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(54) **Mechanical model of an animal**

(57) The mechanical model (1) of a horse comprises a body (2) with forelegs (3) and hind legs (4) adapted to be pivotally driven relative to the body (2) to cause the mechanical model (1) to move along a forward direction. Advantageously, the hind legs may be pivoted forwards

until they reach a forward operating position in which they cause the mechanical model to be pivoted backwards, and to reach a second upright balanced position in which the mechanical model (1) is supported by the tail (22) and by the hind legs (2).

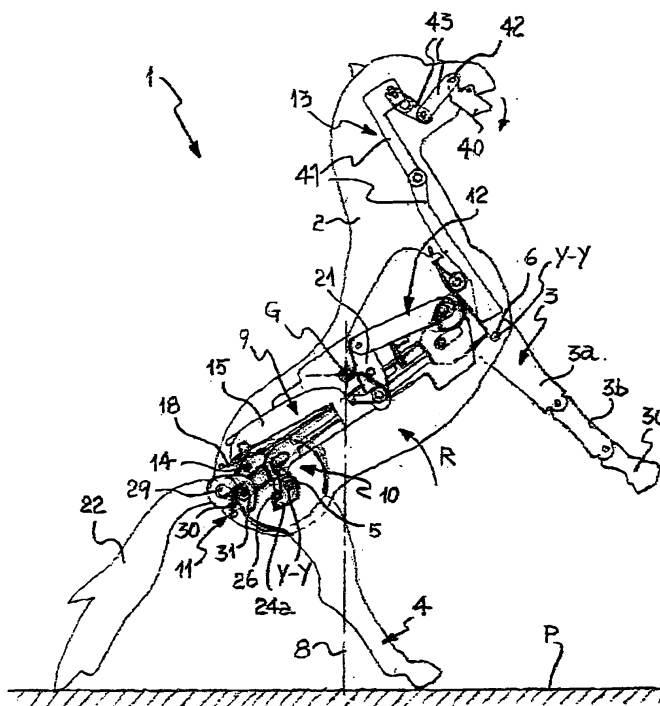


Fig. 2

Description

[0001] The present invention relates to a mechanical model of an animal according to the preamble of claim 1.

[0002] Particularly, the invention relates to a mechanical model which is able to simulate certain movements of a real horse.

[0003] According to a further aspect, the invention also relates to a method for operating the mechanical model of an animal to obtain a realistic simulation of the movements of a real animal, particularly the movements of a horse.

[0004] For the sake of simplicity, reference will be particularly made herein, without limitation, to the mechanical model of a horse.

[0005] In the field of toys, the need is known of providing mechanical models of animals which are able to move in such a manner as to simulate as realistically as possible the movements of real animals.

[0006] Hence, for example, US 6,165,043 discloses a toy reproducing the model of a four-legged walking animal, US 3,952,449 teaches how to make the mechanical reproduction of a four-legged animal which is able to articulate the neck and US 6,290,567 relates to a remotely controlled mechanical model of a horse which is able to walk on its four legs.

[0007] Referring to the above prior art documents, it may be noted that they provide more or less sophisticated and automated mechanical models, which are able to move while resting on all of their legs and to simultaneously articulate other parts of their body without changing their position. Furthermore, prior art mechanical reproductions of animals cannot perform more complex movements, in addition to those described above, without incurring in stability problems. It shall be further noted that the movements that these reproductions may perform are rather rigid and unsmooth, and seem to evoke a puppet rather than a real animal.

[0008] The problem on which the present invention is based is that of providing a mechanical model of an animal having such structural and functional features as to fulfil the above need, while obviating the above prior art drawbacks, so as to perform complex movements in a smooth manner and with unaffected stability.

[0009] This problem is solved by a mechanical model of an animal according to the features of claim 1.

[0010] The idea whereupon this invention is based upon is the provision of a mechanical model comprising a body, front and rear supports, whereby it may be supported in a first upright balanced position on a support surface, the rear supports being adapted to be pivotally driven relative to the body until they reach a forward operating position in which they cause the mechanical model to be pivoted backwards into a second upright balanced position, in which the mechanical model is supported by the rear supports and by additional support means projecting backwards from said body.

