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(54) Delivery connector, particularly for submersed pumps

(57) A delivery connector (10), particularly for submersed pumps, which comprises:
- an elbow duct (11) provided in one piece, bent in the shape of an inverted letter U and intended to be arranged vertically,
- a one-way valve (13) to be connected downstream of the elbow duct (11),
- means (14) for the quick coupling of the elbow duct (11) to a hydraulic system.

The connector (10) can be used in collection apparatuses (15) particularly for wastewater, which comprise:
- a tank (16),
- a submersed pump (12) in the tank (16),
- a connector (10) that connects the submersed pump (12) to a hydraulic system at the top of the tank (16).

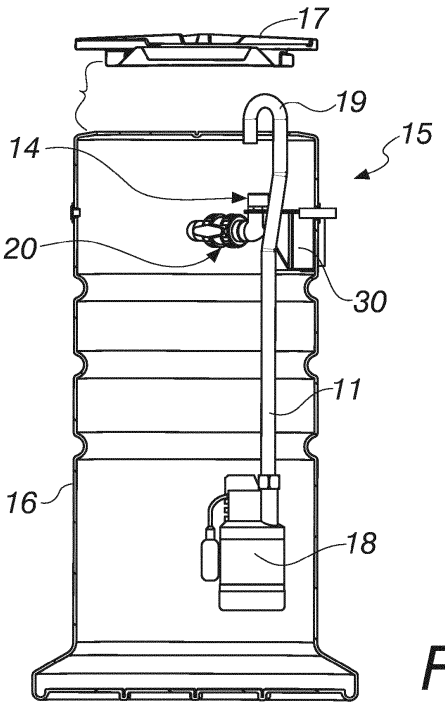

Fig. 2

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Description

[0001] The present invention relates to a delivery connector, particularly for submersed pumps.

[0002] The installation of systems for recovering wastewater from dwellings, which use submersed pumps in collection tanks, is currently widespread.

[0003] A tank of this type typically is cylindrical and a few meters tall and the pump is rested on the bottom of the tank and connected to an adapted outer hydraulic system by means of a substantially L-shaped delivery duct, which has, in succession, a vertical portion that conveys the flow of liquid to the upper part of the tank and a horizontal portion for connection to the system.

[0004] Although they are now widespread, the constructive solutions currently adopted for these pumping systems suffer a series of significant drawbacks.

[0005] First of all, since the electric pickup at pump starting causes the pump to rotate about itself, rotating also the duct that is integral therewith, often one resorts to interposing, between duct portions, means capable of blocking rotation, such as for example a triangular extensible joint that must be designed to size, increasing global production costs. In addition to this, the pump is placed on the bottom of the tank at adapted retention members that prevent its rotation.

[0006] However, this operation is obviously difficult when the tank is not empty.

[0007] Moreover, since the system is subject to maintenance interventions, it can be necessary to remove temporarily the pump or other parts of the delivery duct that contain components that are subject to wear and damage, such as for example gaskets and one-way valves.

[0008] The operation of extracting the pump from the tank is performed by pulling from above a chain that is connected to a handle of the pump. Maintenance workers instead often use the power supply cables of the pump, damaging them.

[0009] The duct is composed typically of a plurality of parts: a faucet on the portion of horizontal piping that is integral with the tank and is connected to the hydraulic system, the vertical part, composed of a plurality of portions connected in succession, of which at least one supports the one-way valve, and threaded rings designed for connection of the preceding parts.

[0010] Therefore, any maintenance interventions on the duct require its disassembly, unscrewing the several connecting rings, and since its vertical part is often immersed in water, these operations require the extraction of the duct from the tank, together with the pump in the manner described earlier, with relatively long times to be dedicated also to the disassembly and subsequent reassembly of the duct.

[0011] The aim of the present invention is to improve the delivery connection of the submersed pumps, reducing the time to be dedicated to the maintenance operations of the system and also solving the other observed drawbacks.

[0012] Within this aim, an object of the invention is to facilitate system maintenance operations.

[0013] Another object of the invention is to reduce production costs.

