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(71) Applicant: **Péterváry Zenei Technológia Kft.**
2800 Tatabánya (HU)

(72) Inventors:
• **Pétervári, Ádám**
1068 Budapest (HU)
• **Páli, Jeno**
2100 Gödöllo (HU)
• **Mészáros, Tamás**
2080 Pilisjászfalu (HU)

(74) Representative: **Danubia Patent & Law Office LLC**
Bajcsy-Zsilinszky út 16
1051 Budapest (HU)

(54) **BENCH WITH Laterally MOVABLE SEAT**

(57) The bench with a laterally movable seat, in particular a piano bench, comprises a stationary supporting frame (60) configured to rest on a floor, and a seat unit (3) arranged on a top portion of the supporting frame (60), the seat unit (3) being configured to be movable with respect to the supporting frame (60) by means of rollers (21, 22) along a horizontal straight line defined as a moving direction (m). The rollers (21, 22) are rotatably mounted on the supporting frame (60). The movable seat unit (3) is provided with first guiding surfaces extending parallel to the moving direction (m) of the seat unit (3), wherein a first group of said rollers (21) mounted on the supporting frame (60) with horizontal axes of rotation are arranged to bear against said first guiding surfaces of the seat unit (3) from below. The movable seat unit (3) is further provided with second guiding surfaces extending parallel to the moving direction (m) of the seat unit (3) and also parallel to said first guiding surfaces (41), wherein a second group of rollers (22) mounted on the supporting frame (60) with horizontal axes of rotation are arranged to bear against said second guiding surfaces of the seat unit (3) from above. The movable seat unit (3) is further provided with a third guiding surface extending parallel to the moving direction (m) of the seat unit (3) and oriented orthogonally to said first and second guiding surfaces, wherein a third group of rollers mounted on the supporting frame (60) with vertical axes of rotation are arranged to bear against said third guiding surface of the seat unit (3) in a first horizontal direction orthogonal to said moving direction (m). The movable seat unit (3) is further provided with a fourth guiding surface extending in parallel to said third guiding surface, wherein a fourth group of rollers mounted on the supporting frame (60) with vertical axes of rotation are arranged to bear against

said fourth guiding surface in a second horizontal direction opposite to said first horizontal direction.

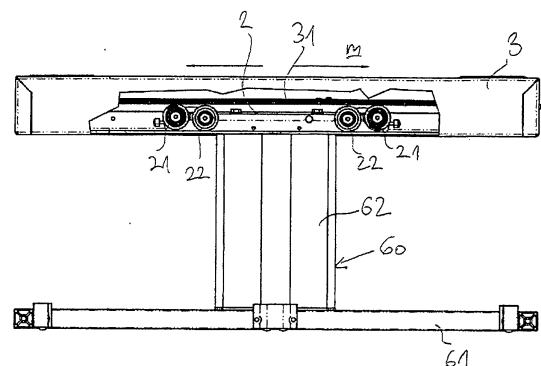


Fig. 6A

Description

Field of the invention

[0001] The present invention relates to a bench with a laterally movable seat, in particular a piano bench.

Background

[0002] In order to reach the extreme areas of a worktable or a keypad of a musical instrument, in particular a piano, a user or an artist sitting on a fixed seat has to twist his back and exert a biased effort with his arms in the desired direction. Such repeated biased movements may cause undesired tensions in the musculoskeletal system, and in the particular case of playing the piano, the twisted position of the artist may cause difficulties in playing forcefully. Laterally movable seats allow the user to conveniently reach the desired extreme areas of the worktable or the piano keys while sitting in an ergonomic and comfortable posture.

[0003] The document US 3,718,365 discloses a seat attachment for boats which includes a fixed main frame and a laterally slidably adjustable subframe holding a seat. Two parallel tubular members of the subframe are slidingly sleeved on the two parallel tubular guiding members of the main frame. Although the closed cylindrically shaped contact surfaces arranged in parallel ensure a specific direction of the sliding movement, this type of guiding has the drawback that there is a large friction between the sliding surfaces and the fixed surfaces of the tubular members. Thus, an increased effort is required to slide the seat when a user is sitting on it. Moreover, it leads to the early wearing of the contact surfaces. This contact friction could be overcome by changing the diameter of either the male cylinder or the female cylinder in order to reduce the area of the contacting surfaces. However, the play on the remaining circumference of the sleeved cylinders not in contact with each other may cause some noise during the sliding movement.

[0004] The document US 1,290,517 discloses a bench having a laterally movable seat. The seat is provided with wheels rotatably mounted on axles configured to engage with two longitudinally extending parallel rails. Although the wheels provide a rolling contact instead of a frictional contact, this arrangement does not comprise any guiding means against the play of the wheel mechanism in a direction perpendicular to the motion of the seat. Furthermore, since the wheels are mounted on the movable seat, the guiding rails are much longer than the width of the seat, which results in a cumbersome bench arrangement.

Summary of the invention

[0005] It is an object of the invention to improve the laterally movable seats of the prior art.

[0006] It is an object of the invention to provide a bench with a laterally movable seat which can be stably moved

with little effort when a user is sitting on it.

[0007] It is a further object of the invention to provide a bench with a laterally movable seat which enables easy, smooth and noiseless back and forth sliding movement of the seat.

