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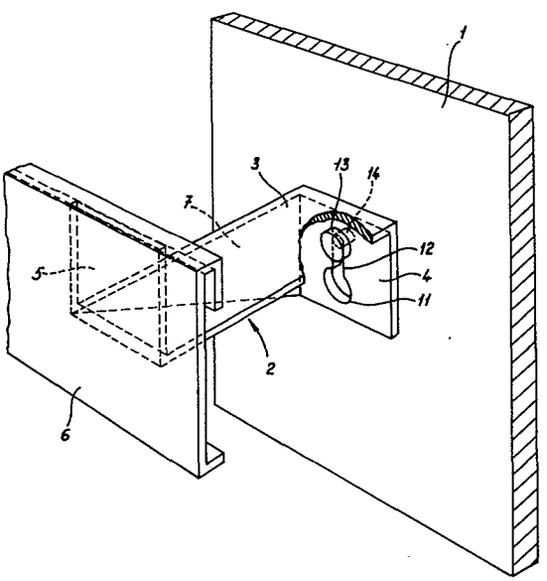
(54) **Spacer arm for an insulation construction and method for mounting said arm.**

(57) Spacer arm (2) for an insulation construction for a tank extending perpendicular to the tank wall and carrying a mounting bar (16) to which cover plates for the insulation construction can be attached. Said spacer arm (2) comprises at the inwards directed end a flat plate section (4), which is after mounting of said spacer arm (2) positioned adjacent to the tank wall (1), said plate section has a «key hole» opening (11, 12) by means of which the spacer arm (2) is mounted onto a pin element (13, 14), which pin element is welded to the tank wall by means of capacitor discharge welding.



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Spacer arm for an insulation construction and method for mounting said arm.

The invention relates to a spacer arm for an insulation construction for a tank or another building structure, which spacer arm extends perpendicular to the tank wall and carries at his outer end a mounting bar to which cover plates for the insulation construction can be attached.

Such a spacer arm is already described in the Dutch Patent 152,622. According to this prior art the spacer arms have at their inner end a plate section by means of which they are hooked into horizontally positioned saddle elements which are beforehand welded to the tank wall.

A disadvantage of this construction is, that it can only be used with empty tanks, because the pending safety regulations do not allow to use an autogeneous welding process or an electrical arch welding process onto a reservoir which is partly or totally filled with oil, liquid fuel or other inflammable material or material reacting onto excessive heating.

An object of the invention is now to eliminate said disadvantages.

Therefore a spacer arm for an insulation construction for a tank or other building structure, which spacer arm extends perpendicular to the tank wall and carries at his outer end a mounting bar to which cover plates for the insulation construction can be attached is now according to the invention characterized in that said spacer arm comprises at the inwards directed end a flat plate section, which is after mounting of said spacer arm positioned adjacent to the tank wall, which plate section has a circular opening and a slot in communication with said opening at the upper side of said opening, whereby the width of said slot is smaller than the diameter of said circular opening, which circular opening and slot are destined to cooperate with a pin element having a shank of which the diameter corresponds to the width of said slot and having furthermore a circular head of which the diameter substantially corresponds to the diameter of said circular opening, whereby the end of said pin element opposite said head is attached to the tank wall.

The spacer arm according to the invention is mounted to the tank wall by means of a pin element, which pin element is attached to the tank wall by means of a so called capacitor discharge welding method, whereby the welding current pulse is adjusted such that the transition area between the end of said pin element and the tank wall is in a very short period enough heated by the welding current pulse flowing therethrough enough to realize a welded joint whereas the inner surface of the tank wall during the welding operation is not heated to such a extend that a dangerous situation results, taking into account the contents of said tank, whereafter said spacer arm is shoved over said pin element whereby the head thereof is passing through the corresponding circular opening of the flat plate section of the spacer arm and thereafter the spacer arm is moved downwards such that the shank of said pin element moves upwards into the slot communicating with said circular opening. As the shank of said pin element reaches the upper end of said slot then the circular head of said pin element will block the spacer arm and will maintain the spacer arm in this mounted position.

