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(12) # EUROPEAN PATENT APPLICATION

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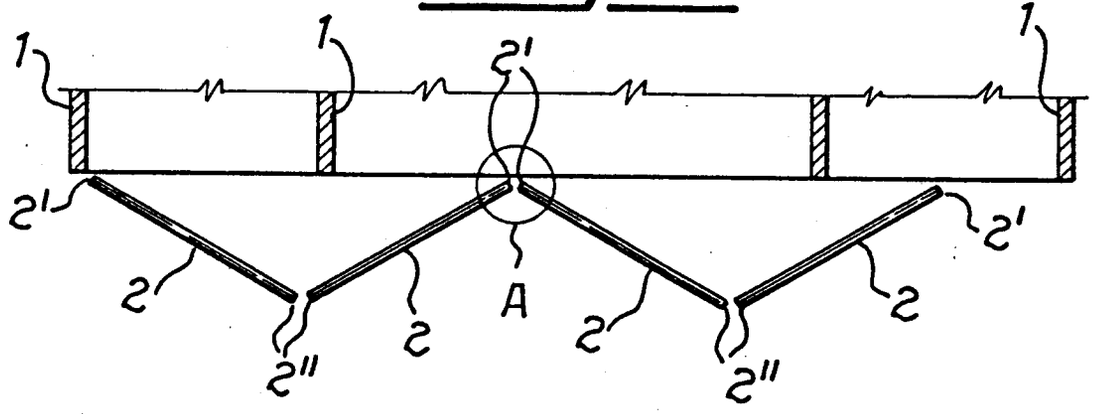
(54) **A device capable of achieving opening and closing of a plurality of wing elements by combined swinging and sliding movements thereof.**

(57) A device capable of causing a plurality of wings (2) to open and close through combined swinging and sliding movements thereof, these wings (2) being adjacent to, and superposable upon one another, the device comprising two gear wheels (4) in constant mesh with one another, each gear wheel (4) having an arm (5) fixed thereto which carries at its free end at least one roller (6) arranged to be slidable in a respective guide (7) fastened to a corresponding wing (2), the gear wheels (4) being rotatably supported on a body (9) which is in turn slidably supported in a horizontal guide and secured by means of hinges (12) to pairs of adjacent wings (2).

Fig.2



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This invention relates to a device capable of causing a plurality of wing elements to open and close through combined swinging and sliding movements thereof, these wing elements being generally of the type as used in the furnishings art, for example, for constructing the front wall of a cabinet, a partition, etc..

Opening and closing arrangements for wing elements of the type referred to above, which is usually supported at its top and guided at its bottom, are well known.

The wings are commonly pair-arranged with the wings of each pair of wings being able to be opened like a "book", that is to say, to be superposed upon each other and then moved together to one side or the other.

Accordingly, if a rather wide or almost complete opening of the aperture covered by the wings is to be obtained, it is necessary for all of the various pairs of wings to be individually opened like a book and then all of them translated to one side.

It is an object of the invention to enable a plurality of wings to be opened simultaneously with the same angle of inclination, so that by action on one terminal wing all of the wings can be moved to an opposite side, upon opening of the wings, and vice versa upon closing thereof.

The above object is attained according to the invention by having a hinge device arranged between the different wings in an alternate manner, the hinge device being able to convert the swinging movement of a wing into a swinging movement equal but opposed in direction of an adjacent wing, thereby to achieve sliding movement of all of the wings in a same direction.

Advantageously, this device includes a pair of gear wheels costantly in mesh with one another, supported, for example, by the guide and support head rail of the wings, these gear wheels having each an arm associated thereto, which arm is slidingly guided into a corresponding wing.

