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(54) **STIFFENING JOINT WITH EXPANDABLE SCREW-NUT MECHANISM**

(57) The present invention pertains with a stiffening joint with expandable screw-nut mechanism intended to inner blocking of some sides of mechanical structures which put together tubular members in order to work or to be stiffened for correct achievement of some technological operations as the surface welding with partial melting of prefabricated doors or window corners, by example of plastics.

The stiffening joint with expandable screw-nut mechanism consists of an expandable nut (**1**) and a conical threaded screw (2) which penetrates in some intermediate elements (3a respectively 3b), the nut (**1**) being of plastics with many holes bordered of some segments (c, d, e, respectively f) and some walls as elastic membranes and where is introduced a conical screw (3) driven until the moment when the nut (**1**) blocks in the hole of tubular profile where it will be stiffened.

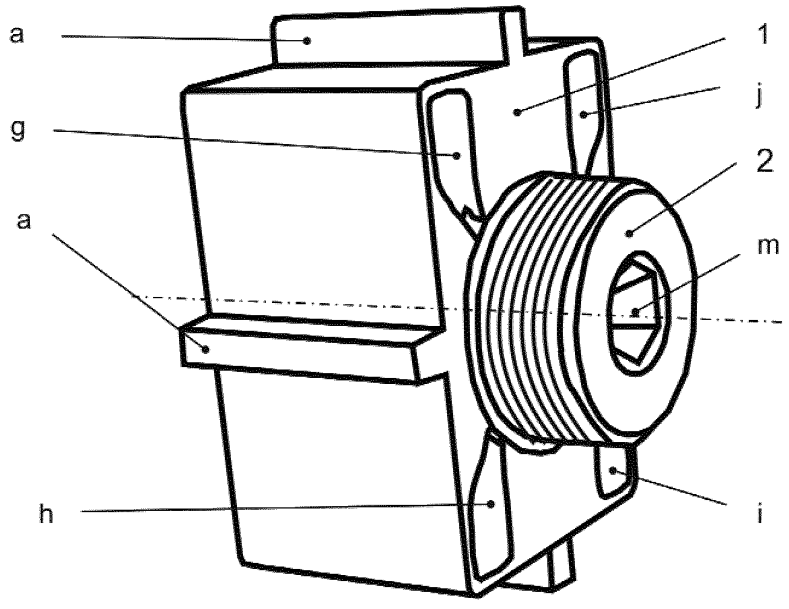

Fig. 1

EP 2 963 227 A1

Description

[0001] The present invention relates to stiffening joint with expandable screw-nut mechanism intended to inner blocking of some sides of mechanical structures which put together tubular parts in order to work or to be stiffened for correct performing of some technological operations as the surface welding with partial melting of prefabricated doors or window corners, by example of plastics.

[0002] Joints to stiffening tubular members in order to corner welding to configure the prefabricated frames of doors and windows are known. These use intermediate weldable parts with inclined faces, which are stiffened with the sides of the frame forming a right angle. They are further introduced in the aperture of the side parts and use other elements with wedge profile inside of the side and their pulling until the blocking. For a safe blocking, the outside of the intermediate elements can be equipped with drag lines intended to increase the setting effect on the length of intermediate elements expended from inside on the wall of tubular aperture in the side where it is stiffened (DE 102 10 309 B4, EP 1 179 652 B1).

[0003] The above mentioned solutions have the disadvantages that the driving of wedge form elements is uncontrolled, that the blocking of intermediate pieces inside of tubular sides is not enough safe and that after the welding, by means of their inclined faces, the obtained frames lose, in time, their profiles and so they diminish their global rigidity.

[0004] The stiffening joint of the present invention does not suffer from these disadvantages.

[0005] The purpose of this invention is to build a mechanical structure reliable during the mounting with good properties in maintaining in time the rigidity of the frame contour (profile) of doors and windows formed by the sides of tubular profile where the joint is introduced before the welding process by partial melting on the slanted faces.

[0006] According to the present invention, we provide a joint with expandable screw - nut mechanism so that it comprises an intermediate member where is introduced an expandable nut of plastics built with wholes and holes forming many segments and elastic membranes where a conical screw is slowly displaced until the nut blocks inside of the orifice of tubular profile where the joint will be stiffened.