[0008] It is yet another object of the invention to provide a bench with a laterally movable seat having an overall compact arrangement and an increased sitting surface.

[0009] The above objects are achieved by providing a bench with a laterally movable seat as defined in claim 1. Various preferred embodiments of the invention are specified by the dependent claims.

Brief description of the drawings

[0010] The present invention will now be described, by way of examples, with reference to the accompanying drawings, in which:

Fig. 1 is a perspective bottom view of a preferred embodiment of the bench according to the invention.

Fig. 2 is a top plan view of a seat supporting plate of the bench according to the invention.

Fig. 3A is a combined side view and cross-sectional view of the seat supporting plate of the bench according to the invention with the cross-sectional view being taken along the line B-B shown in Fig. 2.

Fig. 3B is a combined side view and cross-sectional view of the roller mechanism of the bench according to the invention with the cross-sectional view being taken along the line B-B shown in Fig. 2.

Fig. 3C is a combined side view and cross-sectional view of the seat movement mechanism of the bench according to the invention, illustrating the mutual arrangement of the seat supporting plate and a roller mechanism of the bench when assembled, with the cross-sectional view being taken along the line B-B shown in Fig. 2.

Fig. 4 is a bottom view of the roller mechanism of the bench according to the invention.

Fig. 5 is a perspective bottom view of the seat movement mechanism of the bench in a central position of the seat.

Figs. 6A and 6B are combined side view and sectional view of the bench according to the invention with the movable seat residing in a central position and a shifted position, respectively.

[0011] In the following description, the relative terms like "upper", "lower", "above", "below", "left", "right", etc. are used for a bench standing on the floor, in front of a user, and only serve better understanding the arrangement and the operation of the parts of the bench according to the invention. However, such terms should not be interpreted as any limitation of the scope of the invention.

[0012] Referring to Fig. 1, the bench of the present invention comprises a supporting frame 60, as a stationary part of the bench, configured to rest on a floor, and

a laterally movable seat unit 3, as a movable part of the bench, arranged on a top portion of the supporting frame 60. The movable seat unit 3 is capable of laterally moving back and forth with respect to the supporting frame 60 along a horizontal straight line defined as a moving direction of the moving seat unit 3. The movable seat unit 3 can be laterally shifted to the left and to the right, from its central position. Preferably, the lateral end positions of the seat unit 3 are at the same distance from its central position, and this distance is preferably in the range of 10 to 40 cm in both directions.

[0013] The fixed supporting frame 60 comprises a base structure 61 and a vertical supporting pillar 62 attached thereto. A roller mechanism is secured on the top of the supporting pillar 62.

[0014] The movable seat unit 3 comprises a seat supporting plate 31, also shown in Fig. 2 separately, and a seat portion 32, which is attached to the seat supporting plate 31 and comprises a seat cushion 33. The movable seat unit 3 is mounted on the roller mechanism.

[0015] As shown in Fig. 4, the roller mechanism comprises a roller supporting plate 2 that may be formed, for example, as a rectangular plate with a longitudinal axis of symmetry parallel to the moving direction $\underline{m}$. A plurality of rollers 21, 22, 23, 24 are rotatably mounted on the roller supporting plate 2.

[0016] As shown in Fig. 3A, the seat supporting plate 31 is provided with guiding surfaces 41, 42, 43, 44 (see Figs. 3A and 5) for the rollers 21, 22, 23, 24 of the roller mechanism for linearly guiding the movable seat unit 3 with respect to the stationary roller supporting plate 2. Forming the guiding surfaces 41, 42, 43, 44 on the movable seat unit 3 results in a compact seat configuration with an increased seating surface as compared to the movable seats of the prior art.

[0017] As shown in Fig 3C, the seat supporting plate 31 is provided on one of its longitudinal edges with locking means 6 for locking the movable seat unit 3 in a central position with respect to the supporting pillar 62 of the fixed supporting frame 60 (shown in Fig. 1).

[0018] As shown in Figs. 3A and 3C, the seat supporting plate 31 comprises first guiding surfaces 41 extending in parallel to the moving direction $\underline{m}$ and facing downwards, second guiding surfaces 42 extending in parallel to the first guiding surfaces 41 and facing upwards, a third guiding surface 43 extending in parallel to the moving direction $\underline{m}$ and oriented orthogonally to the first and second guiding surfaces 41, 42 and facing to a first lateral direction orthogonal to the moving direction $\underline{m}$ (e.g. forwards), and a fourth guiding surface 44 extending in parallel to the third guiding surface 43 and facing in a second lateral direction opposite to said first lateral direction (e.g. backwards). In a preferred embodiment of the bench of the invention, the first and second guiding surfaces 41, 42 are arranged along the longitudinal edges of the seat supporting plate 31, whereas the third and fourth guiding surfaces 43, 44 are arranged in a middle region of the seat supporting plate 31.