[0014] This aim, as well as these and other objects that will become better apparent hereinafter, are achieved by a delivery connector, particularly for submersed pumps, **characterized in that** it comprises:

- an elbow duct provided in one piece, bent in the shape of an inverted letter U and intended to be arranged vertically,
- a one-way valve to be connected downstream of said elbow duct,
- means for the quick coupling of said elbow duct to a hydraulic system.

[0015] Moreover, the invention relates to a collection apparatus, preferably for wastewater, **characterized in that** it comprises:

- a tank,
- a submersed pump in the tank,
- a connector for connecting said submersed pump to a hydraulic system at the top of the tank.

[0016] Further characteristics and advantages of the present invention will become better apparent from the description of a preferred but not exclusive embodiment of the connector according to the invention, illustrated by way of nonlimiting example in the accompanying drawings, wherein:

Figure 1 is a sectional view of the apparatus according to the invention with the tank shown in cross-section;
Figure 2 is a view, similar to Figure 1, of the way in which the elbow duct is coupled or separated with respect to the hydraulic system;
Figure 3 is an enlarged-scale exploded perspective view of the connector according to the invention;
Figure 4 is an enlarged-scale sectional view of the connector according to the invention.

[0017] With reference to the figures, the connector according to the invention, generally designated by the reference numeral 10, comprises an elbow duct 11 for the delivery of a flow of liquid to a hydraulic system, propelled by the submersed pump 12. The elbow duct 11, as clearly visible in the first accompanying figure, is arranged substantially vertically, is provided in one piece and is bent in the shape of an inverted letter U.

[0018] The connector 10 also comprises a one-way valve 13 to be inserted downstream of the elbow duct 11 and advantageously means 14 for the quick coupling of the elbow duct 11 to a hydraulic system.

[0019] The connector 10 can be used to provide an

apparatus 15 for collecting wastewater, shown in the first two figures.

[0020] The apparatus 15 comprises: a tank 16 that is closed from above by a lid 17, a pump 12 that is submersed in the tank 16 and the connector 10 that connects the submersed pump 12 to the hydraulic system at the top of the tank 16.

[0021] The elbow duct 11, which as mentioned is arranged substantially vertically, has such a length as to keep the submersed pump 12 raised from the bottom of the tank 16, is thin (where "thin" is understood here as on the order of one millimeter) and preferably but not exclusively made of metallic material.

[0022] Advantageously, the inverted U-shaped bend of the elbow duct 11 is intended to remain above the free surface and constitutes a grip handle 19.

[0023] The quick coupling means 14 also are intended to remain above the free surface and by means of them the elbow duct 11 is associated, by way of the end that lies opposite the one for connection to the submersed pump 18, to a faucet 20 for connection to the hydraulic system. The faucet 20 has an internal flow control element, which is not visible, and a handle 21. It is of an already known type and in a known manner is rendered integral with the top part of the tank 16, from which the liquid is sent to the hydraulic system.

[0024] In particular, the quick coupling means 14, which are clearly visible in the individual parts that compose them in the exploded view of Figure 3, comprise mainly a sealing gasket 22 and a sleeve 23. As shown in the sectional view of Figure 4, the sealing gasket 22 is interposed between the end portion of the elbow duct 11 and a first portion 24 of the sleeve 23, which is associated at the opposite end, with its second portion 25, with the faucet 20.

[0025] The elbow duct 11 is then inserted in the first portion 24 of the sleeve 23, with the interposition of the sealing gasket 22, and can be extracted from it. The sealing gasket 22 is tubular and made of rubber, of the lip type, preferably with multiple lips, as shown, for preventing the accidental extraction of the elbow duct 11.

[0026] Moreover, by viewing Figure 3, one can see better the first portion 24 for association with the elbow duct 11 and the second portion 25 intended to enter a right-angled tubular part 26 of the faucet 20. The second portion 25 can be provided advantageously with an outer thread, not shown, by means of which the sleeve 23 is screwed into the likewise threaded tubular portion 26, as an alternative to an adhesive bonding which would not allow said association to be reversible.

[0027] The two portions, the first one 24 and the second one 25, are connected by an annular grip part 27, which is wider than the second portion 25 and has a polygonal surface, which in any case is very thin with respect to the first portion 24, so as to have faces that are tangent to the surface of the latter.

