

Recording and/or reproducing apparatus.

The invention relates to a recording and/or reproducing apparatus having a housing and having a substantially plate-shaped chassis for accommodating parts of the apparatus, which chassis is connected to a housing part by three connecting devices arranged at a distance from one another as a three-point support, which housing part is spaced from and extends substantially parallel to the chassis.

In a commercially available known apparatus of the type defined in the opening paragraph, which apparatus takes the form of a video recorder for recording and reproducing video and audio signals on/from a magnetic tape, each connecting device has a mounting sleeve which is integral with a housing base from which it projects to both sides, which sleeve has one end adjoining the plate-shaped chassis at the side of the apparatus interior and has a spacer sleeve inserted into it at its other end from the side of the apparatus exterior, the end of the spacer sleeve at the side of the apparatus interior resting on the chassis and its other end, which is remote from the chassis, having a collar, an annular rubber disc for tolerance compensation being interposed between said collar and the end of the mounting sleeve which faces the collar, which disc engages with the head of a screw fitted into a bore in the chassis through the spacer sleeve. Connecting devices of this kind are of comparatively complicated construction, which requires a comparatively intricate mounting process. Another disadvantage is that such connecting devices can transmit moments from the housing base to the chassis during the connection of the chassis to the housing base when the screws are fitted into the bores in the chassis owing to deviating relative positions of the mounting sleeves and the bores in the chassis as a result of tolerances and, once the chassis has been connected to the housing base, owing to for example different temperature-dependent changes in the dimensions of the housing and the chassis. This may result in a deformation, such as warping or bending of the plate-shaped chassis, leading to a change in the position of the apparatus components mounted on the chassis, which affects or deteriorates the correct operation of the apparatus. However, especially in the case of such a video recorder it is particularly important that the parts which cooperate directly with the magnetic tape, such as tape guides,

stationary magnetic heads and a drum-shaped scanning unit which accommodates rotatably drivable magnetic heads always occupy the same position relative to one another because even slight changes in the positions of these parts may adversely affect the recording and reproducing quality.

5 It is the object of the invention to avoid the above problems and to ensure with simple means that no deformation of the chassis from the housing side is possible *via* the connecting devices when the chassis is connected to the housing part and once the chassis has been connected to the housing part. To this end, the invention is characterised in that each of the three connecting devices has a supporting element
10 fixedly connected to the housing part and having a convex dome-shaped supporting surface facing the chassis, and a counter-element connected to the chassis and having a rotationally symmetrical mating surface which widens continuously towards the housing part, with which mating surface the counter-element pivotably engages with the convex supporting surface, in that two counter-elements are connected to the chassis so as to be
15 movable relative to one another substantially in a given direction parallel to the plate-shaped chassis, and in that the third counter-element and the two other counter-elements are connected to the chassis so as to be movable relative to one another substantially in a given direction parallel to the plate-shaped chassis as well as substantially in a direction perpendicular to the said given direction and parallel to the plate-shaped
20 chassis. With particularly simple means it is thus ensured that both during connection of the chassis to the housing part and once the chassis has been connected to the housing part the counter-elements can adapt their positions on the chassis accurately and free from forces and moments to the positions of the supporting elements on the housing part and, consequently, no moments can be transmitted from the housing to the chassis *via*
25 the connecting devices, so that no deformation of the chassis is possible. Consequently, no undesirable changes in the positions of parts mounted on the chassis can occur, so that always a correct operation of the apparatus is guaranteed. This also ensures a simple mounting process for the chassis because the chassis can simply be placed with its counter-elements onto the supporting elements substantially perpendicularly to its
30 plate plane, the counter-elements on the chassis adapting their positions accurately and free from forces and moments to the positions of the supporting elements on the housing part. Such a mounting process can be mechanized easily, which is particularly cost-reducing. Moreover, the particularly simple construction of the connecting devices with

a small number of parts results in a construction which is advantageous for low-cost production.

