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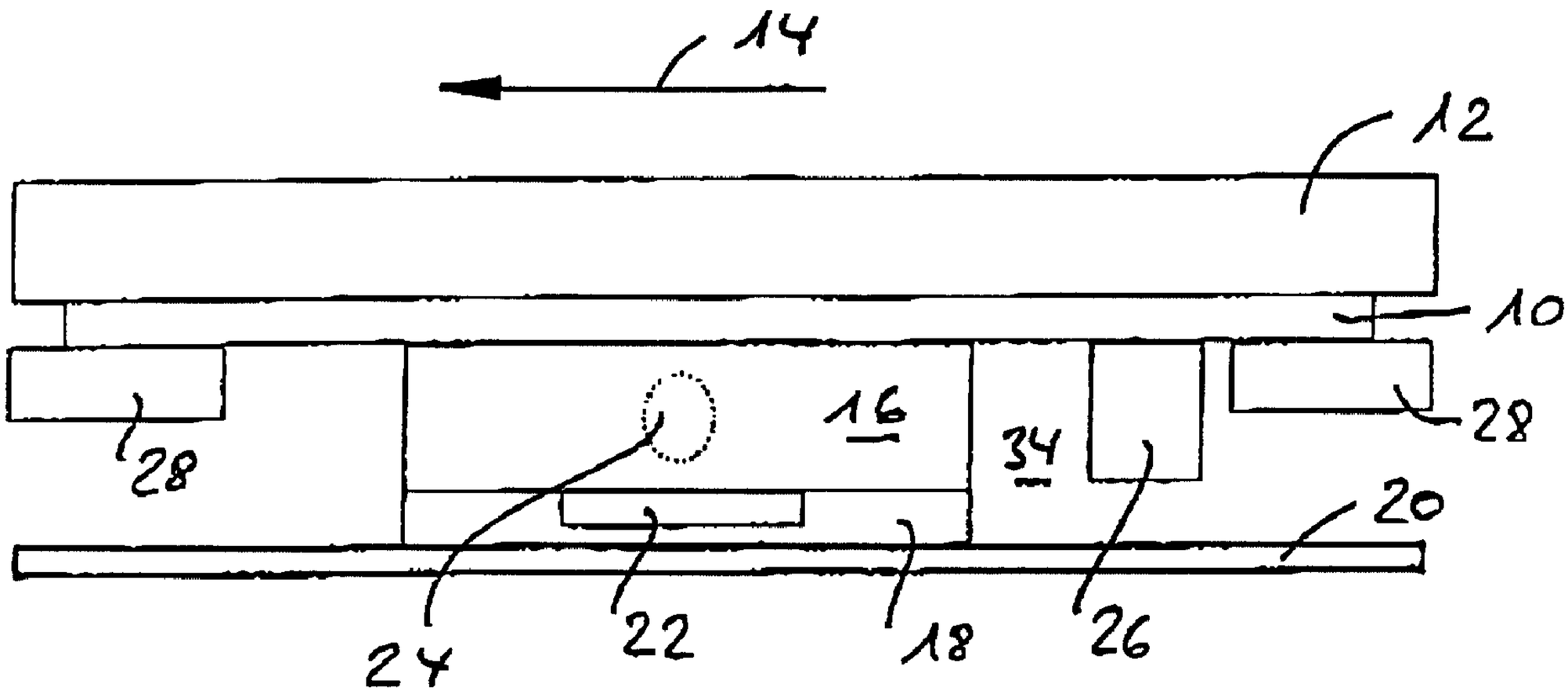

(57) Abrégé/Abstract:
The invention relates to a dynamic seat comprising a seating part which can be displaced in relation to a support element (20, 22) by being swivelled about a first swivel axis with a first maximum swivel lift. Between the seating part (10, 12) and the support element at least one bearing element (24, 30, 32) is provided for which is held by an elastic buffer (16) element which at least partly surrounds the bearing element and connects the seating part and support element. The seat is configured in such a way that it can either be swivelled about a second swivel axis, which differs from the first swivel axis, with a second maximum swivel lift which differs from the first swivel lift, or swivelled only about the first swivel axis.

ABSTRACT

The invention concerns a dynamic seat arrangement comprising a seat portion which is movable relative to a support element by pivoting about a first pivot axis with a first maximum pivotal movement, wherein provided between the seat portion and the support element is at least one mounting element which is held by an elastic buffer element which at least partially surrounds the mounting element and which connects the seat portion and the support element, wherein the seat arrangement is so designed that either a pivotal movement about a second pivot axis which is different from the first pivot axis is made possible, with a second maximum pivotal movement which is different from the first maximum pivotal movement, or pivotal movement only about the first pivot axis is made possible.

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DESCRIPTION

Dynamic seat arrangement

The present invention concerns a dynamic seat arrangement as set forth in the classifying portion of claim 1, as is known for example from DE 42 10 134 A1.

The purpose of an arrangement of that kind is to render dynamic the fact of sitting on a known static seat arrangement such as for example a chair with a fixed seat surface, and thus to overcome disadvantages involved in immobile passive sitting in terms of the back musculature and the intervertebral disks of a user.

More precisely, a known dynamic seat arrangement in which the seat portion as the actual seat surface is held movably relative to the subjacent support element means that the user is constantly forced to perform slight movements in order to achieve an instantaneous equilibrium position, with the result that the back muscles and the intervertebral disks are kept in motion, in an orthopedically advantageous manner.

However a dynamic seat aid of the general kind set forth in turn gives rise to numerous detail problems which in practical use, for example in the event of major deflections in the tilting movement and/or tilting options of equal magnitude in the seat direction and in opposite relationship thereto, are uncomfortable and mean that the user quickly assumes a so-called comfortable posture which makes it easier for him to balance but which at the same time is once again anatomically questionable.

Furthermore the dynamic seat arrangements known from the state of the art suffer from the disadvantage that they are structurally complicated and expensive and thus constitute an obstacle to widespread use at low cost (and thus purchase prices).

Accordingly the object of the present invention is to improve a dynamic seat arrangement of the general kind set forth, in regard to its

properties of use, in particular its orthopedic properties, but also in regard to its suitability for inexpensive, structurally simple manufacture.

That object is attained by the seat arrangement having the features of claims 1 and 11; advantageous developments of the invention are described in the appendant claims.

In a manner which is advantageous in accordance with the invention the seat portion and the support element are firstly connected by a mounting element which itself is held by an elastic buffer element, in particular a foam rubber block or the like.

That results in considerable advantages in practice: not only is such an arrangement inexpensive and simple to produce, but also the buffer element according to the invention, as the holding means for the mounting element, permits the structure to be extremely simple, for with suitable dimensioning of the buffer element in terms of its elasticity, size and spring force, there is no need for special fastening for the mounting element; on the contrary the mounting element can be simply embedded at very low cost, for example in a recess or an incision in the buffer element.

The provision of a buffer element (which is preferably of large surface area, that is to say which extends over a large part of the seat surface or the seat portion) of foam material, rubber, horsehair or the like elastic material permits the use of suitable mounting elements, according to the needs involved, and more specifically not only at the center of the buffer element or the seat portion (whereby pivotability about any axes is guaranteed and axis-specific limitation of the pivotal movement is then to be effected by way of limiting means which are to be suitably fixedly mounted or manually fitted), it is also possible to use bar-shaped mounting elements, a multiplicity of individual mounting elements which are arranged in adjacent relationship along an axis or the like, in order to determine center-of-gravity axes of a pivotal movement as between the support element and the seat portion. In particular however if the elastic buffer element is of a greater thickness than the height of an inserted mounting element, for example a bar, such an arrangement, besides a pivotal movement about the axis defined by means of the bar, permits additional

slight tilting or pivotal movements along the axis (and thus about a second perpendicular pivot axis with a reduced pivotal movement) - a structural advantage which has proven in particular in practice to be an orthopedically effective improvement in a traditional seat which is pivotable only about one fixed axis. A further - mechanical - advantage of the provision according to the invention of a second pivot axis with a different (in this case: reduced) maximum pivotal movement (that is to say maximum pivot angle) is the low degree of susceptibility in relation to vibration-induced fractures or the like material failures in the event of a frequent pulse-like loading, for example due to heavyweight users.

It is also in accordance with the present invention to adapt the seat arrangement according to the invention to the needs of the individual user by suitable means for damping, limiting and/or blocking the pivotal movement: thus it has also been found to be particularly advantageous if a user, by manual intervention, can limit a maximum pivotal movement rearwardly (that is to say in opposite relationship to his seating direction) while frequently a greater pivotal movement is wanted in a forward direction (that is to say in the seating direction). That can be achieved by blocking or limiting means which are arranged fixedly or which if necessary can be manually inserted and which more preferably can be adjusted. It is also in accordance with the present invention for a current pivotal position to be fixed by suitable arresting means, just like, for example by the use of additional springs or damping elements, individual weights and the requirement for a softer or a harder elastic behaviour on the part of the arrangement to be taken into account. A particular area of use of a damping element of that kind involves damping a pivotal movement in the forward direction in order to avoid an excessively fast tilting movement of the pelvis in the seating direction.

A further preferred embodiment of the present invention provides that the seat portion is designed to be displaceable relative to the support element, in particular in relation to the seating direction, in which respect the seat portion can assume relative positions corresponding to predetermined retaining or detent positions. Those measures make it

possible to achieve different lever ratios in relation to the seat portion, linked to suitable orthopedically effective consequences, thus for example by displacement of the seat portion forwardly in the seating direction (into a rearward retaining or detent position of the pivot axis) in order to increase the tendency on the part of the seat portion to tilt forwardly in the seating direction. Such a measure promotes tilting of the pelvis of the user in the forward direction, which results in the entire upper body being straightened up.

The present invention can be integrated into existing seat arrangements in many different ways, for example by mounting on or fixing to static seats; alternatively, it is possible for the seat arrangement according to the invention itself to be directly provided with legs or a support structure so that the arrangement itself becomes a chair. Depending on the respective situation of use, it may also be useful to provide further damping or elastic means at the floor side (that is to say in the direction towards a fixed surface or a subjacent carrier means).

