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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**

Vorrichtung zum Öffnen und Schliessen von mehreren Flügeln durch kombiniertes Schwenken und Schieben von denselben

Dispositif d'ouverture et de fermeture d'une pluralité de vantaux à mouvement tournant et coulissant

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Description

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.

US-A-3,344,837 describes a folding panel assembly according to the preamble of claim 1, which may be used in an opening in a structure, in particular as a door for a garage, and which is movable vertically between an extended, lower position and a retracted or stacked upper position.

According to this arrangement, gear wheels and associated complex mechanisms are provided for moving together the panels, which, however, can be brought only to the upper end of the opening in the stacked position.

It is an object of the present invention to avoid the disadvantages of the known arrangements, and 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 the features listed in the appended claim 1. According to the claimed invention, a hinge device is 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 constantly 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 slidably 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 and 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 slidably 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 corresponding 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.

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') guided between opposite rails, while the adjacent ends (2'') of the wings in each pair of wings are hinged to one another, at least two adjacent pairs of wings being connected together through a hinge device (3) comprising gear wheels (4) which permit all of the wings of concerned pairs of wings to slide simultaneously, characterized in that said remote ends (2') of each pair of wings are supported by a horizontal top rail and guided by a horizontal bottom rail or viceversa, and in that said gear wheels (4) are separated from the respective wings (2) and each has an arm (5) integrally formed therewith, provided with at least one roller (6) slidably received in an associated guide (7) fastened to the inner side of a corresponding wing (2), the gear wheels (4) being rotably supported on a body (9) which is in turn supported and/or guided by one of said horizontal top or bottom guides for the wings (2), said body (9) being secured by means of hinges (12) to associated adjacent wings (2), by action on one of the two terminal wing (2) all the wings being moved to the opposite side upon opening of the wings and vice-versa upon closing thereof.
2. The assembly according to claim 1, characterized in that the diameter of said roller (6) is lower than the width of said associated guides (7).
3. The assembly according to claim 1 or 2 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.
4. The assembly according to claim 3, 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 slidably received in said top and/or bottom rail.

Patentansprüche

1. Vorrichtung, welche Paare von Flügeln (2) aufweist, die wie ein "Buch" geöffnet und geschlossen werden können, wobei die Flügel (2) eines jeden Flügelpaares voneinander entfernte Enden (2') aufweisen, die in gegenüberliegenden Schienen geführt sind, während die beieinanderliegenden Enden (2'') der Flügel bei jedem Flügelpaar zueinander klappbar bzw. um ein Scharnier drehbar sind, und wobei wenigstens zwei beieinanderliegende Paare von Flügeln miteinander durch eine Scharniereinrichtung (3) verbunden sind, welche Zahnräder (4) aufweist, die es allen Flügeln der betroffenen Flügelpaare erlauben, simultan zu gleiten bzw. sich zu verschieben, **dadurch gekennzeichnet**, daß die voneinander entfernt liegenden Enden (2') eines jeden Flügelpaares durch eine horizontale obere Schiene gehalten werden und durch eine horizontale untere Schiene geführt werden oder umgekehrt, und daß die Zahnräder (4) von den jeweiligen Flügeln (2) getrennt bzw. auf Abstand zu diesen sind und jedes einen Arm (5) aufweist, welcher damit integriert bzw. einstückig ausgebildet ist, und mit wenigstens einer Rolle (6) versehen ist, die gleitend in einer damit zusammenarbeitenden bzw. zusammenwirkenden Führung (7) aufgenommen ist, welche an der Innenseite eines entsprechenden Flügels (2) angebracht bzw. befestigt ist, wobei die Zahnräder (4) rotierend an einem Bauteil (9) gehalten sind, welches der Reihe nach durch eine der horizontalen oberen oder unteren Führungen für die Flügel (2) gehalten und/oder geführt ist, wobei das Bauteil (9) mittels Scharnieren (12) an damit zusammenarbeitenden aneinanderliegenden Flügeln (2) befestigt ist, wobei durch die Betätigung eines der zwei End- bzw. Abschlußflügel (2) zum bzw. beim Öffnen der Flügel alle Flügel zur gegenüberliegenden Seite bewegt werden und umgekehrt beim Schließen davon weg.
2. Vorrichtung nach Anspruch 1, **dadurch gekennzeichnet**, daß der Durchmesser der Rolle (6) geringer ist als die Breite der damit zusammenarbeitenden Führungen (7).
3. Vorrichtung nach Anspruch 1 oder 2, **dadurch gekennzeichnet**, daß sie weiterhin einen End- bzw. Abschlußflügel (2) beinhaltet, welcher an einem anliegenden Flügel durch eine der Scharniereinrichtungen (3) befestigt ist und ein äußeres freies Ende aufweist, und wenigstens eine steife Stange (15) aufweist, welche zum Verbinden des besagten End- bzw. Abschlußflügels mit einer der oberen und/oder unteren Halteschienen und/oder Führungsschienen vorgesehen ist.
4. Vorrichtung nach Anspruch 3, worin die Stange (15) drehbar bzw. schwenkbar an