These and further features of the invention will clearly appear from a reading of the detailed description given herein below in relation to one embodiment of the invention shown, by way of example only,in the accompanying drawing, in which :

Figure 1 is a schematic horizontal sectional view of the front part of a cabinet having four wings;

Figures 2 and 3 are views similar to figure 1 and show successive steps in opening the four wings from right side to left side in a simultaneous manner;

Figure 4 is a detail view of the device indicated by A in preceding figures which enables the various wings to be opened and closed in a simultaneous manner;

Figure 5 is a schematic vertical sectional view of the device in figure 4;

Figure 5' is a similar sectional view to figure 5 but showing a different arrangement of parts;

Figure 6 is a sectional view taken along the line VI-VI in figure 5 or 5';

Figures 7, 8 and 9 show the same views as those in figures 1, 2 e 3, respectively, but when relating to a cupboard having five wings;

Figure 10 is a schematic plan view showing handling of a terminal wing in the arrangement of figures 7 to 9.

Figures 1 to 3 are schematic views of the front part of a cabinet which is shown to have vertical walls 1 with the inside space being closed at its front by an even number of wings 2, in particular four wings 2.

It is to be understood that the above example is merely an illustrative example and that the wings 2 could both be different in number -for example 6 in number - and serve for a different purpose from that shown, for example, they may be used for constructing a partition.

As shown in figures 1 to 3, the wings 2 are pair-arranged so that the wings in each pair of wings can be superposed upon one another through combined swinging and sliding movements thereof. Accordingly, the remote ends 2' of the wings of each pair of wings are supported and guided between two rails, namely a top and a bottom rail (not shown) as usually provided for enabling the wings to slide, while the adjacent ends of wings in each pair of wings are hinged to one another to permit the wings to open and close"as a book", in a conventional manner.

According to the invention, the ends 2' of adjacent pairs of wings are connected together, as at the encircled locations A in figures 1 to 3, by the aid of a hinge device shown in figures 4 and 5 or 5', which device enables all of the wings to be opened and closed simultaneously, in a manner to keep them parallel two by two, and to cause all of them to slidingly move to a side, by action upon one of the two terminal wings, as schematically shown figure 2 and 3.

This hinge device, shown in figures 4 and 5 or 5', is generally indicated by reference numeral 3 and substantially comprises a pair of gear wheels 4 in constant mesh with one another, each gear wheel having integrally connected to it an arm 5 carrying a pair of rollers 6 at the free end of the arm, the rollers 6 being arranged to roll in an associated C-shaped guide member 7 (see figure 6, in particular) fastened to the inside of a corresponding wing 2.

As shown by way of example in vertical sectional view figure 5 - where the left and right half parts of the hinge device are seen in complete sectional view and partly sectional view, respectively - the two gear wheels 4 are mounted for free

rotation on respective vertical pins 8, supported by a body 9, which body 9 has associated stirrups 11 fastened by screws 10 to both sides of body 9, said stirrups 11 having hinge means 12 provided thereon for fixing and supporting corresponding wings 2.

Arranged at the top of each stirrup 11 are pairs of rollers 13 of horizontal axis and pairs of rollers 14 of vertical axis (only the rollers on left-side stirrup being shown in figure 5), these pairs of rollers being for the purpose of supporting and guiding a correponding wing 2 in said upper guide, not shown.

The embodiment in figure 5' substantially differs from that in figure 5 by the guides 7 being arranged in another way. The same reference numerals as those in figure 5 have been used in figure 5' to show equal parts.

From the above description, operation of the device according to the invention is readily apparent and is as follows.

Referring to figures 1 to 3, when an outwardly and left-side directed pull is exerted on an appropriate handle (not shown) of an endmost wing that is placed to the right in said figures, this endmost wing and the wing adjacent thereto are caused to open "like a book". Rotation of this latter wing causes, through its associated arm 5, rotation of the corresponding gear wheel 4 which causes in turn the corresponding intermeshing gear wheel 4 to rotate in an opposite direction, thereby to produce an identical rotation of associated wing 2 (see in particular figures 2 and 3). Obviously, rotation of wings 2 is combined with sliding movement of same wings 2 on their support guides.

Figure 4 schematically shows by dotted lines an open position of the righthand wing and the corresponding part of hinge device.

In a similar manner, opening may be obtained by starting from the lefthand terminal wing.

Figures 7, 8 and 9 schematically show successive opening steps when an odd number of wings, in particular five wings, are used.

In this case, a further hinge device 3 (see figures 4 and 5 or 5') is provided between a terminal wing and a close adjacent wing, as evidenced by the encircled areas again indicated by reference letter A in figures 7, 8 and 9.

