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(54) Extendable table

(57) An extendable table (1) comprises two frame portions (3,4) displaceable with respect to each other between a compact position and an extended position of the table, a surface (5), including respective elements (6,7) arranged integrally on said frame portions, and at least one complementary element (15) displaceable between a non-operative position, where it is concealingly housed between the frame and the surface elements, and an operative position associated with the extended position of the table, where it is able to be positioned between the surface elements. The table also comprises means for displacing the complementary element, associated with the frame portions, so as to displace said complementary element between the non-operative position and the operative position owing to relative displacement of the frame portions.

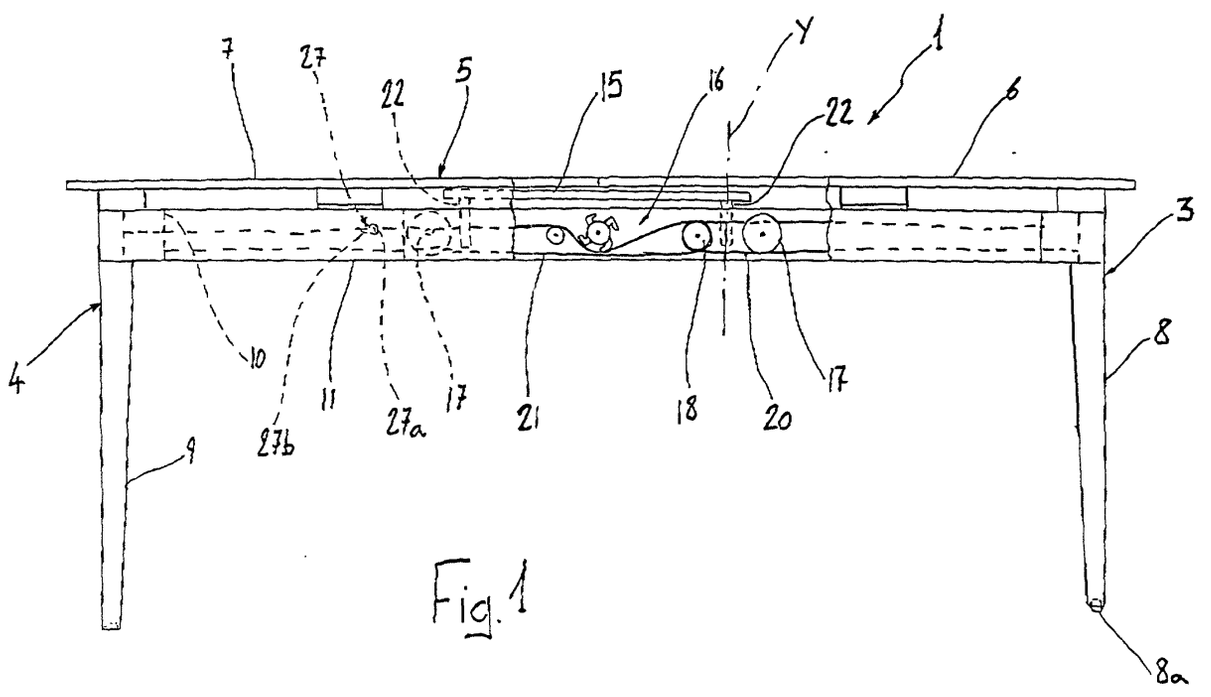

Fig. 1

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Description

[0001] The present invention relates to an extendable table according to the preamble of the main claim.

[0002] The invention in particular concerns the sector of extendable tables in which separate surface elements may be moved away from each other and one or more complementary surfaces elements may be arranged in between them.

[0003] In a first kind of table of the type mentioned, the relative displacement of the surface elements results in a corresponding displacement of respective frame portions of the table on which these elements rest, for example integrally therewith.

[0004] In these tables it is envisaged that the relative displacement of the frame portions is guided by the sliding, alongside each other, of respective longitudinal members extending from each frame portion towards the portion facing it. In this way the frame portions may be displaced between a compact position of the table in which the longitudinal members are, over most of their longitudinal extension, adjacent and alongside each other and an extended position of the table in which the longitudinal members form substantially the extension of each other.

[0005] In the compact position, the surface elements are adjacent to each other, forming the surface of the table, whereas in the elongated position the continuity of the surface is obtained with the aid of the complementary surface elements, as described above.

[0006] In a second type of table, the surface elements are freely slidable while resting on a fixed frame, such that the transition from the compact position to the extended position of the table involves only the displacement of the surface elements without affecting the frame. As in the preceding case, the continuity of the surface is obtained by means of the arrangement of one or more complementary surface elements in between.

[0007] In both the cases mentioned, the complementary elements may be separate from the remaining components of the table or, alternatively, they may be housed between the longitudinal members of the frame and the surface elements when the table is in the compact position. In any case, manual intervention is required in order to arrange the complementary elements so that they are coplanar with the surface elements and restore the continuity of the surface when the table is in the extended position.

[0008] The problem underlying the present invention is that of providing an extendable table which is structurally and functionally designed to overcome the limitations mentioned above with reference to the cited known art.

[0009] This problem is solved by the present invention by means of an extendable table provided in accordance with the claims which follow.

[0010] The characteristic features and advantages of invention will emerge more clearly from the detailed description of some preferred examples of embodiment thereof illustrated, by way of a non-limiting example, with reference to the accompanying drawings in which:

- Figure 1 is a front elevation view and partially split view of a first example of an extendable table provided in accordance with the present invention, in the compact position;
- Figure 2 is a perspective view of the frame of the table according to Figure 1 in the partially extended position;
- Figure 3 is a front elevation view, on a larger scale, of a component of the table according to Figure 1;
- Figures 4 and 5 are views of the component according to Figure 3 in the disassembled condition and in two different operating positions;
- Figure 6 is partially sectioned view of the table along the line VI-VI of Figure 2;
- Figures 7 and 8 are schematic and partial views of the table according to Figure 1 in two different operating positions;
- Figure 9 is a partial, schematic and partially cutaway view of a second example of a table provided in accordance with the invention, in a partially extended position.

[0011] With initial reference to Figures 1 to 8, 1 denotes overall an extendable table provided in accordance with a first example of embodiment of the present invention.

[0012] The table 1 comprises a frame 2 including two portions 3, 4 and a surface 5 in turn including two surface elements 6, 7 each arranged integrally on the respective frame portions 3, 4.

