(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
2 December 2010 (02.12.2010)

PCT

(10) International Publication Number
WO 2010/135999 A2

(51) International Patent Classification:
F16L 23/14 (2006.01)

(21) International Application Number:
PCT/CZ2010/000063

(22) International Filing Date:
26 May 2010 (26.05.2010)

(25) Filing Language: Czech

(26) Publication Language: English

(30) Priority Data:
PV 2009-335 26 May 2009 (26.05.2009) CZ

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

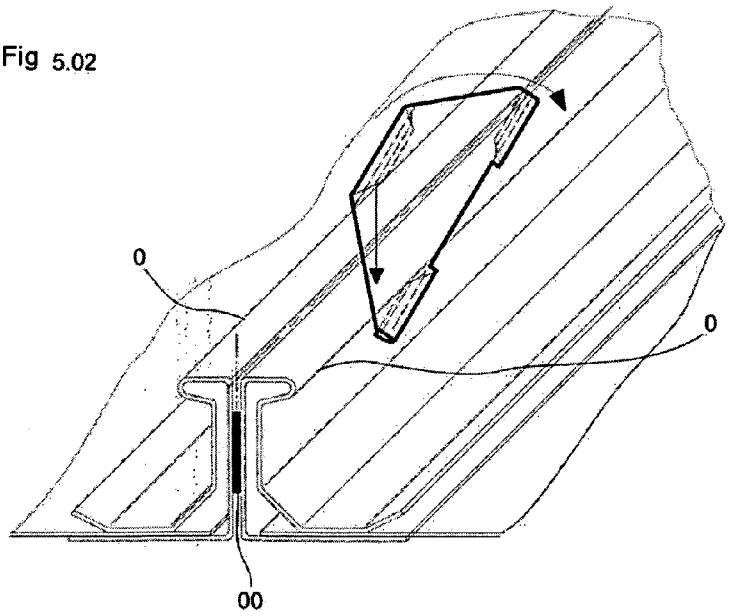
— *of inventorship (Rule 4.17(iv))*

Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

(54) Title: CLAMP FOR MUTUAL ATTACHMENT OF PARTS OF AIR CONDITIONING PIPING OR CHANNELS, ESPECIALLY FOR EXHAUSTION, AIR-CONDITIONING AND TRANSPORTATION OF AIR AND OTHER GASES

Fig 5.02



(57) Abstract: The invention relates to the clamp for mutual attachment of parts of air conditioning piping or channels, especially for exhaustion, air-conditioning and transportation of air and other gases, where the ends of sections of piping or channels being connected are provided with the flange (0) with sealing compound (00) and the clamp comprises an oblong body (1). The oblong body (1) on each its lateral side is provided with at least one bent protrusion (2) having its length less than length of the oblong body (1), while the protrusions (2) are arranged asymmetrically towards longitudinal axis (P) of the oblong body (1).

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Clamp for mutual attachment of parts of air conditioning piping or channels, especially for exhaustion, air-conditioning and transportation of air and other gases

Technical field

The invention relates to the clamp for mutual attachment of parts of air conditioning piping or channels, especially for exhaustion, air-conditioning and transportation of air and other gases, where the ends of connected sections of piping or channel are provided with a flange with sealing compound and the clamp comprises an oblong body.

Background art

Known are many solutions for mutual attachment of parts of air conditioning piping or channels, especially for exhaustion, air-conditioning and transportation of air and other gases, where the ends of sections of piping or channels being connected are provided with a flange, on which the sealing compound is applied.

The common feature of the known solutions is that the joint is realised by means of one or more clamps or by means of screwed joints.

The Fig. 1 represents a clamp formed of oblong metal sheet, whose both edges are along whole length of the clamp bent in the same direction. At the same time one edge is bent (by about 130°) to form an arch to be hooked against a protrusion of the flange, the second edge is bent directly by 90°. In the edge being bent by 90° a through hole with thread is performed in which there is screwed on the screw for tightening of flanges of both sections being connected together, so that the sealing compound is pressed between the flanges and the joint is created and sealed simultaneously. The disadvantage of this embodiment nevertheless is, that the worker who performs installation of the piping and applies these clamps on the piping parts simultaneously must manually hold the clamp and to screw the screw until both flanges are in a necessary position. Another disadvantage is that at

manual installation it is difficult to ensure the same level of tightening the screw on all applied clamps. Another disadvantage of this arrangement is connected with structure of flanges on the sections of piping or channel being connected, when the flanges are often performed in the form of bent metal sheet with hollow space. In such a case, due to in principle spot pressure of the screw against the wall of shaped flange, a section of the flange is subject to deformation, which may cause so called roof-like shape of the joint at which the sealing element between both flanges is not evenly compressed, which results in occurrence of untightness in the joint, which requires usage of further clamp in a smaller distance than it would be at the joint without deformed walls of the flanges. Further disadvantage is also a relatively long time necessary for application of one clamp, which happens especially in places with worse or limited access to the flanges being connected, e.g. where the joint is in a direct vicinity of a construction or other structure.

The Fig. 2 represents a known embodiment, at which for connection of a pair of flanges the connecting strap with profile having a shape of the "C" letter (hereinafter "C" strap" only) is used, which is longitudinally slipped over both flanges of sections of piping or channel being connected, at the same time between both flanges there is inserted the sealing element which by effect of side pressure from arms of the "C" strap is compressed between the flanges. At the same time the distance of the bent arms of the "C" strap must be smaller than the distance of side edges of the flanges being connected with the not compressed sealing compound, so that only after installation of the "C" strap the sealing compound is compressed between the flanges. The disadvantage of this embodiment is that the worker performing installation of piping or channel must both manually hold the "C" strap, and simultaneously e.g. by means of a hammer, manually "push" both flanges until whole length of the "C" strap is inserted into the required position. This application is physically quite difficult, because the worker must overcome the resistance caused by compressing the sealing compound between the flanges, moreover with increasing length of the "C" strap already "thrust" on the flanges also by effect of friction and pressure of the sealing element the friction between the "C" strap and flanges is being increased. This gradually requires applying of a

greater force to insert the "C" strap on the flange, nevertheless there exists increasing risk of "C" strap deformation, especially of its end. Further disadvantage is a relatively long time necessary to position the "C" strap on the flanges.