Further advantages, features and details of the invention will be apparent from the description hereinafter of preferred embodiments and with reference to the drawings in which:

Figure 1 is a diagrammatic side view of the dynamic seat arrangement according to a first embodiment of the present invention,

Figure 2 shows an alternative configuration of the first embodiment of Figure 1,

Figure 3 is a diagrammatic side view of the dynamic seat arrangement according to a second embodiment of the present invention,

Figure 4 through Figure 9 show different implementations (alternative configurations) of the mounting element for use in the dynamic seat arrangement of the present invention,

Figure 10 through Figure 12 show various displacement positions of the dynamic seat arrangement of the second embodiment of Figure 3,

Figures 13 and 14 show diagrammatic side views of the dynamic seat arrangement according to a third embodiment, and

Figure 15 through Figure 18 show views from below and diagrammatic side views respectively of the dynamic seat arrangement according to the third embodiment.

As shown in Figure 1, the dynamic seat arrangement, in a first preferred embodiment (best mode) has a base plate 10 comprising a strong material such as wood, which on its top side is formed with an elastic cushion layer 12, for example of foam rubber or the like, and covered with a cover (not shown). A user takes up a position on the cushion layer 12, in which case the direction of view of the user (hereinafter also referred to as the seating direction) is indicated by the arrow 14 in Figure 1 (this equally also applies however to all further side views).

Fixed beneath the base plate 10 is an elastic buffer block 16 which comprises foam rubber and which in turn rests by way of an adhesive layer 18 (anti-slip) on a subjacent support plate 20. Alternatively or additionally, fixing of the buffer block 16 (with the base plate 10 fixed thereto) is possible by means of lateral holding bars 22.

Embedded in the buffer block 16, as shown in the diagrammatic view of Figure 4, is a bar-shaped mounting element 24 of circular or oval cross-section, in which respect, as can be seen from Figure 1 and Figure 4 respectively, the mounting element 24 of pressure-resistant material (for example plastic material or wood) is surrounded both in the lateral direction (that is to say on both sides of end faces of the mounting element 24) and also in relation to a height of the buffer block 16 (vertical direction in Figure 1) by the foam material of the buffer block 16. In a structurally simple fashion, for example the mounting element 24 is inserted into a cut-out or incision (not shown) in the buffer block 16 and is thereby held in the position shown in Figure 1 and Figure 4 respectively.

That means that, in relation to the support plate 20 or in relation to the (suitably fixed) holding bar 22, the base plate 10 is pivotable about the pivot axis which is determined by the mounting element 24, in accordance with the elasticity of the buffer block 16 and the maximum pivot angle determined by the geometry of the arrangement shown in Figure 1 (which typically is approximately 15°). However, as shown in Figures 1 through 3,

in opposite relationship to the seating direction 14, the maximum pivot angle is additionally limited (or braked) by a diagrammatically illustrated blocking element 26 which can preferably be set in at least one position and which is for example in the form of a transverse bar, so that the level of comfort of use can be enhanced and any risk of accident due to an excessively large pivot angle in a rearward direction can be alleviated. In addition, Figures 1 through 3 all show transverse bars (alternatively: foam elements or the like) as a grip protection 28 in the regions which are at the front and the rear in relation to the seating direction 14, in order to prevent a user inadvertently catching his hands therein or to keep the hands out.

The support plate 20 (which alternatively can also be omitted), the grip protection elements and/or the holding bar or bars 22 can be fixed by suitable fixing means (not shown in the Figures), for example apertures for screws or the like, on a subjacent supporting or carrier unit, in particular also on a chair surface, so that in that way by virtue of the present invention conventional non-dynamic seat furniture can be provided with the advantageous utility of the present dynamic seat arrangement, easily and at a very low level of equipment expenditure. It is also possible for example for the - elastic - adhesion or anti-slip layer 18 to be merely put down on to a subjacent surface, in which case the arrangement can already suitably be fixed in position by virtue of the adhesion effect thereof.

In addition or alternatively it is possible for the (diagrammatically illustrated) support plate 20 to be provided at the floor side with suitable chair legs, feet or the like, so that this can directly provide a dynamic item of seat furniture (as a single-seater or multi-seater, possibly with arrangements which are pivotable separately relative to each other, as shown in Figure 1).

Figures 4 through 9 are a diagrammatic view from below (that is to say viewing from below on to the base plate 10) of various possible ways of embodying the mounting element 24: thus it is possible for the axis-shaped configuration shown in Figure 1 and Figure 4 to be replaced by two or more mounting elements 30, 32 which are disposed along an axis and which are in the form of balls, parallelepipeds or blocks, in which respect, in

accordance with a preferred development of the invention, the provision of only one central mounting element 30, 32 in the manner shown in Figure 7 or Figure 8 provides that pivotability of the arrangement according to the invention about only one axis (in particular a transverse axis with respect to the seating direction, as shown in Figure 1 or Figures 4 through 6 respectively) can be achieved by unlimited pivotability in the manner defined by the base plate 10 or the support plate 20 respectively, in which case a main axis of movement in the seating direction 14 is particularly preferred and differs in terms of its pivotal stroke movement from lateral pivotal motions. The alternative configuration shown in Figure 2 clearly illustrates in the side view therein the parallelepipedic shape of a mounting element 30, as is used for example in the configuration illustrated in Figure 5 or Figure 7 respectively.

Figure 9 shows a particular embodiment of the present invention: this arrangement does not have a separate mounting element and the mounting action in accordance with the invention is ensured by a buffer block 16 (which in this respect additionally performs the function of the mounting element). In this case also therefore a pivotal movement is not fixed in relation to an axis, but pivotal movement or tilting movement of the base plate 10 relative to the support plate 20 or relative to the holding bars 22 takes place in any fashion determined by the buffer block 16 and the elasticity thereof, with a main axis of movement which is set to the seating direction 14.

While, as shown in Figure 1 and Figure 2 respectively, a fixedly mounted blocking element 26 limits a maximum pivotal movement, it is possible for that to be implemented in various other ways: thus, instead of the illustrated element which is parallelepipedic in cross-section, it is possible to provide balls or the like elements, in particular also mounted manually in the internal space 34 defined between the base plate 10 and the support plate 20, displaceably for varying the blocking angle, or it is possible to provide on the base plate 10 and/or the support plate 20 and/or a holding bar 22, preferably in the rearward region with respect to the seating direction 14, a blocking arrangement (not shown) which can be

turned in, folded in, or pivoted in and which if necessary is introduced by a user into the space 34 in such a way that the maximum pivotal movement can be effectively limited thereby. In accordance with a further embodiment moreover a lifting or blocking arrangement of that kind is provided with an adjusting mechanism which permits the user to set a maximum blocking angle in respect of pivotability.

Figure 3 and Figures 10 through 12 are diagrammatic side views showing a further embodiment of the present invention, illustrating possible ways for relative displacement between the base plate 10 and holding bars 22 (in addition to or alternatively to a support plate 20 (not shown in the Figures), similarly to Figure 1). The second embodiment is to be interpreted in particular also supplemental to the pivotability described hereinbefore with reference to Figures 1, 2 and 4 through 9.

As shown in Figures 3 and 10 through 12, displacement in the seating direction (direction of the arrow 14) is achieved by a loop arrangement 36 (alternatively: belt arrangement or the like) which is of an inverted U-shape configuration and which is afforded on a lateral pair of holding bars 22 and which on both sides laterally embraces the buffer block 16 and which extends with its closed central portion between the limbs above the base plate 10 so that the loop arrangement 36 with the buffer block 16 carried thereon and the pair of holding bars 22 at both sides can be displaced between a position of being advanced in the seating direction (Figure 11) and a rearward position in the seating direction (Figure 12).

The Figures do not show a retaining or fixing unit which is operative together with the displacement mechanism of Figures 3 and 10 through 12 and which, for example by virtue of fixing of the loop arrangement 36 (alternatively: belt arrangement or the like) to the base plate 10, at predetermined relative displacement positions, permits latching engagement or secured fixing of a position of use which is set in the desired manner by means of displacement of the arrangement.

A detent or fixing device which is particularly suitable in accordance with the present invention for that purpose is to be found in the third embodiment shown in Figures 13 through 18: as can be seen in particular

in the diagrammatic side view in Figures 13, 14 and 18, the buffer block 16 encloses a pair of mounting blocks 38 which are arranged at both sides laterally and which are respectively adapted to co-operate with a loop 42, provided with detent or retaining grooves 40, on the base plate 10; as Figure 13 (front retaining or detent position), Figure 14 (rear retaining or detent position) and Figure 18 (central retaining or detent position in a slightly modified embodiment) show, the engagement of a mounting pin 44 of a mounting block 38 into a retaining or detent groove 40 fixes the relative position of the base plate 10 with the cushion layer 12 resting thereon, with respect to the subjacent support plate 20, more specifically just by virtue of the inherent weight of the arrangement 10, 12, with an increase in the fixing action when a loading is applied by virtue of a user sitting on the seat arrangement. The mounting pin 44 thus then also defines the pivot axis.

Figure 17 is a diagrammatic view from below showing the arrangement of the retaining or detent arrangement embedded in the buffer block 16 and comprising the mounting blocks 38 and the loops 42, while Figures 15 and 16 show a slightly modified alternative configuration: here the buffer block 16' is shortened in relation to the direction defined by the pivot axis, so that the arrangement comprising the mounting block 38 and the loop 42 is disposed laterally outside the buffer block 16.

The present invention is not limited to the illustrated embodiments; thus it is in particular in accordance with the present invention for features of the illustrated embodiments to be combined in any manner and thus to arrive at forms of implementation of the invention, which depending on the needs involved afford the appropriate configuration for a respective purpose in use.

In particular, it is also in accordance with the invention for the buffer block 16 (which, as an alternative to the described embodiments comprising foam material, can also be made from other suitable elastic natural or synthetic materials such as for example latex, horsehair or the like), to be supplemented or supported in terms of its buffer action by additional spring or buffer elements (not shown in the Figures); thus, it is

particularly preferred to associate with the buffer block in a position adjacent thereto in or in opposite relationship to the seating direction 14, an additional buffer element in the form of a coil spring, a block of elastic material or the like, and further preferably to make such an element which in particular can also be viewed as a damping element adjustable in respect of its damping action or its buffer action, as can be effected for example in the case of coil springs by adjustment of the spring travel or the like.