[0007] The above mentioned construction provides a guided driving during the mounting operation, a blocking on a larger surface and so it proves to be more reliable and by the mentioned blocking for the adjacent sides of the closed contour, a longer running in rigidity conditions results.

[0008] A preferred embodiment of stiffening joint according to the invention is now described by way of examples with reference to the accompanying drawings, in **Fig. 1... Fig. 10** in which:

Fig. 1 - Shows an inclined axonometric view of the joint with expandable screw - nut mechanism when the tubular profile of the side to be mounted has four support surfaces.

Fig. 2 - Shows an inclined axonometric frontal view of the joint with expandable screw - nut mechanism when the tubular profile of the side to be mounted has two support surfaces.

Fig. 3 - Shows an axonometric frontal view of the joint with expandable screw - nut mechanism when the tubular profile of the side to be mounted has three support surfaces.

Fig. 4 - Shows a frontal axonometric view of the joint with expandable screw - nut mechanism when the tubular profile of the side to be mounted has two support surfaces.

Fig. 5 - Shows a frontal axonometric view of the expandable nut when the tubular profile of the side to be mounted has four support surfaces.

Fig. 6 - Shows a frontal axonometric view of the expandable nut when the tubular profile of the side to be mounted has three support surfaces.

Fig. 7 - Shows axial cross-section of the conical driving screw.

Fig. 8 - Shows a lateral cross-section in order to exemplify the manner in which intermediate members are introduced in tubular sides to be mounted of the frames dedicated, by example, to profile a door or a window.

Fig. 9 - Shows a detail of a top view on the of the joint between the intermediate member and the longitudinal parallelepiped rib of the expandable nut.

Fig. 10 - Shows an axonometric view of the intermediate member where is inserted the joint of expandable nut.

[0009] The stiffening joint according the invention as in Fig. 1 comprises an expandable nut **1** and a conical screw **2** provided with normal thread. The joint of these two parts penetrates in an intermediate member **3a,** which interacts by welding with an other intermediate member **3 b** together welded in order to stabilize and rigidify the positions of two neighboring sides of the frame to be configured.

[0010] In order to use the joint, each screw **2** is introduced and mounted by coupling in a nut **1** and further introduced in the intermediate member **3a,** respectively **3b,** by one for each of sides **4a,** and **4b** respectively which one desires to be mounted in order to form a frame for a

door or window. The intermediate members **3a,** respectively **3b** are from weldable plastics and possess each one inclined surface **a1,** respectively **a2,** which are welded at an appropriate temperature according to the used material.

[0011] In a first embodiment as in **Fig. 1** and **Fig. 5,** the expandable nut **1** has a parallelepiped profile accordingly with the inner tubular profile of the intermediate member **3a,** respectively **3b** where it is introduced. So the expandable nut **1** acts on the four walls of the intermediate member **3a,** respectively **3b.** Along of each face of the expandable nut **1 ,** achieved as an elastic membrane, that is void of segments of the threaded orifice, there is a parallelepiped rib **a.** The expandable nut **1** is built so that its threaded orifice **b** is situated at the centre of the side which is normal on the direction of the orifice of intermediate member and the transversal profile of the expandable nut **1** consists of four segments **c, d, e** respectively **f** separated along the expandable nut **1** by some open orifices **g, h, l** respectively **j** linked between them through thin walls which close the outside profile of the nut body. The ribs **a** appear in this situation on the walls of the nut **1** on which appear the segments **c, d, e,** respectively **f.**

[0012] In other embodiment as shown in **Fig. 3** and **Fig. 6** the number of walls of intermediate elements **3a,** respectively **3b** on which acts the expandable nut **1** is of three. In these circumstances, the threaded orifice **b** consists of three segments **c, d,** respectively **e,** separated by three open orifices **g, h,** respectively **i.** The **a** ribs appear in this situation on the wall of the expandable nut **1** where find the segments **c, d,** respectively **e.**

[0013] In a third embodiment as in **Fig. 4** the number of intermediate element **3a,** respectively **3b** on which acts the expandable nut **1** is of two. In these circumstances the threaded orifice **b** consists of two segments **c,** respectively **d,** separated by two open orifices **g,** respectively **h.** The **a** ribs appear in this situation on the wall of the expandable nut **1** where find the segments **c,** respectively **d.**

[0014] For cases acting on two or three walls, in the body of one or of all segments one provides one additional hole.

