

# PATENT SPECIFICATION

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## (54) DEVICE FOR POSITIONING AND SUPPORTING LAYERS OF TUBES

(71) We, B.S.L. (BIGNIER SCHMID-LAURENT), a French Body Corporate, residing at 25 quai Marcel Boyer, 94 Ivry Sur Seine, France, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 The present invention relates to a device for positioning and supporting layers of tubes.

French Patent 1 506.023 discloses a device which enables layers of tubes to be positioned and supported. This device comprises a plurality of spacer sections which are superposable, positioning means which are fixed to these sections and locking means.

20 German Patent 930 146 likewise discloses a device for positioning and supporting layers of tubes, comprising elements from which tabs are cut out and folded obliquely to the outside.

25 In the device according to the French Patent, the positioning means are displaceable with respect to spacer elements and are designed to hold the tubes prisoner.

30 Moreover, in this device, two blocking means for holding the positioning means must be provided for each spacer element.

35 It is an object of the present invention to provide a simpler positioning device which may be manufactured economically, particularly for supporting superposed layers of tubes.

The invention is defined by claim 1 hereinafter.

40 A device embodying the invention particularly enables the positioning tabs to be obtained by being cut out of the spacer sections.

45 Although the German Patent 930 146 provides the use of tabs for positioning the tubes, it does not describe the combination

of the positioning means and locking means of the present invention.

The spacer sections are preferably of U-or rectangular cross-section. The positioning tabs may be added to the spacer sections or obtained by cutting out and folding certain parts of the spacer sections. These tabs constitute for example supports in which the tubes pass or riders which span the tubes. The locking means are preferably constituted by a plurality of rods passing in perforations in the spacer sections or between the spacer sections and fixed to a base or passing therethrough, stops being movably mounted at the ends of the rods as far as a stop position corresponding to a tightening of the stack with pressure.

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In a preferred embodiment, a plurality of tubes can be formed into a single assembly which may be handled as a unit, this considerably facilitating the installation of the tubes where they are required, for example in a reactor, since the relative positioning of the tubes has already been affected in the device and it suffices to provide means for supporting the unit in the reactor, the "positioning" and "support" functions being separate. This unit constitution, preferably in modular units, also facilitates the removal of one or more units, for example for periodic checks for tightness or the like.

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The invention will now be described in more detail, solely by way of example with reference to the accompanying drawings, in which:

Fig. 1 is a schematic perspective view of part of a device embodying the invention;

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Fig. 2 is a view in detail of an example of a spacer section provided with positioning tabs;

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Fig. 3 is a partial sectional view through a stack having spacer sections such as the one shown in Fig. 2 at a plane passing

through superposed sections;

Fig. 4 is a view along line IV-IV of Fig. 3;

Fig. 5 is a view in detail of another example of a spacer section;

5 Fig. 6 is a partial sectional view of a stack having spacer-sections such as the one shown in Fig. 5 at a plane passing through superposed sections;

Fig. 7 is a view along line VII-VII of 10 Fig. 6; and

Fig. 8 is a plan view of tube coils in position in a reactor.

Referring now to the drawings, the device which has been shown partially and 15 schematically in Fig. 1 comprises a self-supporting base 1 in the form of a star, comprising a central portion 1a from which radiate arms such as 1b above which are superposed spacer sections 2. The sections 2 bear support members 5 in which 20 are received the tubes 6 to be positioned. Each stack or superposed sections 2 is maintained by tightening frames constituted by pairs of rods 3 cooperating with transverse bridges 12. In the case shown, the base constitutes the lower transverse bridges and the rods are fixed to the base. By tightening moveable stops such as nuts 4, the frames maintain the assembly constituted 25 by the sections 2 and tubes 6, in a unit.

Fig. 2 shows by way of example a U-section spacer section 7 and Fig. 5 shows another example constituted by a section 8 of rectangular cross-section.

35 The means for positioning the tubes in the spaces between the superposed spacer sections are for example supports constituted by tabs 9 cut out from the base out of the U (Fig. 2) or tabs 10 cut out from 40 plates 10' welded to the section 8 (Fig. 5), these tabs being folded obliquely towards the outside of the section to form, in two's, a trough or arc (Figs. 2 and 5).