The terminal wing 2 whose outer end is free, is connected to a sliding rail, for example the upper rail, through a stiff rod 15.

The rod 15 is in particular hinged at its one end, in 16, to an intermediate location on wing 2 and at its other end to a carriage 17 which is arranged to slide on an appropriate rail.

In this manner, opening of the wings occurs in a similar manner to that described in relation to figures 1 and 3 and as schematized in figures 7 to 9, the terminal wing 2 always moving parallel to corresponding wings placed in alternate positions in the set, due to the presence of the stiff rod 15.

In figure 10, the terminal wing 2 is shown, by continuous line, to be in approximately full open position towards the left side (it is to be intended that in this condition the wing is translated in proximity to the left end of a cabinet) and, by dotted line, in both the closed position and the almost full open position towards the right side.

It should be apparent that the invention is not limited to the particular embodiment as described above and shown in the drawings, and that many changes, as to the details of construction, may be thought by any person skilled in the art, without departing from the spirit and scope of the invention as defined in the annexed claims.

Claims

1. An assembly comprising pairs of wings (2) which are able to be opened and closed like a "book", the wings (2) in each pair of wings having their remote ends (2') supported by a horizontal top rail and guided by a horizontal bottom rail or vice versa, while the adjacent ends (2'') of the wings in each pair of wings are hinged to one another, characterized in that at least two adjacent pairs of wings are connected together through a hinge device (3) which permits all of the wings of concerned pairs of wings to slide simultaneously and at the same time to swing so as to have the wings always kept parallel two by two.

2. The assembly according to claim 1 and further including a terminal wing (2) connected to an adjacent wing through one said hinge devices (3) and having an outer end free, at least one stiff rod (15) being provided for connecting said terminal wing to one said top and/or bottom support and/or guide rails.

3. The assembly according to claim 2, wherein said rod (15) is hinged at one end thereof to an intermediate point on said terminal wing (2) and at the other end thereof to a carriage slidingly received in said top and/or bottom rail.

4. The assembly according to any preceding claim, wherein said device (3) comprises a pair of gear wheels (4) in constant mesh with one another, each gear wheel (4) having an arm (5) integrally formed therewith, said arm being secured for sliding motion to a respective wing (2).

5. The assembly according to claim 4, wherein each of said arms (5) has at its free end at least one roller (6) slidably received in an associated guide (7) fastened to a corresponding wing (2).

6. The assembly according to claim 4 or 5, wherein the gear wheels (4) are rotatably supported on a body (9) which is secured by means of hinges (12) to associated adjacent wings (2).

7. The assembly according to claim 6, wherein said body (9) is supported and/or guided by one of said horizontal top or bottom guides for the wings (2).

8. A device capable of causing two pairs of adjacent wings (2) to open and close through combined swinging and sliding movements thereof so as to maintain said wings parallel two by two, wherein said device comprises a pair of gear wheels (4) in constant mesh with one another, each gear wheel carrying an arm (5) which is slidably secured to an associated wing (2).