It is to be noted that it is known from DE-PS 25 22 270 to connect a first plate and a second plate, which however are both disposed at the same level, via three supports in such a way that, if the second plate is warped no forces deforming the first plate are transmitted to the first plate. In this case, however, the supports are of complicated construction, each of the three supports having a ball element and a first hollow conical counter-element for the ball element, one support further having a second hollow conical counter-element for the ball element and the two other supports each having a second counter-element for the ball element, which second counter element is formed by two guide rails. Supports of this kind are difficult to produce and are therefore correspondingly expensive. Moreover, supports of this kind require a complicated mounting process for mounting the first plate on the second plate.

Conversely, in the case of the apparatus according to the invention the connecting devices for connecting the plate-shaped chassis and the housing part, which is spaced from and extends parallel to the plate-shaped chassis, have a particularly simple construction with a particularly small number of parts, which is advantageous for low-cost production and also results in simple mounting of the chassis on the housing part.

In an apparatus in accordance with the invention two counter-elements may be connected to the chassis so as to be movable relative to one another in a first direction and the third counter-element and the two other counter-elements may be connected to the chassis so as to be movable relative to one another in a second direction and in the direction perpendicular to this second direction. However, it has proved to be advantageous if two counter-elements are connected to the chassis so as to be exclusively movable substantially in the direction of a connecting line between these two counter-elements, and the third counter-element is connected to the chassis so as to be exclusively movable substantially in a direction perpendicular to the direction of this connecting line. This is advantageous for a simple construction of the movable connection of all three counter-elements to the chassis, enabling the same construction of the movable connection to be used for all three counter-elements.

However, it has also proved to be advantageous if one counter-element is immovably connected to the chassis and one counter-element is connected to the chassis so as to be exclusively movable substantially in the direction of a connecting line

between itself and the counter-element which is immovably connected to the chassis, and the third counter-element is connected to the chassis so as to be movable substantially in the direction of this connecting line as well as substantially in a direction perpendicular to the direction of this connecting line. This has the advantage that only two of the three counter-elements are movably connected to the chassis and one counter-element is simply connected immovably, *i.e.* fixedly, to the chassis, and that the connecting device having its counter-element fixedly connected to the chassis forms a fixed reference point for the positioning of the chassis relative to the housing part.

For movably connecting the movable counter-elements to the chassis the relevant counter-elements may have omnilaterally rigid arms which project from them and whose distal ends are pivotably supported on the chassis. However, it has proved to be particularly advantageous if for movably connecting the movable counter-elements to the chassis the movable counter-elements have arms projecting from them, which arms are constructed to be rigid in the direction of their longitudinal extension and to be elastically flexible in the direction transverse to their longitudinal extension, and are fixedly connected to the chassis by their distal ends. This is advantageous for a simple construction and a simple connection to the chassis. The counter-elements including their arms can then consist of plastics and the counter-elements or their arms can be connected to the chassis in a particularly advantageous manner by means of an outsert moulding technique.

The counter-elements may rest with their mating surfaces on the supporting surfaces of the supporting elements merely under the influence of the weight of the chassis and of the parts mounted on the chassis but the connecting devices then connect the chassis securely to the housing part over only a limited range of spatial positions of the apparatus. It has therefore proved to be advantageous if each connecting device has a screw, which is fitted into a bore in the supporting element and extends through an opening in the chassis and through a substantially coaxial opening in the counter-element connected to the chassis, and a spring element, on which the screw head of the screw is supported and which engages on the chassis to urge the latter resiliently towards the supporting element, the force of the spring element holding the counter-element, which is connected to the chassis, in engagement with the supporting surface of the supporting element by its mating surface. In this way, the three connecting devices always ensure that the chassis

is connected to the housing part reliably and without transmitting any moments independently of the spatial position of the apparatus.

In this arrangement, it has proved to be particularly advantageous if the supporting element has a sleeve projecting from it, which sleeve is coaxial with the bore, extends through the openings in the counter-element and in the chassis, and has a free end supporting the screw head *via* the interposed spring element. In this way, the screw-in depth for the screw is defined by the sleeve and, consequently, the force exerted on the chassis by the resilient element on the screw head is fixed at a constant value determined by the screw-in depth thus defined.