[0019] As further shown in Figs. 3A and 3C, the seat supporting plate 31 may comprise a top plate 311 and longitudinal lower flanges 312 extending in the moving direction $\underline{m}$. The top plate 311 may be a one-piece folded plate with four folded flanges projecting downwardly from each edge of the top plate 311. In this preferred embodiment, the first guiding surfaces 41 are formed by longitudinal stripe areas of the bottom side of the top plate 311, adjacent to the longitudinal edges of the rectangular top plate 311. Furthermore, the second guiding surfaces 42 are formed by the top side of the lower flanges 312. It is preferred that the distance between the plane of the first guiding surfaces 41 and the plane of the second guiding surfaces 42 is adjustable by changing the vertical position of the lower flanges 312 with respect to the top plate 311 for a fine tuning of the frictional force between the guiding surfaces and the associated rollers. The vertical position of the lower flanges 312 may be changed, for example, by the screws 316 arranged on the downwardly projecting side surfaces of the top plate 311.

[0020] As shown in particular in Figs. 3A and 5, a rail 313 is secured to the lower surface of the top plate 311 so that two opposite longitudinal lateral surfaces of the rail 313 are parallel to the moving direction $\underline{m}$ of the seat unit 3, wherein said lateral surfaces of the rail 313 define the third guiding surface 43 and the fourth guiding surface 44, respectively.

[0021] As best illustrated in Figs. 3C and 5, the seat supporting plate 31 is in contact with a plurality of rollers of the roller mechanism of the stationary supporting frame. The rollers include a first group of rollers 21 rotatably mounted on the roller supporting plate 3 with horizontal axes and bearing against the first guiding surfaces 41 of the seat supporting plate 31 from below. The rollers further include a second group of rollers 22 rotatably mounted on the roller supporting plate 31 with horizontal axes and bearing, from above, against the second guiding surfaces 42 formed by the top surfaces of the longitudinal lower flanges 312. The rollers further include a third group of rollers 23 rotatably mounted on the roller supporting plate 31 with vertical axes and bearing against the third guiding surface 43 defined by one lateral surface of the rail 313, and a fourth group of rollers 24 rotatably mounted on the roller supporting plate 31 with vertical axes and bearing against the fourth guiding surface 44 defined by the other lateral surface of the rail 313 facing in an opposite direction relative to said first lateral surface.

[0022] As also shown in Figs. 3C and 5, the seat supporting plate 31 is preferably provided with a locking means 6 arranged at the center of its longitudinal edge on either the front side or on the back side of the bench. The locking means 6 is configured to secure the movable seat unit 3 to the supporting pillar to prevent the seat unit 3 from laterally moving with respect to the supporting frame of the bench. The locking means 6 may include any mechanism suitable for fixing the seat unit 3 relative to the underlying supporting frame.

[0023] Fig. 4 illustrates the arrangement of the rollers 21, 22, 23, 24 on the roller supporting plate 2 in a preferred embodiment of the bench according to the invention. As shown in Fig. 4, the roller supporting plate 2 may be formed as a rectangular plate longitudinally extending in the moving direction $\underline{m}$ of the movable seat unit. The first group of rollers 21 preferably consists of multiple pairs of coaxial rollers arranged at the longitudinal end portions of the roller supporting plate 2. The second group of rollers 22 preferably consists of single rollers arranged at the longitudinal end portions of the roller supporting plate 2, near each pair of said first rollers 21.

[0024] As best shown in Fig. 3C, the axes of the rollers 21 of the first group and the axes of the rollers 22 of the second group are vertically offset with respect to each other. Thus, a functional gap 25 is provided between the second rollers 22 and the associated first guiding surfaces 41 (shown in Fig. 3A).

[0025] Reverting to Fig. 4, the third and the fourth rollers 23 and 24 consist of single rollers, preferably also arranged at the longitudinal end portions of the roller supporting plate 2, at both lateral sides of the rail 313 as also shown in Fig. 3C.

[0026] As it can be seen in Figs. 4 and 5, at both transversal edges of the roller supporting plate 2, there are shock-absorbers 5, each having a front surface facing in the moving direction $\underline{m}$ of the seat unit. The shock-absorbers 5 are arranged so that in an outermost lateral position of the seat unit, they bear against the inner lateral surface of the downwardly folded transversal edge of the seat supporting plate 31. Preferably, the shock-absorbers 5 may be made of an elastic material for damping the force of collision of the seat supporting plate 31 to the roller supporting plate 2 during use.

[0027] In one embodiment, the shock-absorbers 5 may comprise a pneumatic piston with an elastic head. In another embodiment, each of the shock-absorbers 5 may comprise a magnet, and the seat supporting plate 31 may comprise respective counter-magnets having the same polarity and arranged in line with the magnets of the roller supporting plate 2. The shock-absorbers 5 are used to reduce or eliminate the noise of collision between the roller supporting plate 2 and the seat supporting plate 31, and further allow a progressive deceleration of the movable seat unit when it is approaching one of its outermost position.

[0028] The operation of the bench according to the invention will be described below with reference to the drawings. In an idle state of the bench, the locking mechanism 6 is activated and thus the movable seat unit 3 is fixed in a central position. Once the locking mechanism 6 is released, the seat unit 3 can be moved by the user (or the artist, for example a pianist) from the central position in the lateral moving direction $\underline{m}$, namely to the left or to the right, back and forth. Due to the roller mechanism described above, the user can easily displace the movable seat unit 3 in either direction along the straight moving direction $\underline{m}$ of the seat unit 3.