According to a preferred embodiment the flat plate section of said spacer arm has at a mutual distance two circular openings with communicating slots. In that case it is necessary to attach two pins by means of the above described capacitor discharge welding process at a mutual distance corresponding to the distance of both circular openings to the tank wall. In that case a very stable construction can be realized.

Preferably the pin element has at the end opposite of the head section a further section with increased diameter. Because the pin element is attached with said further section with increased diameter to the tank wall the area of the welded joint is increased. Furthermore the contact between the flat plate section of the spacer arm and the tank wall is restricted to the under edge of said flat plat section or is even eliminated at all resulting into a very restricted heat transfer through the metal of the spacer arm from the tank wall to the outside or vice versa.

According to a further development of said preferred embodiment the diameter of the head section of said pin element is substantially equal to the diameter of said further section with increased diame-

ter. This simplifies the fabrication process of said element.

The invention will now be explained referring to the attached drawings in which preferred embodiments of the spacer arm according to the invention are illustrated.

Fig. 1 shows a perspective partly sectional view of an embodiment of the spacer arm according to the invention attached to a tank wall and carrying a mounting bar.

Fig. 2 shows a sectional view at a different scale of a preferred embodiment of a pin element for mounting the spacer arm.

Fig. 1 illustrates a part of a tank wall 1, onto which the spacer arm 2 is mounted. Said spacer arm comprises in this embodiment a central plate section 3 extending substantially perpendicular to the tank wall 1, which central plate section 3 at the side of the tank passing is connected to an end plate section 4 parallel to the tank wall and at the other side connected to a further end plate section 5, also parallel to the tank wall but oppositely directed. The end plate section 5 functions as suspension support for a mounting bar 6, which has in sectional view an U-shaped upper part, whereby the distance between the legs of said U-shape is adapted to the thickness dimension of the end plate section 5.

Said end plate section 4 comprises a circular opening 11 communicating with a slot 12 at the upper side of said opening, of which slot the width is smaller than the diameter of the circular opening 11. The tank wall 1 carries a pin element, comprising a shank 14 of which the diameter substantially corresponds to the width of the slot 12 and a circular head 13 of which the diameter substantially corresponds to the diameter of the opening 11.

Before the spacer arm 2 is mounted to the tank wall 1 by means of said pin element 11, said pin element is welded onto said tank wall 1 by means of a capacitor discharge welding method. Thereby the shank 14 of the pin element is by means of a suitable tool pressed against the tank wall in the correct position, after which a short current pulse is supplied to the transition area between the shank 14 and the tank wall 1, which current pulse is generated by discharging a capacitor. Said capacitor is beforehand charged such, that a welding current pulse can be supplied to heat the transition area between the shank 14 of the pin and the tank wall 1 in a very short period

sufficiently to realize a welded joint between the tank 14 of the pin element and the tank wall 1, whereas the inner surface of the tank wall 1 during the said welding process is not heated to such an extend, that this will cause a dangerous sitituation taking into account the contents of the tank. After finishing said welding process the spacer arm 2 is shoved over said pin element, whereby the head section 13 of said pin element moves through the circular opening 11 in the end plate section 4 of the spacer arm 2 until the end plate section 4 is positioned behind said head section 13 of the pin element, after which the spacer arm is moved downwards such that the shank 14 of the pin element moves into the slot 12 in the end plate section 4 until the final position is reached and the spacer element is locked in place.

As is indicated in Fig. 1 the spacer arm can be strengthened by means of a side wall element 7 perpendicular to the central plate section 3 and also perpendicular to the end plate section 4. In the figure only one side wall element 7 is attached to the edges of the central plate section 3 and the end plate section 4, however it will be clear that a similar side wall element may be attached to the other edges of the central plate section 3 and the end plate section 4 in which case the central part of the spacer arm will have an U-shaped cross section.

Furthermore it is also possible to attach one wall element 7 according to the center lines of the central plate section 3 and the end plate section 4, in which case it is possible to make two circular openings in communication with two respective slots into the end plate section 4, cooperating with two respective pin elements, welded onto the tank wall, whereby the above mentioned openings, slots and pin elements are made similar as described above for the singular embodiment. An embodiment having two circular openings communicating with slots results, after mounting onto the tank wall into a very stable construction whereby the spacer arm is substantially locked against rotation.