It is also particularly preferred in accordance with the present invention for the cushion layer 12 (which is suitably covered) to be supplemented by a further support, illustrated for example as a support layer 46 in Figure 3, in order in that way to provide for additional adaptation to a user or the body weight of the user, by virtue of choosing a suitable material for the support layer, for example strong stable foam material.

A further preferred development of the invention provides that, in addition (or alternatively) to limiting a maximum pivotal movement, there are provided means which can fix an instantaneous pivotal position of the arrangement, for example by rearwardly or laterally engaging clamp, lever, blocking or push-in arrangements, so that a user can as desired (releasably) prevent any dynamic mobility of his seat surface relative to the subjacent support.

Accordingly therefore the present invention can provide a very high degree of variability in terms of carrying into effect the advantages of a practical, dynamic seat arrangement which is simple to manufacture.

CLAIMS

1. A dynamic seat arrangement comprising a seat portion (10, 12) which is movable relative to a support element (20; 22) by pivoting about a first pivot axis with a first maximum pivotal movement, characterised in that provided between the seat portion and the support element is at least one mounting element (24; 30, 32) to define a mounting between the support element and the seat portion with the first pivot axis, wherein the mounting element is held by an elastic buffer element (16) which at least partially surrounds the mounting element and which affords a spring force for the mounting, wherein the buffer element can be so designed that either a pivotal movement about a second pivot axis which is different from the first pivot axis with a second maximum pivotal movement which is different from the first maximum pivotal movement, or pivotal movement only about the first pivot axis is made possible, by the mounting, and wherein there are provided means for adjustable displacement of the seat portion relative to the support element in a displacement plane defined by the seat portion or the support element.

2. An arrangement as set forth in claim 1 characterised in that the buffer element is of a disk-like, strip-like, parallelepipedic or cushion-shaped configuration or the like, fixed with one side to the seat portion and/or the support element, and is so designed that the mounting element is embedded at least in a portion-wise manner into the buffer element.

3. An arrangement as set forth in claim 1 or claim 2 characterised in that the elastic buffer element is formed from foam rubber, sponge rubber, latex or another elastic synthetic or natural material, and has an incision or cut-out for receiving the mounting element.

4. An arrangement as set forth in one of claims 1 through 3 characterised in that the mounting element is a ball (32), a bar (24) or a

parallelepiped (30) or the like, of a material which is elastic or non-elastic in relation to a seat loading, or is embodied by the buffer element itself.

5. An arrangement as set forth in one of claims 1 through 4 characterised in that an effective height of the mounting element between the seat portion and the support element is less than a thickness of the elastic buffer element.

6. An arrangement as set forth in one of claims 1 through 5 characterised by means for limiting a maximum pivotal motion between the seat portion and the support element, which means can be manually introduced into an intermediate space (34) between the seat portion and the support element by an operator, said means being in particular in the form of a lever or screw device which can be inserted or pivoted in and which more preferably is adjustable in respect of height.

7. An arrangement as set forth in one of claims 1 through 6 characterised by damping means provided in an intermediate space (34) between the seat portion and the support element outside the buffer element and preferably being adjustable in respect of its force action, in particular in the form of an adjustable spring element.

8. An arrangement as set forth in one of claims 1 through 7 characterised by arresting means for fixing a pivotal position as between the seat portion and the support element, which arresting means can be manually introduced into an intermediate space (34) between the seat portion and the support element or can be manually fixed laterally or rearwardly to the seat portion and/or the support element.

9. An arrangement as set forth in one of claims 1 through 8 characterised in that the means for displacement of the seat portion have fixing and/or retaining means (38, 40, 42, 44) for affording at least one fixed relative position between the seat portion and the support element, wherein preferably the displacement means have a loop and/or belt arrangement (36) for connecting the seat portion and the support element, which permits displacement along a direction, in particular the seating

10. An arrangement as set forth in one of claims 1 through 9 characterised in that, at a side of the support element which is remote from the seat portion, same is provided with a foil or sheet, an elastic layer (16) and/or a leg arrangement, and/or has means for fixing on an article of seat furniture.

11. A dynamic seat arrangement comprising a seat portion (10, 12) which is movable relative to a support element (20; 22) by pivoting about a first pivot axis, characterised in that provided between the seat portion and the support element is an elastic buffer element (16) as a damping and/or mounting element, and there are provided means adjacent to or embedded in the buffer element, for displacement of the seat portion relative to the support element in a displacement plane defined by the seat portion or the support element, with at least one fixed relative position between the seat portion and the support element.