[0029] During motion of the seat unit 3, the third and fourth rollers 23, 24 and the guiding rail 313 co-operate, by virtue of their mutual arrangement, to produce a linear movement of the seat unit 3 without any play in a horizontal direction perpendicular to the moving direction $\underline{m}$. Similarly, the first and second rollers 21, 22 running on the first and second guiding surfaces 41, 42 also co-operate, by virtue of their mutual arrangement, to produce a linear movement of the seat unit 3 without any play in the vertical direction and also preventing the seat unit 3 from tilting.

[0030] When the user is sitting on the bench, the weight of the user applied on the seat unit 3 is distributed over the first rollers 21, which have a load-bearing function by supporting the seat supporting plate 31 from below along the first guiding surfaces 41. In the central resting position, as shown in Fig. 6A, the roller supporting plate 2 is located exactly or substantially under the user sitting on the seat unit 3.

[0031] When the seat unit 3 is not in the central position, but in a shifted position as shown in Fig. 6B, the second rollers 22 prevent the seat unit 31 from tilting along the moving direction $\underline{m}$. This may be the case when the user moves the seat unit 3 to one of its outermost positions to reach an extremity of a worktable or an instrument's (e.g. piano) keyboard.

[0032] It is noted that although in the above description, the bench of the invention was described as comprising a roller mechanism formed of rollers and respective guiding surfaces, it is obvious for those skilled in the art that instead of rollers, other rolling means, like wheels, may equally be used without departing the scope of the invention.

[0033] Furthermore, it is noted that the number and the arrangement of the rollers may vary depending on the expected load distribution of the movable seat.

[0034] It should be also noted that the guiding surfaces for the rollers may be formed in or on the seat supporting plate in many other ways, provided that they comply with the geometrical restrictions defined above.

Claims

1. A bench with a laterally movable seat, in particular a piano bench, comprising:
 - a stationary supporting frame (60) configured to rest on a floor,
 - a seat unit (3) arranged on a top portion of the supporting frame (60), the seat unit (3) being configured to be movable with respect to the supporting frame (60) by means of rollers (21, 22, 23, 24) along a horizontal straight line defined as a moving direction ($\underline{m}$),

characterized in that

- the rollers (21, 22, 23, 24) are rotatably mounted on the supporting frame (60),
 - the movable seat unit (3) is provided with first guiding surfaces (41) extending parallel to the moving direction (m) of the seat unit (3), wherein a first group of said rollers (21) mounted on the supporting frame (60) with horizontal axes of rotation are arranged to bear against said first guiding surfaces (41) of the seat unit (3) from below,
 - the movable seat unit (3) is further provided with second guiding surfaces (42) extending parallel to the moving direction (m) of the seat unit (3) and also parallel to said first guiding surfaces (41), wherein a second group of rollers (22) mounted on the supporting frame (60) with horizontal axes of rotation are arranged to bear against said second guiding surfaces (42) of the seat unit (3) from above,
 - the movable seat unit (3) is further provided with a third guiding surface (43) extending parallel to the moving direction (m) of the seat unit (3) and oriented orthogonally to said first and second guiding surfaces (41, 42), wherein a third group of rollers (23) mounted on the supporting frame (60) with vertical axes of rotation are arranged to bear against said third guiding surface (43) of the seat unit (3) in a first horizontal direction orthogonal to said moving direction (m),
 - the movable seat unit (3) is further provided with a fourth guiding surface (44) extending in parallel to said third guiding surface (43), wherein a fourth group of rollers (24) mounted on the supporting frame (60) with vertical axes of rotation are arranged to bear against said fourth guiding surface (44) in a second horizontal direction opposite to said first horizontal direction.
2. The bench according to claim 1, **characterized in that** said first guiding surfaces (41) are provided on a bottom of a top plate (311) of a seat supporting plate (31) of the seat unit (3), and the second guiding surfaces (42) are provided on an upper surface of a lower flange (312) of said seat supporting plate (31).
 3. The bench according to claim 1 or 2, **characterized in that** said third guiding surface (43) and said fourth guiding surface (44) are defined by two opposite lateral surfaces of a rail (313) mounted on a bottom of a top plate (311) of a seat supporting plate (31) of said seat unit (3), said rail (313) longitudinally extending parallel to the moving direction (m) of the seat unit (3).
 4. The bench according to any one of the preceding claims, **characterized in that** the supporting frame (60) is provided with shock-absorbers (5) mounted on the roller supporting plate (2) at its longitudinal end portions.
 5. The bench according to any one of the preceding claims, **characterized in that** the seat supporting plate (31) is provided with locking means (6).
 6. The bench according to claim 5, **characterized in that** the locking means (6) is either on the front side or on the back side of the seat supporting plate (31) of the bench.