Fig.1

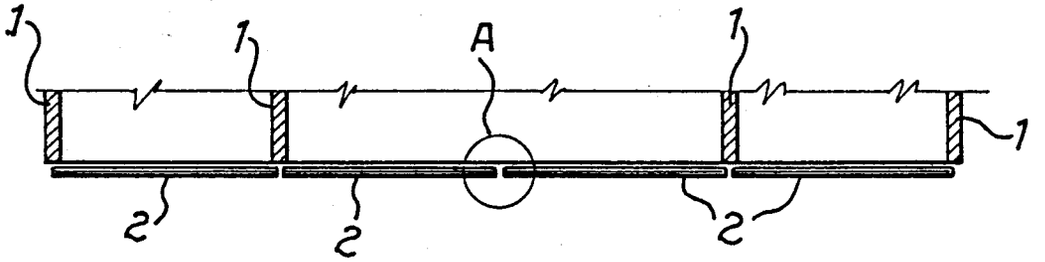


Fig.2

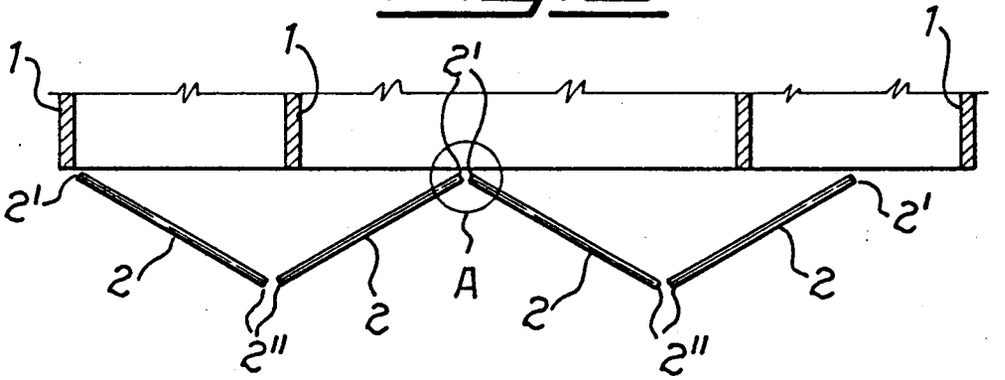
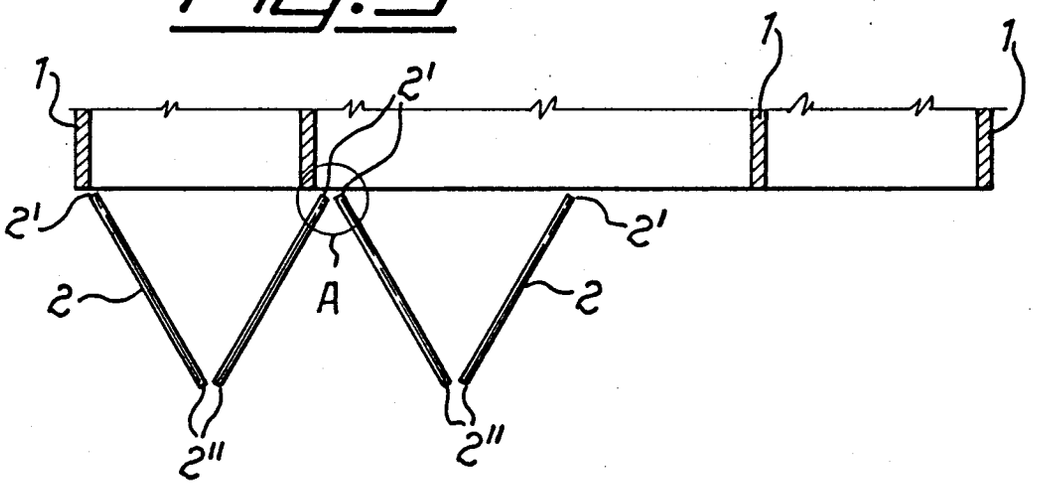