[0011] According to a further aspect, the invention also

relates to a method according to claim 21 for operating a mechanical model of an animal.

[0012] Further features and advantages of the mechanical animal model of this invention, and the method for operating it, will be apparent from the following description of one preferred embodiment thereof, which is given by way of illustration and without limitation with reference to the accompanying figures, in which:

- Figure 1 is a simplified and partially sectional side view of a mechanical model of the invention, in a first upright position;
- Figure 2 shows the mechanical model of Figure 1 in a second backwardly pivoted upright position;
- Figure 3 is a sectional view of a detail of the mechanical model of Figure 1 in a bent configuration;
- Figure 4 shows the detail of Figure 3 in an extended configuration;
- Figure 5 is a simplified perspective view of a detail of the model of Figure 1 in one operating position;
- Figures 6, 7 and 8 are plane views of the detail of Figure 5 in three different positions, i.e. backward, forward and operating positions respectively.

[0013] Referring to the accompanying figures, numeral 1 generally designates a mechanical model of an animal according to the invention, specifically the mechanical model of a horse.

[0014] The model 1 comprises a body having front support means 3 and rear support means 4 for supporting said mechanical model 1 on a support surface P in a first upright position (Fig. 1).

[0015] The rear support means 4 are associated to the body 2 to pivot about a first axis of rotation 5, transverse to a predetermined forward direction (X-X) that the mechanical model 1 can follow in its first upright position (Fig. 1) on the support surface P, thanks to the movement of the rear support means 4. The forward direction X-X coincides with the longitudinal direction along which the body 2 of the mechanical model 1 extends. Preferably, the first axis of rotation 5 extends in a direction Y-Y perpendicular to the forward direction X-X.

[0016] In this embodiment, the rear support means 4 comprise two opposed hind legs, each being associated to the body 2 to pivot about the first axis of rotation 5 as described above.

[0017] The front support means 3 are associated to the body 2 to rotate about a second axis of rotation 6, parallel to the first axis of rotation 5. In this example, the front support means 3 comprise two opposed forelegs, each being associated to a corresponding flank of the body 2 to pivot about the second axis of rotation 5 as described above.

[0018] When the mechanical model 1 is in said first upright position (Fig. 1), said front support means 3 and rear support means 4 stably support the mechanical model. When the mechanical model 1 is in its first upright position (Fig. 1), the front support means 3 and the rear

support means 4 define a first support area on the support surface P, through which the vertical line 7 drawn from the centre of mass G of the mechanical model passes.

[0019] The model 1 comprises first drive means 9, for reversibly pivotally driving the rear support means 4, i.e. the hind legs, between a forward position (Fig. 7) and a backward position (Fig. 6), with respect to the forward sense (denoted by arrow A in Fig. 1) of the mechanical model along the forward direction X-X, such drive action causing the mechanical model 1 to move forward along the forward direction X-X while the mechanical model is in its first upright position.

[0020] Furthermore, the mechanical model 1 has fourth drive means 12 for reversibly pivotally driving the front support means 3, i.e. the forelegs, between a forward position and a backward position, with respect to the forward sense of the mechanical model 1 along the X-X.

[0021] Advantageously, the first drive means 9 and the fourth drive means 12 are in kinematic operative connection so that, as a hind leg pivots to the forward position, the corresponding foreleg on the same side of the body 2 simultaneously pivots to the backward position, and vice versa.

[0022] According to the specific embodiment of the figures, the first drive means 9 comprise, for each hind leg 4, a first connecting rod 15 extending in the forward direction X-X, for releasably engaging a pin 14 which is pivotally integral with the hind leg 4. The pin 14 has such a position that it extends parallel to the first axis of rotation 5 at a higher level than the support surface P. As a result of the eccentricity of the pin 14 with respect to the first axis of rotation 15, the to-and-from movement of the first connecting rod 15 in the forward direction X-X causes the respective hind leg 4 to pivot from the forward position (Fig. 7) and the backward position (Fig. 6), and vice versa. It should be noted that the first connecting rod 15 is adapted to releasably engage the underlying pin 14 through an open notch 16 which faces toward the underlying support surface P. For reasons to be further clarified hereafter, the first connecting rod 15 is disengaged from the pin 14 by simply lifting it to pull the pin 14 out of the open notch 16.