The Fig. 3 represents a known embodiment, at which for connection of a couple of flanges the connecting strap with profile having a shape of the "C" letter (hereinafter "C" strap" only) is used. A sealing element is inserted between the flanges. The "C" strap in this solution is applied on the flanges so that it is longitudinally positioned to one flange, by one its arm along its whole length it is hooked to this flange, after that by pressure from above (manually, using hammer, ...) to the area of the second arm this second arm engages (making use of elastic deformation of this second arm) with the second flange, through which fixation of both flanges along the length of the "C" strap is performed, also the required compression of the sealing element is achieved. It is obvious, that in this solution the "C" strap must be of a greater elasticity, than in embodiment in the Fig. 2, where rather strength to buckling is required. The disadvantage of this solution is that the worker performing installation must manually hold the "C" strap and simultaneously manually developing pressure from above apply the same to flanges until the whole length of the "C" strap "engages" into the required position. Another disadvantage is a longer time of installation of the "C" strap upon performance of long joints as well as upon performance of joints in places with limited access, e.g. in a close vicinity of a construction or other structure. Another disadvantage of this embodiment of the "C" strap is direction of acting of the force (crosswise to longitudinal direction of piping) necessary to achieve "engagement" of the "C" strap especially by means of a hammer or stick, which may lead up to deformation of the whole piping profile. Another disadvantage is that there is necessary the roof-like shape in profile of the "C" strap, which is enforced by necessity of increased elasticity of the "C" strap during installation. Another disadvantage, also given by the need for greater elasticity of the "C" strap according to this embodiment, is necessity to use a thinner material for its production, than it is used at embodiment in the Fig. 2, which also requires a

greater necessary length of the "C" strap to maintain the strength characteristics of the joint.

The Fig. 4 (US 4 123 094) represents a known embodiment, at which for connection of flanges of a pair of opposite piping the corner segments are used, which are by their arms inserted into the cavity of flanges and are provided with a through hole for a screw, while both corner segments are by means of the screwed connection tighten to one another, by which through arms of the corner segments pressure on flanges in direction to these flanges is exerted, the sealing compound is compressed between the flanges and a required connection of flanges is created. Worker performing installation must manually assemble the ends of piping together, to insert the screws, nuts and washers and after then manually carry out tightening of nuts. The disadvantage of this solution is that the worker must for all actions necessarily use both hands simultaneously, both for installation of connecting parts and after then for screwing the nut by both hands, when he must hold the screw by one hand by means of a spanner against turning and by the second hand he performs tightening of the nut. Another disadvantage is also a real danger of uneven compression of the corner segments by a screw connection and an uneven transfer of force to flanges, or to the flanged straps, at the same time the sealing element is compressed in an uneven manner which results in untightness, which after then must be manually remedied by means of a sealant. These operations excessively prolong the time for connection of piping and make the installation more costly. Yet another disadvantage is a long time of installation especially in area with limited access, when the joint in flanges of piping is in a direct vicinity of construction or other structure.

The goal of the invention is to eliminate or at least minimise the disadvantages of the background art, this especially by creating an universally applicable, low-cost, light and simple clamp enabling an easy, exact, quality and quick installation with even distribution of pressure on the flange connection, with low demand as to manual force exerted upon installation.

Principle of the invention

The goal of the invention has been achieved through a clamp for mutual attachment of parts of air conditioning piping or channels, especially for exhaustion, air-conditioning and transportation of air and other gases, the principle of which consists in that, the oblong body on each its lateral side is provided with at least one bent protrusion having its length less than length of the oblong body, while the protrusions are arranged asymmetrically towards longitudinal axis of the oblong body.

The clamp according to this invention enables a quick and exact connection and even distribution of pressure on the flanged joint of individual parts of air-conditioning piping and channels. The clamp according to this invention reduces difficulty and time of installation operations, reduces the number of types of parts necessary to create the joint, reduces volume as well as weight of the joint, does not disturb linearity and straightness of the sealing inserted between the flanges, does not disturb linearity and straightness of flanges of the piping being connected, ensures even strength of connection in all points, where through it the contact is created, it is possible to apply it in any position and space, its position may be changed on the joint whenever according to the need, this even after the installation has been accomplished. The clamp according to this invention also enables an easy and quick installation in an area with difficult access due to adjacent construction and other structures, it expressively reduces the weight of connecting material, reduces the price of transportation of connecting material into the place of installation, reduces demand as to installation and auxiliary tools needed for installation and it reduces economic demand as to equipment of installation workplace with technology for installation.

The preferred embodiments are the subject of dependent claims and they are described in a detailed way in examples of embodiment.

Description of the drawing

The invention is schematically represented in the drawing, where the Fig. 1 shows a cross section of the first solution according to the background

art, the Fig. 2 a cross section of the second solution according to the background art, the Fig. 3 a cross section of the third solution according to the background art, the Fig. 4 a cross section of the fourth solution according to the background art, the Fig. 5.0 to 5.3 shows independent views to the solution of the first embodiment of the clamp according to the invention, the Fig. 5.4 is the developed clamp from the Fig. 5.0 to 5.3 (initial semi-product), the Fig. 5.00 to 5.02 positioning of the clamp according to the Fig. 5.0 to 5.3 in a realised flanged joint of piping or channel parts being connected, the Fig. 6.0 to 6.2 shows independent views to solution of corner embodiment of the clamp according to the invention, the Fig. 6.3 a developed clamp from the Fig. 6.0 to 6.2 (initial semi-product), the Fig. 6.00 to 6.02 positioning of the corner embodiment of the clamp according to the Fig. 6.0 to 6.2 in a realised corner flanged joint of piping or channel parts being connected.