The mating surfaces of the counter-elements may, for example, have the form of a hollow cone. However, it has proved to be particularly advantageous if the mating surfaces of the counter-elements are dome-shaped. This provides an accurate adaptation of the spatial positions of the counter-elements to the spatial positions of the supporting elements for a relatively large pivoting range of the counter-elements.

The invention will be described in greater detail hereinafter with reference to two exemplary embodiments which are shown in the drawings but to which the invention is not limited. Fig. 1 is a reduced-scale diagrammatic oblique view showing a recording and reproducing apparatus for television signals and audio signals, which apparatus accepts a cassette accommodating a magnetic tape on which television signals can be recorded in helical tracks or from which they can be reproduced with the aid of rotatable magnetic heads. Fig. 2 is a diagrammatic plan view and partly sectional view showing a part of the apparatus shown in Fig. 1, comprising a plate-shaped chassis connected to the base of the housing of the apparatus of Fig. 1 by means of three connecting devices. Fig. 3 is a sectional view taken on the line III-III in Fig. 2 showing one of the three connecting devices of the apparatus of Figures 1 and 2. Fig. 4 is a sectional view taken on the line IV-IV in Fig. 2 and showing another one of the three connecting devices of the apparatus shown in Figures 1 and 2. Fig. 5 shows similarly to Fig. 2 a part of a further apparatus having a plate-shaped chassis which is likewise connected to the base of the housing of this apparatus by means of three connecting devices.

Fig. 1 shows a recording and reproducing apparatus 1 constructed for recording and reproducing television signals and audio signals on/from a magnetic tape and in general briefly referred to as a video recorder. The magnetic tape is

accommodated in a cassette 2 shown diagrammatically in Fig. 1. The cassette 2 can be inserted by hand into the apparatus 1 in the direction indicated by the arrow 5, through an opening 4 which can be closed by a cover 3 which is pivotable into the interior of the apparatus. The opening 4 has been provided in a front wall 6 of the housing 7 of the apparatus 1. During insertion of the cassette 2 into the apparatus 1 it is slid into a movable cassette holder by means of which the cassette, after complete insertion into this holder, is lowered substantially perpendicularly to the cassette main walls into an operating position inside the apparatus. In this operating position the cassette is positioned by means of locating pins on the apparatus and movable tape guides enter the cassette to move the magnetic tape out of the cassette for cooperation with stationary tape guides, stationary magnetic heads and a drum-shaped rotatable scanning unit containing magnetic heads, which have been provided on the apparatus. For starting modes of operation of the apparatus 1, such as "record", "normal forward reproduction", "still reproduction", "fast forward reproduction", "fast reverse reproduction", "fast forward winding", "fast reverse winding" and the like the apparatus 1 has a first set 8 of keys on its housing front wall 6. For programming the apparatus 1 and for the entry of further data, for example for setting a clock or for setting a preprogrammable starting time, the apparatus 1 has a second set 9 of keys on its housing front wall 6. On its housing front wall 6 the apparatus 1 further has two display units 10 and 11, whose display elements are each made up, for example, of seven segments and serve, for example, to display readings of a tape length counter and to display daytimes.

The abovementioned locating pins for positioning a cassette 2 in its operating position in the apparatus and the movable tape guides, the stationary tape guides, the stationary magnetic heads, the drum-shaped scanning unit and a multiplicity of other parts of the apparatus 1 are mounted on an substantially plate-shaped chassis 12 of the apparatus 1. This chassis 12 is shown diagrammatically in Fig. 2, the above-mentioned parts and any further bores, openings, reinforcing ribs or beads and the like provided on the chassis 12 not being shown for the sake of simplicity. In the present case the chassis 12 is made of steel but it may also be constructed as an aluminium diecasting.

The chassis 12 is connected to the base 16 of the housing 7 by three connecting devices 13, 14 and 15 arranged at a distance from one another as a three-

point support, said base being spaced from and extending parallel to the chassis 12. In addition to the base 16 the housing rear wall 17 of the housing 7 of the apparatus 1 is also shown in sectional view in Fig. 2.