[0023] The first drive means 9 further comprise elastic means 18 adapted to act with a predetermined elastic force on the rear support means 4, thereby causing them to pivot to the forward position (in the clockwise direction in the Figure).

[0024] For each foreleg 3, the fourth drive means 12 comprise a connecting rod 19 extending in the forward direction X-X and having an end that is set on a pivot 40 in a slot 20 that is formed in a portion of the foreleg 3 which is positioned above the second axis of rotation 6. As a result, the to-and-from movement of the first connecting rod 19 in the forward direction X-X causes the respective hind leg 3 to pivot from the forward position and the backward position, and vice versa.

[0025] On each side of the body 2, the mechanical

model 1 comprises a crank 21 which is adapted to connect in an articulated manner the end of the first connecting rod 15 of a hind leg 4 to the connecting rod 19 of the corresponding foreleg 3 on the same side, to operatively connect as described above the first drive means 9 to the fourth drive means 12. A rotating shaft, driven by conventional motor means, is connected in a rotatably integral manner with the central point of each crank 19 to set it into rotation. A complete rotation of each crank 21 corresponds to a complete to-and-from movement of the corresponding first connecting rod 15 and the associated connecting rod 19.

[0026] Furthermore, the mechanical model 1 comprises:

- second drive means 10 for rotating the rear support means 4 to a more forward operating position (Figures 5 and 8) than said forward position (Fig. 7), with respect to the forward sense (denoted by arrow A in Fig. 1) of the mechanical model along the forward direction X-X, and
- further rear support means 22, which are in a more backward position than the rear support means 4, with respect to the forward sense (denoted by arrow A in Fig. 1) of the mechanical model along the forward direction X-X.

[0027] As a result of the forward movement of the rear support means 4 from the forward position (Fig. 7) to the operating position (Fig. 8) while the mechanical model is in the first upright position (Fig. 1), the rear support means 4 (namely the portion thereof that rests on the surface P) are in a more forward position than the vertical line drawn from the centre of mass G of the mechanical model 1. Thus, the vertical drawn from the centre of mass G is displaced backwards with respect to the new support area, defined between the front support means 3 and the rear support means 4 in the operating position. This causes a backward rotation (in the anticlockwise direction, denoted by arrow R in Fig. 2) through a predetermined angle relative to the rear support means 4, with respect to the forward sense of the mechanical model along the forward direction X-X.

[0028] As a result of such rotation, the mechanical model takes a second upright position (Fig. 2), in which the additional support means 22 cooperate with the rear support means 4 to support the mechanical model 1 in the second backwardly rotated upright position.

[0029] As shown in Figure 2, the second upright position of the mechanical model 1 is stable because the vertical line 8 drawn from the centre of mass G of the mechanical model 1 passes through the new support area defined by the rear support means 4 and the additional rear support means 22.

[0030] The additional support means 22 comprise an extension which projects from the body 2 of the mechanical model 1 backwards, with respect to the forward sense of the mechanical model along the forward direction X-

X. Such extension preferably forms the tail of the horse reproduced by the mechanical model 1.

[0031] According to a preferred embodiment, said second drive means 10 comprise:

- means 23 for disengaging the first connecting rod 15 from the pin 14 of its respective hind leg 4, to allow said hind leg to pivot to the operating position (Figures 5 and 8) under the action of the elastic means 18;
- a rocker arm 24, which is supported in such a manner as to pivot about the first axis of rotation 5 and has a first end 24a engaged with a drive bar 25, which is designed to set the angular position of the rocker arm 24 relative to the body 2, and an opposite end 24b which is designed to act as an abutment for an abutting member 26, integrally associated to each hind leg 4. In this embodiment, the abutting member 26 is a pin that projects from the corresponding hind leg 4 parallel to the first axis of rotation and is situated near the first axis of rotation.