[0013] Each frame portion 3, 4 comprises a respective pair of legs 8, 9 and a pair of longitudinal members 10, 11 extending towards the other frame portion in a longitudinal direction X of the table 1. Each longitudinal member 10 of the frame portion 3 extends in a position alongside and parallel to a respective longitudinal member 11 of the frame portion 4. Moreover, the pair of longitudinal members 10 is arranged on the inside of the pair of longitudinal members 11, in a position closer to the middle zone of the table 1, the free ends of the longitudinal members 10 being connected together by a cross-piece 12.

[0014] The longitudinal members 10, 11 are extruded sections of aluminium alloy, the cross-section (Figure 6) of which has a cavity 10a, 11a extending longitudinally, for lightening the structure and a C-shaped groove 10b, 11b on which lips 10c, 11c are defined. The longitudinal members 10, 11 are arranged so that the respective grooves 10b, 11b are facing each other.

[0015] The pairs of longitudinal members 10, 11 are able to perform a relative displacement with respect to each other in the direction X and, for this purpose, guide means - all denoted by 13 - ar provided, fixed at the free end of each longitudinal member 10, 11 in a position be-

tween the respectively adjacent longitudinal members 11, 10. The guide means 13 have, rotatably mounted on them, idle rollers (not shown in the Figures) which are slidably engaged along the lips 10c, 11c of the longitudinal member adjacent to that with which they are integral.

[0016] The longitudinal members 10, 11 also have fixed to them, at intervals, plates 14 for supporting and fixing surface elements 6, 7, for example by means of screwing.

[0017] As a result of the structural characteristics described hitherto, the table 1 may be extended between a compact position, where the frame portions 3, 4 are arranged next to each other, and an extended position where the said portions are mutually spaced in the direction X.

[0018] Extension of the table 1 is obtained by means of displacement of the frame portion 3 with respect to the frame portion 4 which remains fixed with respect to the surrounding environment. In order to favour this displacement, the legs 8 of the frame portion 3 are conveniently provided with wheels 8a.

[0019] With the table 1 in the compact position, the surface elements 6, 7 are adjacent to each other and coplanar, while when the table 1 is in the extended position an empty space is formed between them.

[0020] For restoration of the continuity of the surface 5, the table 1 comprises a sheet-like complementary element 5 which is able to be positioned in a coplanar manner between the surface elements 6, 7.

[0021] The complementary element 15 is displaceable with a combination of movements performed both in the direction X and in a direction Y substantially perpendicular thereto, between a non-operative position, coinciding with the table 1 in the compact position, and an operative position, coinciding with the table 1 in an extended position, passing through an intermediate position.

[0022] The table 1 comprises, for this purpose, means for displacing the complementary element 15, which are associated with the frame portions 3, 4 in order to displace the complementary element 15 parallel to the direction X between a non-operative position, where the said element is housed between the frame 2 and the surface 5, in a substantially middle position underneath the surface elements 6, 7 (Fig. 1), and an intermediate position, where it is displaced opposite the free aperture formed between them following the relative displacement of the frame portions 3 and 4 (Fig. 7).

[0023] According to a main characteristic feature of the invention, the table 1 also comprises raising means for raising, in the direction Y, the complementary element 15 from the intermediate position to the operative position where it is located between the surface elements 6 and 7.

[0024] The displacement means comprise a pair of carriages 16 on which the complementary element 15 rests. Each carriage 16 is slidably guided between a pair of adjacent longitudinal members 10, 11, by means of idle rollers 17 engaged on the lips 10c and 11c and preferably arranged at the opposite ends of the carriage 16.

[0025] The displacement means also comprise a movable pulley system with parallel arms, including an idle pulley 18 which is displaceably integral with the carriage 16 and projects into the groove 11b of the longitudinal member 11. The pulley 18 has, formed on it, two grooves 19 which are respectively engaged on opposite sides by a first and a second cable 20, 21 which are both tensioned inside the groove 11b of the longitudinal member 11.

[0026] The ends of the first cable 20 are fixed respectively to the frame portion 3 and to the free end of the longitudinal member 11 adjacent to the carriage 16, while the ends of the second cable 21 are correspondingly fixed to the frame portion 4 and to the end of the longitudinal member 10.

[0027] In this way, displacing the frame portion 3 with respect to the frame portion 4 towards the extended position of the table 1 produces, by means of the action of the first cable 20 on the pulley 18, the simultaneous displacement, in unison, of the carriage 16, and therefore the complementary element 15, towards the intermediate positioned defined above. Similarly, during the reverse movement, the carriage 16 is brought back into the non-operative position by the action of the second cable 21 on the pulley 18.

[0028] It should be noted that, owing to the use of the movable pulley system, in both the movements described, the degree of displacement of the carriage 16 with respect to either portion of the frame 3, 4 is equal to half the corresponding relative displacement of the frame portions 3 and 4. This advantageously allows the complementary element 15, starting from the non-operative position where it is arranged substantially with each half overlapping the surface elements 6, 7, to reach the intermediate position opposite the open aperture between the surface elements 6, 7, substantially at the same time that the extended position of the table 1 defined by the frame portions 3 and 4 is reached.

[0029] It should also be noted that the particular profile of the longitudinal members 10, 11 and manufacture thereof using aluminium alloy - which material has the favourable properties of being light and strong - allows the table 1 to be extended significantly (110-120 cm), thereby increasing the amount of sitting space, without adversely affecting the overall solidity of the table 1.

[0030] The raising means of the table 1 are operationally associated with the displacement means so as to raise the complementary element 15 from the carriage 16 into the position where it is coplanar with the surface elements 6, 7.

[0031] The raising means comprise a pair of pistons 22 housed in seats 23 formed in terminal zones of each carriage 16 and capable of performing an alternating movement in the direction Y. The pistons 22 are operated by actuator means comprising a free-wheel system

able to rotate following displacement of the complementary element 15 towards the intermediate position and respective rocker arms 24 connected to the pistons 22 and to the free-wheel system in order to convert the rotation of the free-wheel system into the alternating movement of the pistons 22. The free-wheel system comprises a wheel 25 with pawls 26, which is rotatably mounted in a central position on the carriage 16 and with which the second cable 21 is slidably engaged inside respective circumferential grooves 26a formed on each pawl 26, and a locating element 27 which is fixed onto the second cable 21 and able to engage with one of the pawls 26 so as to cause rotation of the wheel 25 about its axis.

[0032] Preferably, the wheel 25 has four pawls 26 arranged radially at equidistant intervals and having a respective free end curved angularly in the same manner with respect to each other.