[0028] Moreover, the elbow duct 11 is fixed to the tank 16 by way of adapted fixing means 28, which are preset to prevent its rotation when the submersed pump 12 starts. They comprise a plate-like element 29 to be fixed to a support 30 of the tank 16 by way of the quick coupling means 14, in the manner described hereinafter.

[0029] Moreover, from the exploded view of Figure 3 it can be noted that the plate-like element 29 is perforated in order to be crossed by the second portion 25 of the sleeve 23, thus being interposed between the tubular portion 26 of the faucet 20 and the annular portion 27 of the sleeve 23. The annular portion 27 in fact is wider than both the second portion 25 and the diameter of the hole 31 of the plate-like element 29.

[0030] The plate-like element 29 further has a series of secondary holes 32, which have reduced dimensions, for fixing by means of screws to the support 30 of the tank 16.

[0031] Use of the connector according to the invention is as follows.

[0032] If maintenance interventions on the apparatus 15 or on the connector 10 itself are necessary, the operator assigned to maintenance of the device lifts the lid 17 of the tank 16 and accesses the connector 10 from above.

[0033] The way in which the elbow duct 11 is associated or separated with respect to the faucet 20 is shown in Figure 2.

[0034] By gripping and lifting the elbow duct 11 by the handle 19, which as mentioned lies above the free surface, it is extracted easily from the sleeve 23 and the submersed pump 12 is also lifted and optionally extracted from the tank 16, since the elbow duct 11 is integral therewith.

[0035] The quick coupling means 14 also can be accessed from above for any maintenance interventions and like the handle 19 are above the free surface and are therefore easily accessible.

[0036] The connector 10 is fitted first of all by fitting on the faucet 20 the parts that compose the quick coupling means 14. The one-way valve 13 is inserted in the tubular portion 26, before the right-angled bend. Then the second portion 25 of the sleeve 23 is inserted in the hole 31 of the plate-like element 29 and screwed into the tubular portion 26, interposing between it and the annular portion 27 the plate-like element 29, which is fixed to the support 30.

[0037] The sealing gasket 22 is inserted in the first portion 24 of the sleeve 23 and the elbow duct 11 is inserted therein, so that the sealing gasket 22 is interposed between the inner surface of the first portion 24 and the outer surface of the end portion of the elbow duct 11.

[0038] It should be noted that the maintenance of the apparatus 15 does not require the disassembly of a plurality of duct parts, since the duct is formed in one piece. Moreover, it is inserted and extracted without using rings to be screwed on.

[0039] It should in fact be noted also that the elbow duct 11 with the pump 12 can be lifted and extracted from the tank 16 easily by gripping the handle 19, without in-

ducing the operator to lift the pump by pulling the power supply cables.

[0040] Moreover, it should be noted that if it is necessary to replace the one-way valve 13 inserted in the tubular part 26, it is sufficient to extract the elbow duct 11 from the sleeve 23 and unscrew it from the tubular part 26, since it is the only component of the connector 10 that is optionally provided with a thread.

[0041] Moreover, the described elbow duct 11, since it can be made conveniently of thin metallic material, for example stainless steel, is lightweight and at the same time capable of bearing the load of the submersible pump 12, which, as clearly visible in Figure 1, is raised from the bottom of the tank 16 by a distance that depends on the thermal expansions to which the elbow duct 11 is subjected, which cause its length variation.

[0042] In practice it has been found that the invention achieves the intended aim and objects, by providing a connector for submersed pumps that provides for the use of quick coupling means capable of facilitating maintenance operations and reducing their durations.

[0043] Another advantage of the connection according to the invention is to allow the containment of production costs, as a result of the association of parts that are already per se known and can be manufactured with low costs and technologies.

[0044] Moreover, thanks to the connector according to the invention the operation of extracting the submersed pump from the tank, by acting only on the appropriately provided handle of the elbow duct, is facilitated as well.

[0045] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all the details may further be replaced with other technically equivalent elements.

[0046] In practice, the materials used, so long as they are compatible with the specific use, as well as the contingent shapes and dimensions, may be any according to requirements and to the state of the art.