Examples of embodiment

The invention shall be described on exemplary embodiments of the clamp, at the same time it is not limited to the represented embodiments only, as it can be, within the skills of an average specialist, easily modified into further structural embodiments.

In example of embodiment in the Fig. 5.0 to 5.3 the clamp is formed of the oblong body **1**, which is provided with a triad of bent protrusions **2**. The first two protrusions **2.1**, **2.2** are situated in interval from each other on one lateral side of the oblong body **1** , and the third protrusion **2.3** is situated on the second lateral side of the oblong body **1** in the level between the first two protrusions **2.1**, **2.2**. Preferably the first two protrusions **2.1**, **2.2** are situated at ends of the oblong body **1**. The protrusions **2.1**, **2.2**, **2.3** are preferably of a linear character, by which it is understood, that they are of a suitable length in direction of length of an oblong body **1**, at the same time their length is smaller than the length of the oblong body **1**. The protrusions **2.1**, **2.2**, **2.3** are positioned non-symmetrically towards the longitudinal axis **P** of the oblong body **1**. As it is obvious from the Fig. 5.4, the clamp is performed by bending the flat semi-product according to the Fig. 5.4. The width **X** of the oblong body **1**, i.e. distance between the protrusions **2.1**, **2.2**, **2.3** on both lateral sides of

the oblong body 1, corresponds to the width of a pair of flanges 0 being connected with compressed sealing compound 00 between them, as it is shown in the Fig. 5.00. The length Y of the clamp is in principle optional taking into account material consumption, strength requirements and possibly also dimensional characteristics of realised connections.

As represented in the Fig. 5.02 and 5.01, the clamp to the flanges 0 being connected is applied so that to the first flange 0 engages with the first protrusion 2.1, after then also with the second protrusion 2.2 on the same lateral side of the oblong body 1 and after then the third protrusion 2.3 situated on opposite lateral side of the oblong body 1 engages by turning around the longitudinal axis of the longitudinal body 1 (using elastic deformation of the protrusions 2.1, 2.2, 2.3) with the second flange 0. Through this both flanges 0 are simultaneously tightened to each other and the sealing compound 00 is compressed between the flanges 0. For this manipulation with the clamp it is possible to use a not represented simple single-handed fixture, into which the clamp is simply inserted and by motion of one hand is applied to its position on the flanges 0. The next clamp is to the flanges applied in a suitable interval. By means of this clamp it is possible to realise not only the linear long joints, but also the circular joints, e.g. upon connection of end parts of two piping or channels.

In the not represented example of embodiment the clamp is formed of the oblong body 1, which is provided only with a couple of bent protrusions 2, out of which one protrusion 2 is situated on one lateral side of the oblong body 1 (preferably on one of its ends) and the second protrusion 2 is situated on opposite lateral side of the oblong body 1 (preferably on the second end of the oblong body 1), while both protrusions 2 are positioned non-symmetrically towards longitudinal axis P of the oblong body 1. Also this clamp is created by bending a flat semi-product and to its place on flanges 0 it is positioned in the same manner as the clamp represented in the Fig. 5.0 to 5.3.

The example of embodiment in the Fig. 6.0 to 6.2 represents the clamp for realisation of corner joints without usage of screws. The clamp is formed of oblong body 1, which is provided with a triad of bent protrusions 2. The first protrusion 2.1 is situated on one lateral side of the oblong body 1 on the first

end of the oblong body **1**. In direction of longitudinal axis of the oblong body **1** in interval from the first protrusion **2.1** on the opposite lateral side of the oblong body **1** the second protrusion **2.2** is situated. On the second end of the oblong body **1** in direction across to longitudinal axis **P** of the oblong body **1** the third protrusion **2.3** is situated. Preferably the third protrusion **2.3** is situated on the bent end section of the flat element **1**. The first two protrusions **2.1** and **2.2** are preferably of a linear character, by which it is understood, that they are of a suitable length in direction of length of the oblong body **1**. The protrusions **2** are positioned in a non-symmetric manner towards longitudinal axis **P** of the oblong body **1**. As it is obvious from the Fig. 6.3, the clamp is performed by bending the flat semi-product. The width **X** of oblong body **1**, i.e. the distance between protrusions **2** on both lateral sides of the oblong body **1**, corresponds to the width of a pair of flanges **0** being connected with compressed sealing compound **00** between them, as it is shown in the Fig. 6.00. As represented in the Fig. 6.01 and 6.02, the clamp to the corner connected flanges **0** is applied so that each flange **0** is provided with the corner segment **3** with across through hole **30**. The third protrusion **2.3** is being inserted into the through hole **30** of the corner segment **3**, after then using the elastic deformation of the clamp the first and second protrusion **2.1**, **2.2** engage with the flanges **0**. Through this both flanges **0** are simultaneously tightened together and the sealing compound **00** is compressed between the flanges **0**. Against a reverse disengagement of the third protrusion **2.3** mechanical bending by about 90° is carried out. Through this the corner segments **3** are compressed and the sealing compound **00** is squeezed. For this manipulation with the clamp it is possible to use a not represented simple single-handed fixture, into which the clamp is simply inserted and by motion of one hand is applied to its position on the flanges **0**. In direction to the next corner of the piping being connected, it is possible onto the flanges **0** to apply the clamp e.g. according to the Fig. 5.0.

Applicability

The invention is applicable especially at installation or production of piping and channels used for air conditioning or transport of other gases.

List of referential markings

0	flange
00	sealing compound
1	oblong body
2	protrusion
2.1	first protrusion
2.2	second protrusion
2.3	third protrusion
3	corner segment
30	across hole in a corner segment
P	longitudinal axis of oblong body
X	width of oblong body
Y	length of the clamp

CLAIMS

1. The clamp for mutual attachment of parts of air conditioning piping or channels, especially for exhaustion, air-conditioning and transportation of air and other gases, where the ends of sections of piping or channel being connected are provided with the flange (0) with sealing compound (00) and the clamp comprises oblong body (1), **characterised in that, the** oblong body (1) on each its lateral side is provided with at least one bent protrusion (2) having its length less than length of the oblong body (1), while the protrusions (2) are arranged asymmetrically towards longitudinal axis (P) of the oblong body (1).