As is shown in Figures 2, 3 and 4, each of the three connecting devices 13, 14 and 15 has a supporting element 18, 19 and 20, respectively, fixedly connected to the base 16. In the present case the supporting elements 18, 19 and 20 and the base 16 are integral with one another, the base 16 and the supporting elements 18, 19 and 20 consisting of a plastics. However, the supporting elements 18, 19 and 20 may also be constructed as separate parts which are, for example, screwed to the base of the housing. Each of the three supporting elements 18, 19 and 20 is substantially dome-shaped and has a convex dome-shaped supporting surface 21, 22 and 23 respectively, facing the chassis 12. The supporting elements need not have a continuous dome shape but may also comprise uniformly spaced-apart arcuate ribs, all the ribs of a supporting element together defining a convex dome-shaped supporting surface.

Each of the three connecting devices 13, 14 and 15 further has a counter-element 24, 25 and 26, respectively, connected to the chassis 12 and having a rotationally symmetrical mating surface 27, 28 and 29, respectively, widening continuously towards the base 16. With its mating surface 27, 28 and 29, respectively, each counter-element 24, 25 and 26, respectively, pivotably engages with the convex supporting surface 21, 22 or 23 of the respective supporting element 18, 19 and 20. In the present case the mating surfaces 27, 28 and 29 of the counter-elements 24, 25 and 26, respectively, are also of dome-shaped, which provides a comparatively large pivoting range for the counter-elements relative to the supporting elements. However, the mating surfaces may also have a hollow conical or paraboloid shape.

Two of the three counter-elements 24, 25 and 26, *i.e.* the two counter-elements 24 and 25, are connected to the chassis 12 so as to be movable relative to one another substantially in a given direction, indicated by a double arrow 30, parallel to the plate-shaped chassis 12, which given direction 30 in the present case coincides with the direction of a connecting line 31 between the two counter-elements 24 and 25, although this is not necessary. For this, one of the two counter-elements 24 and 25, *i.e.* the counter-element 24, is in the present case connected immovably to the chassis 12 and the other counter-element 25 is connected to the chassis 12 so as to be movable only substantially in the direction 30 of the connecting line 31 between counter-element 25

and the counter-element 24 which is connected immovably to the chassis. Furthermore, the third counter-element 26 and the two other counter-elements 24 and 25 are connected to the chassis 12 so as to be movable relative to one another substantially in a given direction parallel to the plate-shaped chassis 12, which in this case corresponds to the direction indicated by the double arrow 30, and substantially in a direction perpendicular to this direction 30, parallel to the plate-shaped chassis 12 and indicated by a double arrow 32. For this purpose, the third counter-element 26 is in the present case connected to the chassis 12 so as to be movable substantially in the direction 30 of connecting line 31 and substantially in the direction 32 perpendicular to the direction 30 of connecting line 31. All three counter-elements 24, 25, and 26 consist of a plastics and are connected to the chassis 12 by an outsert moulding technique.

For immovably connecting the counter-element 24 to the chassis 12 the counter-element 24 has three integral laterally projecting plastics arms 33 whose distal ends each carry a peg 34 of square cross-section, which engages an opening 35 of correspondingly square cross-section in the chassis 12 and has a head 36 of circular cross-section at its end which projects from the chassis 12. The counter-element 24 and the arms 33 rest against the chassis 12 with their bounding surfaces which are remote from the supporting element 18.

For the movable connection of the counter-element 25 to the chassis 12 the counter-element 25 has an integral plastics arm 37 which projects laterally from it in the direction 32 and which is constructed to be rigid in the direction of its longitudinal extension and to be elastically flexible in a direction transverse to its longitudinal extension, its distal end being fixedly connected to the chassis 12. For this purpose, the distal end of the arm 37 carries a peg 38 of square cross-section, which peg engages an opening 39 of correspondingly square cross-section in the chassis 12 and has a head 40 of circular cross-section at its end which projects from the chassis 12. The counter-element 25 and the arm 37 rest against the chassis 12 with their bounding surfaces which are remote from the supporting element 19.