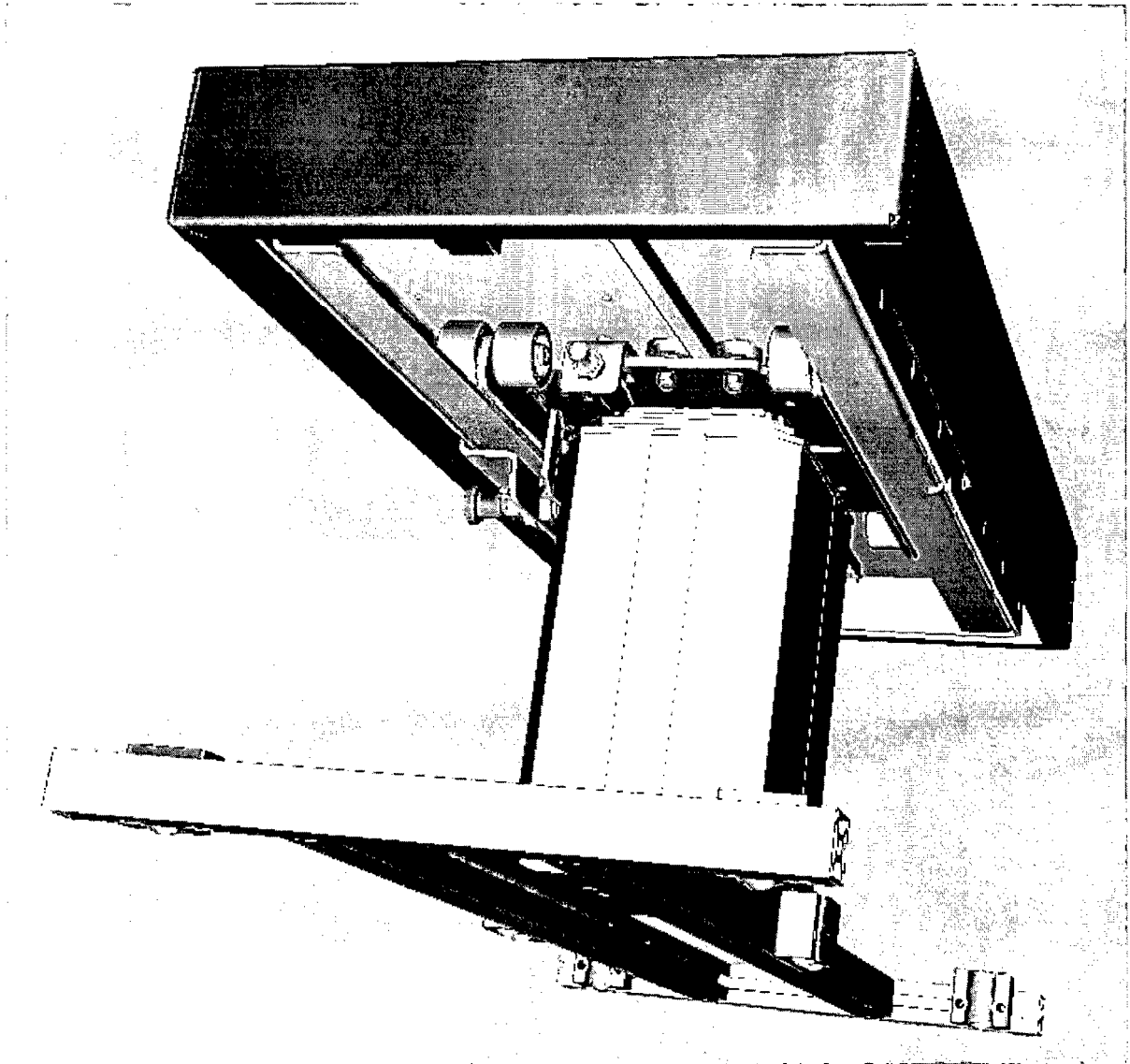


Fig. 1

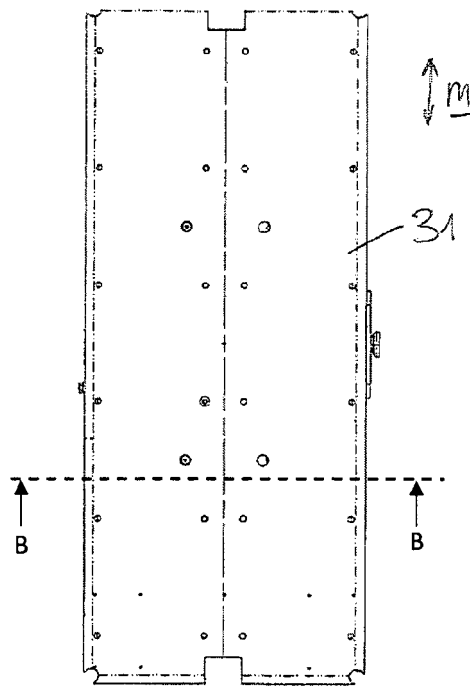


Fig. 2

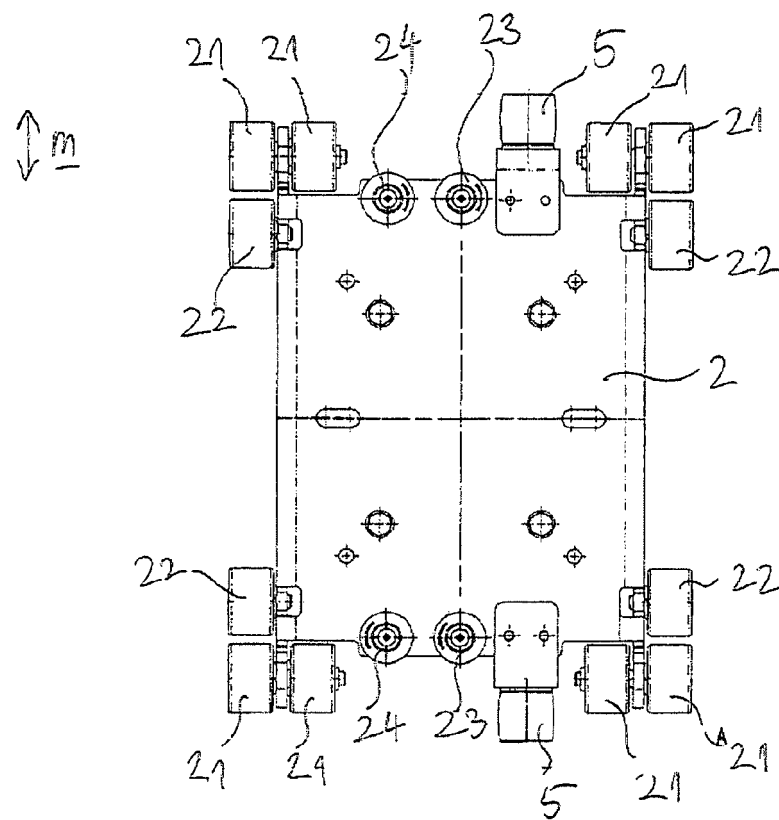


Fig. 4

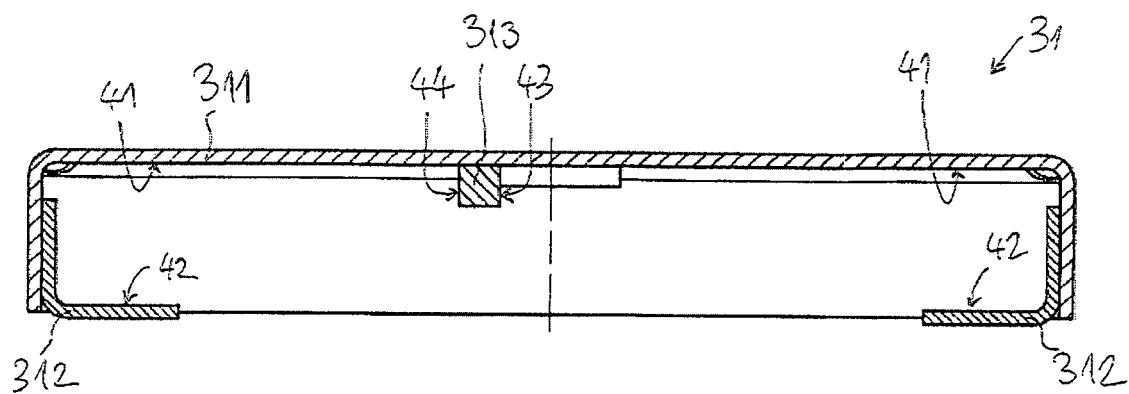


Fig. 3A

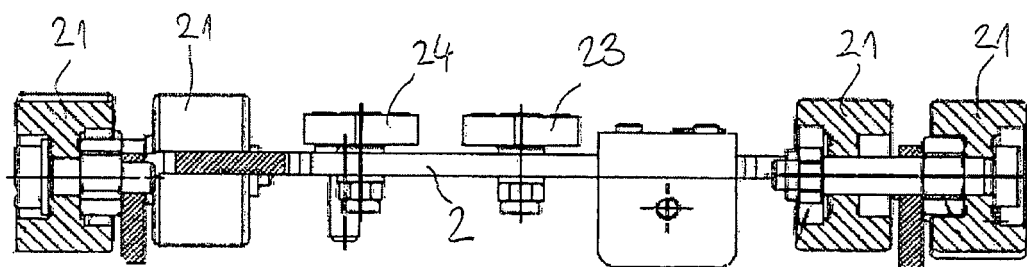


Fig. 3B

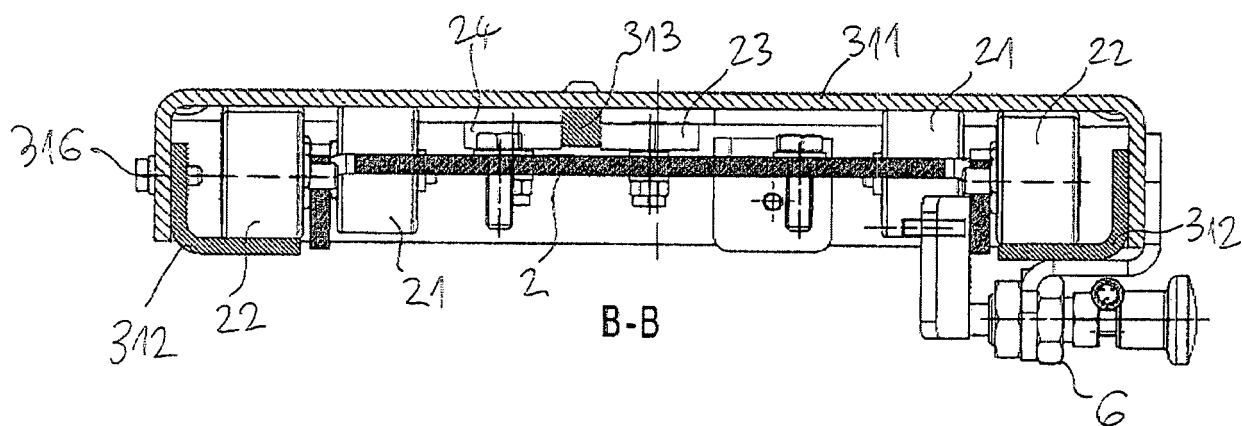


Fig. 3C

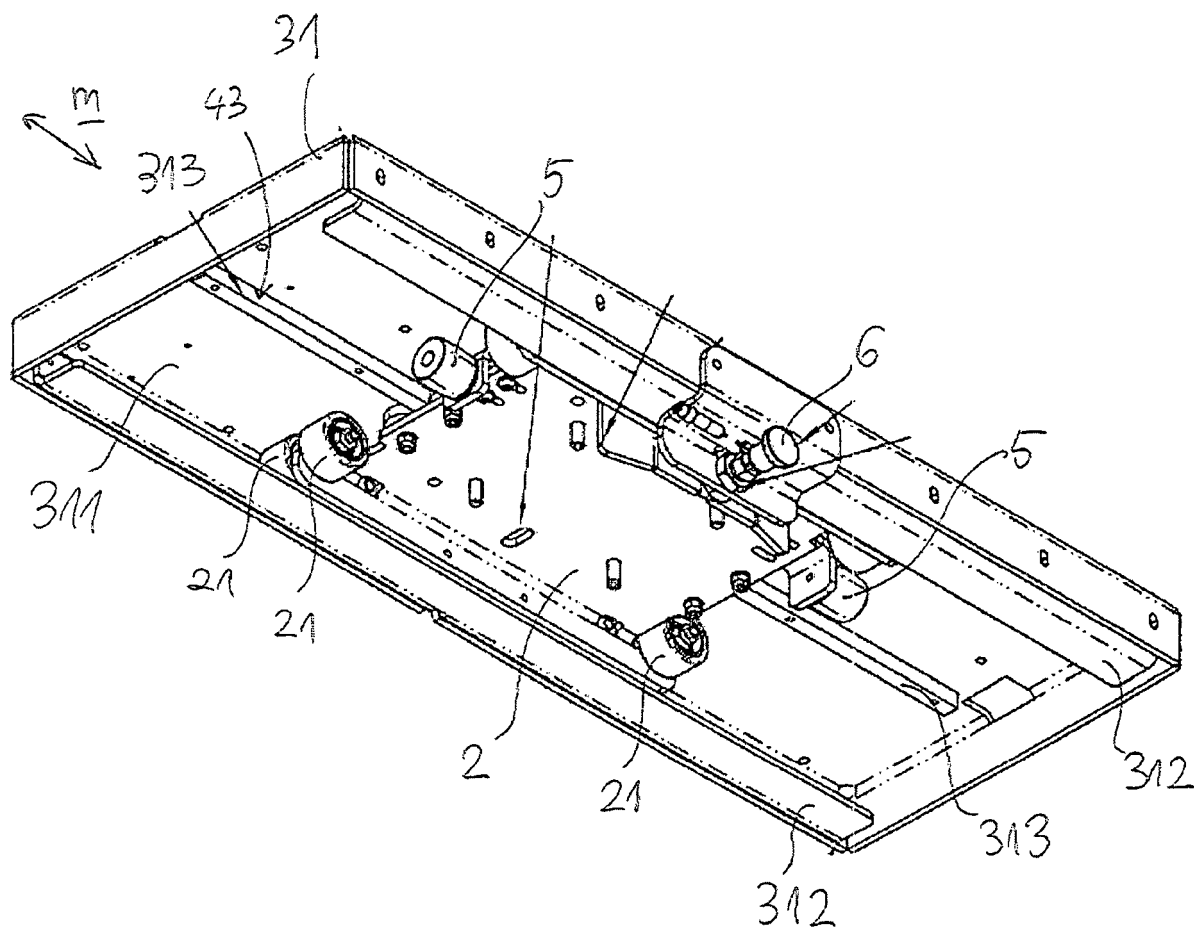


Fig. 5

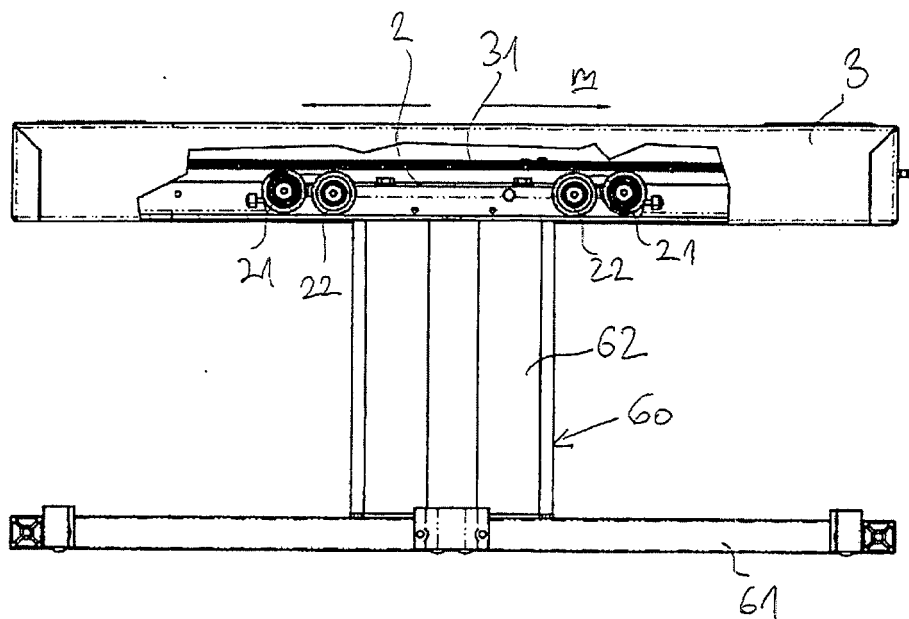


Fig. 6A

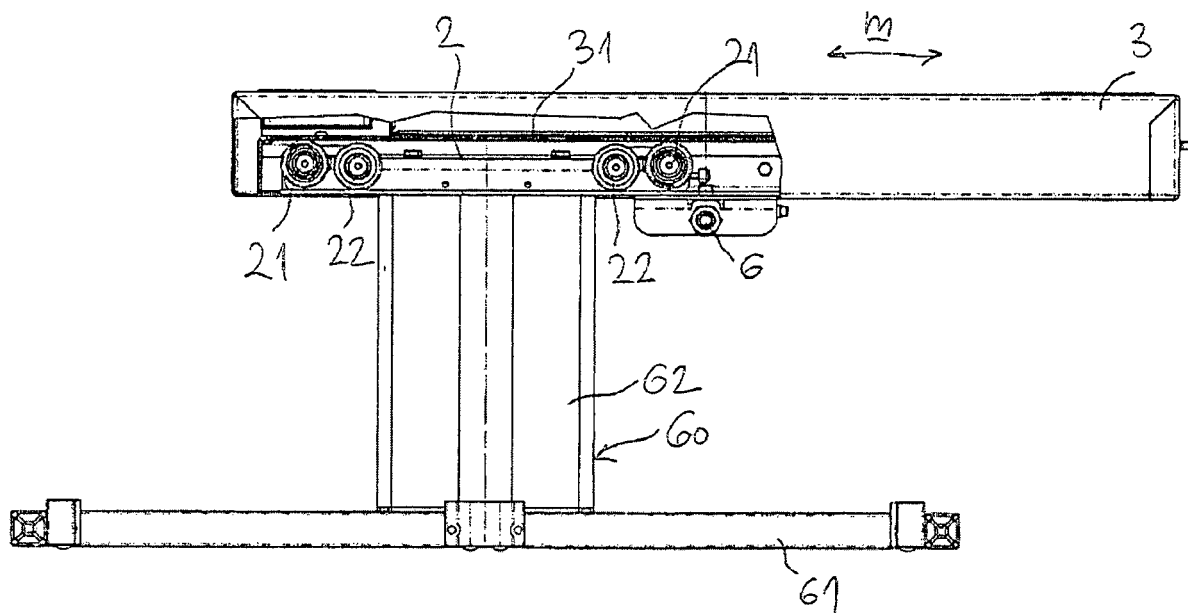


Fig. 6B



EUROPEAN SEARCH REPORT