2. The clamp according to the claim 1, **characterised in that, the** oblong body (1) is provided with a triad of bent protrusions (2), out of which the first two protrusions (2.1, 2.2) are situated in interval from each other on one lateral side of the oblong body (1) and the third protrusion (2.3) is situated on the second lateral side of the oblong body (1) in the level between the first two protrusions (2.1, 2.2).

3. The clamp according to the claim 2, **characterised in that, it** is formed of a bent metal sheet.

4. The clamp according to the claim 1, **characterised in that, the** oblong body (2) is provided with a triad of bent protrusions (2.1, 2.2, 2.3), while the first protrusion (2.1) is situated on one lateral side of the oblong body (1) on the first end of the oblong body (1), in direction of longitudinal axis (P) of the oblong body (1) in interval from the first protrusion (2.1) on the opposite lateral side of the oblong body (1) the second protrusion (2.2) is situated, and on the second end of the oblong body (1) in direction across to longitudinal axis (P) of the oblong body (1) the third protrusion (2.3) is situated.

5. The clamp according to the claim 4, **characterised in that, the** third protrusion (2.3) is situated on the bent end section of the flat element (1).

Fig 1

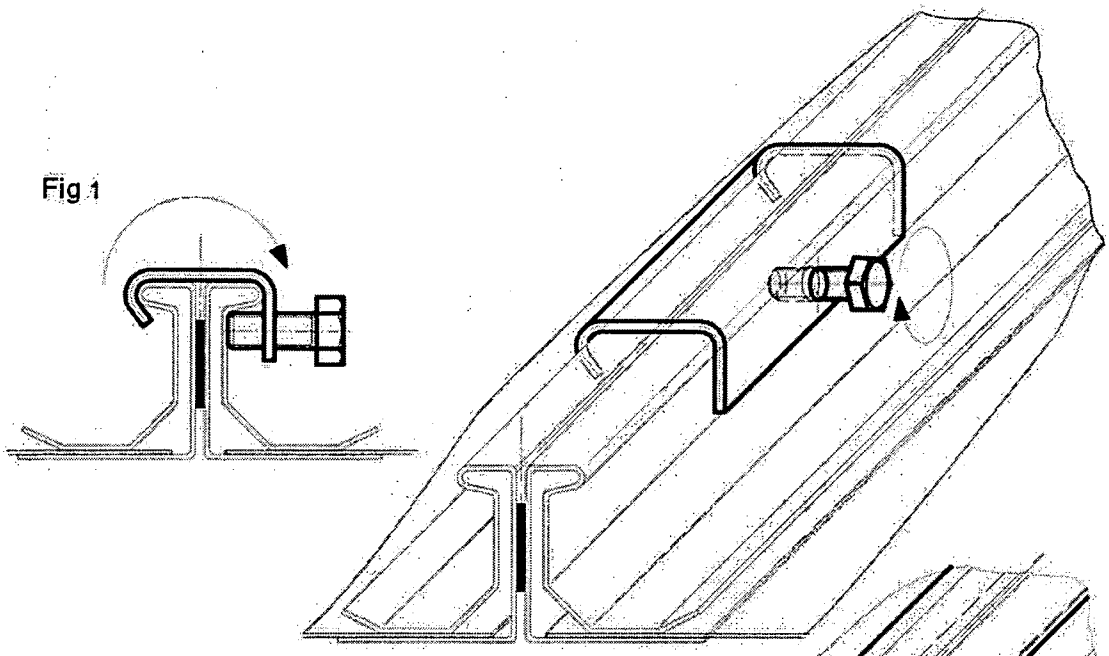


Fig 2

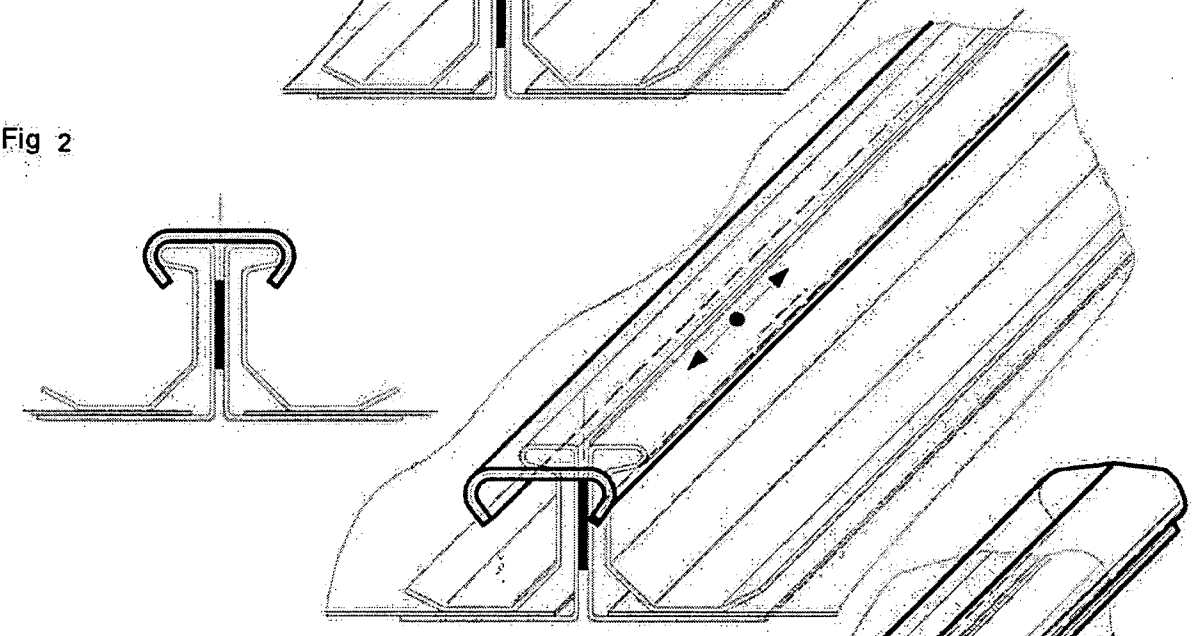


Fig 3