[0015] The conical screw **2** is of plastics and it is provided in the inside with a profiled orifice **m,** by example hexagonal, where it is introduced a driving key. This orifice **m** is ended in other orifice **n** of circular orifice which enables the passing of the key through the screw during its driving.

[0016] Always the mounting of the screw **2** in the expandable nut **1** is performed in outside of intermediate element **3a,** respectively **3b,** from the opposite side of the inclined surface **a1,** respectively **a2.** The intermediate element **3a,** respectively **3b,** introduces further in the profiled side **4a,** respectively **4b,** of the frame to be configured. After the positioning, through a hole in the inclined surface **a 1 ,** respectively **a2,** of the intermediate element introduces a driving key with an outside profile identical with the inner orifice **m** of the inside of the screw **2.** After the blocking of intermediate elements **3a,** respectively **3b** in the sides **4a** respectively **4b** one welds the intermediate elements by overlapping of the surfaces **a1** and **a2** through a surface thermal process with partial melting.

[0017] The intermediate elements **3a,** respectively **3b** have on the all lateral faces some longitudinal channels **o** with a breadth close to the breadth of the rib **a** from the nut **1 ,** channels which have at the free part a flared portion **s.**

[0018] Somewhere, on the length of the channel **o** of the intermediate element **3a,** through which are pulled the longitudinal ribs **a** together with the nut **1 ,** there is a concave hole with a constriction **p,** similar to an arrow profile, where penetrate the heads of the ribs **a.** These ribs have a full profile **r** identical with the profile of the hole in the channel on the intermediate element **3a** with the role to immobilize the nut **1** at the end of the stroke where it is pulled by the conical screw **2.**

References

[0019]

1. REICHEL-SCHEIDERER, G. Eckverbinder. Patent Germany DE 102 10 309 B4.

2. REICHEL-SCHEIDERER, G., REICHEL, J. Eckverbinder. European Patent EP 1 179 652 B1.

Claims

1. A stiffening joint with expandable screw-nut mechanism intended to ensure the blocking from inside of some sides of mechanical structures of frame type which assembles tubular pieces to work and rigidify with the aim to perform correct technological operations as the welding of prefabricated doors and windows, by example of plastics, consisting by some intermediate parallelepiped elements **(3a,** respectively **3b)** close to an end with inclined surface **(a1,** respectively **a2)** with a groove as a longitudinal channel **(o)** and which are introduced in the sides of the frame and finally are welded through a surface thermal process with partial melting by means of a plane piece **characterized in that** it consists of a expandable parallelepiped nut **(1)** of plastics and provided in central frontal part with a hole **(b)** threaded where one introduces a conical screw **(2)** in the prolongation of a profiled hole (m), by example hexagonal, where introduces a driving key which by rotating the conical screw **(2)** causes the nut **(1)** expanding inside of intermediate elements **(3a,** respectively 3 **b).**

2. A stiffening joint with expandable screw-nut mechanism as claimed in claim 1, **wherein** said joint has, along of the faces of the nut **(1)** as an elastic mem-

brane, a parallelepiped rib **(a)** and the expandable nut **(1)** is built in such manner that its threaded orifice **(b)** is situated at the centre of the face which is perpendicular on the direction of the parallelepiped orifice of the intermediate element and the transversal profile of expandable nut **(1)** is made up of four segments **(c, d, e,** respectively **f)** separated on the entire length of the expandable nut **(1)** by some open holes **(g, h, i,** respectively **j)** connected between them by some thin walls which close the outside profile of the nut body and the longitudinal ribs **(a)** appear here on the walls of expandable nut **(1)** where are the segments **(c, d,** respectively **e)** of the nut.

3. A stiffening joint with expandable screw-nut mechanism as claimed in claim1, **wherein,** when the frame profile has three support walls, the joint has, along of the faces of the nut **(1)** as an elastic membrane, a parallelepiped rib **(a)** and the expandable nut **(1)** is built in such manner that its threaded orifice **(b)** is situated at the centre of the face which is perpendicular on the direction of the parallelepiped orifice of the intermediate element and the transversal profile of expandable nut **(1)** is made up of three segments **(c, d,** respectively **e)** separated on the entire length of the expandable nut **(1)** by some open holes **(g, h,** respectively **i)** connected between them by some thin walls which close the outside profile of the nut body and the longitudinal ribs **(a)** appear here on the walls of expandable nut **(1)** where are the segments **(c, d,** respectively **e)** of the nut.