Fig.3



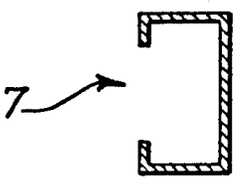
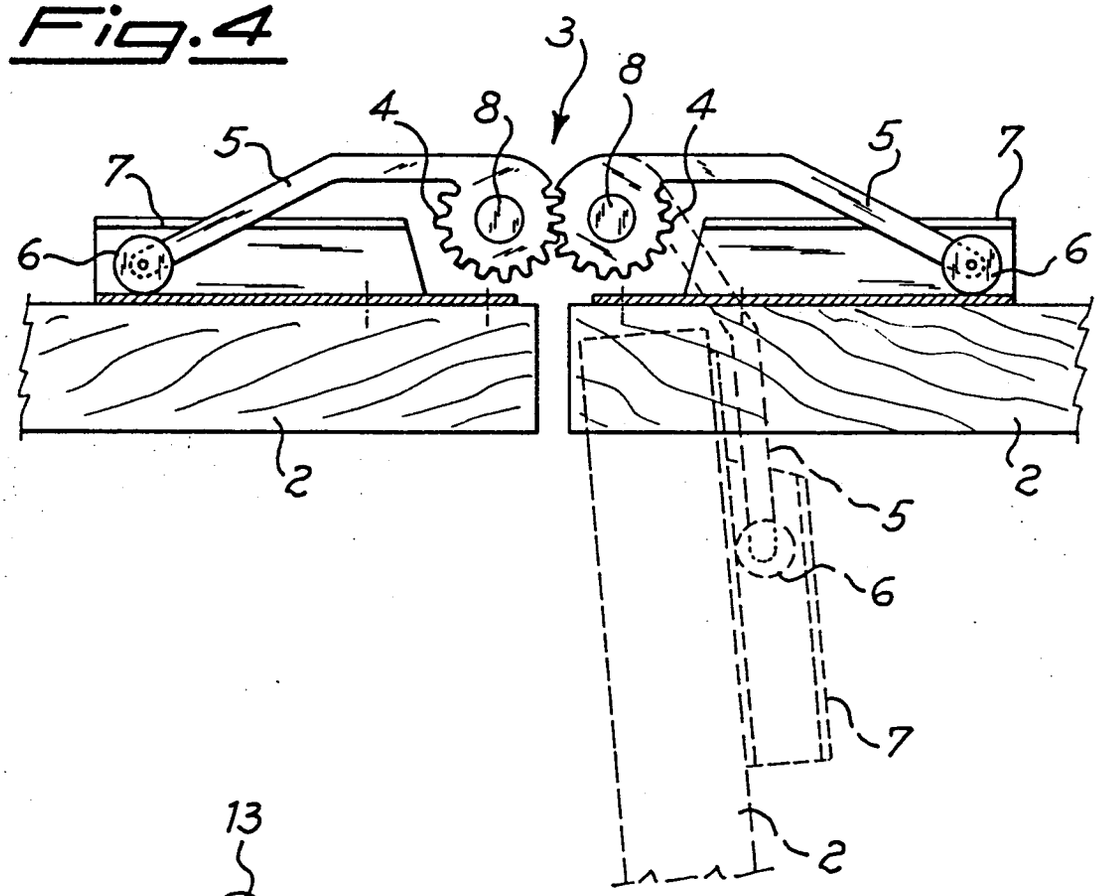


