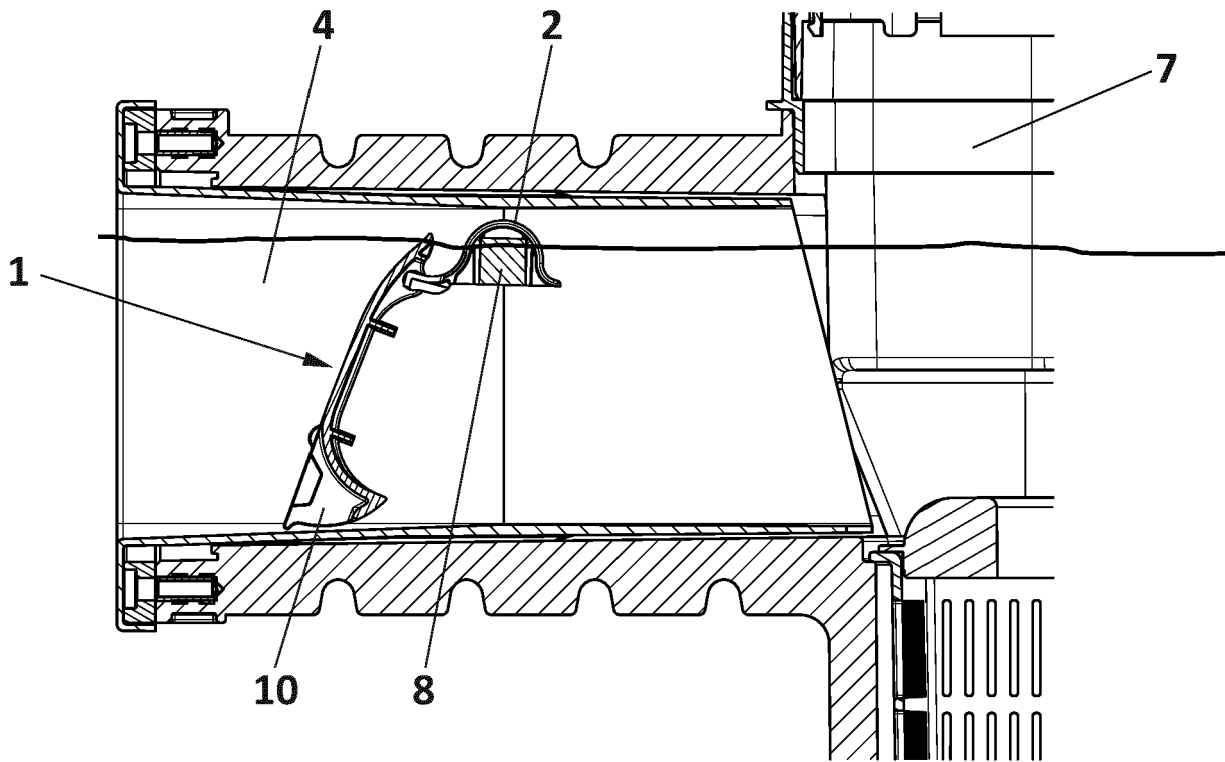


FIG. 5.1

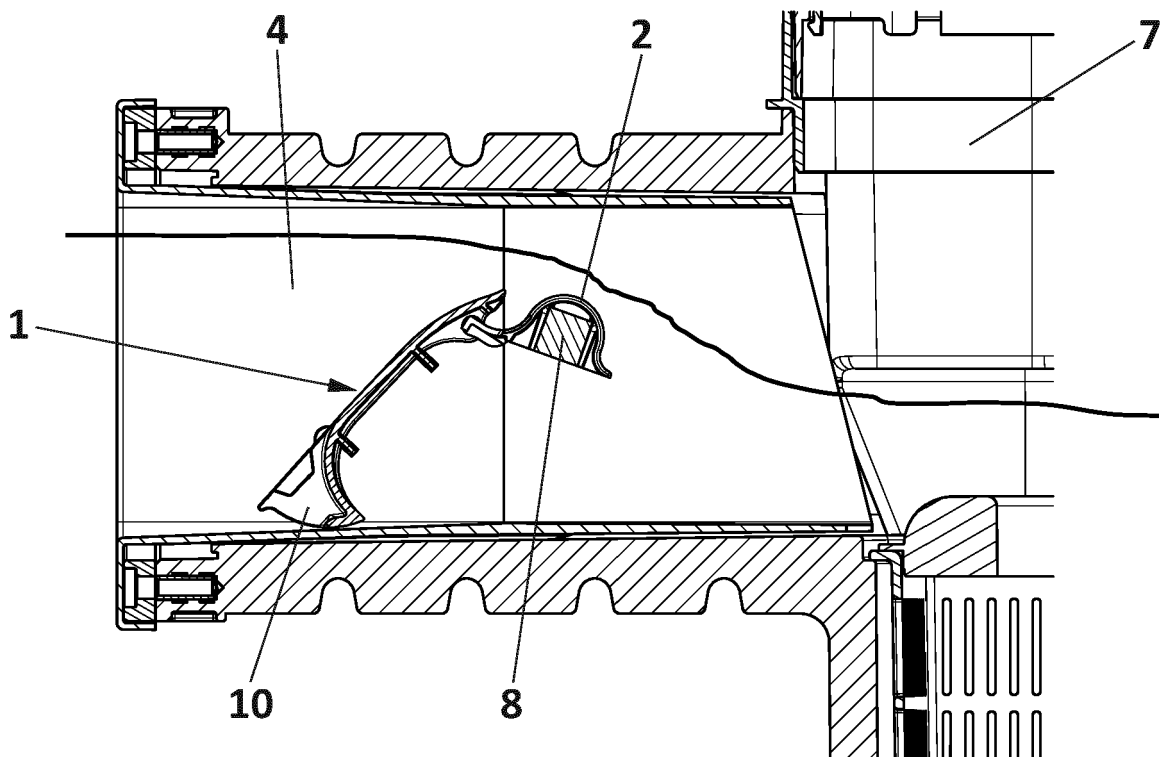


FIG. 5.2

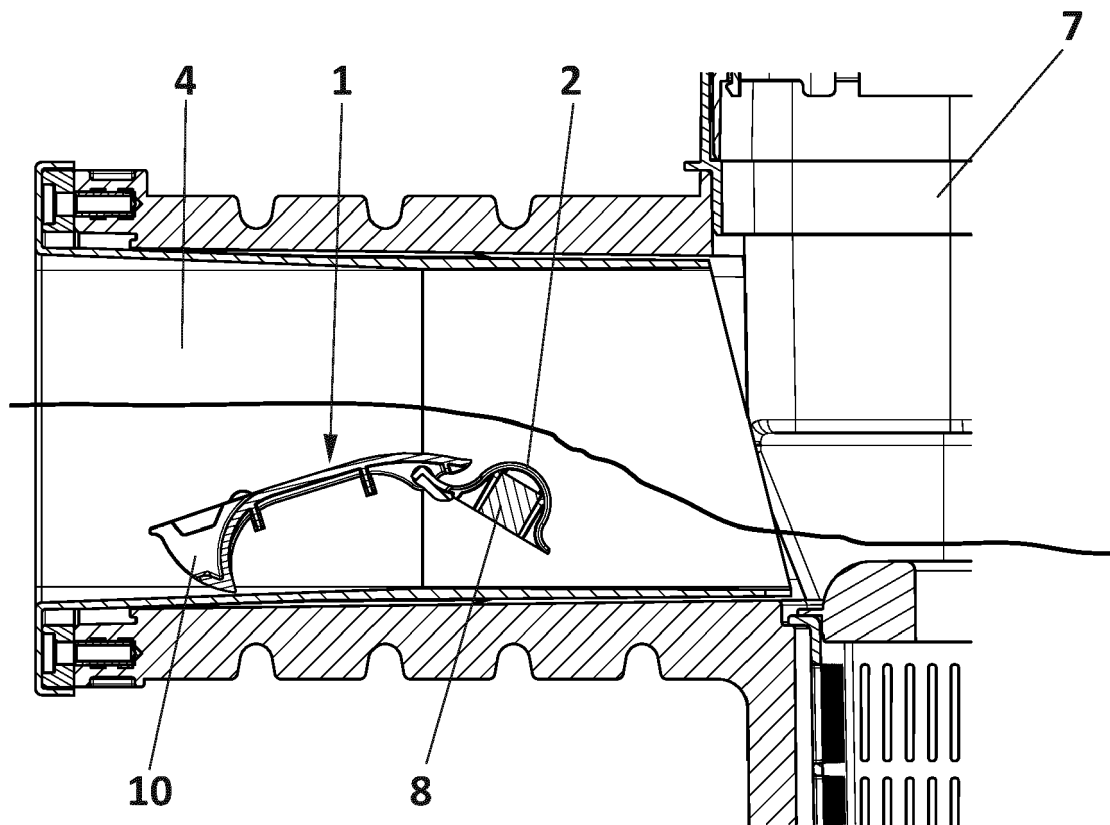


FIG. 5.3

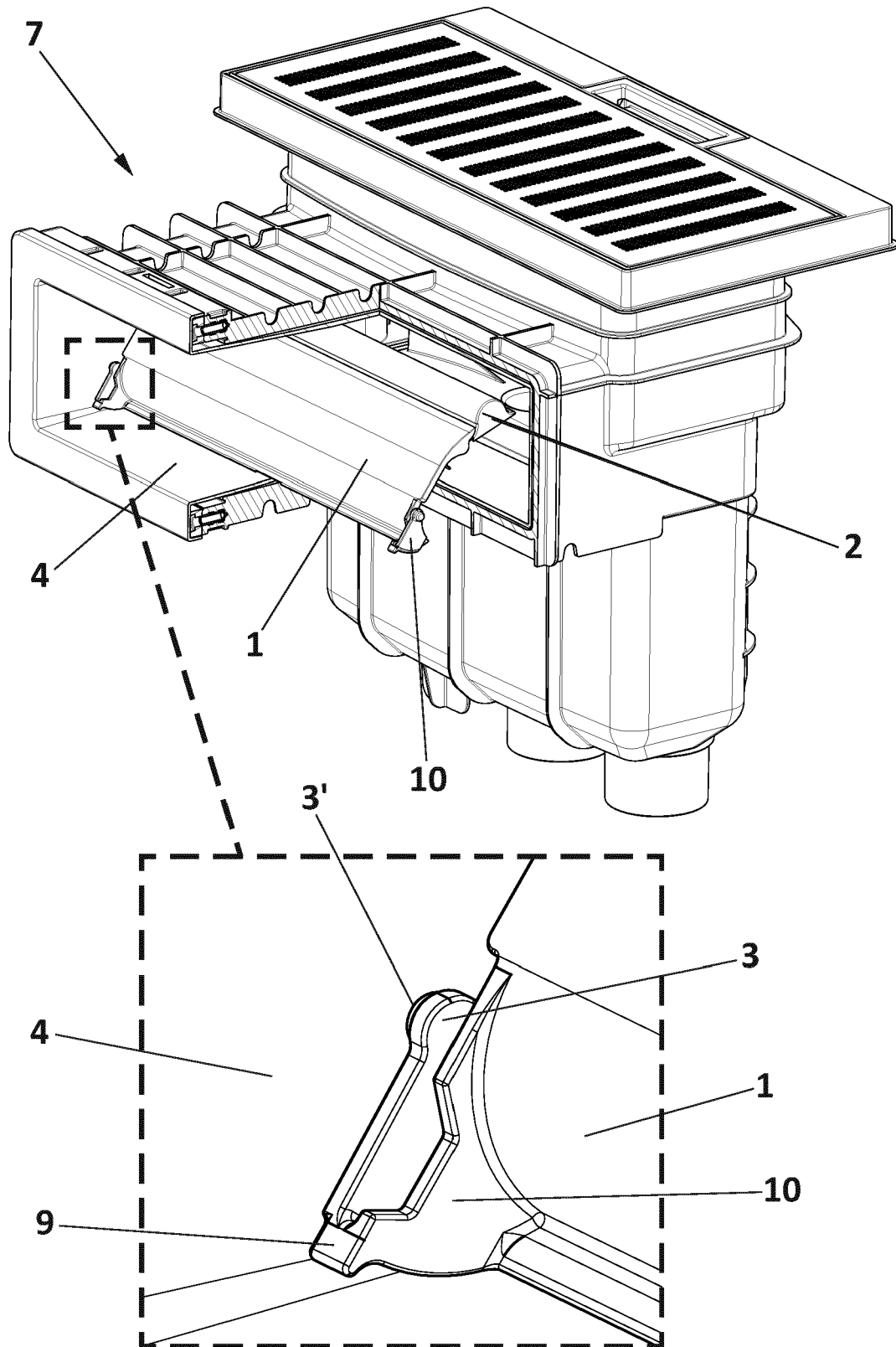


FIG. 6



EUROPEAN SEARCH REPORT

Application Number

EP 21 38 2603

5

10

15

20

25

30

35

40

45

50

55

1

EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT				
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)	
X	US 3 314 543 A (NASH FLOYD M) 18 April 1967 (1967-04-18)	1, 8, 10-12	INV. E04H4/12	
Y	* column 1, line 49 - column 3, line 8; figures 1-3 *	2-4, 6, 7, 9		