4. A stiffening joint with expandable screw-nut mechanism as claimed in claim 1, **wherein,** when the frame profile has two support walls, the joint has, along of the faces of the nut (**1**) as an elastic membrane, a parallelepiped rib **(a)** and the expandable nut (**1**) is built in such manner that its threaded orifice **(b)** is situated at the centre of the face which is perpendicular on the direction of the parallelepiped orifice of the intermediate element and the transversal profile of expandable nut **(1)** is made up of two segments **(c,** respectively **d)** separated on the entire length of the expandable nut **(1)** by some open holes **(g,** respectively **h)** connected between them by some thin walls which close the outside profile of the nut body and the longitudinal ribs **(a)** appear here on the walls of expandable nut **(1)** where are the segments **(c, d,** respectively **e)** of the nut.

5. A stiffening joint with expandable screw-nut mechanism as claimed in claim 1, **wherein** when the frame profile has two or three support walls, in the body of one or of all segments can be provided an additional orifice **(k).**

6. A stiffening joint with expandable screw-nut mechanism as claimed in claim 1, **wherein** the intermediate elements **(3a,** respectively **3b)** have on all their faces some longitudinal channels (**o**) with a breadth close to the similar breadth of the longitudinal rib **(a)** of the expandable nut **(1),** channels which have at the free part a flared portion **(s)** and somewhere along the channel (**o**) of intermediate element **(3a,** respectively **3b)** through which are pulled the longitudinal ribs **(a)** together with expandable nut **(1)** the is a concave orifice with a constriction **(p)** which of their turn have a full profile **(r)** identical with the orifice of the channel in the intermediate elements **(3a,** respectively **3b)** with the role to immobilize the stiffening joint screw-expandable nut **(1 , 2)** at the end of the stroke where it is pulled by the conical screw **(2)** driven through the hexagonal key of the human operator.