einem Ende davon mit einem mittleren Punkt an dem End- bzw. Abschlußflügel (2) und am anderen Ende davon an einem Wagen befestigt ist, der gleitend in der oberen und/oder unteren Schiene aufgenommen ist.

Revendications

1. Un ensemble comprenant des paires de vantaux (2) qui peuvent être ouverts et fermés à la manière d'un livre, les extrémités écartées l'une de l'autre (2') des vantaux (2) de chaque paire de vantaux étant guidées entre des rails opposés, tandis que les extrémités adjacentes (2'') des vantaux (2) de chaque paire de vantaux sont assemblées entre elles par charnières, au moins deux paires adjacentes de vantaux étant connectées entre elles au moyen d'un dispositif à charnière (3) comprenant des engrenages (4) qui permettent à tous les vantaux de paires concernées de vantaux de coulisser simultanément,

caractérisé en ce que lesdites extrémités écartées entre elles (2') de chaque paire de vantaux sont supportées par un rail horizontal supérieur et guidées par un rail horizontal inférieur ou vice versa,

et en ce que lesdits engrenages (4) sont séparés des vantaux respectifs (2) et comportent chacun un bras (5) qui est formé d'un seul tenant avec l'engrenage, et est pourvu d'au moins un galet (6) reçu à coulissement dans un guide associé (7) fixé sur le côté intérieur d'un vantail (1) correspondant, les engrenages (4) étant supportés à rotation sur un corps (9) qui est lui-même supporté et/ou guidé par l'un desdits guides horizontaux supérieur ou inférieur destinés aux vantaux (2), ledit corps (9) étant fixé au moyen de charnières (12) à des vantaux adjacents associés (2), tous les vantaux étant déplacés vers le côté opposé sous l'effet de l'un des deux vantaux terminaux (2) lors de l'ouverture des vantaux et étant déplacés en sens inverse lors de la fermeture de ceux-ci.

2. L'ensemble selon la revendication 1, caractérisé en ce que le diamètre dudit galet (6) est inférieur à la largeur desdits guides associés (7).
3. L'ensemble selon la revendication 1 ou 2 incluant en outre un vantail terminal (2) connecté à un vantail adjacent par l'un desdits dispositifs (3) à charnière et comportant une extrémité extérieure libre, au moins une tige rigide (15) étant disposée de manière à connecter ledit vantail terminal à l'un desdits rails supérieur et/ou inférieur de support et/ou de guidage.

4. L'ensemble selon la revendication 3, dans lequel ladite tige (15) est montée à charnière, par l'une de ses extrémités, sur un point intermédiaire dudit vantail terminal (2) et, à son autre extrémité, sur un chariot reçu à coulissement dans ledit rail supérieur et/ou inférieur.