Fig.1

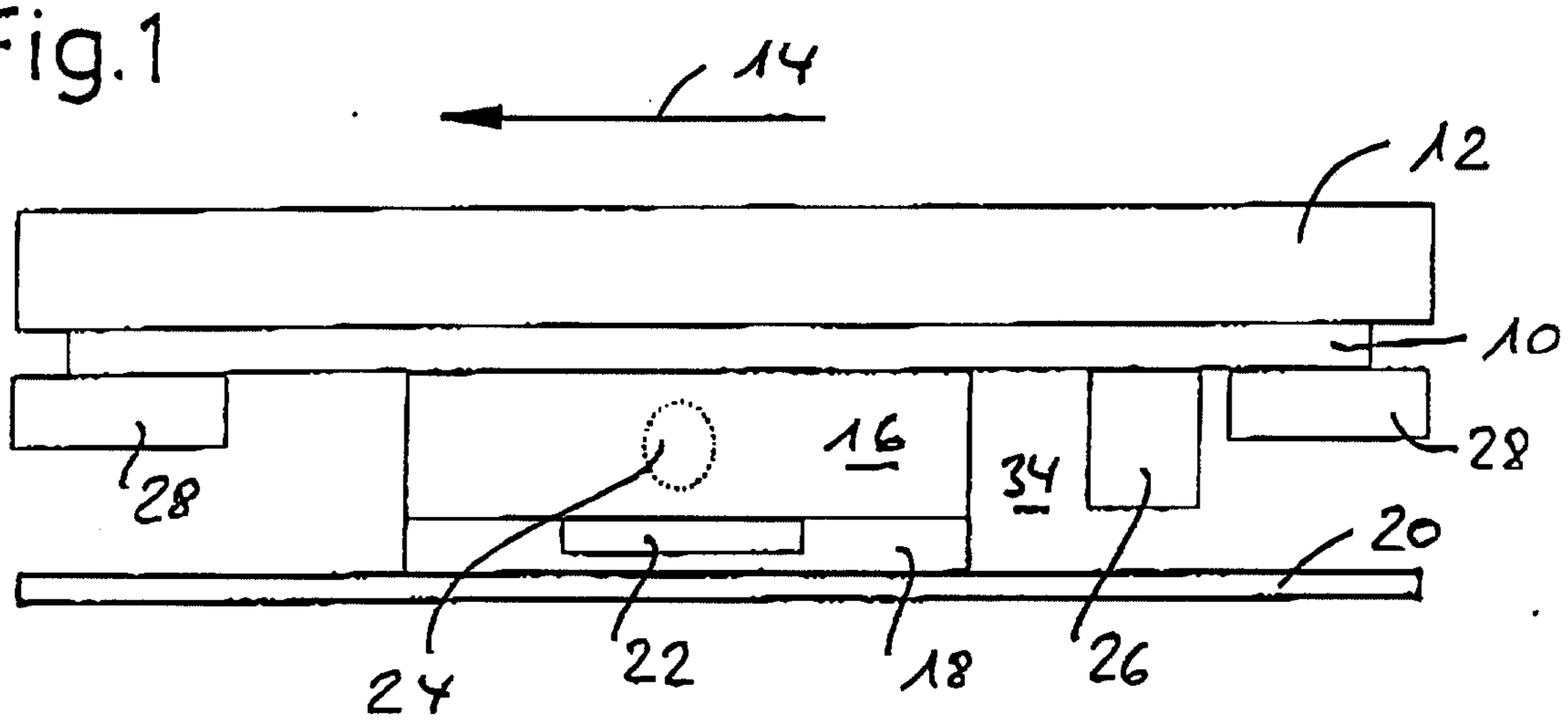

Fig.2

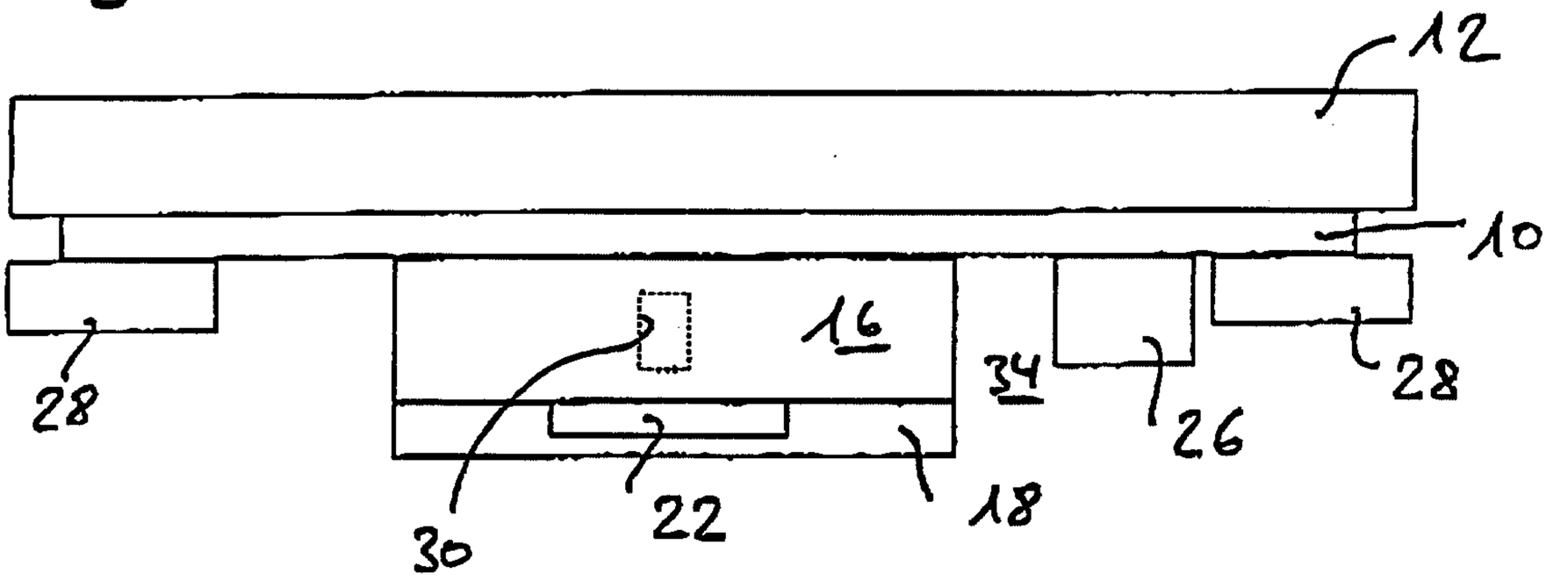

Fig.3

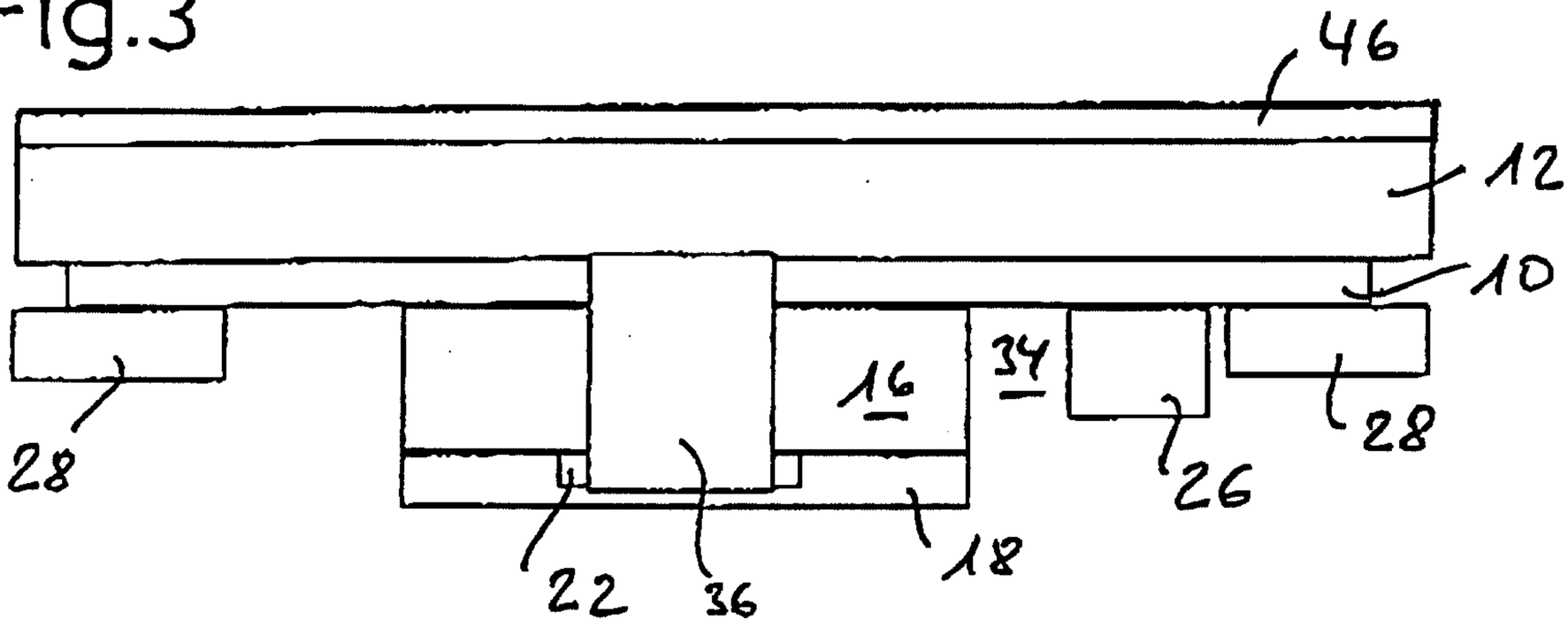

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Fig.4

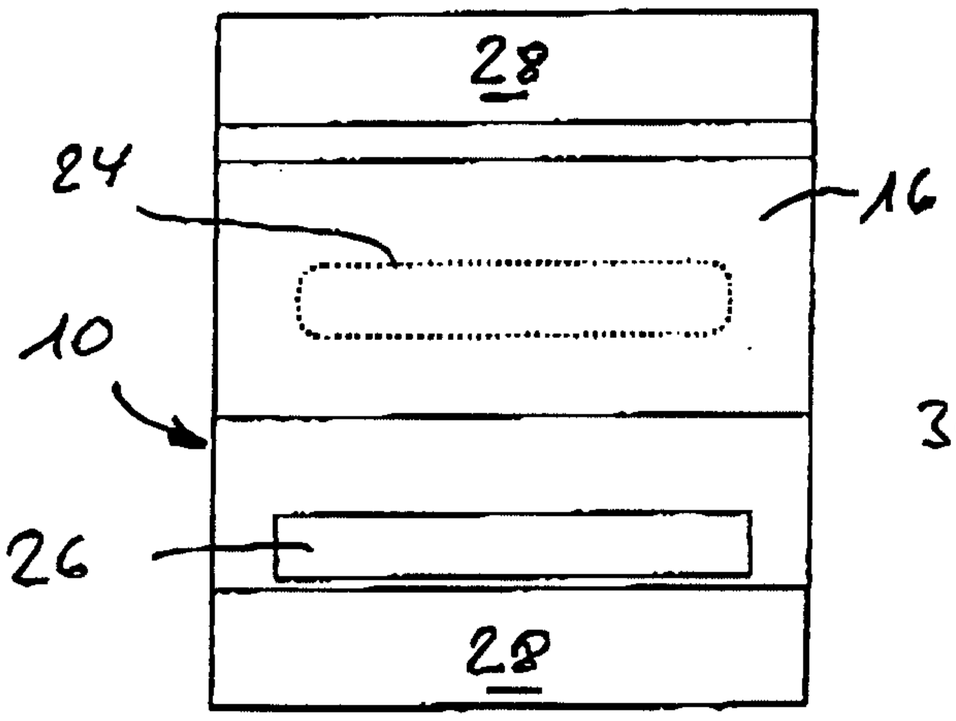

Fig.5

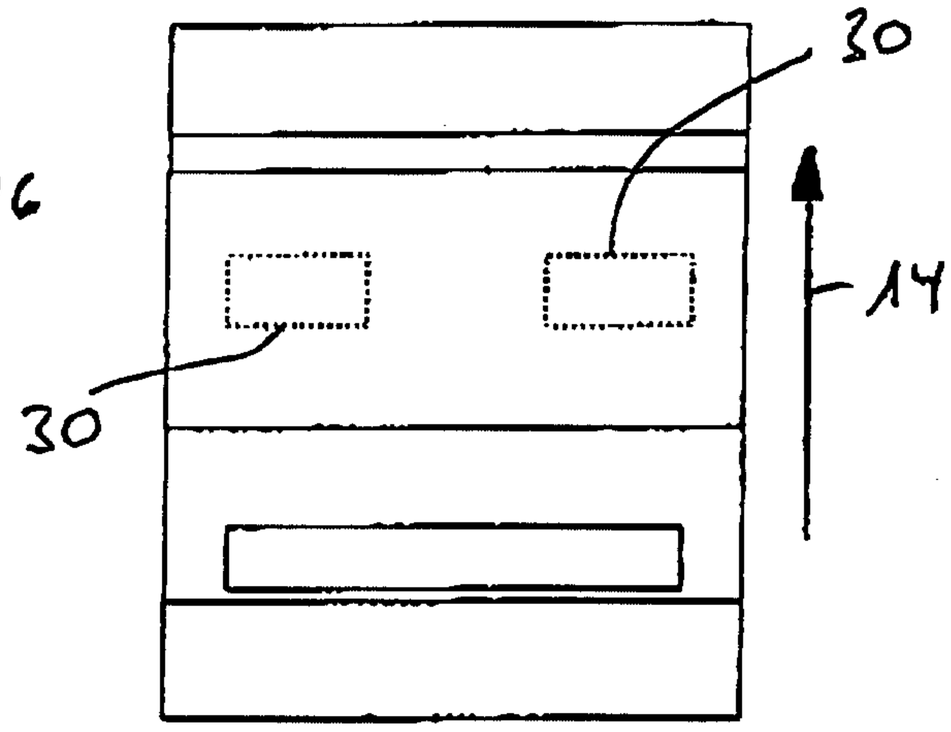