For movably connecting the third counter-element 26 to the chassis 12 counter-element 26 has an integral plastics arm 41 which projects laterally from it and which is likewise constructed to be rigid in the direction of its longitudinal extension and to be elastically flexible in a direction transverse to its longitudinal extension, its distal end being fixedly connected to the chassis 12. In the present case the arm 41 is L-

shaped and has a limb 42 extending in the direction 30 of the connecting line 31 and a limb 43 extending in the direction 32 perpendicular to the connecting line 31. In this way, counter-element 26 is connected to the chassis 12 so as to be movable relative to the other two counter-elements 24 and 25 both in direction 30 and in the direction 32 perpendicular thereto. The distal end of the limb 43 of the arm 41 also carries a peg 44 of square cross-section which engages an opening of correspondingly square cross-section in the chassis 12 and has a head 45 of circular cross-section at its end which projects from the chassis 12. The counter-element 26 and the arm 41 rest against the chassis 12 with their bounding surfaces which are remote from the supporting element 20.

Each connecting device 13, 14 and 15, respectively, has a screw 49 fitted into a bore 48 in the supporting element 18, 19 and 20, respectively, through an opening 46 in the chassis 12 and a substantially coaxial opening 47 in the respective counter-element 24, 25 or 26 which is connected to the chassis 12, and a spring element 51 supporting the head 50 of the screw 49. In the present case the spring element 51 is constructed as a cup spring but it may, for example, also be constructed as a helical compression spring. The spring element 51 acts on the chassis 12, urging the chassis 12 resiliently towards the respective supporting element 18, 19 or 20, the force of the spring element 51 holding the respective counter-element 24, 25 and 26, which is connected to and rests against the chassis 12, in engagement with the respective supporting surface 21, 22 or 23 of the supporting element 18, 19 or 20 by its mating surface 27, 28 and 29, respectively. Each supporting element 18, 19 and 20 has a projecting sleeve 52 which is coaxial with the bore 48 and extends through the openings 47 and 46 in the respective counter-element 24, 25 or 26 and in the chassis 12, the free end of this sleeve projecting slightly from the chassis and supporting the screw head 50 via the interposed spring element 51.

To mount the chassis 12 on the base 16 of the housing 7 of the apparatus 1 the chassis 12 is simply placed with its counter-elements 24, 25 and 26 onto the supporting elements 18, 19 and 20 perpendicularly to the plane of its plate, which can be effected advantageously in a mechanized process. The connecting device 13, which comprises the counter-element 24 which is fixedly connected to the chassis 12, forms a fixed reference point for the positioning of the chassis 12 relative to the base 16 of the housing 7 of the apparatus 1. Since they have been connected to the chassis 12, as

described above, so as to be movable relative to the counter-element 24 and relative to one another, the counter-elements 25 and 26 of the two other connecting devices 14 and 15 can then adapt their spatial positions, free from forces and moments, to the positions of the relevant supporting elements 19 and 20, so that when the counter-elements 24, 25 and 26 are placed onto the supporting elements 18, 19 and 20, no moments are transmitted to the chassis 12 and, consequently, deformation of the chassis 12 is not possible. After the counter-elements 24, 25 and 26 have been placed onto the supporting elements 18, 19 and 20 and the spring elements 51 have been placed the screws 49 are fitted into the bores 48, which can also be effected advantageously in a mechanized process. The screws 49 are tightened until the screw heads 50 with the interposed spring elements 51 are supported on the free ends of the sleeves 52 of the supporting elements 18, 19 and 20. In this way, the three connecting devices 13, 14 and 15 always provide a reliable connection of the chassis 12 to the base 16 of the housing 7, which connection does not transmit any moments and is independent of the spatial position of the apparatus 1. Since the screw heads 50 are supported on the free ends of the sleeves 52 via the interposed spring elements 51, the insertion depth of the screws 49 is accurately defined and therefore the forces exerted on the chassis 12 by the spring elements 51 supporting the screw heads 50 have constant values determined by the given screw-insertion depth. Owing to the above-described construction of the three connecting devices 13, 14 and 15 the counter-elements 24, 25 and 26 can always adapt their positions to the positions of the supporting elements 18, 19 and 20 without any moments, even when the chassis 12 is already connected to the base 16, so that no deformation of the chassis 12 can occur. This is important for the compensation of different temperature-dependent changes of the dimensions of the housing base 16 and the chassis 12 connected thereto. Since, as stated, deformation of the chassis 12 can neither occur during the mounting of the chassis 12 on the housing base 16 nor when the chassis 12 is already connected to the housing base 16, it is achieved that the components mounted on the chassis 12 always remain in the same positions relative to one another, thereby always guaranteeing a correct operation of the apparatus 1. This is of great importance particularly for a video recorder because in such an apparatus even slight changes in the positions of, for example, the tape guides relative to the drum-shaped scanning unit or relative to the stationary magnetic heads lead to appreciable