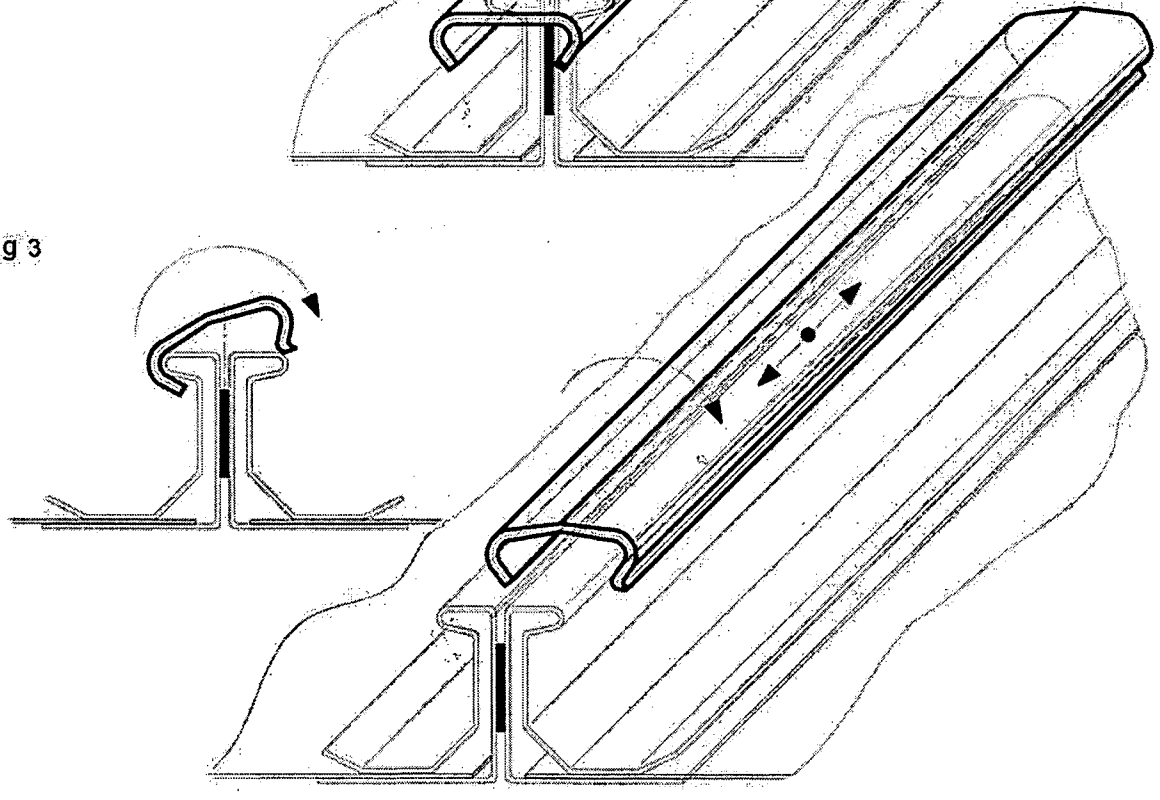


Fig 4

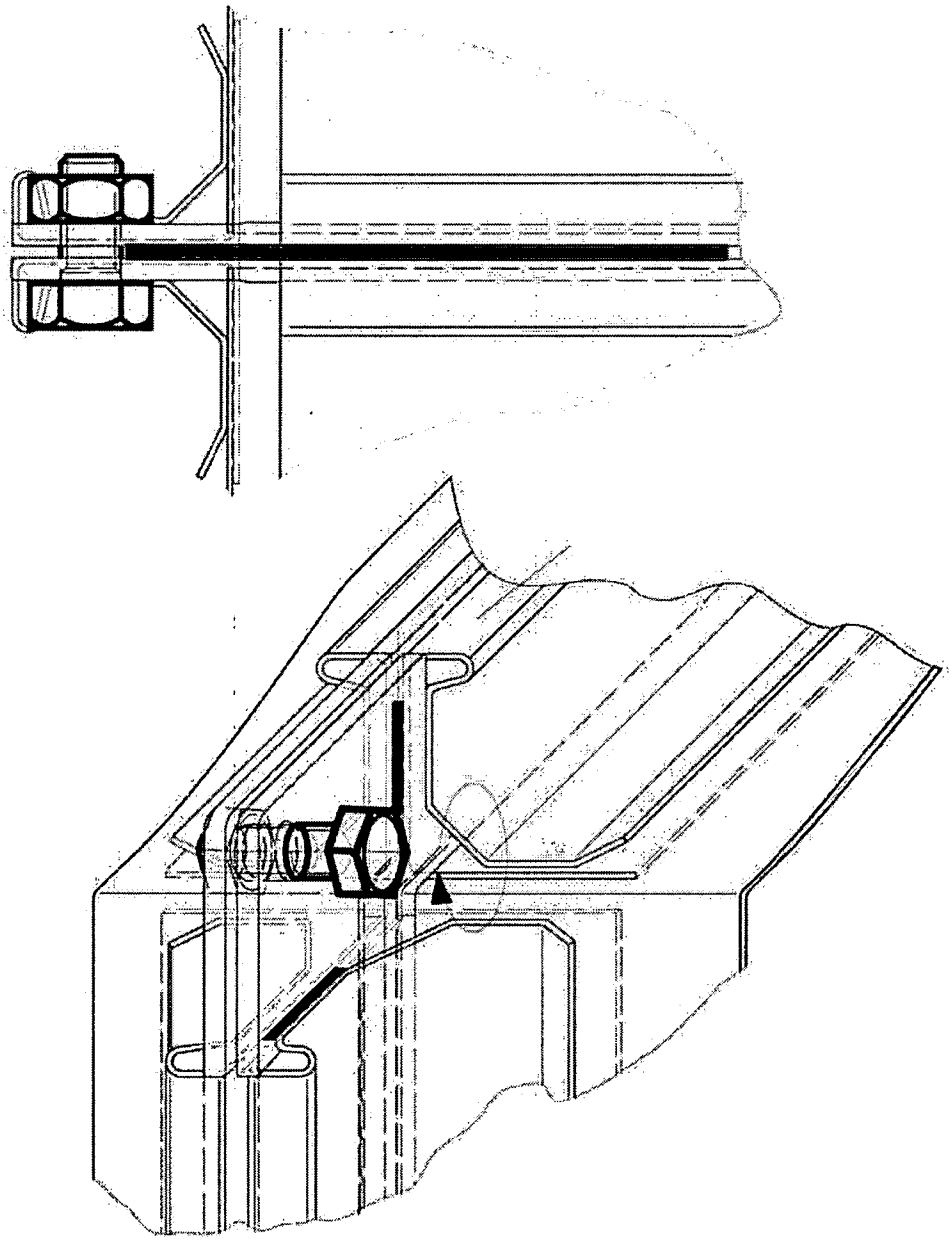


Fig 5.0

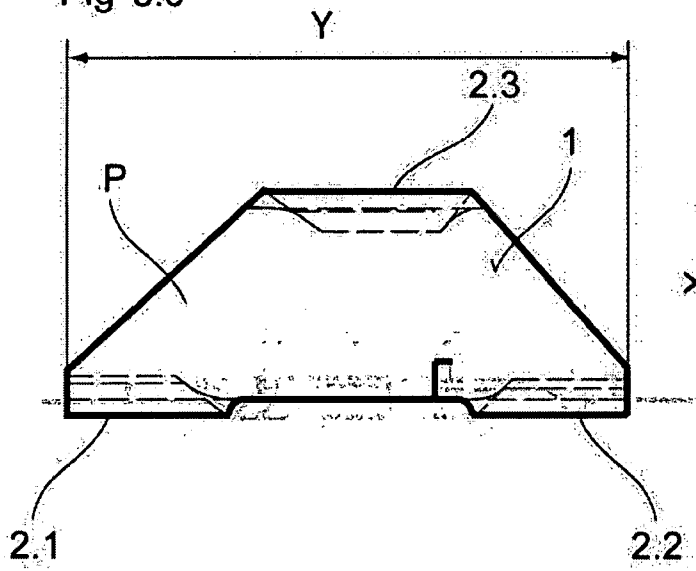


Fig 5.1

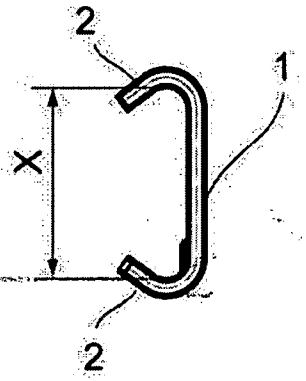


Fig 5.2

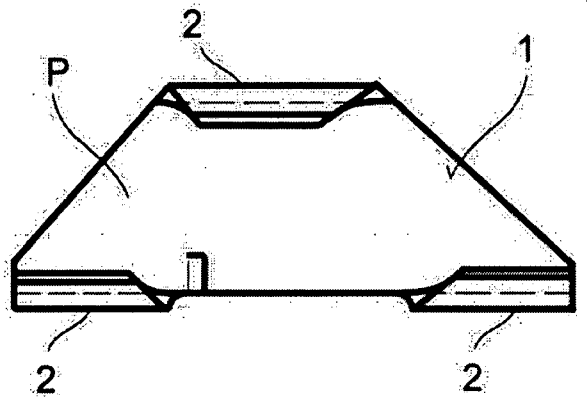


Fig 5.4

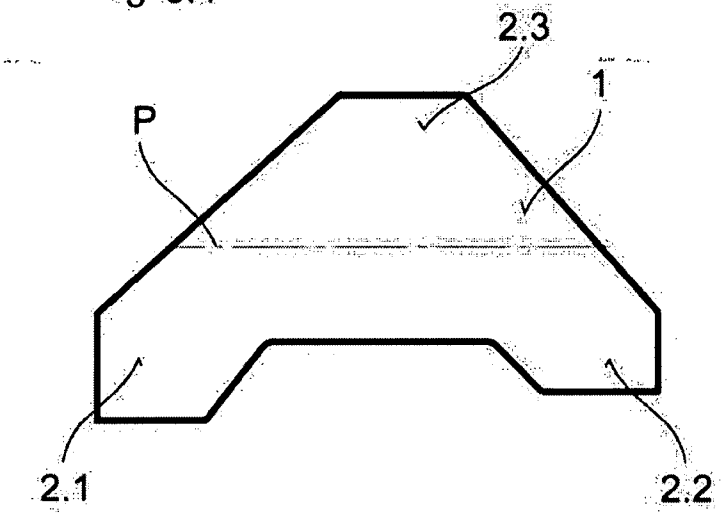


Fig 5.3

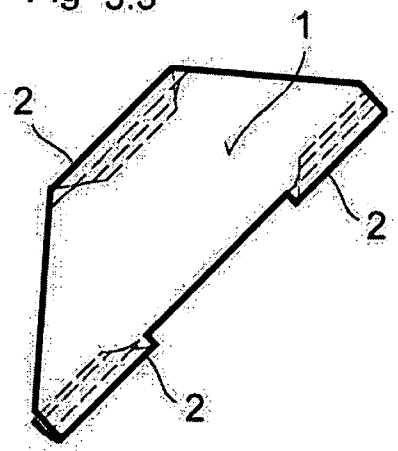


Fig 5.00

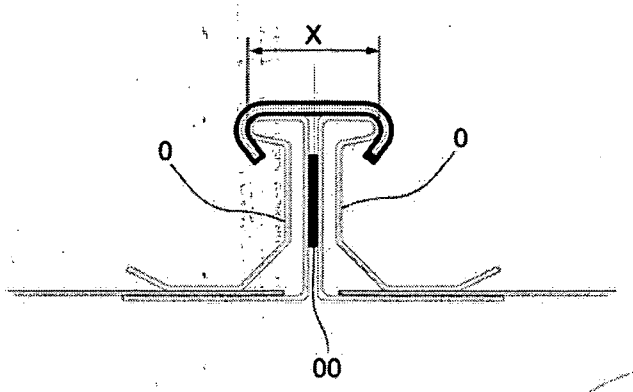


Fig 5.01

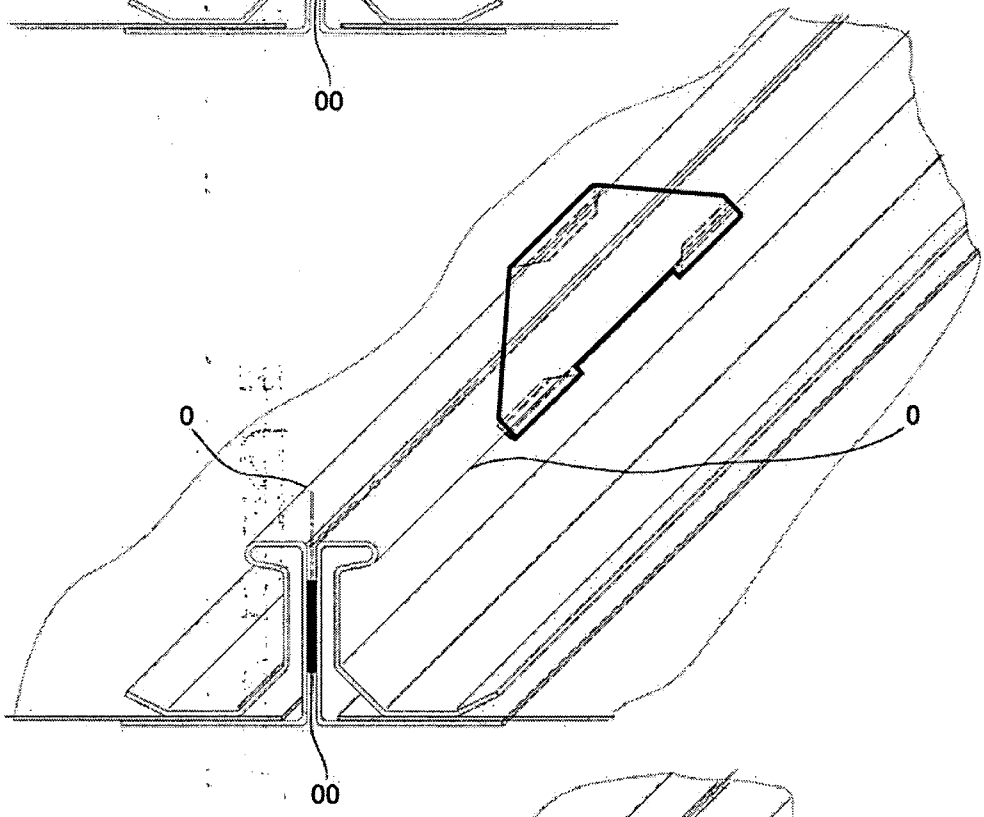
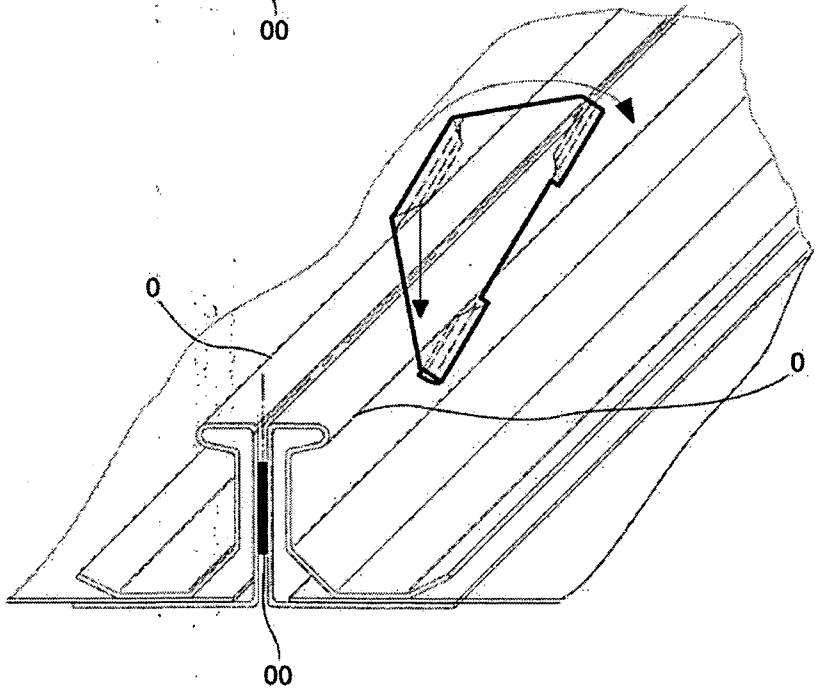