Fig. 2 illustrates in sectional view a preferred embodiment of a pin element, comprising a shank section 14a, a head section 13a and a further section 15 with increased diameter.

In this preferred embodiment, illustrated in Fig. 2, the diameter of

the head section 13a is substantially equal to the diameter of the further section 15 with increased diameter. Said pin element is by means of a capacitor discharge welding process welded to the tank wall 1. Thereby the further section 15 offers because of the increased diameter a larger transition area between the pin element and the tank wall 1, resulting into an enlarged welded joint.

When the spacer arm is installed onto said pin, then the end plate section 4 will not come into contact with the tank wall 1 or, when there is enough clearance, only the under edge of said end plate section 4 will be in contact with the tank wall 1. The result thereof is that the temperature transfer from the tank wall 1 to the environment through the metal of the spacer element is significantly restricted, resulting into improved insulating characteristics of the whole construction. Preferably the width of the slot 12 decreases slightly with increasing distance from said circular opening so that the shank 14 or 14a will enter said slot 12 very easily and fits without clearance into the upper part of said slot 12 resulting into a very tight mounting of the spacer arm.

It will be clear that the invention is not restricted to the embodiments shown in the figures and described above, but that various amendments and modifications are possible within the scope of the invention.

C L A I M S.

1. Spacer arm for an insulation construction for a tank or other building structure, which spacer arm extends perpendicular to the tank wall and carries at his outer end a mounting bar to which cover plates for the insulation construction can be attached characterized in that said spacer arm comprises at the inwards directed end a flat plate section, which is after mounting of said spacer arm positioned adjacent to the tank wall, which plate section has a circular opening and a slot in communication with said opening and at upper side of said opening, whereby the width of said slot is smaller than the diameter of said circular opening, which circular opening and slot are destined to cooperate with a pin element with a shank of which the diameter corresponds to the width of said slot and having furthermore a circular head of which the diameter substantially corresponds to the diameter of said circular opening, whereby the end of said pin element opposite said head is attached to the tank wall.

2. Spacer arm according to claim 1, characterized in that the flat plate section of the spacer arm has at a mutual distance two circular openings at the upper side in connection with respective slots as defined in claim 1, destined to cooperate with two respective pin elements as defined in claim 1, attached to the tank wall.

3. Spacer arm according to claim 1 or 2, characterized in that the pin element has at the end opposite the head section a further section with increased diameter.

4. Spacer arm according to claim 3, characterized in that the diameter of the head section is substantially equal to the diameter of said further section with increased diameter.

5. Spacer arm according to one of the preceding claims, characterized in that the width of each slot decreases slightly with increasing distance from said circular opening.

6. Method for mounting a spacer arm according to one of the preceding claims to the wall of a tank or other building structure, characterized in that each pin element necessary for mounting said spacer arm is welded to the tank wall by means of a capacitor discharge welding method, whereby the welding current pulse is adjusted such that the transition area between the end of said pin element and the tank

wall is in a very short period enough heated by the welding current pulse flowing therethrough to realize a welded joint, whereas the inner surface of the tank wall during said welding operation is not heated to such an extend that a dangerous situation results, taking into account the contents of said tank, whereafter said spacer arm is shoved over said pin element, whereby the head thereof is passing through the corresponding circular opening of the flat plate section of the spacer arm and thereafter the spacer arm is moved downwards such that the shank of said pin element moves upwards into the slot communicating with said circular opening.