Fig.6

Fig.4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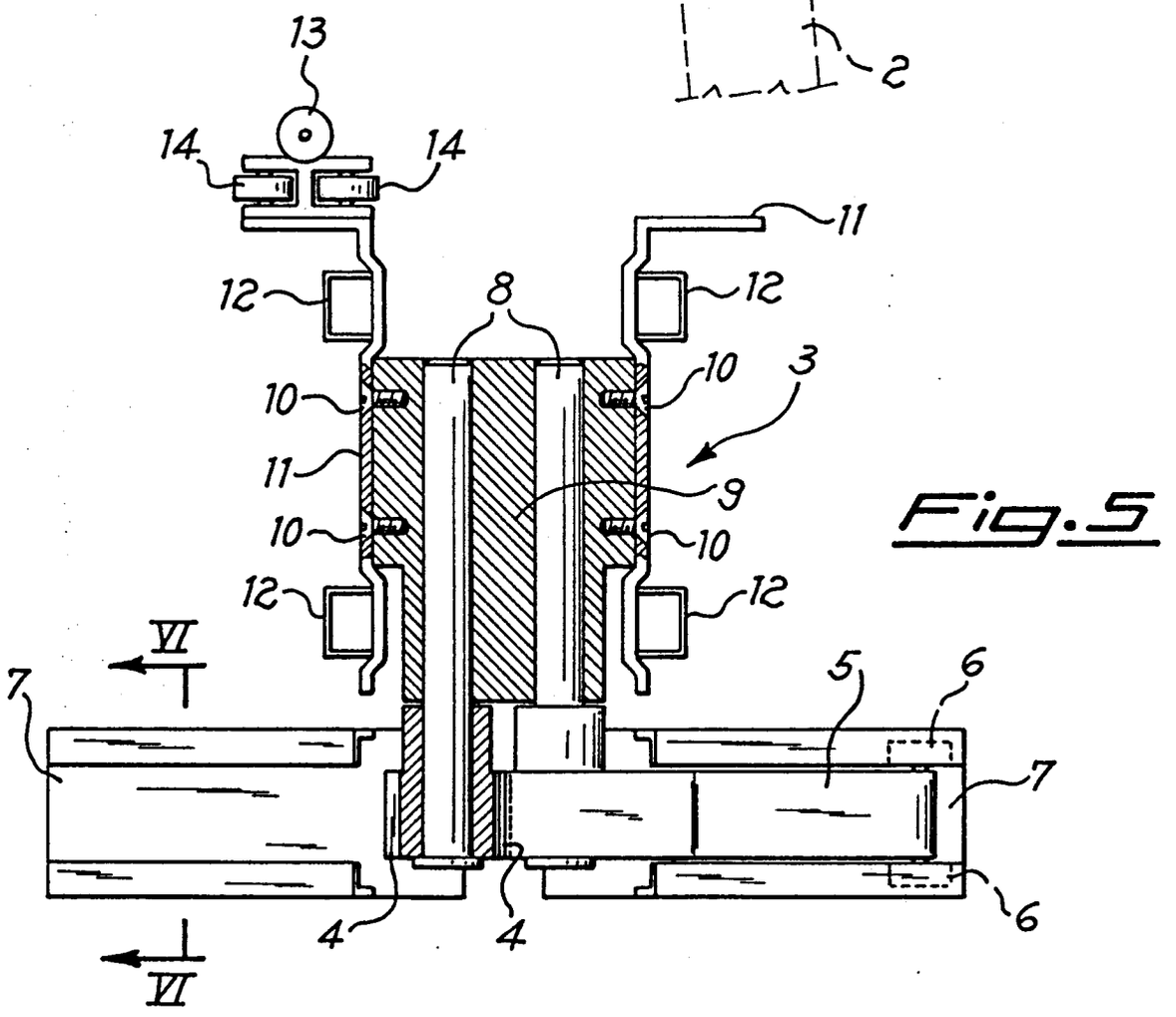
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Fig.5

Fig.5'