[0032] The above mentioned drive bar 25 is provided in the form of a slider, extending along the forward direction X-X and adapted to run a predetermined stroke along such direction between a forward end-of-stroke position (Figures 6 and 7) and a backward position (Figures 5 and 8), with respect to the forward sense, as denoted by arrow A in Fig. 1, of the mechanical model 1, along the forward direction X-X. The first end 24a of the rocker arm 24 is engaged with said drive bar 25 by means of a pivot 28, which extends parallel to the first axis of rotation 5 and is inserted in a conveniently shaped sliding slot 27, formed in the drive bar 25.

[0033] When the drive bar 25 is in the above mentioned forward end-of-stroke position (Figures 6 and 7), the means 23 for disengaging the first connecting rod 15 from the pin 14 of the corresponding hind leg 4 are not operated to lift the first connecting rod 15, which is therefore engaged with the pin 14. As a result, the to-and-from movement of the first connecting rod 15 causes the hind legs 4 to rotate between the forward position and the backward position. In this condition, the rocker arm does not interfere with the pin 26.

[0034] When the drive bar is in the above mentioned backward end-of-stroke position (Figures 5 and 8), the means 23 are operated to lift the first connecting rod 15 and disengage it from its respective pin 14. Therefore, the elastic means 18 cause the hind legs 4 to pivot to the above mentioned operating position, in which any further forward rotation (anticlockwise direction in Figure 8) of the hind legs is prevented by abutment of the pin 26 of both hind legs against the end 24b of the rocker arm 24. It should be further noted that, in this configuration, the rocker arm 24 is prevented from pivoting any further, thanks to the fact that the pivot 28 at the end 24a of the rocker arm 24 is at the end of the stroke defined by the slot 27 of the drive bar 25.

[0035] Preferably, the tail 22 is associated to the body 2 so as to rotate relative to the body 2 about an axis of rotation 29, which extends parallel to the first axis of rotation 5. Thus, the tail 22, i.e. the additional rear support means, are able to reversibly pass from a first configuration (Figures 1, 6 and 7) to a second configuration (Figures 5 and 8), in which the tail is at a greater angular distance from the hind legs 4, thereby increasing the extension of the second support area and, consequently, also the stability of the mechanical model 1 in the second upright position. To this end, the model has third drive means 11 for reversibly driving the tail 22 between the first configuration (Figures 1, 6 and 7) and the second configuration (Figures 5 and 8).

[0036] Said third drive means 11 for reversibly driving the tail 22 comprise elastic means 30 which are designed to exert a predetermined elastic force on the tail 22 toward said second configuration (Figures 5 and 8). Furthermore, the third drive means 11 comprise an extension 31 of the tail 22, extending into the body 2 and adapted to be driven by a slider to cause the tail 22 to be pivoted about the axis of rotation 29 against the action of the elastic means 30. Advantageously, the extension 31 of the tail 22 is adapted to be driven by the rear end of the drive bar 25, more particularly by a pivot 44 extending perpendicular to the end of such drive bar, so that the movement of the drive bar 25 from the forward end-of-stroke position (Figures 6 and 7) to the backward position (Figures 5 and 8) causes a corresponding movement of the tail 22 from the first configuration to the second configuration.

[0037] In accordance with a preferred embodiment, each foreleg is composed of an upper connecting rod 3a, an intermediate connecting rod 3b and an end connecting rod 3c, which are articulated together to reproduce the articulation of the forelegs of a horse. The upper connecting rod 3a is the part of the foreleg 3 that is associated to the body 2 to pivot about the second axis of rotation 6.

[0038] The upper connecting rod 3a and the intermediate connecting rod 3b are connected at their ends by a first hinged joint, comprising a hinge pin 32 parallel to the second axis of rotation 6.

[0039] The intermediate connecting rod 3b and the end connecting rod 3c are connected at their ends by a second hinged joint, comprising a hinge pin 33 parallel to the second axis of rotation 6.

[0040] Each foreleg 3 has respective means 34 for articulating the end connecting rod 3c and the intermediate connecting rod 3b to the upper connecting rod 3a, so that the foreleg 3 may reversibly pass from an extended configuration (Figure 4) to a partially backwardly bent configuration (Fig. 3), with respect to the forward sense of the mechanical model 1 along the forward direction X-X.