losses in quality or to disturbances in, for example, the reproduction of the television signals.

Fig. 5 shows a recording and reproducing apparatus 1 in accordance with another exemplary embodiment, whose plate-shaped chassis 12 is connected to the base 16 of the housing 7 of the apparatus 1 by three connecting devices 13, 14 and 15. Each of these three connecting devices 13, 14 and 15 also comprises a supporting element 18, 19 and 20, respectively, having a convex, dome-shaped supporting surface 21, 22 and 23, respectively, facing the chassis 12, and a counter-element 24, 25 and 26, respectively, connected to the chassis 12 and having a rotationally symmetrical dome-shaped mating surface 27, 28 and 29, respectively, widening continuously towards the base 16.

In the apparatus shown in Fig. 5 two counter-elements, *i.e.* the two counter-elements 24 and 25, are connected to the chassis 12 so as to be exclusively movable substantially in the direction 30 of a connecting line 31 between these two counter-elements 24 and 25, and the third counter-element 26 is connected to the chassis 12 so as to be exclusively movable substantially in a direction 32 perpendicular to the direction 30 of this connecting line 31.

For movably connecting the three counter-elements 24, 25 and 26 to the chassis 12 each of the three counter-elements has an integral laterally projecting plastics arm 53, 54 and 55, respectively. The free ends of the arms 53, 54 and 55 are fixedly connected to the chassis 12 in the same way as in the apparatus shown to Figures 1 to 4 by square pegs 56, 57 and 58 having circular heads 59, 60 and 61. The arms 53, 54 and 55 are designed to be rigid in the direction of their longitudinal extension and to be elastically flexible in the direction transverse to their longitudinal extension. The arms 53 and 54 of the two counter-elements 24 and 25 extend in the direction 32 perpendicular to the connecting line 31 between the two counter-elements 24 and 25, so that these two counter-elements 24 and 25 are connected to the chassis 12 so as to be movable relative to one another substantially in the direction 30 of the connecting line 31. The arm 55 of the third counter-element 26 extends in the direction 30 of the connecting line 31, so that the third counter-element 26 and the two other counter-elements 24 and 25 are connected to the chassis 12 so as to be movable relative to one another substantially in the direction 30 of the connecting line 31 as well as substantially perpendicularly to the direction 30 of the connecting line 31.

In the apparatus shown in Fig. 5, in the same way as in the apparatus shown in Figures 1 to 4, each connecting device 13, 14 and 15, respectively, comprises a screw fitted into a bore in the respective supporting element 18, 19 or 20 *via* an opening in the chassis 12 and a substantially coaxial opening in the respective counter-
5 element 24, 25 or 26 connected to the chassis 12, and a spring element 51 which supports the screw head 50 of the screw.

In the apparatus shown Fig. 5 the above construction of the three connecting devices 13, 14 and 15 also guarantees that deformation of the chassis 12 can neither occur during connection of the chassis 12 to the base 16 of the housing 7 nor
10 after the chassis 12 has been connected to the base 16, so that no changes in the relative positions between the parts arranged on the chassis can occur and, consequently, a correct operation of the apparatus is always guaranteed.