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Fig.1

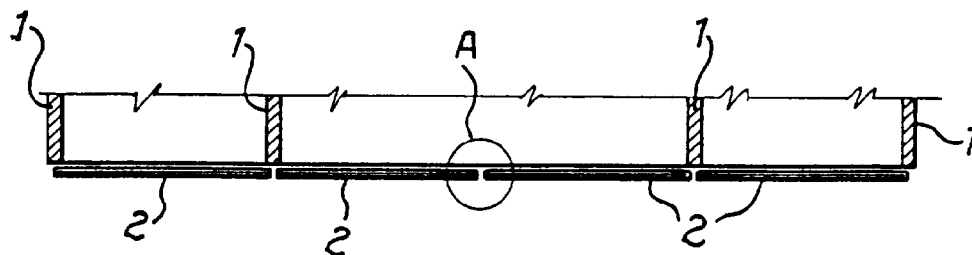


Fig.2

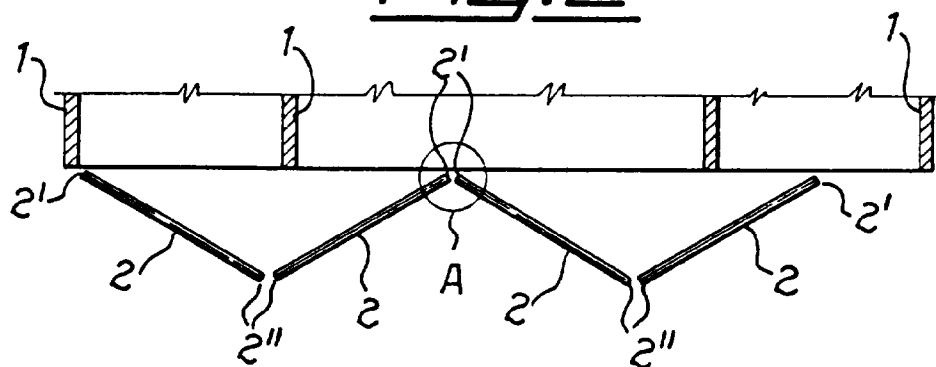


Fig.3

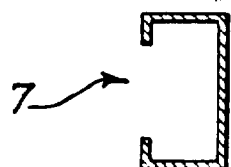