[0033] The locating element 27 is fixed onto the second cable 21 in a position such as to come into engagement with the pawl wheel 25 when the complementary element 15 is in the vicinity of the intermediate position and is formed so as to engage with the pawl wheel 25 unidirectionally during the movement towards it.

[0034] For this purpose the element 27 has a wedge-shaped profile with a front portion 27a substantially perpendicular to the direction of longitudinal extension of the second cable 21 and an opposite rear portion 27b tapered towards it.

[0035] In order to increase the angle of winding of the second cable 21 around the pawl wheel 25, the carriage 16 is also provided with a transmission wheel 28.

[0036] The raising means also comprise a disk 29 - coaxial with and rotationally integral with the pawl wheel 25 - from which a pair of lugs 30 extend axially on diametrically opposite sides, said lugs being able to come into engagement with a first end 24a of the rocker arms 24 and move them between a lowered position (Fig. 7) and a raised position of the pistons 22 (Fig. 8).

[0037] As can be seen more clearly in Figures 4 and 5, in the lowered position of the pistons 22, the lugs 30 are aligned along a diameter substantially parallel to the direction X, with the respective first ends 24a of the rocker arms resting thereon, while in the raised position the lugs 30 are aligned along a diameter substantially parallel to the direction Y.

[0038] In order to ensure retention of the disk 29 in this latter position, which is per se less stable, suitable retention means are provided, said means for example being of the spring type or consisting, in accordance with a preferred embodiment of the present invention, of a recess 31 formed on one end 24a of a rocker arm 24. This recess 31 is able to come into engagement with a flat surface 30a defined on each lug 30. The symmetrical arrangement of the rocker arms 24 with respect to the disk 29 also helps increase this stability.

[0039] Spring means 32 adjustable by means of respective pre-tensioning screws 33 and acting on the rocker arms 24 are provided in the carriage 16 in order to counteract partially the return falling movement of the complementary element 15 into the lowered position of the pistons 22.

[0040] Advantageously the pistons 22, the respective rocker arms 24, the disk 29 and the spring means 32 with respective pre-tensioning screws 33 are concealingly housed inside the carriage 16 which comprises, for this purpose, a pair of plates 16a, 16b which can be removably coupled with each other. Seats 34 for receiving the abovementioned components are symmetrically formed in the respective surfaces of the plates 16a, 16b facing each other during use.

[0041] During displacement of the carriage 16 towards the intermediate position of the complementary element 15, the pistons 22 are lowered and the second cable 21 is made to travel along the pawl wheel 25. In the vicinity of the intermediate position (Fig. 7), the pawl wheel 25 is engaged by the locating element 27 which, encountering with its front portion 27a one of the pawls 26, causes it to rotate at the same time as the disk 29.

[0042] Owing to rotation of the disk 29 and consequently the lugs 30, the rocker arms 24 pivot about a respective pin 24b, thus raising, at the opposite end, the pistons 22 and the complementary element 15 resting thereon, in the vertical direction Y.

[0043] After a quarter of a turn of the pawl wheel 25, corresponding to raising of the complementary element 15 into the position where it is coplanar with the surface elements 6, 7 (Fig. 8), the lugs 30 are arranged in more or less vertical alignment (Fig. 5). In this condition it should be noted that the rotation, in the reverse direction, is prevented by engagement of the lug 30 in contact with the rocker arms 24 having the recess 31 formed in one of them.

[0044] In order to bring the table into the compact position, it is sufficient to exert a further slight pulling force on the frame portion 3 so as to rotate slightly the disk 29 and move the lug 30 out of the abovementioned stable condition on the opposite side with respect to the recess 31. Subsequent rotation of the disk 29 a quarter of a turn into the initial lowered condition of the pistons 22 is determined by the weight itself of the complementary element 15, the falling movement of which is suitably dampened by the spring means 32.

[0045] It should be noted that this rotation is not prevented by the engaged condition of the locating element 27 with the pawl wheel 25, the pawls 26 being able to slide along the back portion 27b thereof, and that lowering of the complementary element 15 is independent of the displacement thereof into the non-operative position, thus preventing interference with the surface elements 6, 7.

[0046] In Figure 9, 100 denotes overall a second example of embodiment of an extendable table according to the invention, while details similar to the table 1 in the preceding example have the same reference numbers.

[0047] The table 100 differs from the table 1 essen-

tially in that it comprises a fixed frame 102 on which the surface elements 6 and 7 rest with the possibility of sliding in the direction X.

[0048] The extended position of the table 100 is determined therefore only by the movement away from each other, in the direction X, of the surface elements 6 and 7.

[0049] The table 100 comprises means for kinematically connecting the surface elements 6, 7 such that a displacement of one of the two surface elements in the direction X produces a similar displacement of the other of the two surface elements in the opposite direction. These kinematic connection means comprise a cable 103 closed in a loop and tensioned between a pair of idle pulleys 104 mounted on the frame 102 on longitudinally opposite sides, a pair of runners 105 fixed in an adjustable manner on the cable 103 by means of clamps 106 and pairs of rods 107 for connecting the surface elements 6 and 7 to the respective runner 105.

[0050] The looped form of the cable 103 defines two opposite sections 108a, 108b thereof extending parallel to the direction X. The surface element 6 is fixed to one of the two sections 108a,b, while the surface element 7 is respectively fixed to the other of the two sections 108a,b.

[0051] The displacement of the two surface elements 6, 7 is therefore performed in a specularly symmetrical manner with respect to a middle axis of the table 100.

[0052] Consequently the complementary element 15, in order to pass from the non-operative position to the operative position, which positions are defined in a manner entirely similar to that of the preceding example, requires only a raising movement along the axis Y (in other words the non-operative position and intermediate position coincide).

[0053] For this purpose, raising means mounted on the frame 102, entirely similar to those described for the table 1 in the preceding example, are provided.

[0054] Advantageously, the locating element 27 is fixed on the cable 103 which is driven, partially wound around the pawl wheel 25 of the raising means. The displacement of the table 100 from the compact position to the extended position is obtained by pulling one of the two surface elements 6 or 7 in the direction X, the other of the two surface elements being displaced at the same time in the opposite direction owing to the kinematic connection means described above.

[0055] In the vicinity of the extended position, the locating element 27, which is fixed on the cable 103 sliding between the pulleys 104, is engaged by the pawl wheel 25 which, in a manner entirely similar to that of the preceding example, is rotationally driven so as to activate raising of the complementary element 15 into the position coplanar with the surface elements 6, 7 by means of the pistons 22.