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Fig-1

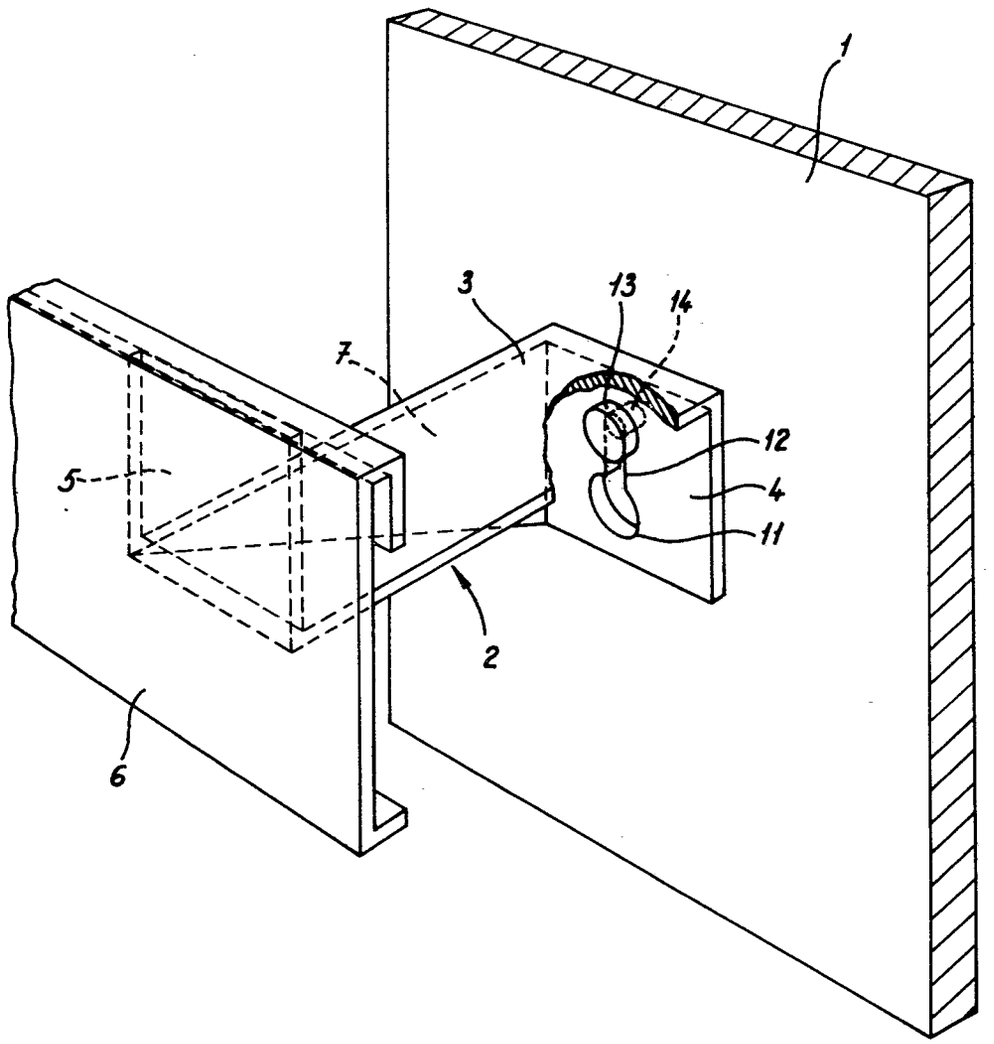
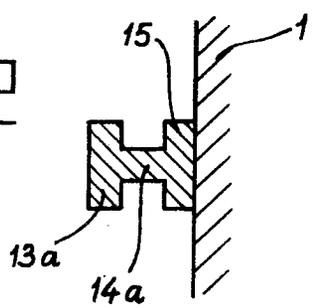


Fig-2



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EUROPEAN SEARCH REPORT

Application number
0047554
EP 81 20 0961

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
D/A	DE - A - 1 932 489 (ENTREPRENA-DISOLERING AB) & NL - C - 152 622	
	FR - A - 2 307 094 (SCANALPINA) * page 2, lines 34-38; page 3, lines 1-15; figures 1-4 *	1
	DE - A - 2 140 957 (NEB) * claim 1; figures 1 and 2 *	1
	FR - A - 2 057 121 (G.E.A.I.) * page 2, lines 7-25; figure 1 *	2
	PHILIPS NEDERLAND N.V., September 24, 1959, EINDHOVEN (NL) "Philips Stiftlasprocédé" * the whole document *	1,6
	WELDING AND METAL FABRICATION, vol. 33, no. 10, October 1965, HAYWARDS HEATH., SUSSEX (GB) "High Speed Stud Welding", pages 428 and 429 * the whole document *	6

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

B 65 D 90/06
E 04 F 13/08

TECHNICAL FIELDS SEARCHED (Int. Cl.³)

B 65 D
E 04 F
E 04 B
F 17 C
B 23 K

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	07.12.1981	OSTIJN

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