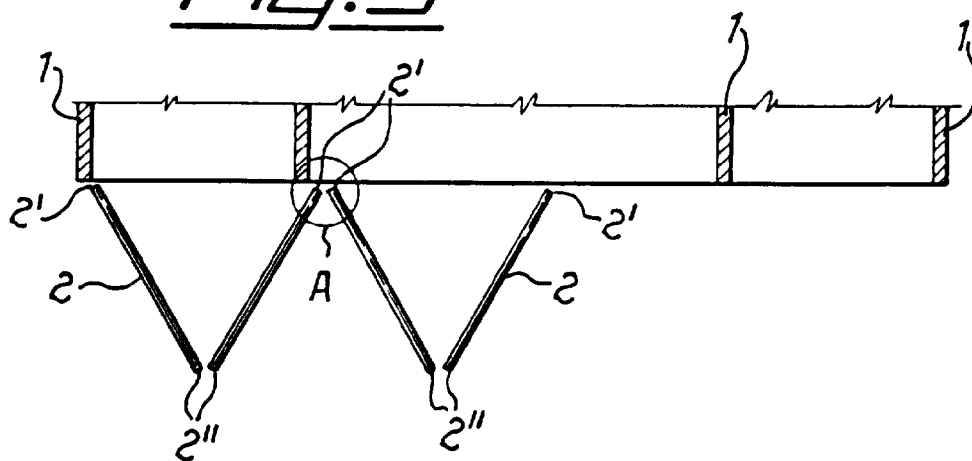
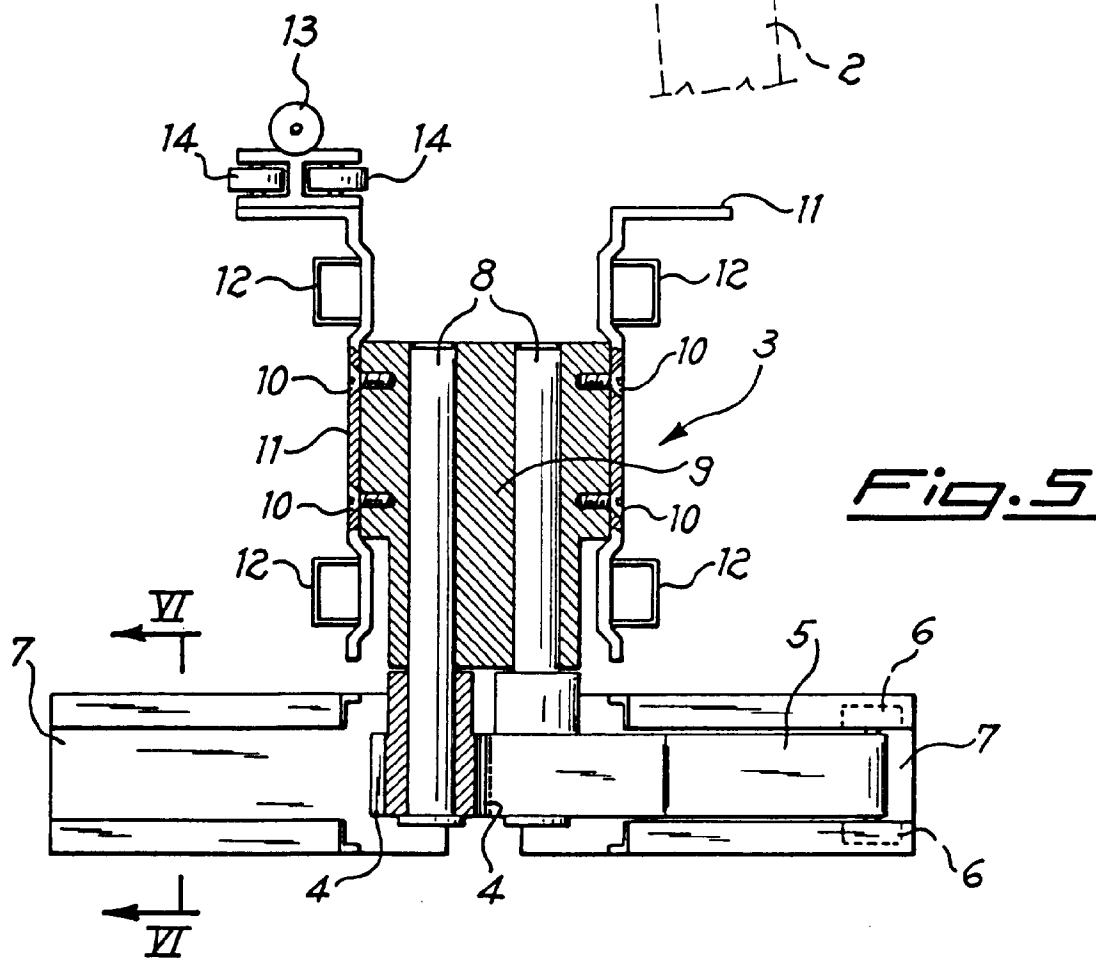
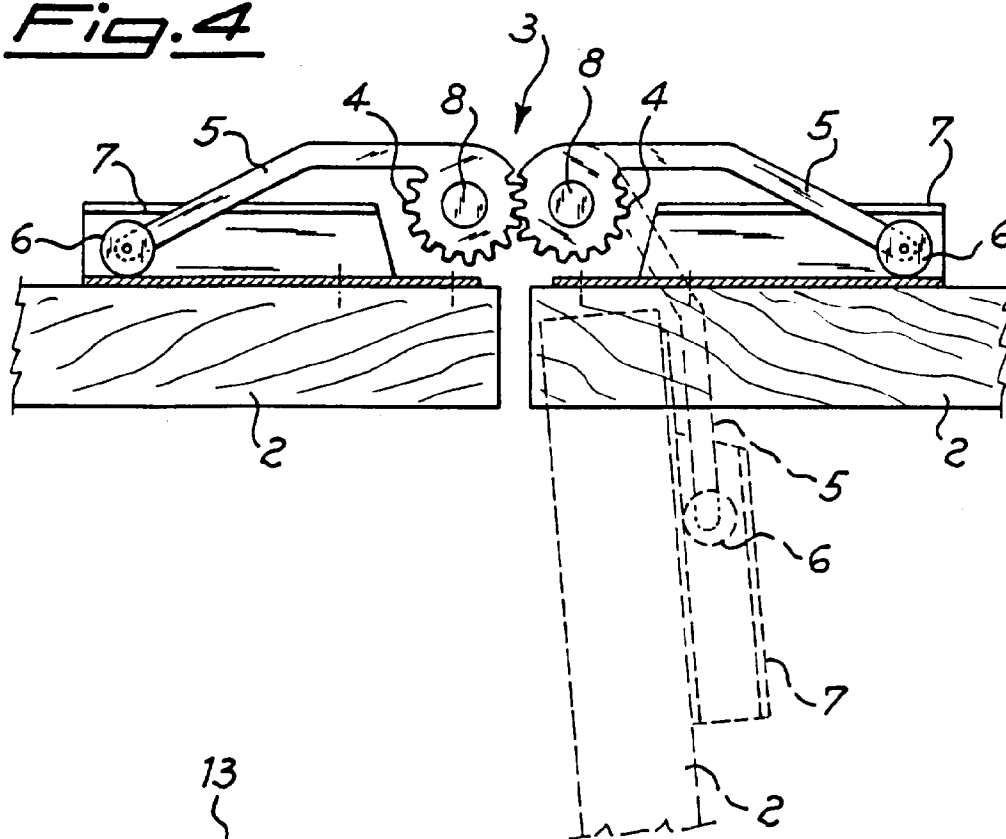