[0056] With respect to the table of the preceding solution, the table 100 has a simplified design and is easier to handle. On the other hand, the table 1 allows the legs 8, 9 to be kept in the vicinity of the terminal zones of the table even when the latter is displaced into the extended position.

[0057] In fact the table 1 provided in accordance with the first embodiment of the present invention described above allows the entire surface in both the compact and extended configuration to be supported only peripherally by means of the frame 2. As a result, the surface of the table top may be made of transparent material, without this being visually interrupted by support elements. This fact provides the table with a notable aesthetic value.

[0058] The present invention therefore solves the problem mentioned above with reference to the cited known art, offering at the same time numerous other advantages, including the possibility of performing extension of the table and restoration of the surface by means of a single pulling movement which can be easily performed by a single person.

Claims

1. Extendable table comprising a frame (2,102), at least one surface element (5,6,7) provided on said frame (2,102) and displaceable between a compact position and an extended position of said table (1) and at least one complementary surface element (15) displaceable between a non-operative position associated with the compact position of the table (1), where the complementary element is concealingly housed between said frame (2,102) and said at least one surface element (5,6,7), and an operative position associated with the extended position of the table (1), where the complementary element (15) is arranged in a coplanar manner and as an extension of said at least one surface element (5,6,7), **characterized in that** it comprises means (22,29) for raising said at least one complementary surface element (15) operationally associated with said at least one surface element (5,6,7) for raising the at least one complementary element (15) between said non-operative position and said operative position owing to displacement of said at least one surface element (5,6,7) between said compact position and said elongated position of the table (1).

2. Table according to Claim 1, in which said raising means comprise at least one piston (22) capable of performing an alternating movement for raising and lowering said complementary element (15) from said frame (2,102).

3. Table according to Claim 2, in which actuating means are provided for operation of said at least one piston, comprising a free-wheel system (25,27) capable of rotation following displacement of said surface element (5,6,7) towards said extended po-

sition of the table (1) and at least one rocker arm (24) connected respectively to said free-wheel system (25,27) and to said piston (22) so as to convert said rotation of the free-wheel system (25, 27) into the alternating movement of said piston (22).

4. Table according to Claim 3, in which said free-wheel system comprises a wheel (25) with pawls (26) and a locating element (27) associated with said surface element (5,6,7) and capable of engaging with said wheel (25) with pawls (26) so as to activate said free-wheel system when the surface element (5,6,7) is displaced towards the extended position of the table (1).

5. Table according to Claim 4, in which said raising means comprise a disk (29) - rotationally integral with said wheel (25) with pawls (26) - from which there extends at least one lug (30) capable of displacing said at least one rocker arm (24) between a position for raising and a position for lowering said piston (22).

6. Table according to Claim 5, which comprises retaining means for ensuring retention of said disk (29) in said raising position, said retention means consisting in particular of a recess (31) defined on said rocker arm (24) and able to receive in engaging contact said lug (30) in said raised position of said piston (22), so as to lock unidirectionally the reverse rotation of said disk (29).

7. Table according to one or more of Claims 3 to 6, in which spring means (32), in particular pretensioned in an adjustable manner, are provided, said spring means being active between said frame (2,102) and said complementary surface element (15) so as to counteract partially the return falling movement of the piston (22) towards said lowered position.

8. Table according to one or more of Claims 4 to 7, in which said locating element (27) is fixed to a cable (21,103) guided slidably around said wheel (25) with pawls (26), said cable (21,103) being tensioned on said frame (2,102) with the possibility of sliding with respect thereto and being drawn along by said surface element (15) when displaced towards the extended position of the table (1).

9. Table according to one or more of the preceding claims, in which said surface (5) comprises two surface elements (6,7) displaceable with respect to each other between a compact position of the table (1), where said surface elements are adjacent to each other, and an extended position of the table (1), where they are spaced from each other, said complementary surface element (15) being located between said surface elements (6,7) when in said operative position, kinematic connection means being envisaged such that a displacement of one of said surface elements (6,7) results in a similar displacement, in the opposite direction, of the other of said surface elements (6,7), which kinematic connection means comprise in particular a cable (103) closed in a loop and tensioned between two pulleys (104) fixed rotatably on said frame (102), said surface elements (6,7) being respectively fixed to said cable (103) on opposite sections (108a,108b) of said loop.

10. Table according to one or more of the preceding claims, in which said surface elements (6,7) are integral with respective frame portions (3,4) relatively displaceable with respect to each other so as to pass from said compact position of the table (1) into said extended position of the table (1) and vice versa, means (16,18) for displacement of said complementary means (15) being associated with said frame portions (3,4) so as to move, as a result of the relative displacement of the frame portions (3,4), said complementary element (15) parallel to the direction of displacement (x) of said frame portions (3,4) between said non-operative position and an intermediate position in which the complementary element (15) is capable of being raised by said raising means.

11. Table according to Claim 10, in which said displacement means (16,18) are designed to displace said complementary element (15) from and towards said intermediate position with identical displacement, relative to each other, of said frame portions (3,4), equal to half the relative displacement of a frame portion with respect to the other frame portion.

12. Table according to Claim 11, in which said displacement means comprise at least one movable pulley system with parallel sections, including a pulley (18) rotationally integral with said complementary element (15), in one groove (19) of which a respective cable (20,21) having opposite ends respectively fixed to either end of said frame portions (3,4) is engaged.

13. Table according to Claim 12, in which said displacement means comprise a pulley (18) with two grooves (19), having a first and a second cavity each engaged in one of said grooves (19) and having ends fixed to either one of said frame portions (3,4), respectively on opposite sides with respect to said pulley (18), so as to displace the complementary element (15) into said intermediate position following the displacement of said frame portions (3,4) towards the extended position of the table (1) and displace the complementary element (15) towards said non-operative position following displacement

of said frame portions (3,4) towards the compact position of the table (1).

14. Table according to Claim 4 and according to one of Claims 9,12,13, in which said locating element (27) of said free-wheel system is fixed onto one of said cables (20,21).

15. Table according to one or more of Claims 12 to 14, in which said displacement means comprise at least one carriage (16) guided slidably along at least one longitudinal member (10,11) of said frame portions (3,4) and having, mounted thereon, said complementary element (15) and/or said pulley (18) and/or said raising means.

16. Table according to Claim 15, in which said carriage (16) is simultaneously engaged so as to slide along a pair of longitudinal members (10, 11), in particular inside associated grooves (10b,11b) of either one of said frame portions (3,4) respectively, said longitudinal members (10,11) extending parallel to the direction of displacement (x) of said complementary element (15) and in the opposite direction with respect to each other.