[0047] The disclosures in Italian Patent Application No. PD2012A000297 from which this application claims priority are incorporated herein by reference.

[0048] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A delivery connector (10), particularly for submersed pumps, **characterized in that** it comprises:

   - an elbow duct (11) provided in one piece, bent in the shape of an inverted letter U and intended to be arranged vertically,
   - a one-way valve (13) to be connected downstream of said elbow duct (11),
   - means (14) for the quick coupling of said elbow duct (11) to a hydraulic system.

2. A collection apparatus (15) preferably for wastewater, **characterized in that** it comprises:

   - a tank (16),
   - a submersed pump (12) in said tank (16),
   - a connector (10) according to claim 1 for connecting said submersed pump (12) to a hydraulic system at the top of said tank (16).

3. The delivery connector according to claim 2, **characterized in that** said connector (10) connects said submersed pump (12) to the hydraulic system by way of said elbow duct (11), having such a length as to keep said submersed pump (12) raised from the bottom of said tank (16).

4. The connector according to claim 1, **characterized in that** the U-shaped bend of said elbow duct (11) constitutes a handle (19) intended to remain above the free surface of said tank (16).

5. The connector according to claims 1 and 2, **characterized in that** said elbow duct (11) is fixed to said tank (16) by way of adapted fixing means (28) intended to prevent its rotation.

6. The connector according to claims 1 and 2, **characterized in that** said quick coupling means (14) comprise a sealing gasket (22) and a sleeve (23), said sealing gasket (22) being interposed between one end of said elbow duct (11) and said sleeve (23), which is associated on the opposite side with a faucet (20) for connection to the hydraulic system.

7. The connector according to claim 6, **characterized in that** said sealing gasket (22) is substantially tubular, made of rubber and of the lip type.

8. The connector according to claim 6, **characterized in that** said sleeve (23) has a first portion (24) for association with said elbow duct (11) and a second portion (25) that is designed to enter a tubular part (26) of said faucet (20), said first portion (24) and said second portion (25) being connected by an annular grip part (27) that is wider than the first portion (25) and said fixing means (28) comprising a plate-like element (29), to be fixed to a support (30) of said tank (16), which is perforated in order to be crossed by said second portion (25) of the sleeve (23), interposing itself between said tubular part (26) and said annular portion (27), which is wider than the hole (31) of said plate-like element (29).

9. The connector according to claim 8, **characterized in that** said elbow duct (11) is inserted in said first portion (24) of the sleeve (23) and can be extracted from it.