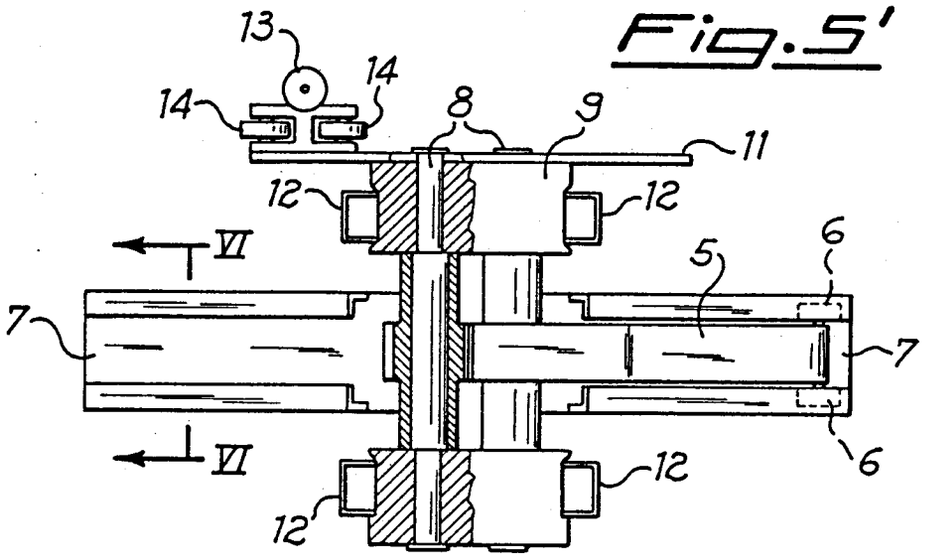


Fig.7

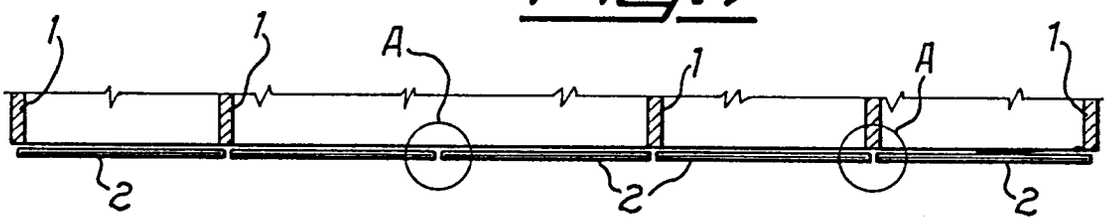


Fig.8

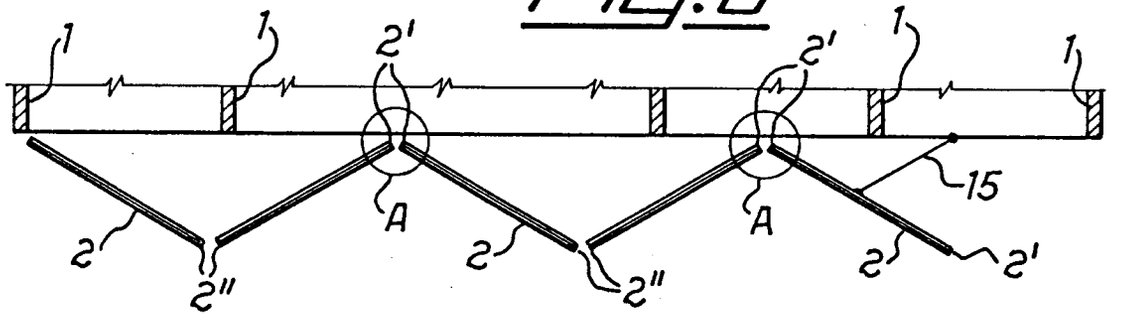
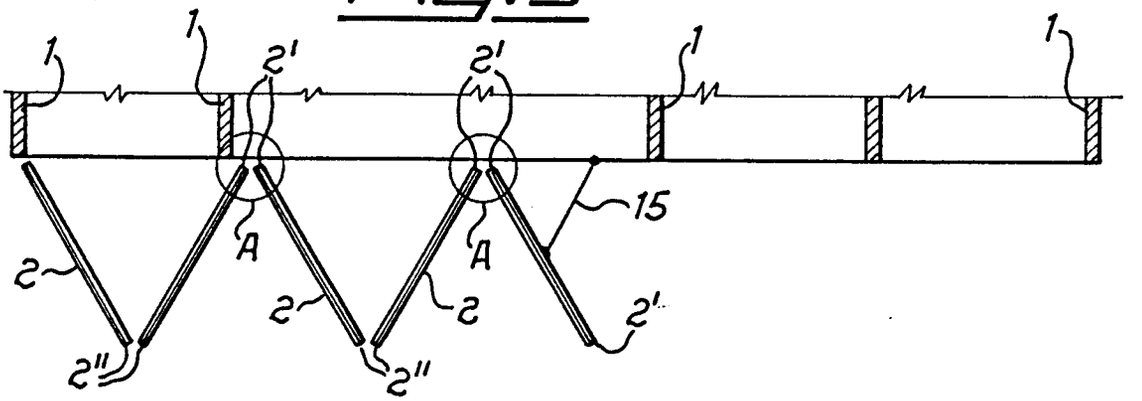