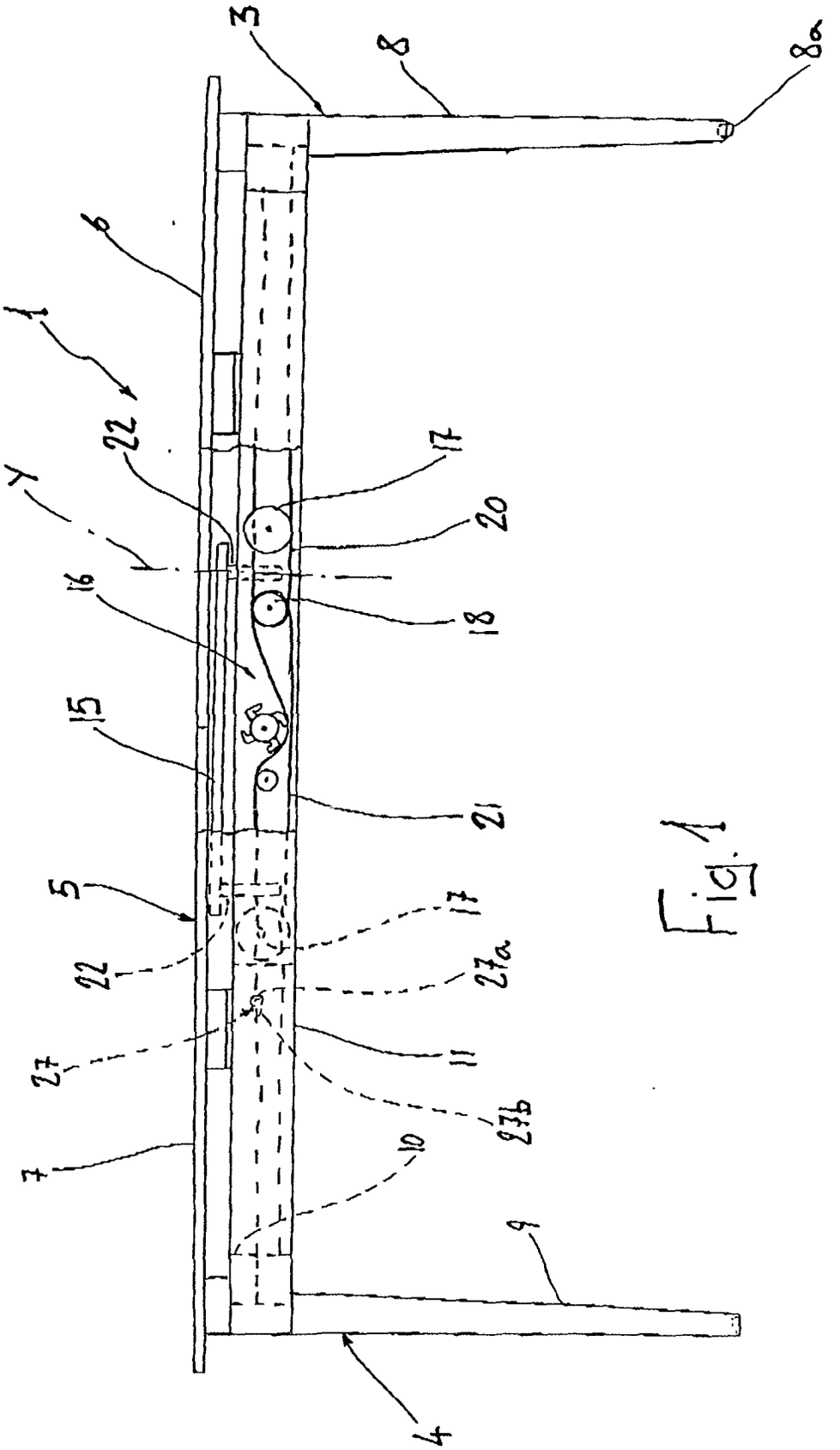

Fig. 1

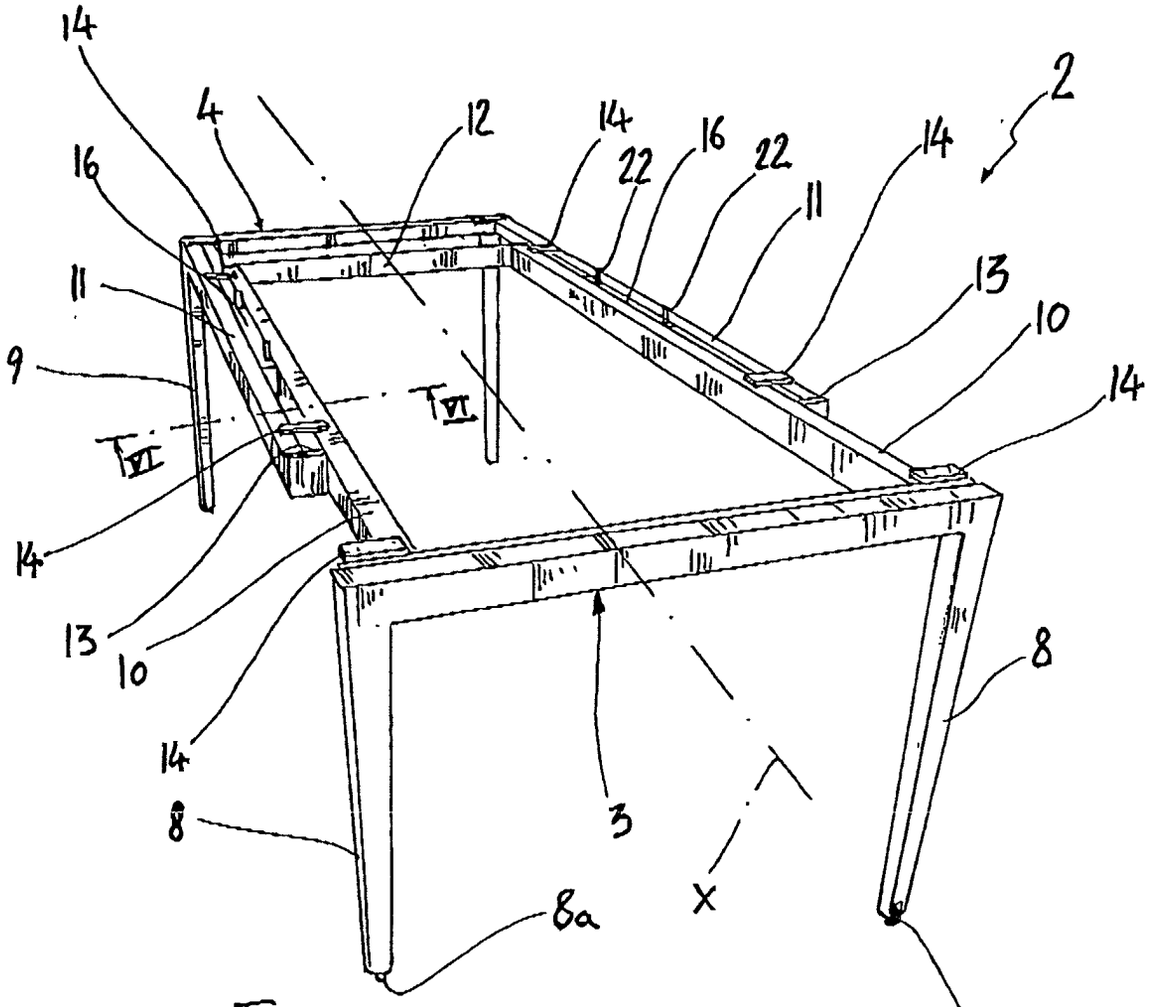
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Fig.2