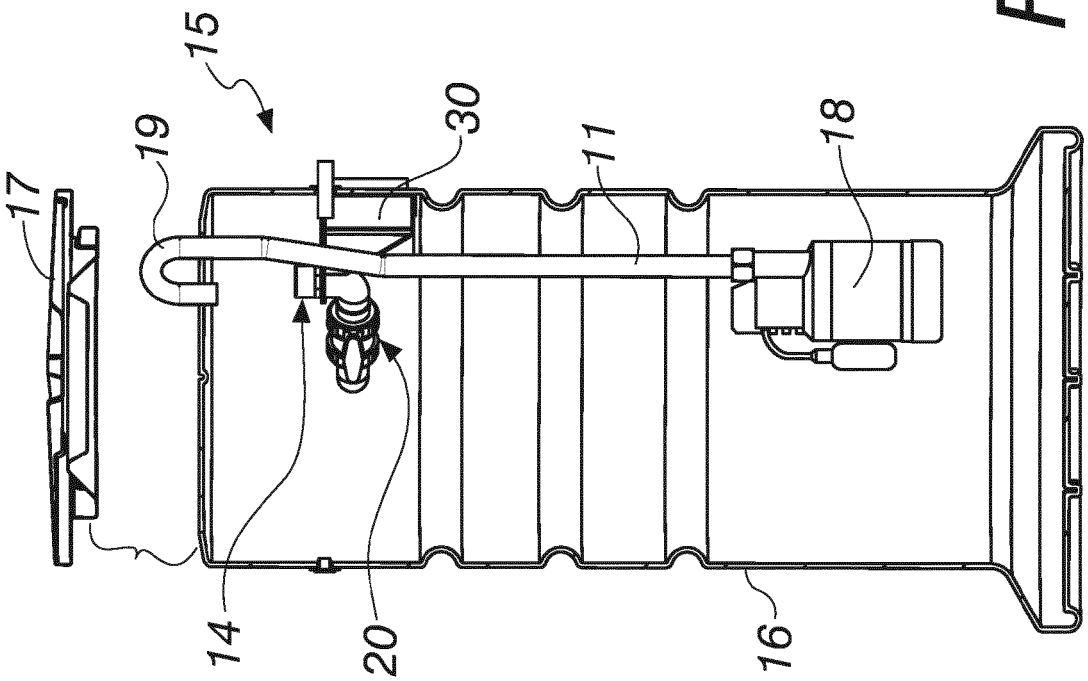

Fig. 2

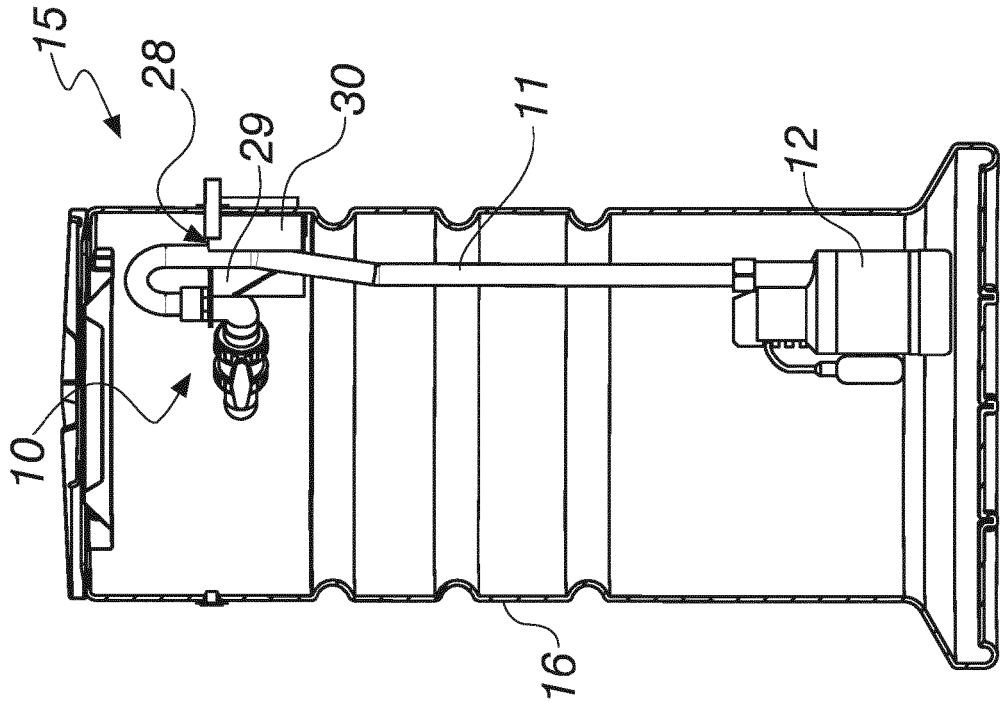

Fig. 1

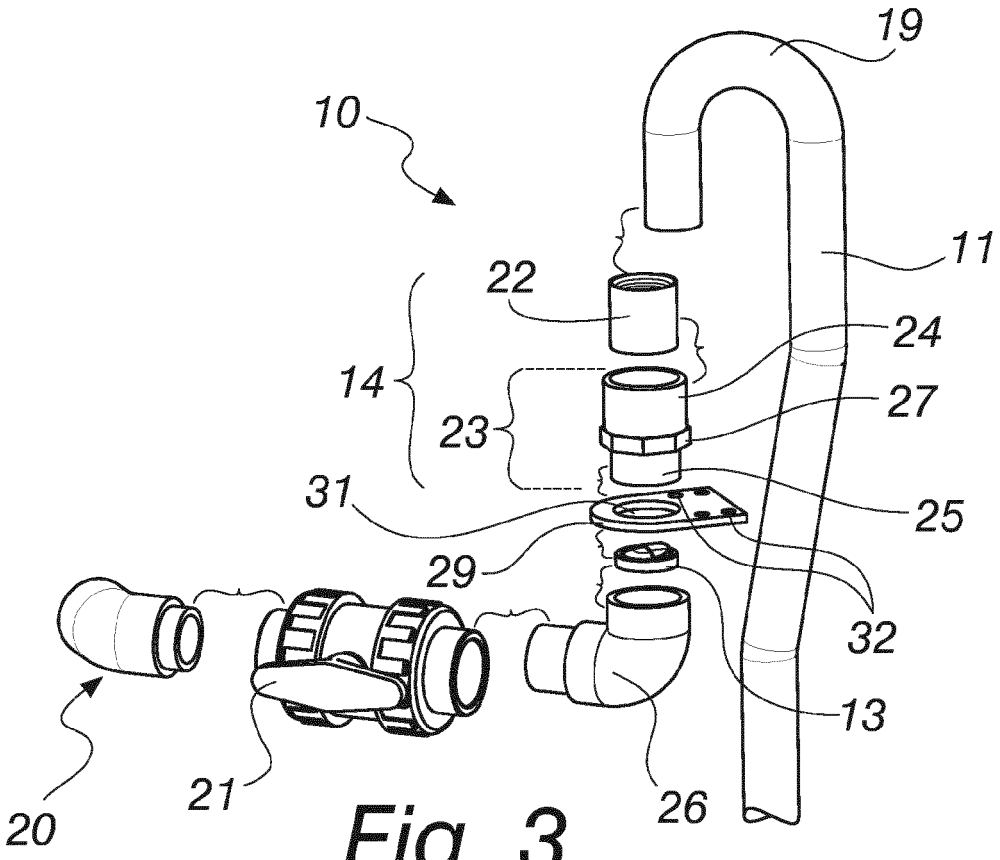
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Fig. 3