Fig.6

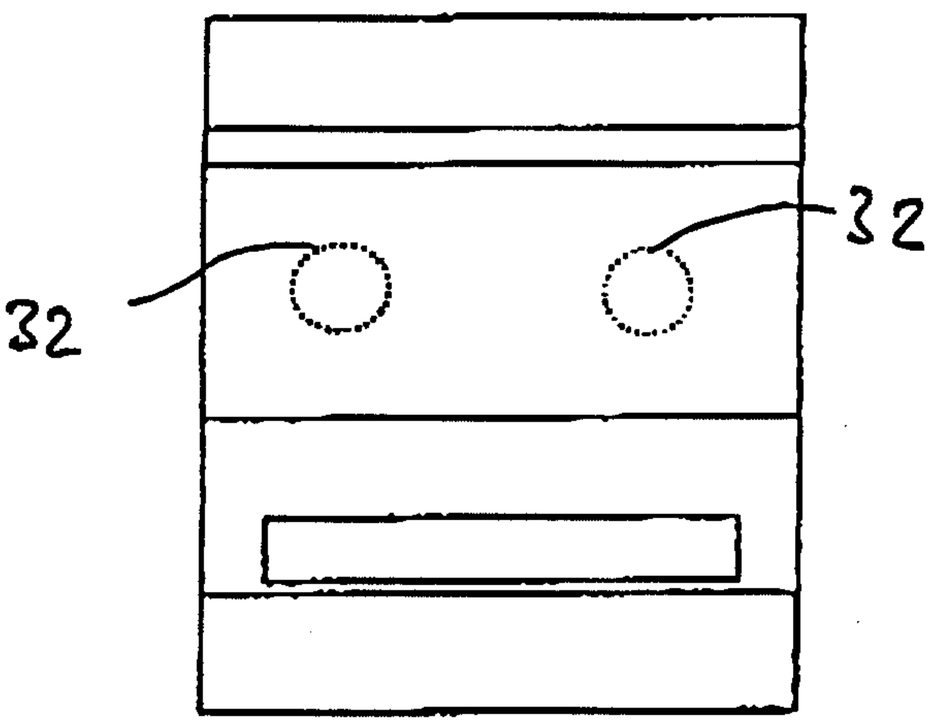

Fig.7

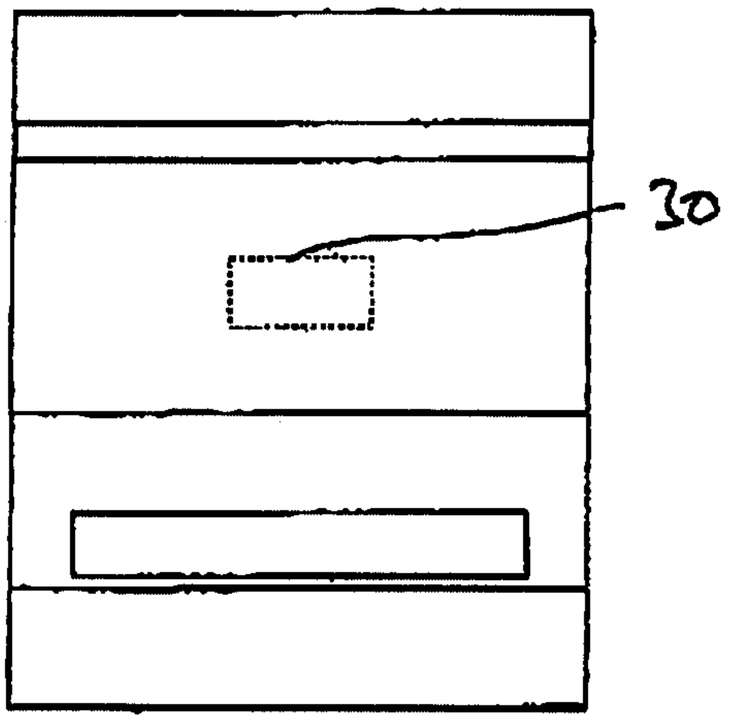

Fig.8

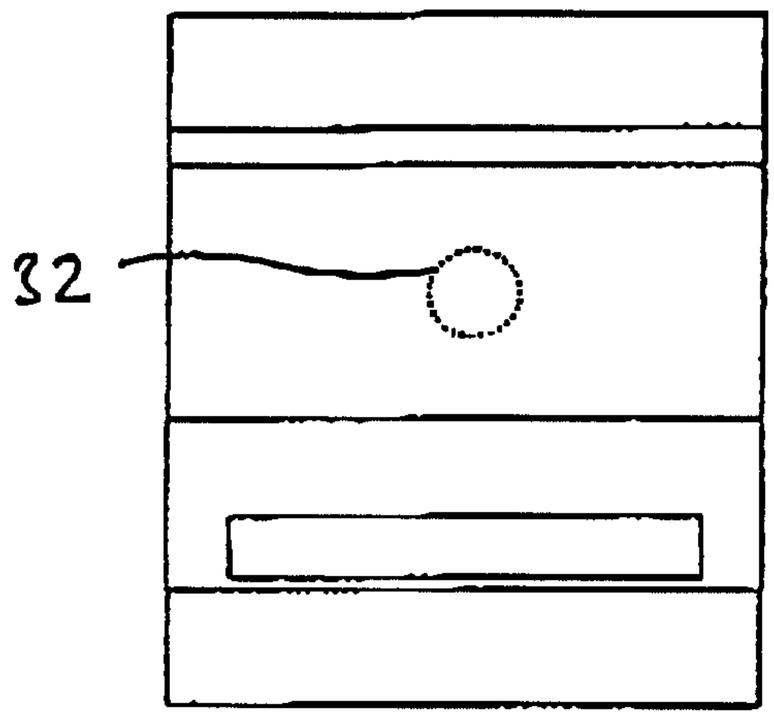

Fig.9

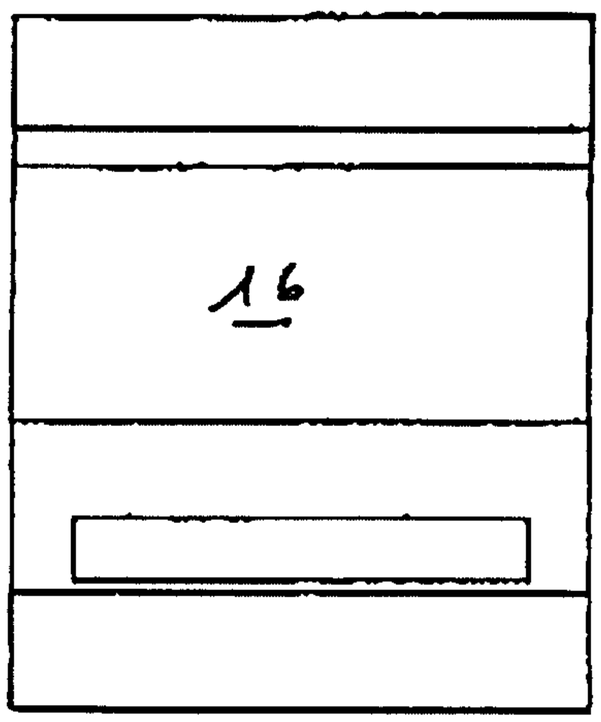

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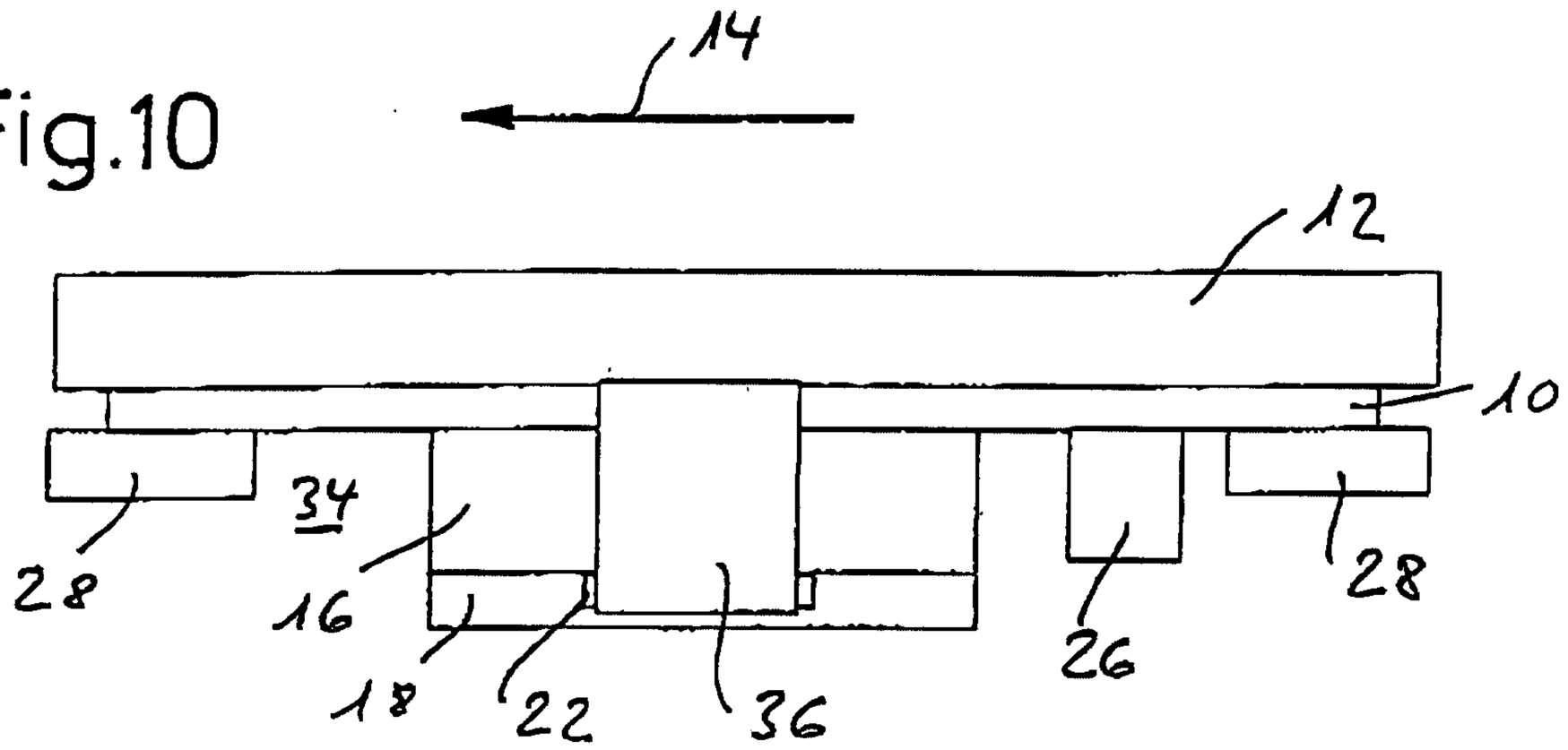
Fig.10