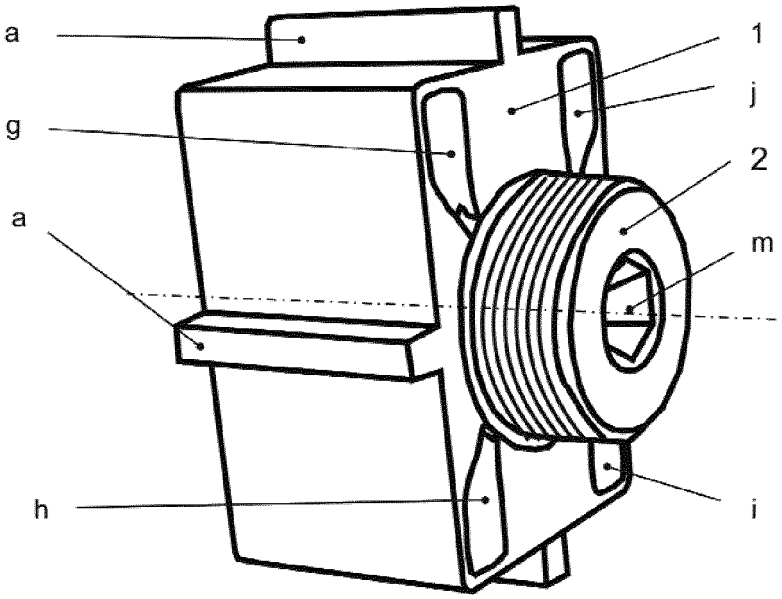

Fig. 1

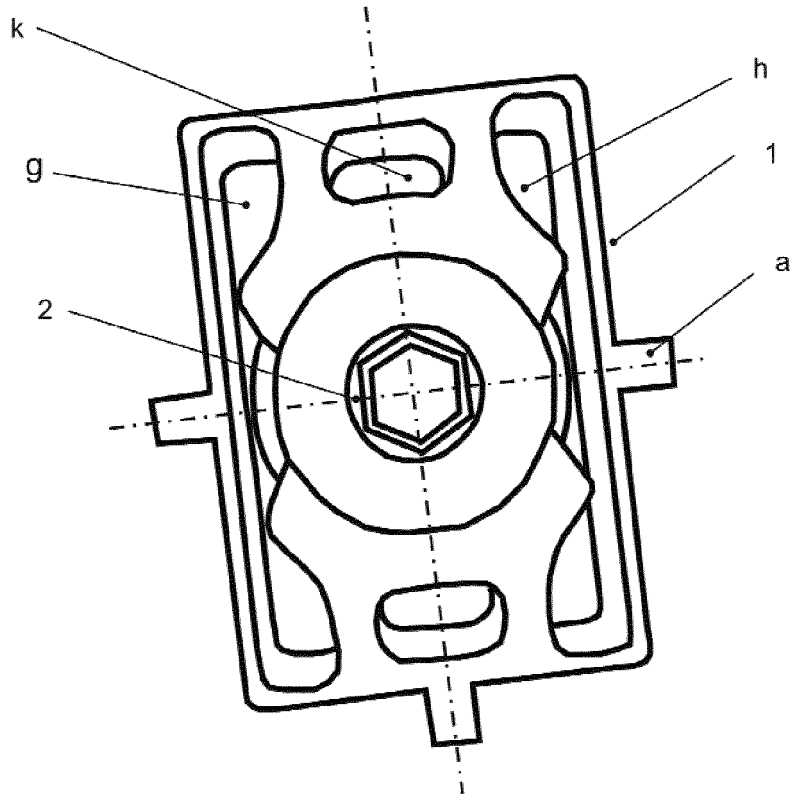

Fig. 2

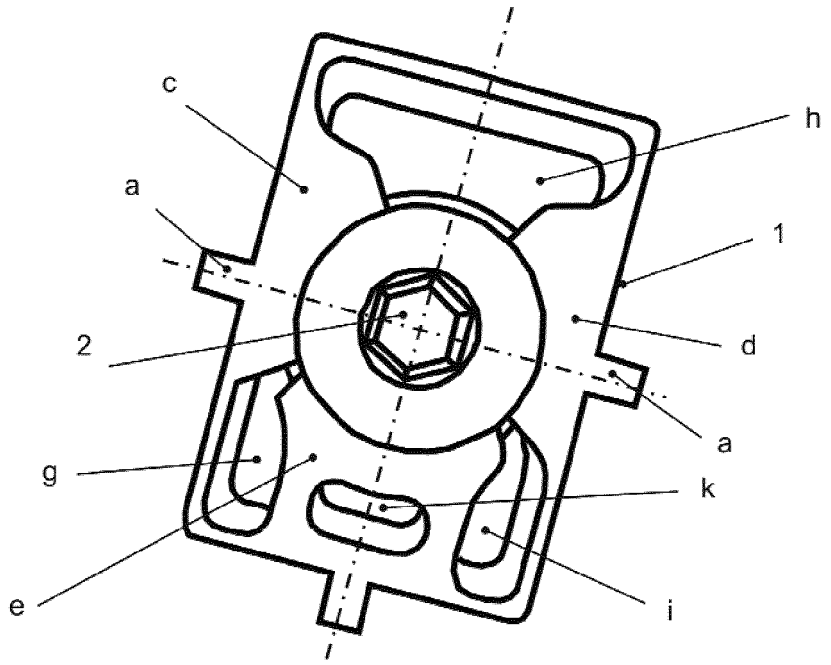

Fig. 3

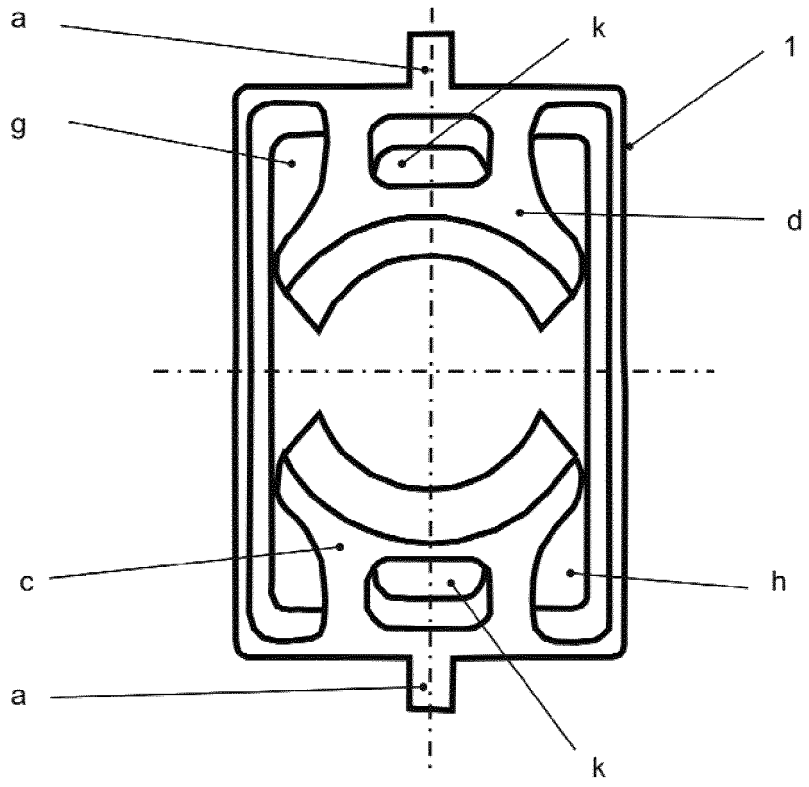

Fig. 4

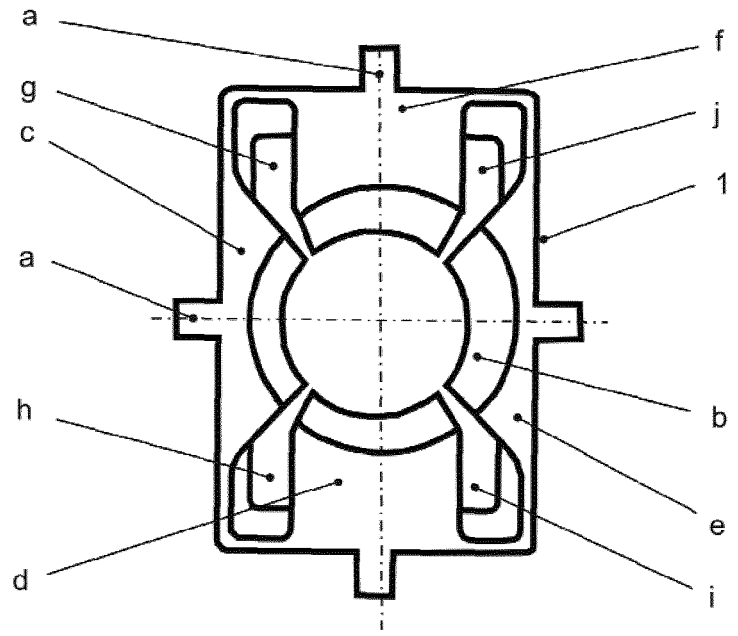

Fig. 5

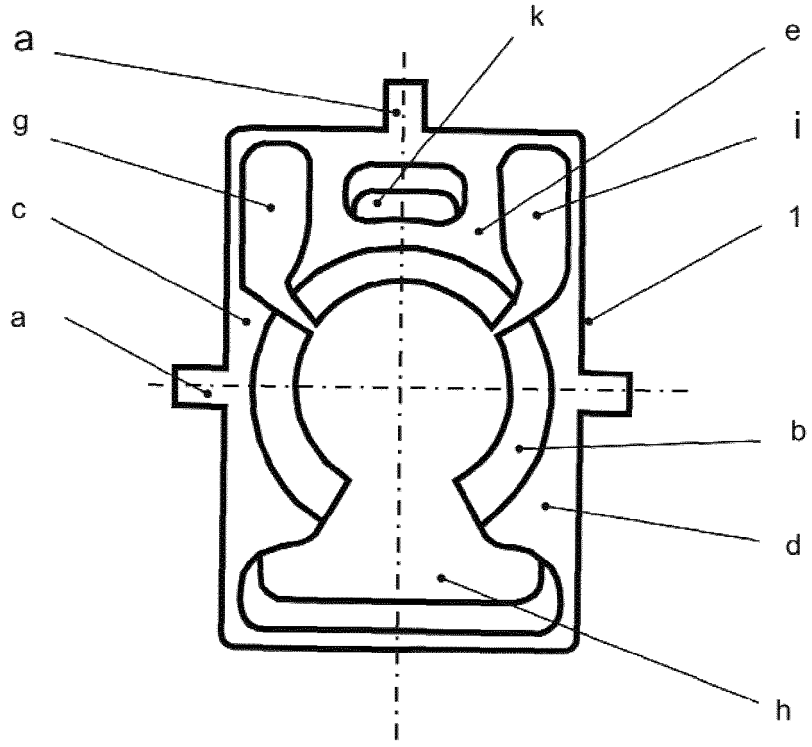

Fig. 6