Fig.9



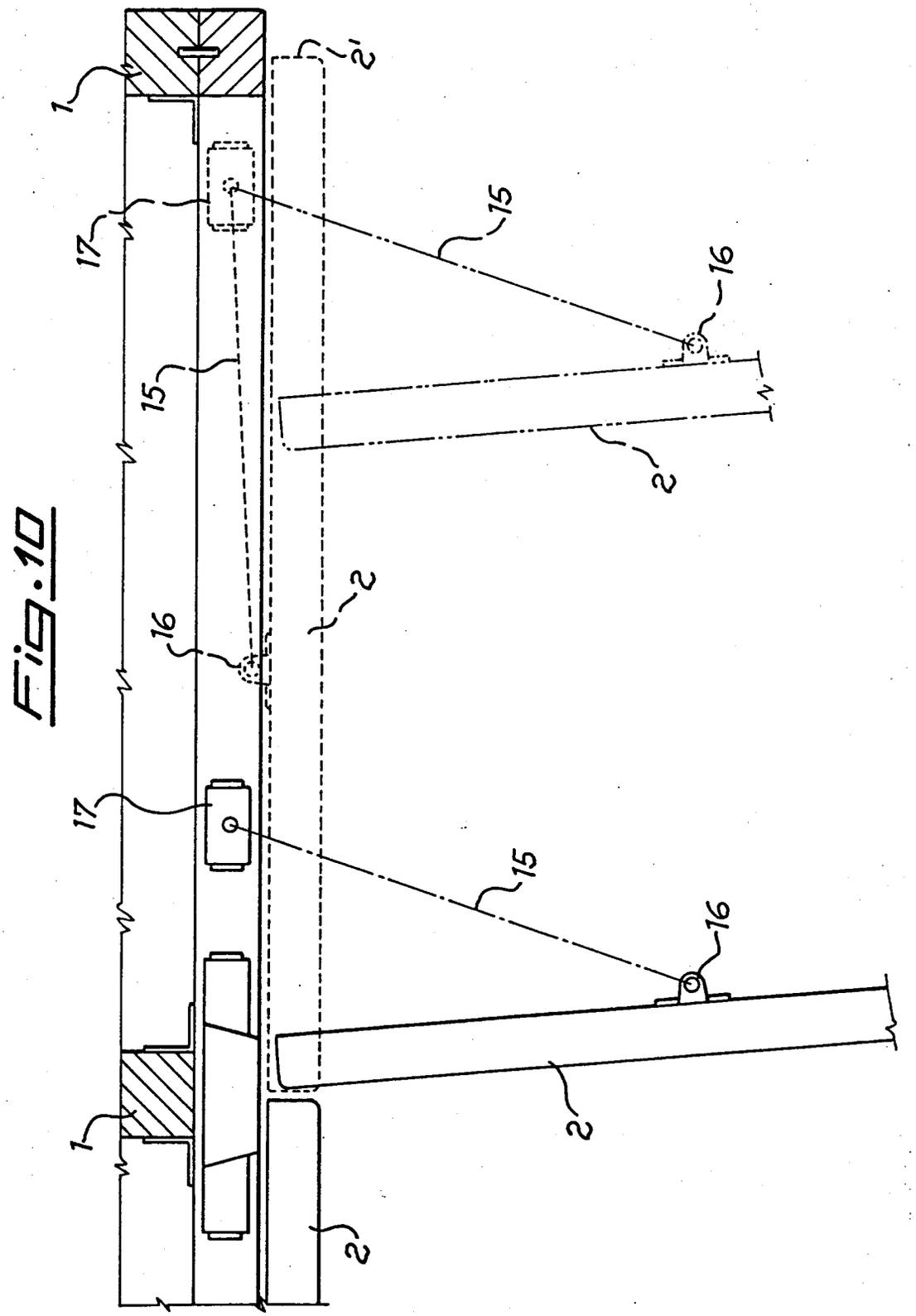


Fig.10

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EUROPEAN SEARCH REPORT

Application Number

EP 91 12 0744

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X Y	US-A-3 344 837 (YOUNG) * column 6, line 52 - column 7, line 47; figures 18-24 *	1,4-8 2,3	E05D15/26
Y	US-A-2 151 033 (JONES) * page 13, column 2, line 41 - line 49; figures 27-29 *	2,3	
A	DE-A-3 507 863 (HETTICH GMBH & CO) * page 8, line 10 - page 10, line 28; figures 5-8 *	1,4-8	
A	US-A-2 820 514 (TRAVIS) * column 2, line 37 - line 44; figures 2-4 *	3	
A	DE-A-1 759 226 (BATOR) * page 3, last paragraph - page 4, line 11; figure 1 *	2,3	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)
E05D E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 JUNE 1992	VAN KESSEL J.

CATEGORY OF CITED DOCUMENTS

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