Fig.6

Fig. 4



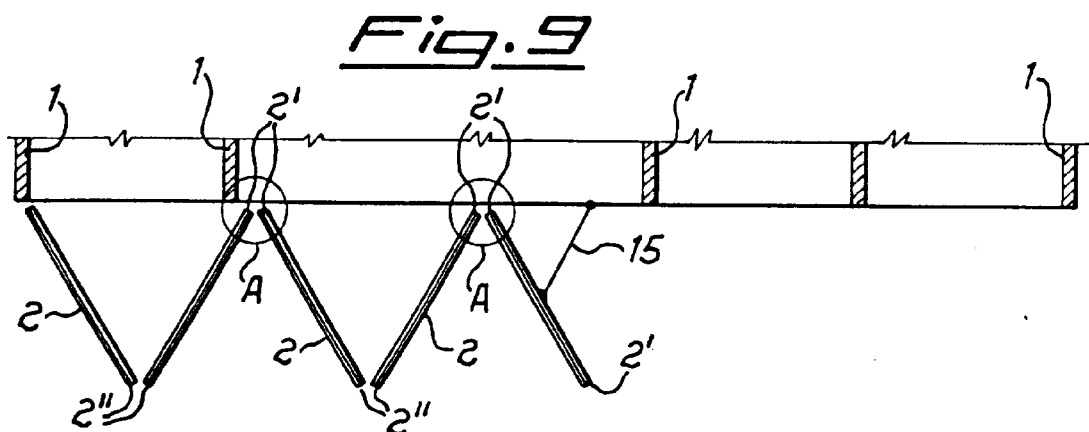
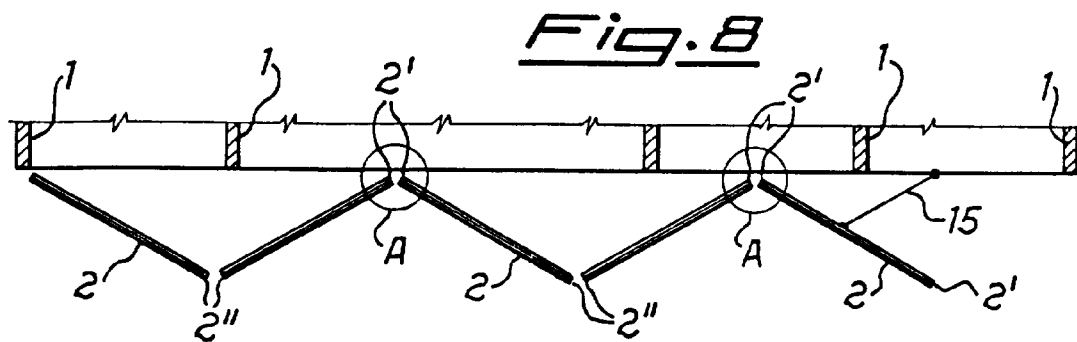
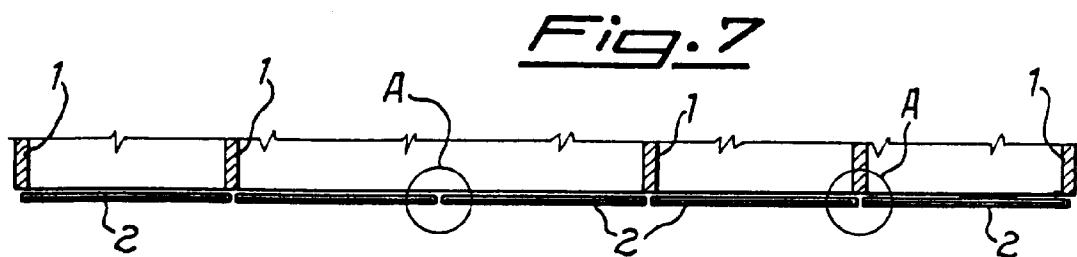
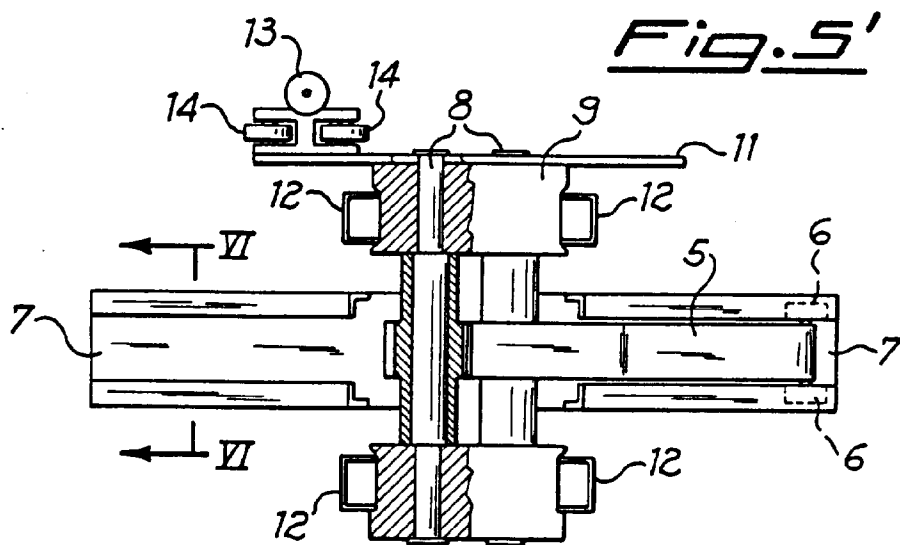


Fig. 10