If the sections 7 and 8 are disposed as 45 in Figs. 3 and 6, the troughs in fact constitute riders for the tubes 6 placed beneath the tabs whilst, if the sections are disposed upside down, they effectively act as troughs beneath the tubes. In both cases, 50 the tubes are efficiently positioned.

The tube unit may be formed in different ways. For example, a first layer of tubes is stacked on the base plate 1, followed by the spacer sections of a first level, then the 55 second layer of tubes, then the spacer sections for a second level, etc.

Locking rods are placed in position and nuts are screwed tightly therein, in order to stabilise the whole.

60 As a variant, when the rods are integral with the base, the spacer sections are fitted on the rods as the stack is made.

The unit obtained is disposed where required, for example in a reactor 11 (Fig. 8) 65 where it is held in position by any suitable

means and where the connections of the tubes with unions or inlet or outlet passages are made as required. Fig. 8 shows one of the spacer sections 2 by way of example only. 70

The invention is applied to all forms of coils, for example to helical coils, hair-pin coils, flat coils and those which unwind in space.

Variant embodiments are obtained by 75 constituting the upper transverse bridges by another base, the two bases then constituting walls between which the stack is tightened.

The invention is not limited to a particular form of base, nor to a particular base structure. 80

As a variant, the rods may be provided to pass through the spacer sections. 85

#### WHAT WE CLAIM IS:

1. A device for positioning and supporting layers of tubes, which comprises a plurality of spacer sections superposed to form a stack and to constitute therebetween 90 spacers for receiving the layers, these spacer sections bearing positioning tabs for positioning the tubes in said spaces, and locking means provided to maintain the stack of the spacer sections stable, wherein the positioning tabs are located at fixed places on the spacer sections and are solely designed to prevent a displacement of the tubes of one layer towards the adjacent tubes of the same layer, the tubes being retained in the position by the pressure of the stack under the action of the locking means, which pressure is transmitted by the tubes in the stack. 95

2. The device as claimed in Claim 1, 105 wherein the spacer sections comprise sections of U-cross-section.

3. The device as claimed in Claim 1, wherein the spacer sections comprise sections of rectangular cross-section. 110

4. The device as claimed in any one of the preceding Claims, wherein the positioning tabs are added to the spacer sections or obtained by being cut out from the spacer sections. 115

5. The device as claimed in Claim 4, wherein the tabs constitute troughs or riders for the tubes.

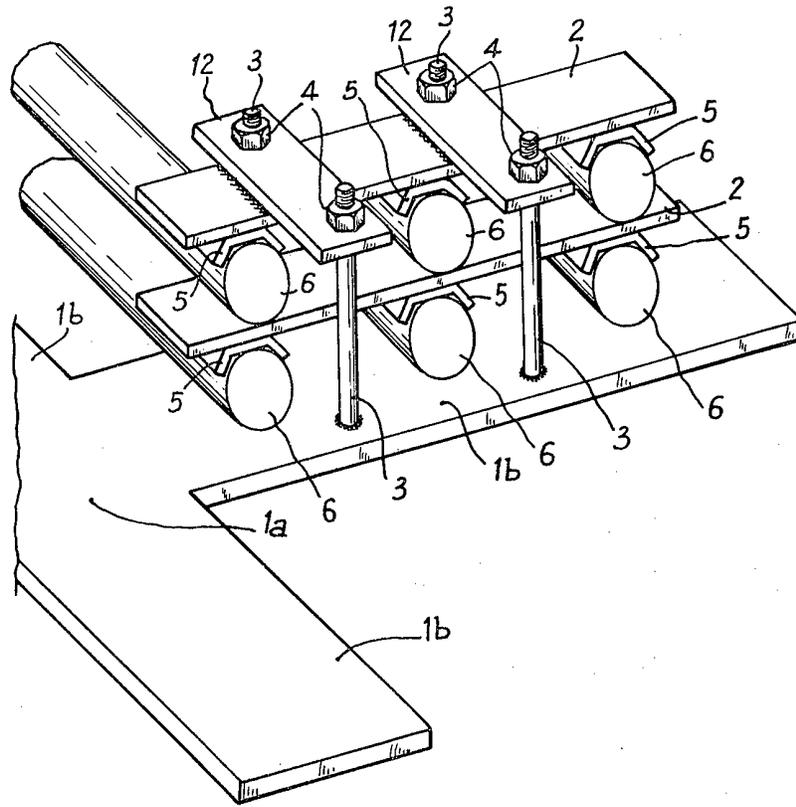
6. The device as claimed in Claim 1, wherein the spacer sections are U-sections, the base surface of which is cut out in places, to form the said tabs which are folded obliquely towards the outside and cooperating in two's to constitute troughs. 120