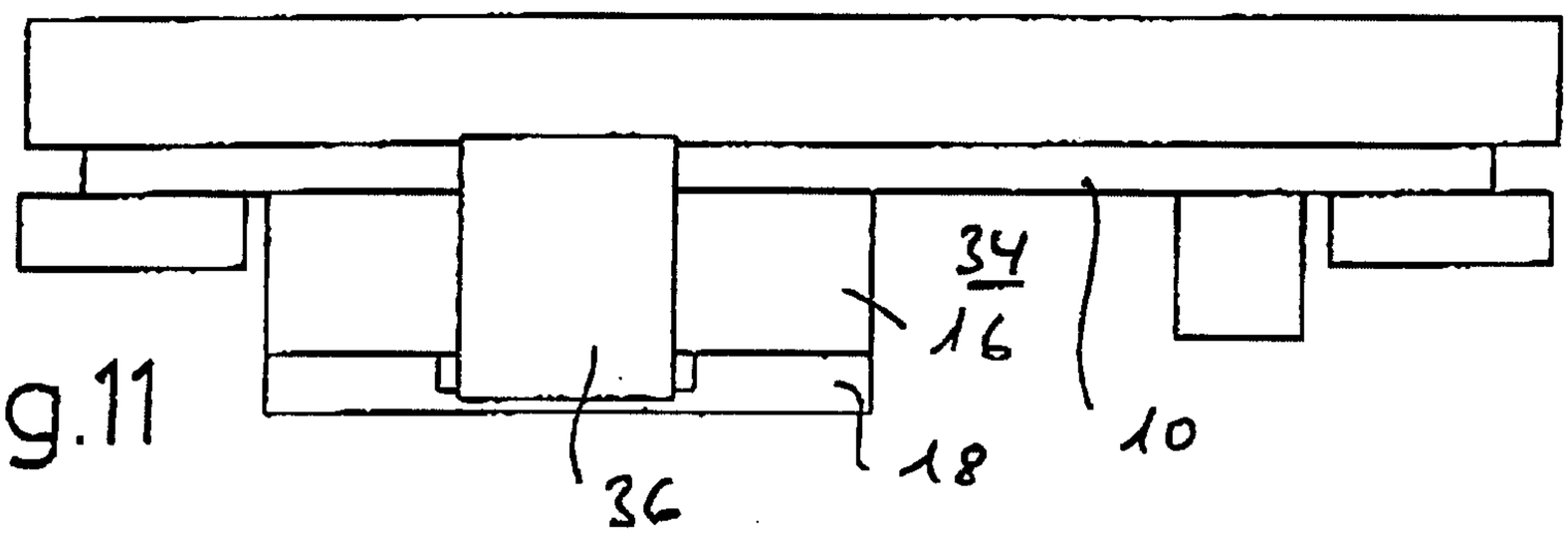


Fig.11

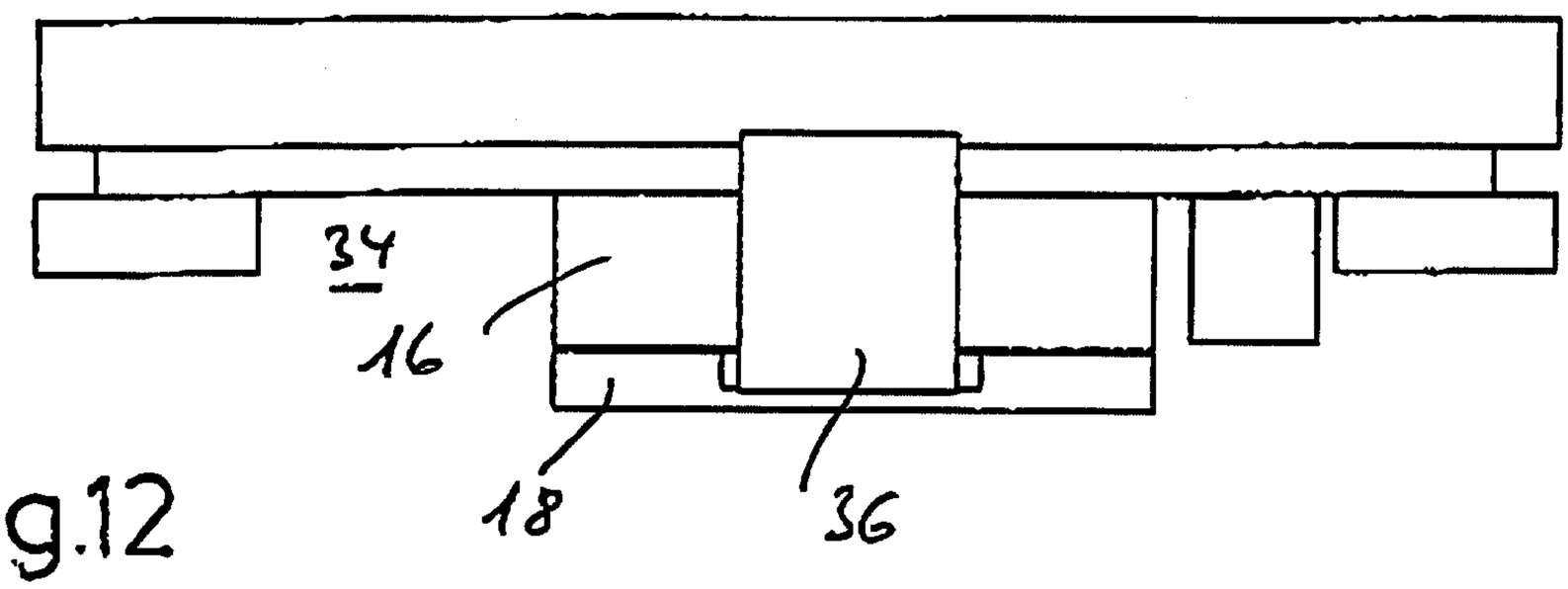


Fig.12

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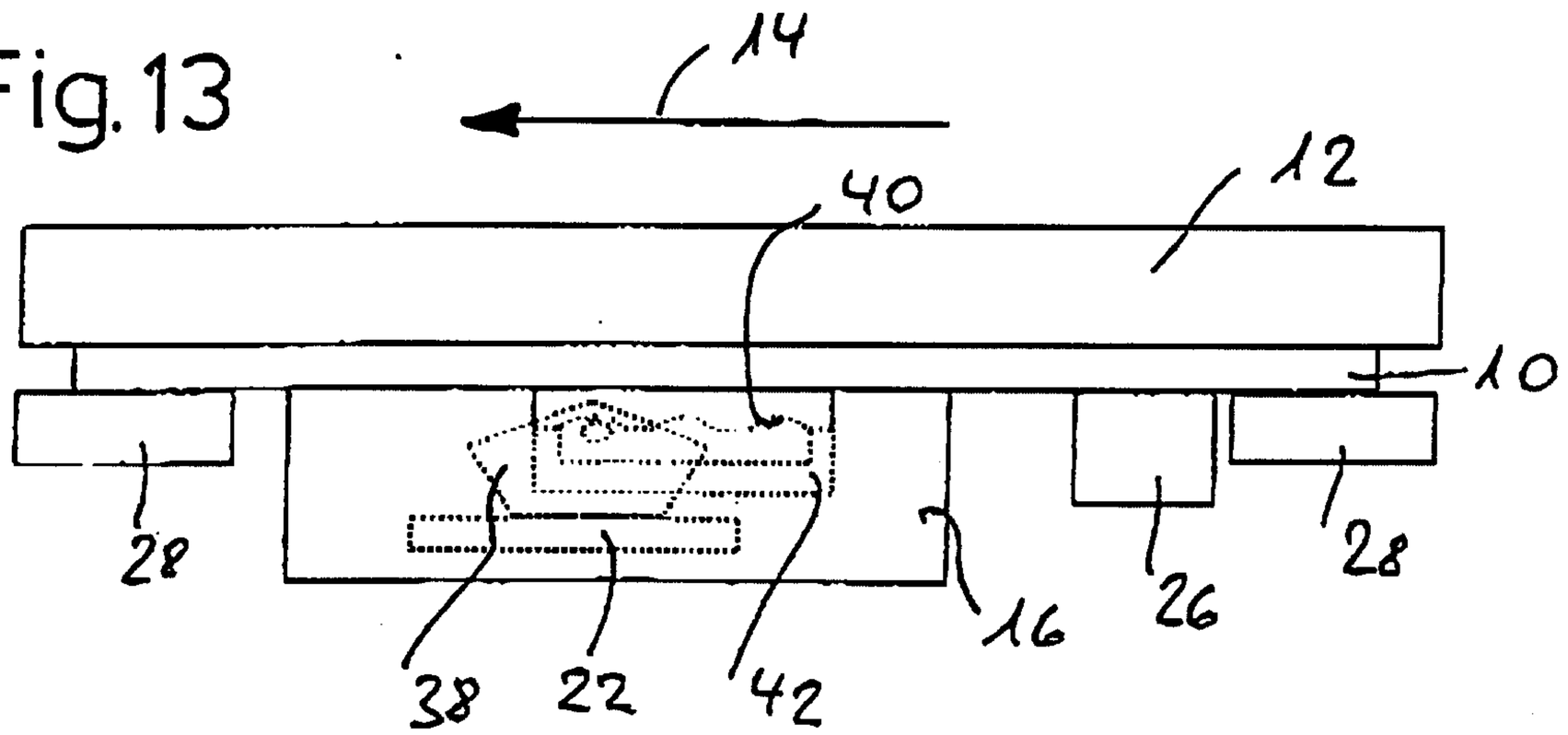
Fig.13