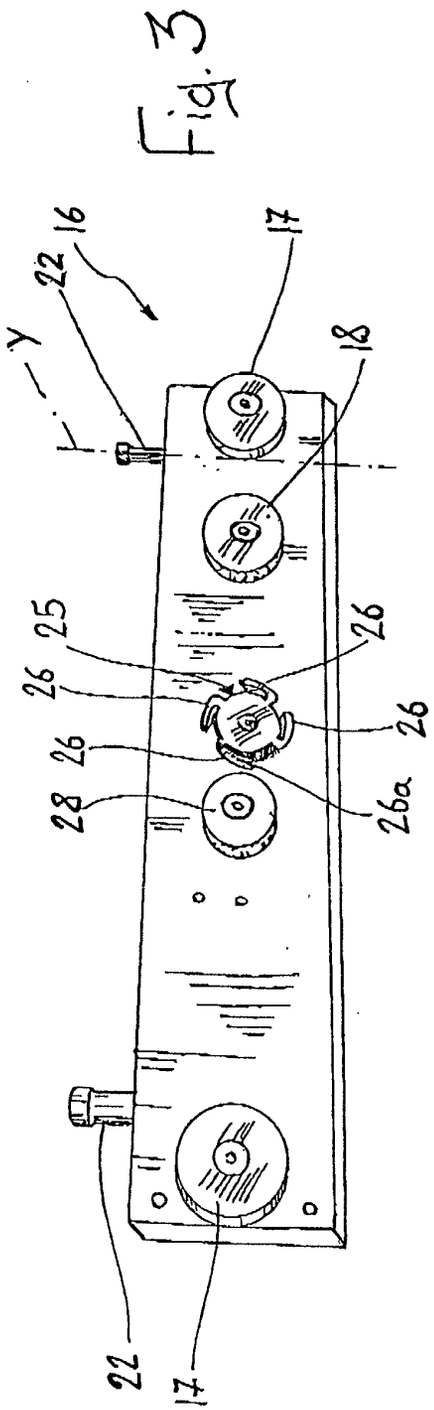
Fig. 3
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26a
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17

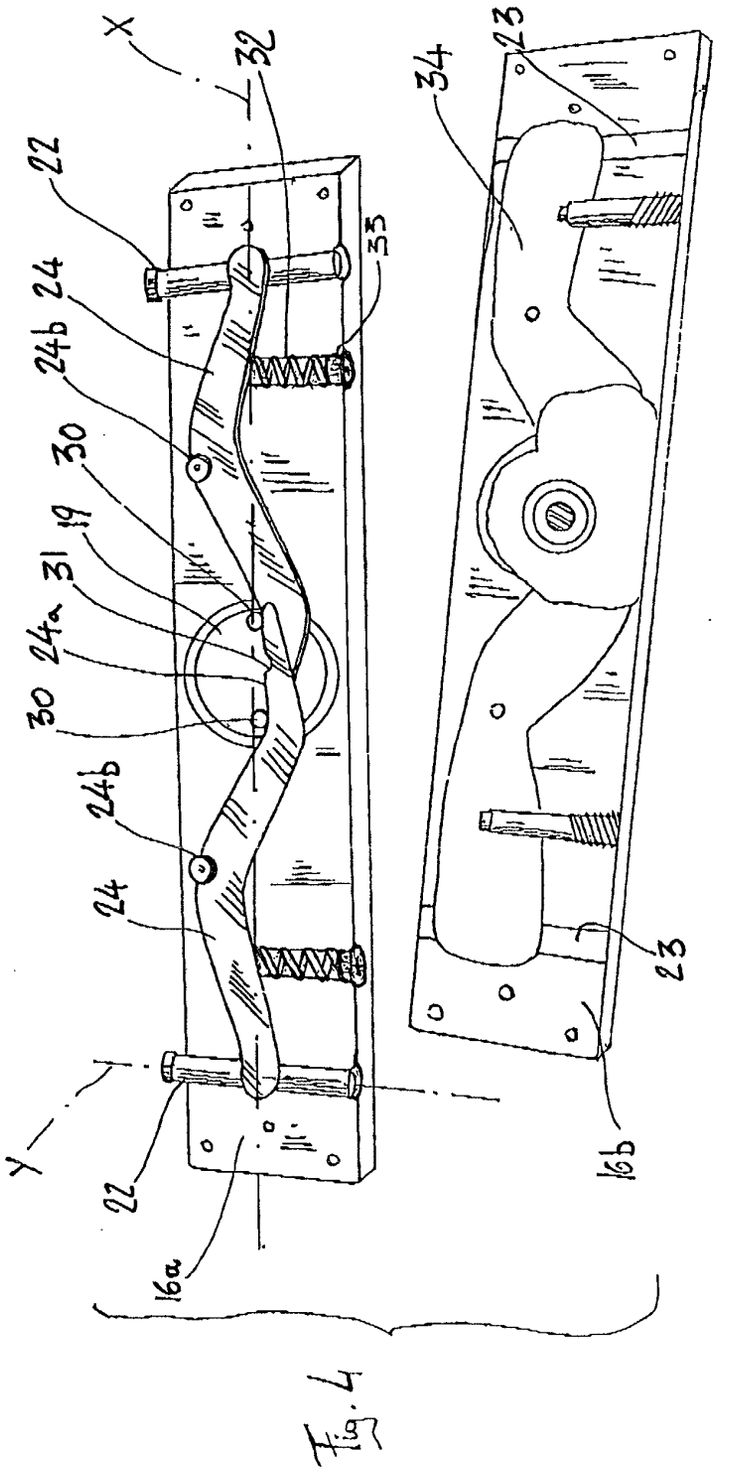
X
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Fig. 4