7. The device as claimed in Claim 1, 125 wherein the spacer sections have added thereon plates cut out to form the said tabs which are folded obliquely towards the outside and cooperating in two's to constitute troughs. 130

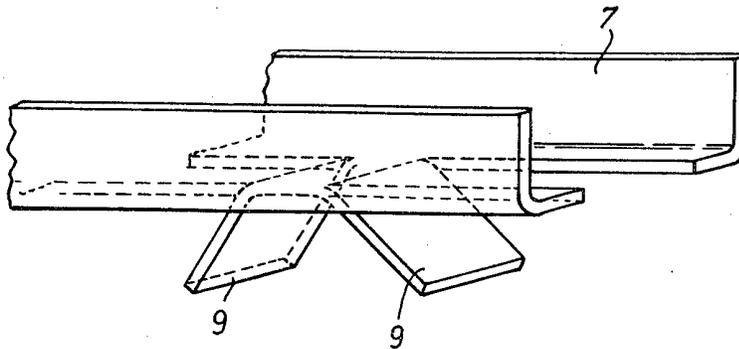
8. The device as claimed in any one of the preceding Claims, wherein the locking means comprise means which act by pressure on the stack, to maintain said stack 5 stable.
9. The device as claimed in Claim 8, wherein the locking means comprise a plurality of rods passing in perforations in the spacer sections, and stops movably 10 mounted at least at one end of the rods as far as a stop position corresponding to a tightening of the stack with pressure.
10. The device as claimed in Claim 8, wherein the locking means comprise pairs 15 of rods passing through at least one group of superposed spacer section and cooperating with transverse bridges disposed at the two ends of the stack in order to constitute frames for tightening the stack, the tightening being obtained by stops disposed at 20 the ends of the rods in order to create a pressure on the transverse bridges.
11. The device as claimed in any one of the preceding Claims, further comprising a base which supports the stack assembly. 25
12. A device for positioning and supporting layers of tubes, substantially as hereinbefore described and illustrated in the accompanying drawings. 30