[0041] The articulating means 34 comprise:

- a tie connecting rod 35 for connecting a front portion of the intermediate connecting rod 3b, next to the first hinged joint, to a rear portion of the end connect-

- ing rod 3c, next to the second hinged joint;
- elastic means 37, which exert a predetermined elastic force between the upper connecting rod 3a and the intermediate connecting rod 3b to maintain the intermediate connecting rod 3b in the bent configuration (Fig. 3);
- a crank and slotted link 38 adapted to perform a rotary and translational movement about the second axis of rotation 6.

[0042] The crank and slotted link 38 has:

- an end turned toward the first hinged joint and connected by a tie connecting rod 36 to a rear portion of the end connecting rod, next to the first hinged joint, and
- an opposite end, designed to be driven by a cam 39.

[0043] Advantageously, the cam 39 is operatively associated to the above mentioned fourth drive means 12 to drive the crank and slotted link 38 so that it can cause the corresponding foreleg 3 to pass from the extended configuration (Fig. 4) to the bent configuration (Fig. 3), as such foreleg pivots from the forward position to the backward position, and vice versa. More in detail, the cam 39 is pivotally integral with said pivot 40, which is introduced in the slot 20 in the upper connecting rod 3a of the foreleg 3.

[0044] In another preferred aspect, the mechanical model comprises a jaw, which is associated to the body 2 in such a manner as to move from an open position (Fig. 2) to a closed position (Fig. 1), in which fifth drive means 13 are provided to drive the jaw 40 between these open and closed positions.

[0045] The jaw is rotatably supported by a pivot 42, which is integral with the body 2 and extends parallel to the first axis of rotation 5. In this embodiment, the fifth drive means 13 comprise a rocker lever 41 having a first end designed to be driven by a slider associated to said fourth drive means 12, and an opposite end connected to the jaw by two interposed connecting rods 43, articulated together to drive the jaw to rotate about the pivot 42.

[0046] The mechanical model 1 further comprises motor means (not shown) for driving the various drive means of the mechanical model.

[0047] The method of operating the mechanical model of the invention provides the steps of:

- pivotally driving in a reversible manner the rear support means relative to the body, from a forward position to a backward position, with respect to the forward sense along the forward direction, by causing these rear support means to pivot about a first axis of rotation substantially perpendicular to the predetermined forward direction, to obtain a forward movement of the mechanical model into a first upright position on a support surface,
- rotating the rear support means to an operating po-

sition which, with respect to the forward sense of the model along the forward direction, is further forward with respect to the forward position, to such an extent that the rear support means are more forward than the vertical drawn from the centre of mass of the mechanical model.

[0048] This step in which the rear support means are rotated to the operating position (in an anticlockwise direction, as shown in Figure 8) causes a backward rotation of the mechanical model body relative to the rear support means, which brings the mechanical model into a second upright position, in which the mechanical model 1 is supported on the support surface by the rear support means and by additional support means, which are positioned more backward than the rear support means.

[0049] Preferably, the method provides a subsequent step of rotating the rear support means to the backward position to cause the body of the mechanical model to rotate forwards, with respect to the forward sense of said model along the forward direction, with respect to said rear support means. Thanks to this rotation, the mechanical model is again supported by the front support means and the rear support means, whereby said mechanical model passes from the second upright position to the first upright position.

[0050] Preferably, the rear support means are two opposed hind legs and, before the above mentioned step of rotating the hind legs into the operating position, the method provides a step in which the hind legs are substantially aligned in a direction substantially perpendicular to the forward direction.

[0051] Preferably, the rear support means are two opposed hind legs and the method provides a step in which the hind legs are rotated to the operating position while being maintained in substantial alignment in a direction substantially perpendicular to the forward direction.

[0052] Preferably, the method provides the step of rotating the rear support means from the operating position to the forward position while the mechanical model is in the second upright position to raise the body with respect to said support surface and simulate the rearing movement of a horse.

[0053] Preferably, the additional support means are associated to the body in such a manner that they can reversibly pivot relative to it from a first configuration to a second configuration, in which they are at a greater distance from the rear support means, thereby increasing the stability of the mechanical model in the second upright position, and the method provides the step of rotating the additional support means from the first to the second configuration, as the rear support means move from the forward position to the operating position.