Fig 5.02



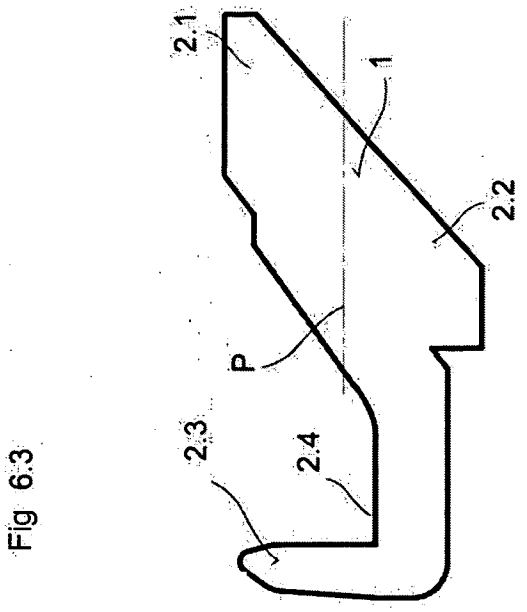


Fig 6.3

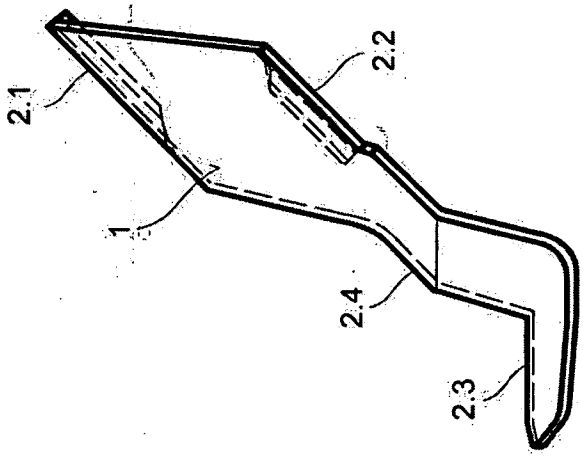


Fig 6.2

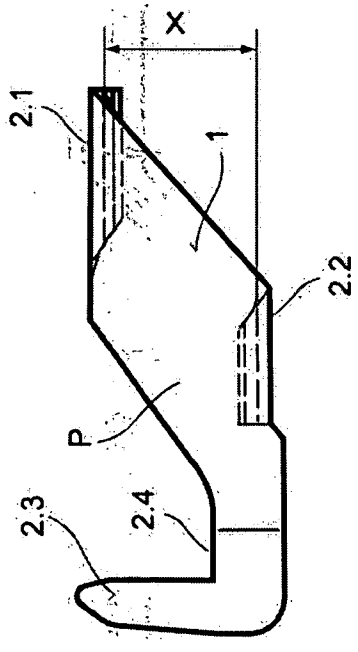


Fig 6.0

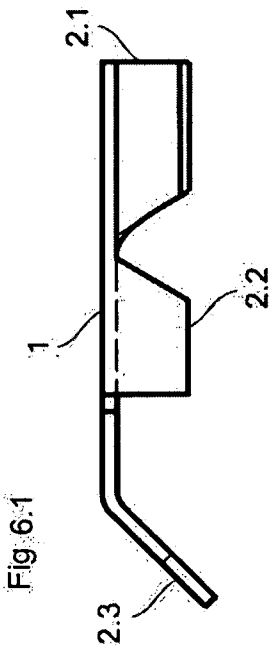


Fig 6.1

Fig 6.00

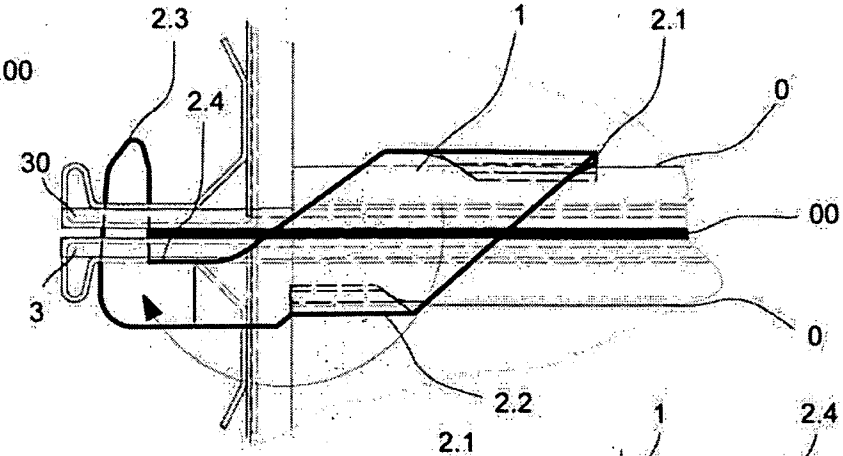


Fig 6.01

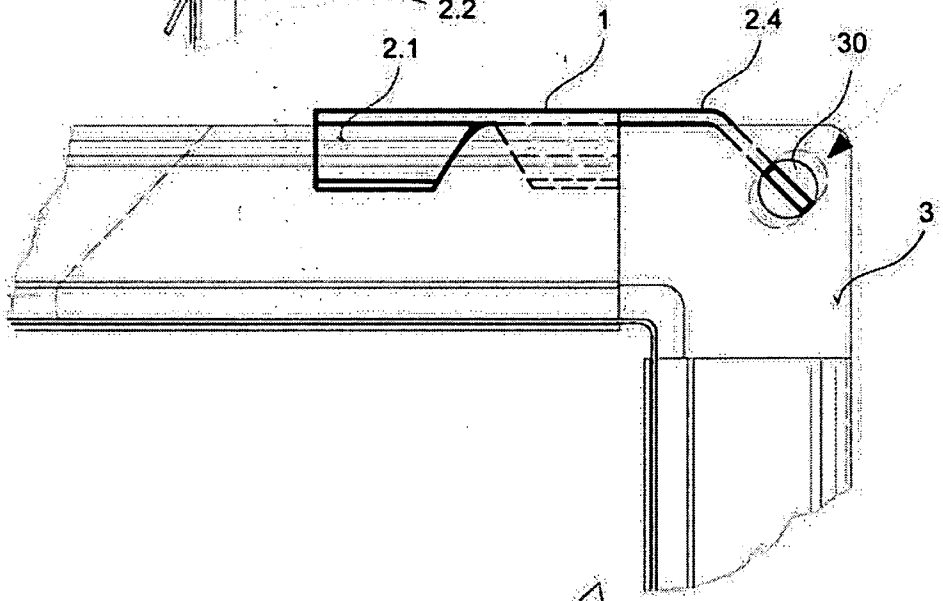


Fig 6.02