Y,D	US 6 453 483 B1 (JACUZZI ROY A [US] ET AL) 24 September 2002 (2002-09-24)	2, 3, 7		
A	* column 2, line 15 - column 3, line 22; figures 1, 6-8 *	1, 8, 10-12		
Y	US 3 792 499 A (WHITAKER B) 19 February 1974 (1974-02-19)	4, 6		
A	* column 3, line 58 - column 4, line 53; figures 5-7 *	1, 8-12		
Y	US 3 567 020 A (WHITAKER BRACKSTON T ET AL) 2 March 1971 (1971-03-02)	9		
A	* column 1, line 70 - column 2, line 32; figure 1 *	1-7, 10-12		
				TECHNICAL FIELDS SEARCHED (IPC)
				E04H
The present search report has been drawn up for all claims				
Place of search Munich		Date of completion of the search 23 December 2021	Examiner Stefanescu, Radu	
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document				

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 21 38 2603

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

23-12-2021

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3314543 A	18-04-1967	NONE	
US 6453483 B1	24-09-2002	NONE	
US 3792499 A	19-02-1974	NONE	
US 3567020 A	02-03-1971	DE 2026066 A1 GB 1300171 A US 3567020 A	11-02-1971 20-12-1972 02-03-1971

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 6453483 B [0015]