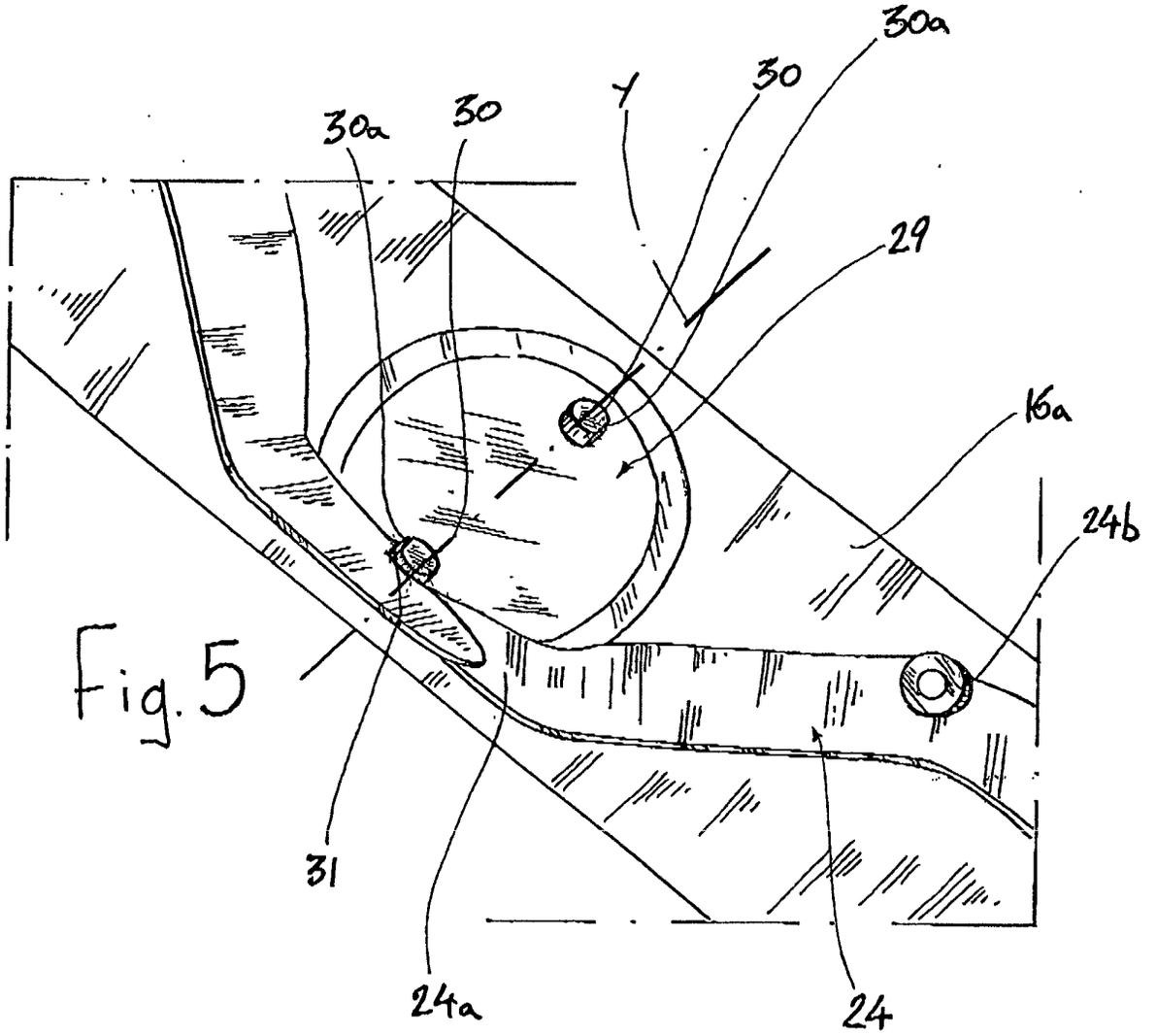


Fig. 5

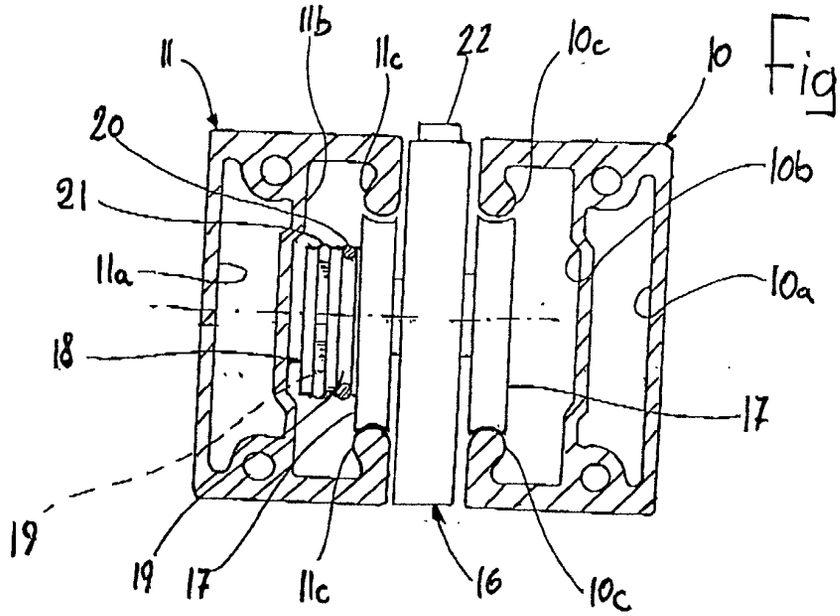


Fig. 6

Fig. 7

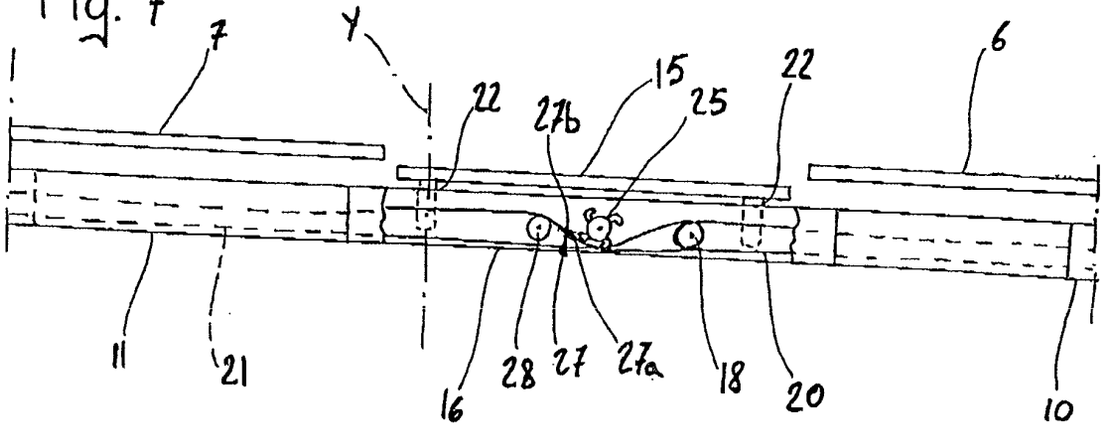
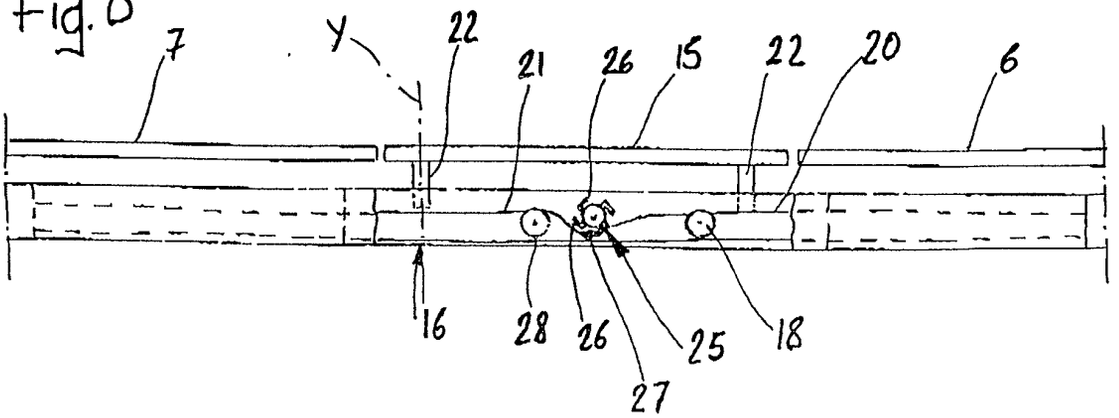
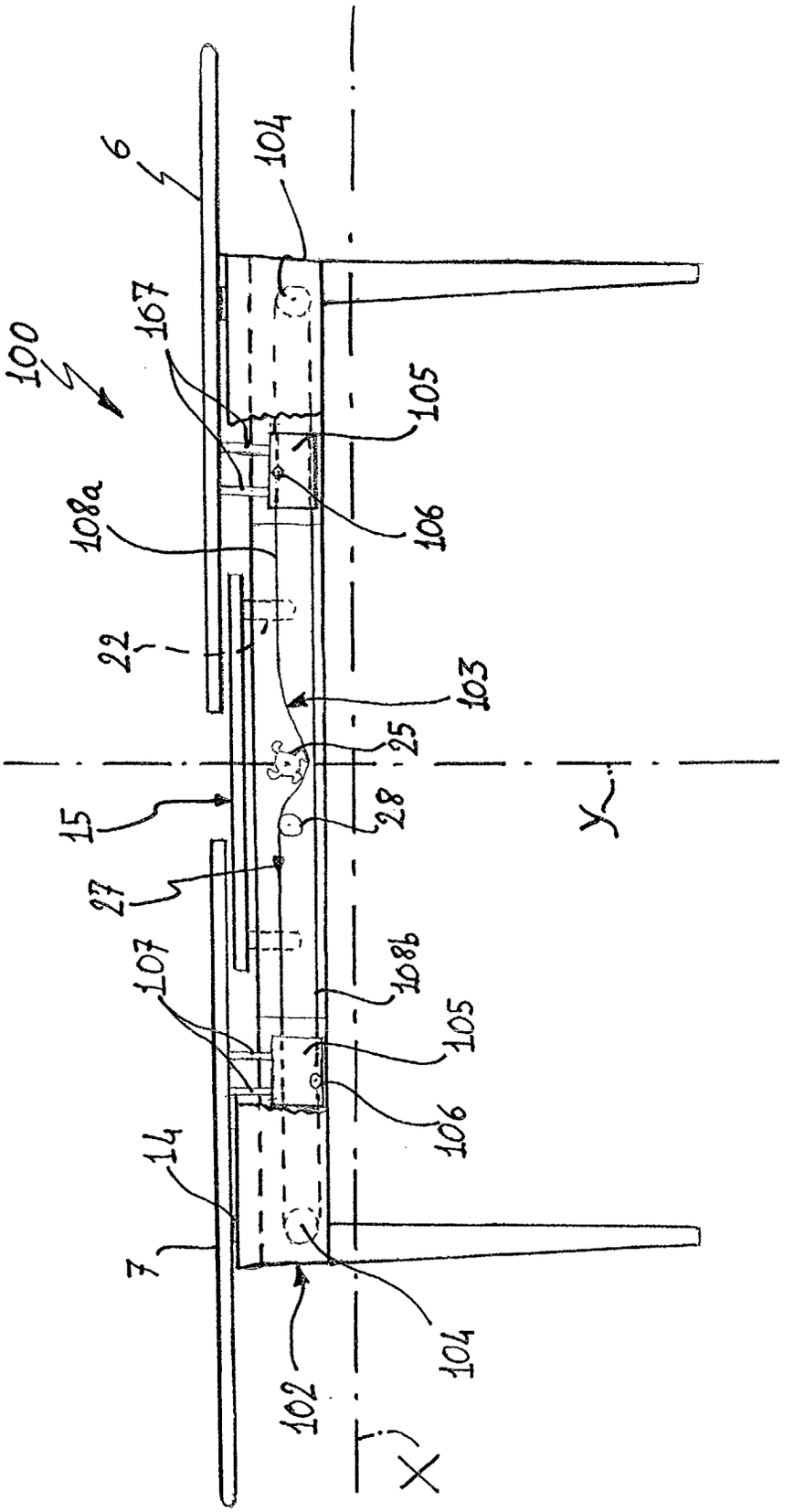


Fig. 8




6
104
100
167
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108a
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22
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103
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107
108b
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104
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X

Fig. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 02 07 7669

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