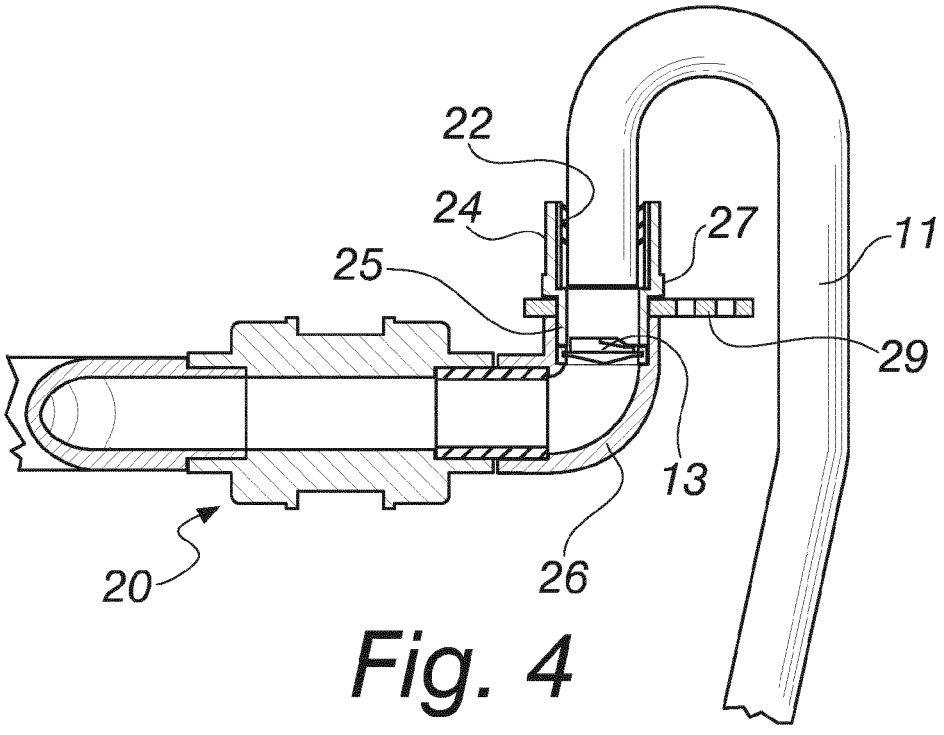
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Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- IT PD20120297 A **[0047]**