The invention is not limited to the exemplary embodiments described above. Thus, instead of the arms for movably connecting the movable counter-elements to the chassis being constructed to be elastically flexible over their entire length in a
15 direction transverse to their longitudinal extension, it is possible to use omnilaterally rigid arms provided with integral hinges. The invention can be used advantageously not only in video recorders as described above but, for example, also in other recording and/or reproducing apparatuses, such as Compact Disc players and magnetic tape
20 recorders for recording and reproducing analog or digital audio signals.

Claims:

1. A recording and/or reproducing apparatus having a housing (7) and having a substantially plate-shaped chassis (12) for accommodating parts of the apparatus, which chassis is connected to a housing part (16) by three connecting devices (13, 14, 15) arranged at a distance from one another as a three-point support, which housing part is spaced from and extends substantially parallel to the chassis (12), characterised in that each of the three connecting devices (13, 14, 15) has a supporting element (18, 19, 20) fixedly connected to the housing part (16) and having a convex dome-shaped supporting surface (21, 22, 23) facing the chassis (12), and a counter-element (24, 25, 26) connected to the chassis (12) and having a rotationally symmetrical mating surface (27, 28, 29) which widens continuously towards the housing part (16), with which mating surface the counter-element pivotably engages with the convex supporting surface (21, 22, 23), in that two counter-elements (24, 25) are connected to the chassis (12) so as to be movable relative to one another substantially in a given direction parallel to the plate-shaped chassis (12), and in that the third counter-element (26) and the two other counter-elements (24, 25) are connected to the chassis (12) so as to be movable relative to one another substantially in a given direction parallel to the plate-shaped chassis (12) as well as substantially in a direction perpendicular to the said given direction and parallel to the plate-shaped chassis (12).

2. An apparatus as claimed in Claim 1, characterised in that two counter-elements (24, 25) are connected to the chassis (12) so as to be exclusively movable substantially in the direction (30) of a connecting line (31) between these two counter-elements (24, 25), and the third counter-element (26) is connected to the chassis (12) so as to be exclusively movable substantially in a direction perpendicular to the direction of this connecting line.

3. An apparatus as claimed in Claim 1, characterised in that one counter-element (24) is immovably connected to the chassis (12) and one counter-element (25) is connected to the chassis (12) so as to be exclusively movable substantially in the direction (30) of a connecting line (31) between itself and the counter-element (24)



which is immovably connected to the chassis (24), and in that the third counter-element (26) is connected to the chassis so as to be movable substantially in the direction (30) of this connecting line (31) as well as substantially in a direction (32) perpendicular to the direction of this connecting line.

5 4. An apparatus as claimed in any one of the preceding Claims, characterised in that for movably connecting the movable counter-elements (24, 25, 26) to the chassis (24) the movable counter-elements (24, 25, 26) have arms (37, 41, 53, 54, 55) projecting from them, which arms are constructed to be rigid in the direction of their longitudinal extension and to be elastically flexible in the direction transverse to their longitudinal extension, and are fixedly connected to the chassis (12) by their distal ends.

10 5. An apparatus as claimed in any one of the preceding Claims, characterised in that each connecting device (13, 14, 15) has a screw (49), which is fitted into a bore (42) in the supporting element (18, 19, 20) and extends through an opening (46) in the chassis (12) and through a substantially coaxial opening (47) in the counter-element (24, 25, 26) connected to the chassis (12), and a spring element (51), on which the screw head (50) of the screw (49) is supported and which engages on the chassis (12) to urge the latter resiliently towards the supporting element (18, 19, 20), the force of the spring element (51) holding the counter-element (24, 25, 26), which is connected to the chassis (12), in engagement with the supporting surface (21, 22, 23) of the supporting element (18, 19, 20) by its mating surface (27, 28, 29).

20 6. An apparatus as claimed in Claim 5, characterised in that the supporting element (18, 19, 20) has a sleeve (52) projecting from it, which sleeve is coaxial with the bore (48), extends through the openings (46, 47) in the counter-element (24, 25, 26) and in the chassis (12), and has a free end supporting the screw head (50) *via* the interposed spring element (51).

25 7. An apparatus as claimed in any one of the preceding Claims, characterised in that the mating surfaces (27, 28, 29) of the counter-elements (24, 25, 26) are dome-shaped.