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EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	GB 609 671 A (HARRY DAVID JENNER; A AND C JENNER LTD) 5 October 1948 (1948-10-05) * page 2, line 112 - page 3, line 12; figures 1-4 *	1-6	INV. A47C9/08 A47C1/023 A47C7/16 A47C11/00
A	US 2 681 690 A (JOHNSON CARROLL W ET AL) 22 June 1954 (1954-06-22) * column 3, line 16 - line 35; figures 2-6 *	1-6	
A	DE 26 38 924 A1 (VOGT BUEROMOEBEL) 2 March 1978 (1978-03-02) * figures 1-8 *	1-6	
A	JP 2005 040552 A (FUJIMOTO KEIJIRO) 17 February 2005 (2005-02-17) * figures 1,9-13 *	1-6	
A	US 2022/225779 A1 (PERILLO STEVE [US] ET AL) 21 July 2022 (2022-07-21) * paragraph [0002]; figures 1-4 *	1-6	TECHNICAL FIELDS SEARCHED (IPC) A47C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 22 May 2023	Examiner Pössinger, Tobias
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EP 22 46 2013

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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22-05-2023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 609671 A	05-10-1948	NONE	
US 2681690 A	22-06-1954	NONE	
DE 2638924 A1	02-03-1978	BE 858106 A	16-12-1977
		DE 2638924 A1	02-03-1978
		FR 2362604 A1	24-03-1978
		LU 78023 A1	11-01-1978
		NL 7708774 A	02-03-1978
JP 2005040552 A	17-02-2005	JP 4418983 B2	24-02-2010
		JP 2005040552 A	17-02-2005
US 2022225779 A1	21-07-2022	EP 4046538 A1	24-08-2022
		US 2022225779 A1	21-07-2022

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 3718365 A [0003]
- US 1290517 A [0004]