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Fig. 1



*Fig. 2*



*Fig. 5*

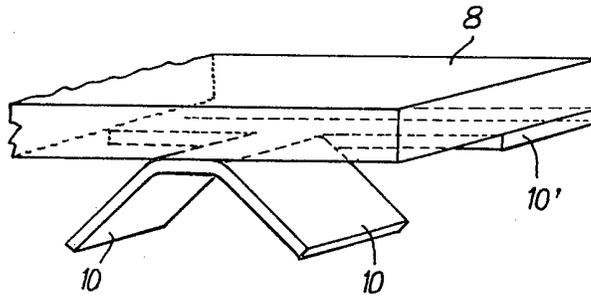


Fig: 4

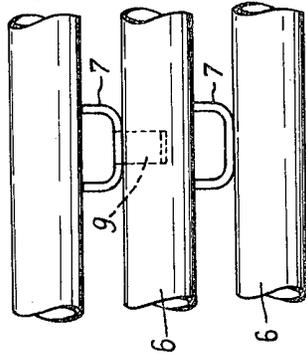


Fig: 7

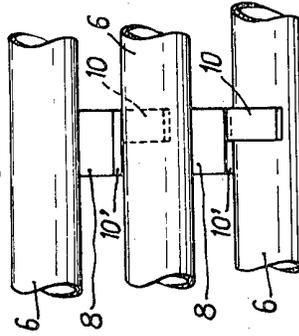


Fig: 3

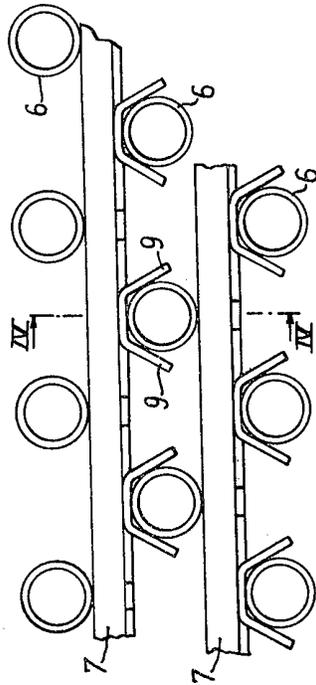
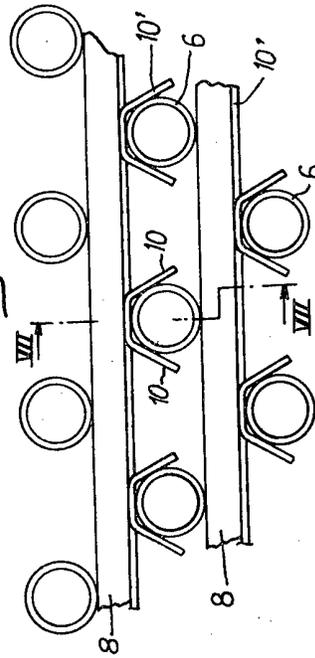


Fig: 6



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COMPLETE SPECIFICATION

4 SHEETS

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the Original on a reduced scale  
Sheet 4

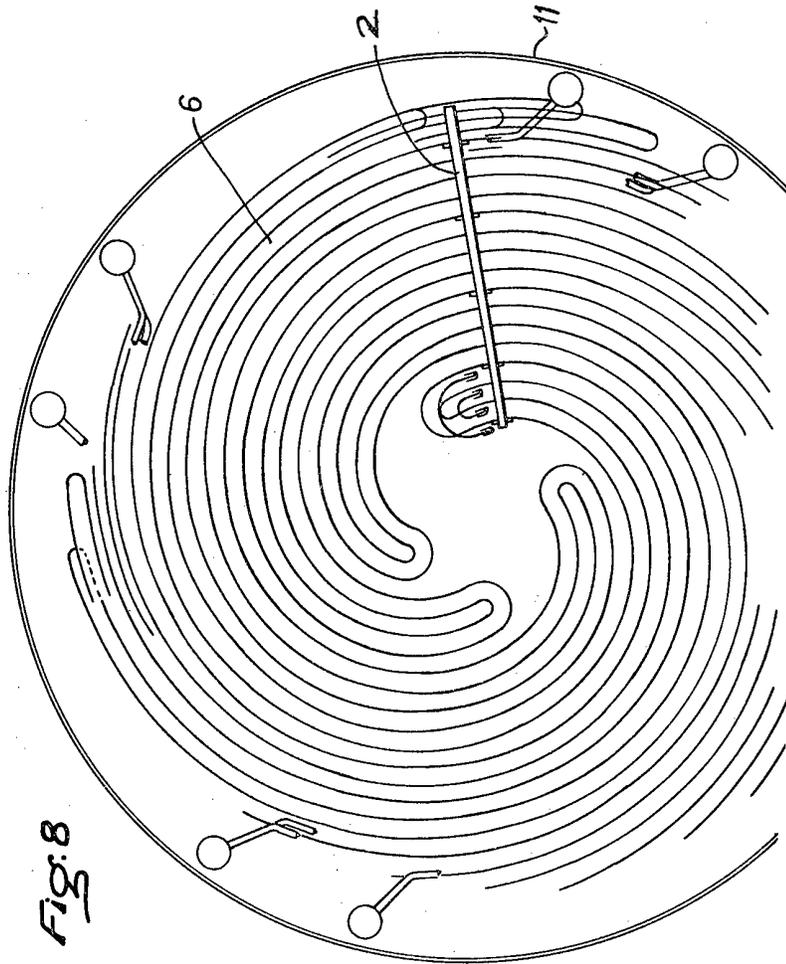


Fig. 8