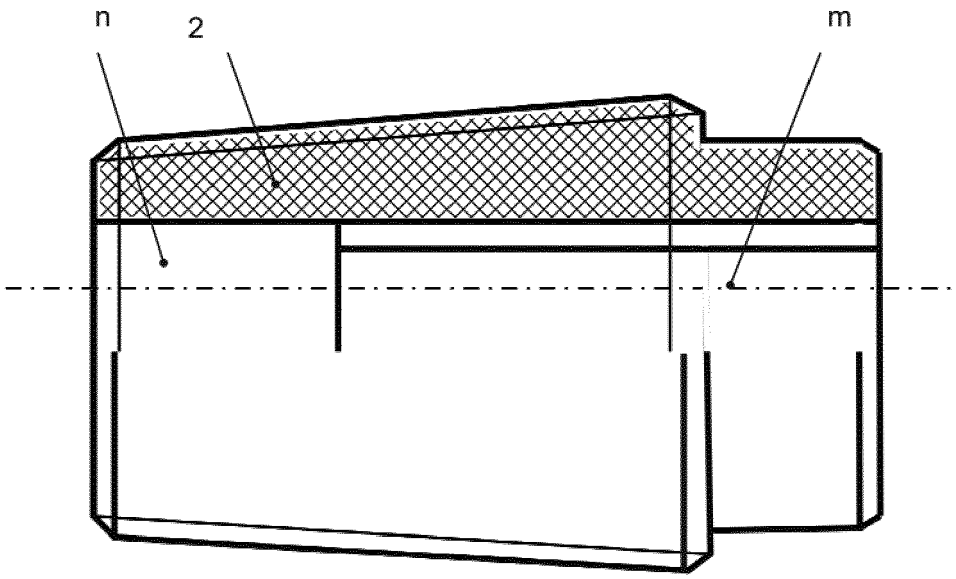

Fig. 7

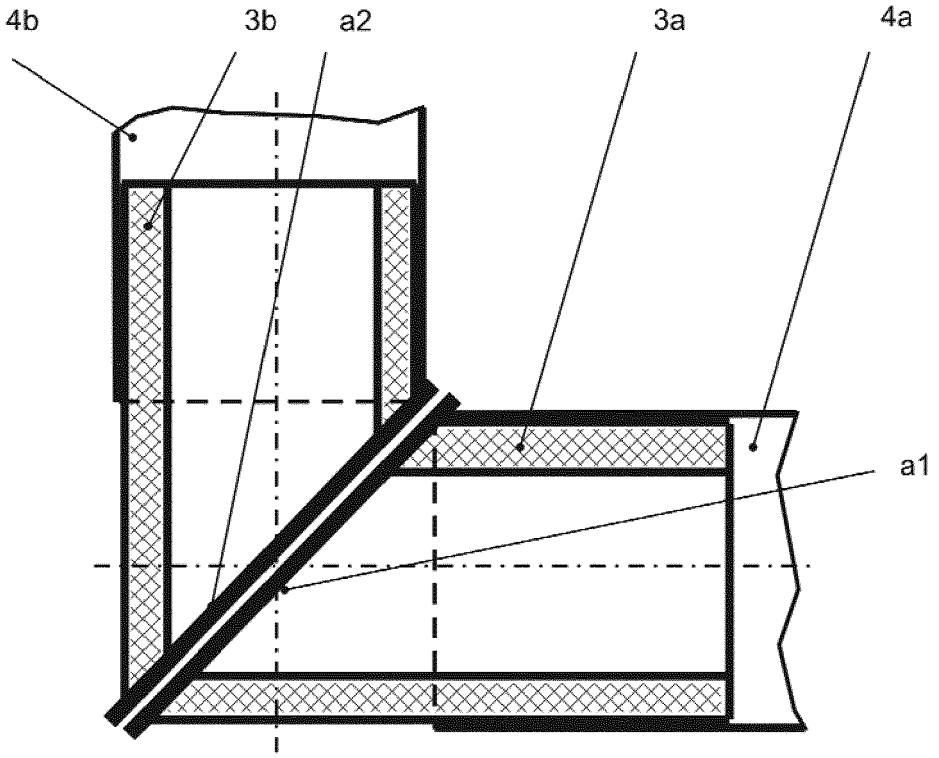

Fig. 8

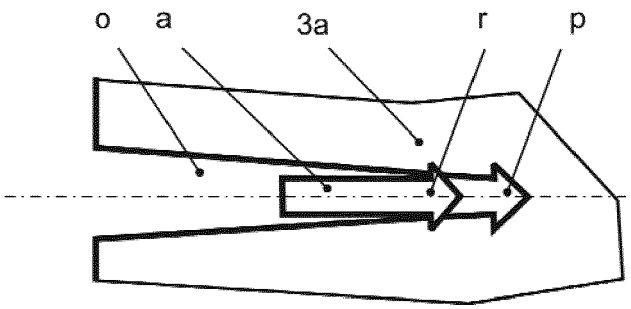

Fig. 9

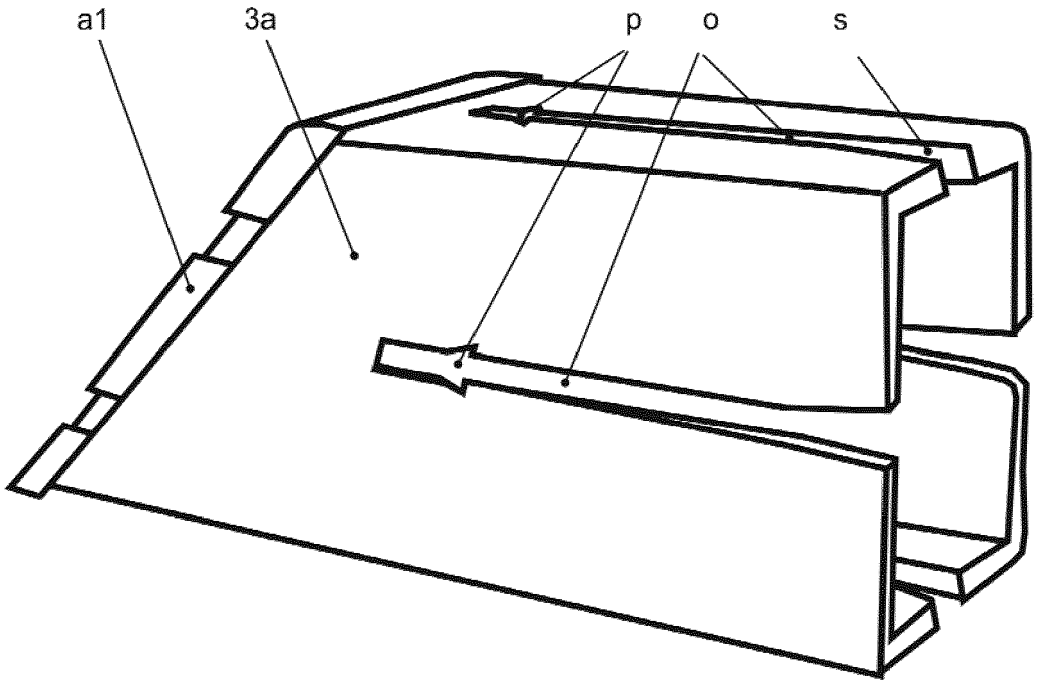

Fig. 10

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EUROPEAN SEARCH REPORT

Application Number
EP 15 17 1028

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	DE 39 24 547 A1 (GROTEFELD HANS DIETER [DE]) 5 April 1990 (1990-04-05) * figures 1-7 * -----	1-6	INV. E06B3/972 E06B3/96
X,P	EP 2 873 795 A1 (GROTEFELD HANS DIETER [DE]) 20 May 2015 (2015-05-20) * figure 2 * -----	1-6	

TECHNICAL FIELDS SEARCHED (IPC)
E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	1 December 2015	Cobusneanu, D

CATEGORY OF CITED DOCUMENTS

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 3924547 A1	05-04-1990	NONE	
EP 2873795 A1	20-05-2015	NONE	

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- DE 10210309 B4 **[0002] [0019]**
- EP 1179652 B1 **[0002] [0019]**