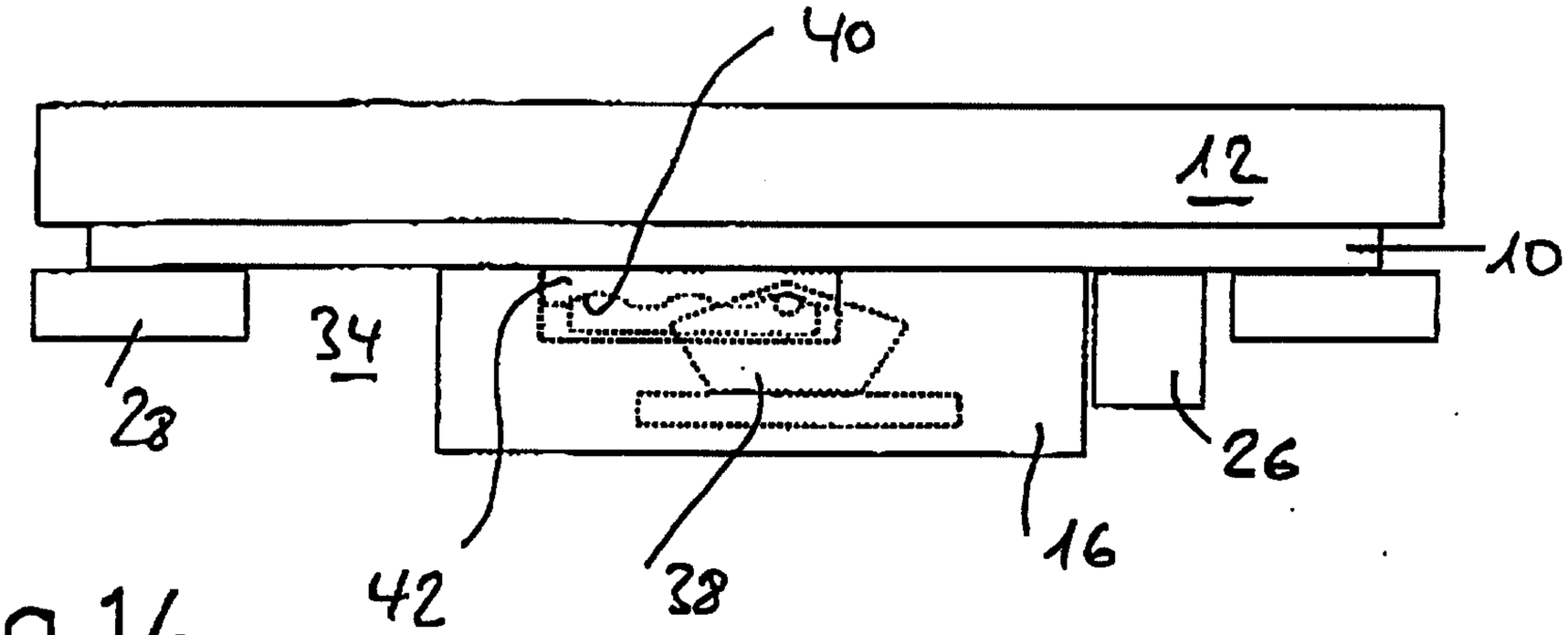


Fig.14

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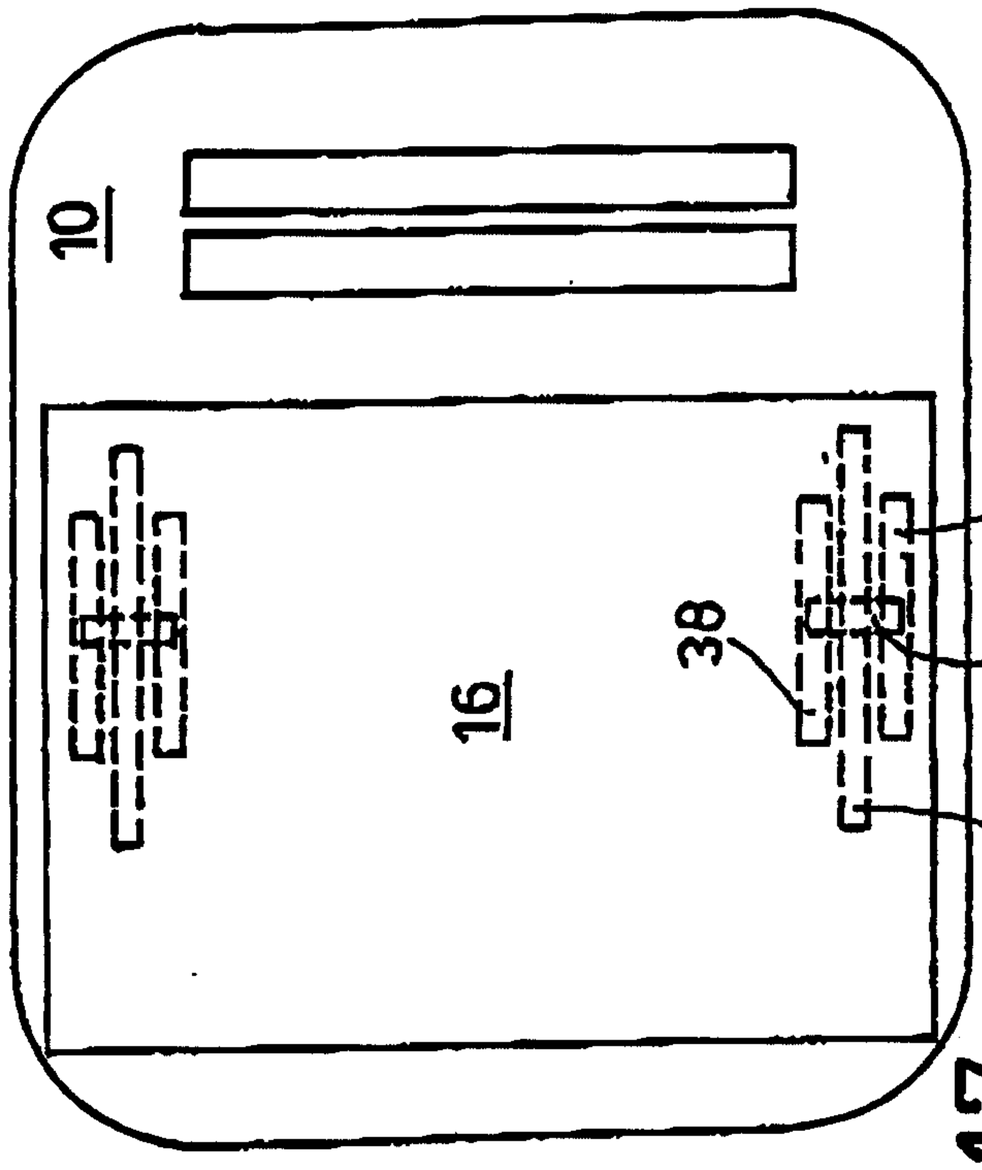

Fig.17

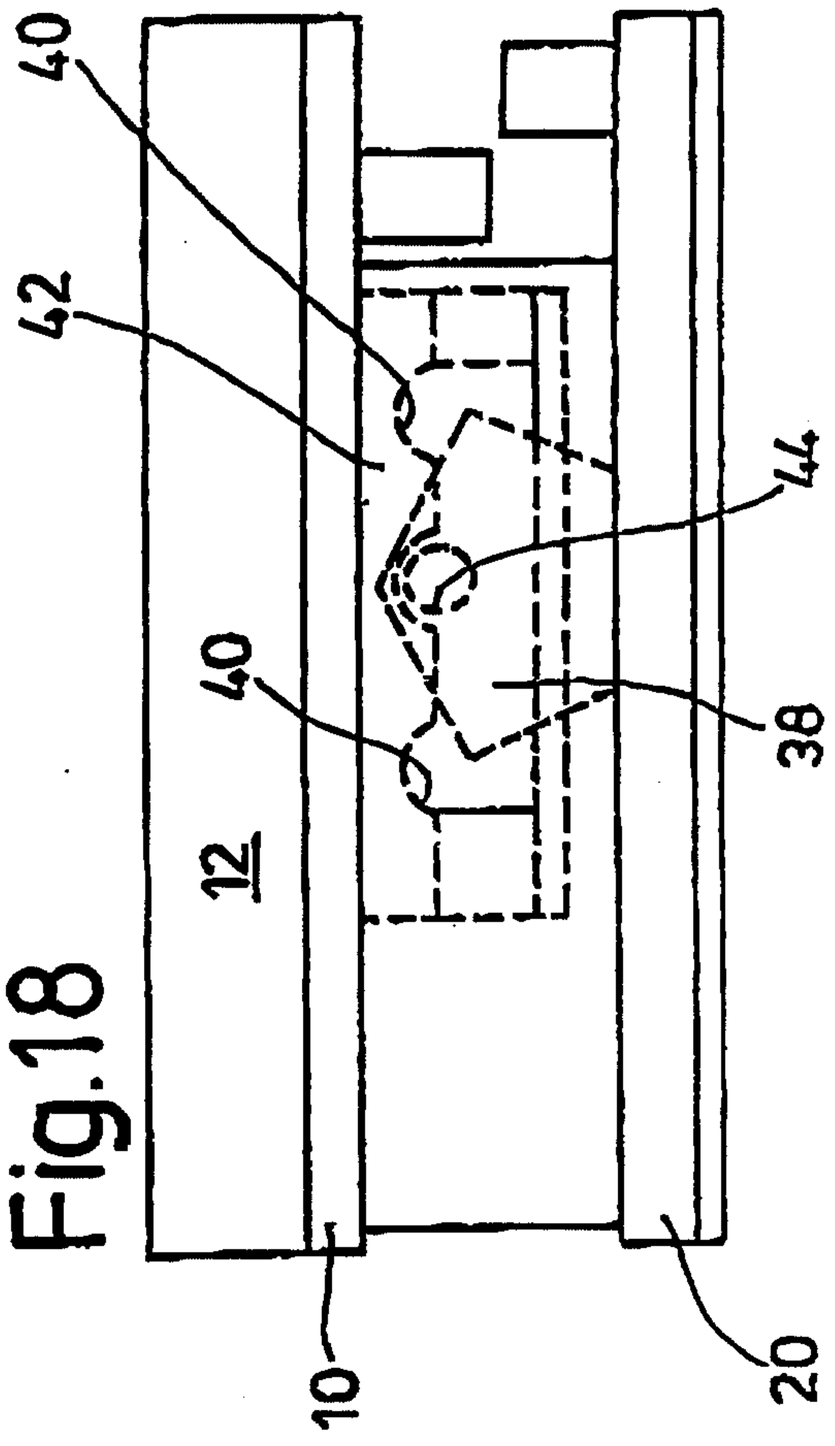

Fig.18

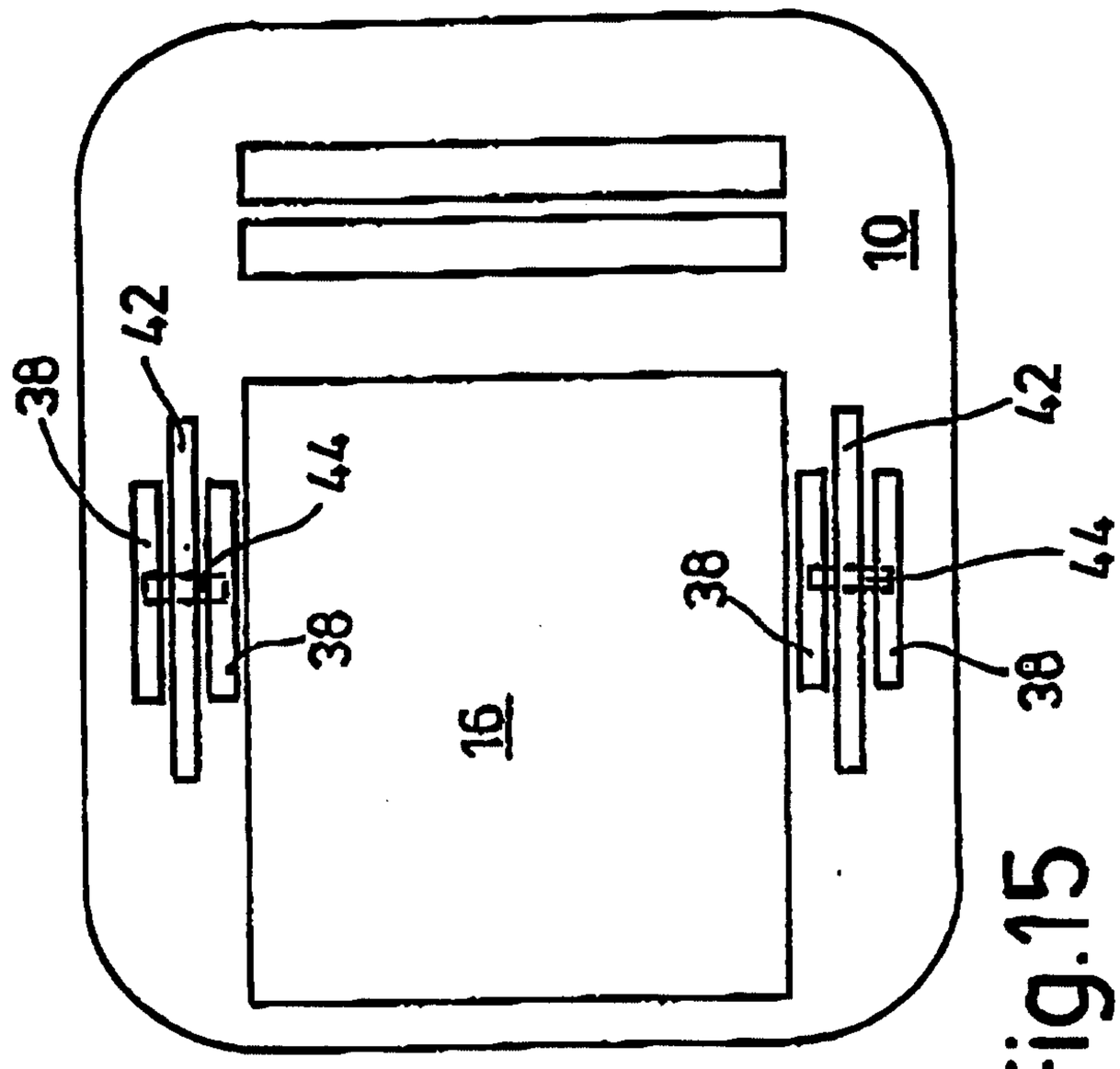

Fig.15

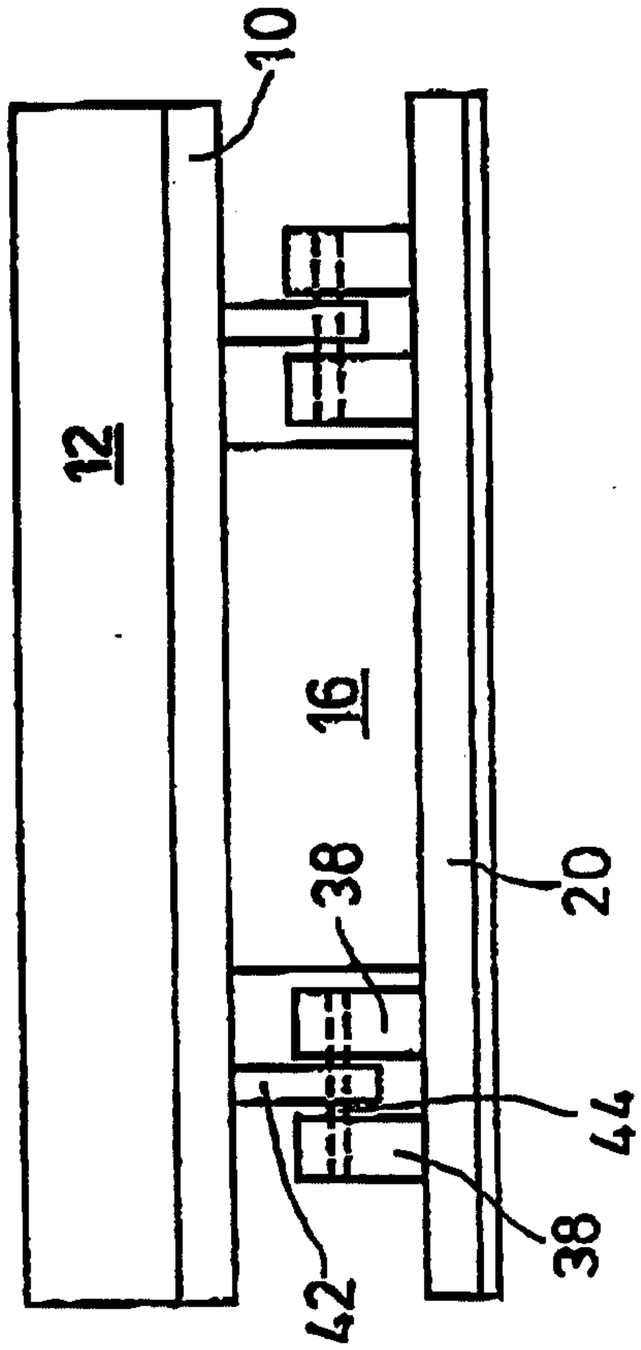

Fig.16

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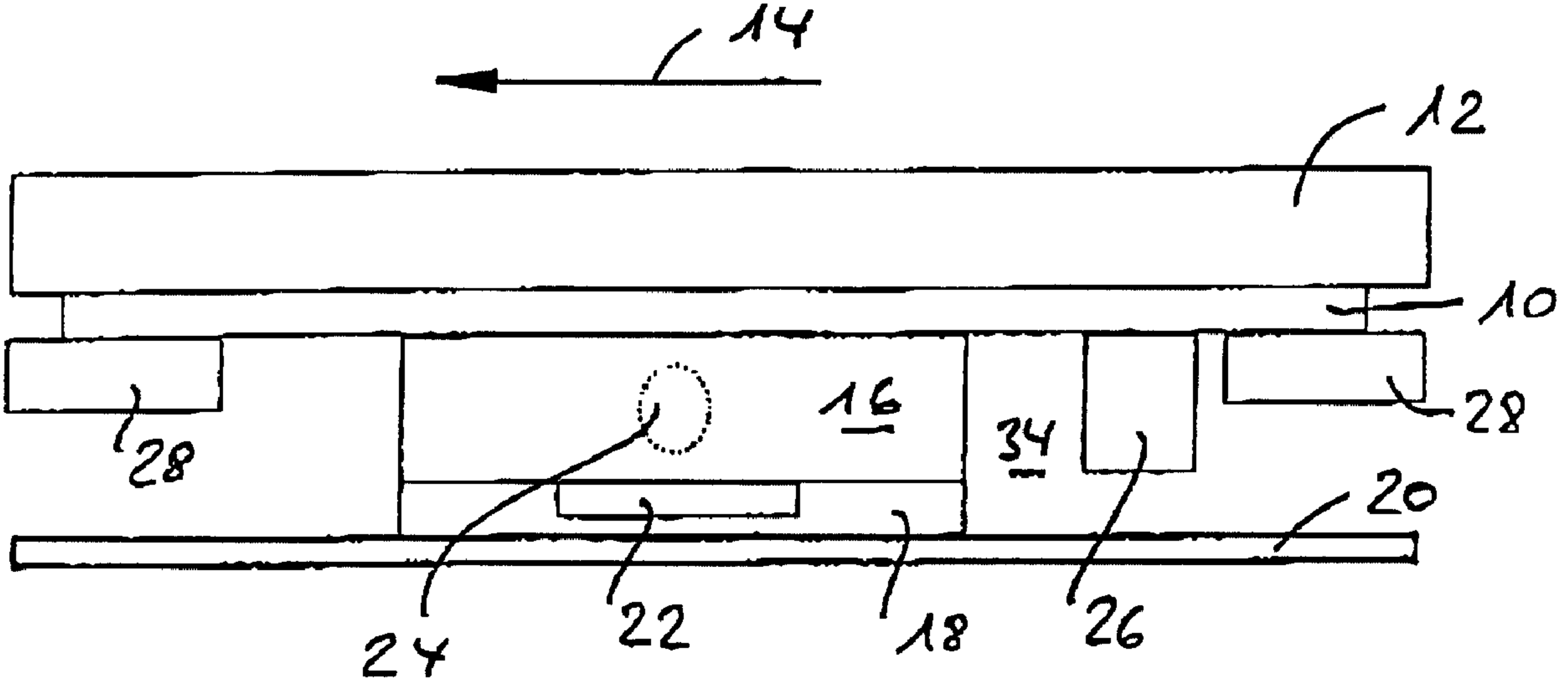
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