[0054] As clearly shown in the above description, the mechanical model of an animal according to the present invention fulfills the above mentioned need and also obviates prior art drawbacks as set out in the introduction of this disclosure. In addition to being able of moving

forward in a predetermined straight direction, by alternately moving the legs like a real horse, the mechanical model of the invention can also assume a second upright position, corresponding to a horse rising on its hind legs, as well as articulate the forelegs in said second alternate position.

[0055] Furthermore, the feature of the inventive mechanical model of having the forelegs articulated at three points and of comprising means for articulating such parts allows to realistically simulate the movements of the forelegs of a real horse, both in the first and second upright positions.

[0056] Another advantage of the mechanical animal model of this invention is the possibility of cyclically operating all the drive means of the mechanical model by using a single motor.

[0057] Those skilled in the art will obviously appreciate that a number of changes and variants may be made to the mechanical model of an animal as described hereinbefore, without departure from the scope of the invention, as defined in the following claims.

Claims

1. A mechanical model of an animal comprising a body (2) having front support means (3) and rear support means (4) suitable for supporting said mechanical model on a support surface (P) in a first upright position and for causing the mechanical model to move along a predetermined forward direction (X-X), wherein:

- said rear support means (4) are associated to said body (2) so as to pivot about a first axis of rotation (5) which is transversal to said predetermined forward direction (X-X) that said mechanical model can follow in said first upright position on said support surface (P), thanks to the movement of the rear support means (4) and
- said model has first drive means (9) suitable for reversibly pivotally driving said rear support means (4) between a forward position and a backward position with respect to the forward sense of said model along said forward direction (X-X),

said front support means (3) and said rear support means (4) defining a first support area on said support surface (P), through which the vertical (7) drawn from the centre of mass (G) of said mechanical model passes, when said mechanical model is in said first upright position,

characterized in that it comprises:

- second drive means (10) for rotating said rear support means (4) to a more forward operating position than said forward position, with respect

to the forward sense of said model along said forward direction (X-X), in which said rear support means (4) are more forward than the vertical drawn from the centre of mass (G) of the mechanical model, so as to cause the mechanical model to rotate backwards, with respect to the forward sense of said model along said forward direction (X-X), and

- additional support means (22), which are in a more backward position than said rear support means (4), with respect to the forward sense of said model along said forward direction (X-X), for cooperating with said rear support means (4) to support said mechanical model in a second upright position, which is backwardly rotated through a predetermined angle relative to said rear support means (4) and with respect to the forward sense of said model along said forward direction (X-X),

said rear support means (4) and said additional support means (22) defining a second support area on said support surface (P), through which the vertical (8) drawn from the centre of mass (G) of said mechanical model passes, when said mechanical model is in said second upright position.

2. A mechanical model as claimed in claim 1, wherein said rear support means (4) comprise two opposed hind legs associated to said body (2) so as to be able to pivot about said first axis of rotation (5).
3. A mechanical model as claimed in claim 1 or 2, wherein said first axis of rotation (5) is perpendicular to said predetermined forward direction (X-X).
4. A mechanical model as claimed in any one of claims 2 to 3, wherein said first drive means (9) comprise, for each hind leg, a first connecting rod (15), for releasably engaging a first portion (14) of said hind leg, said first portion (14) being eccentric to said first axis of rotation (5), so that the to-and-from movement of said first connecting rod (15) causes the corresponding hind leg to rotate from the forward position to the backward position, and vice versa.
5. A mechanical model as claimed in any one of claims 2 to 4, wherein said first drive means (9) comprise elastic means (18) which act with a predetermined elastic force to bring each of said hind legs (4) to said operating position.
6. A mechanical model as claimed in any one of claims 2 to 5, wherein said second drive means (10) comprise:
 - means (23) for disengaging said first connecting rod (15) from said first portion (14) of the

- corresponding hind leg (4) so as to allow said hind leg (4) to rotate to said operating position;
- a rocker arm (24), which is supported in such a manner as to pivot about said first axis of rotation (5) and has a first end (24a) engaged with a drive bar (25), which is suitable for setting the angular position of said rocker arm (24) relative to said body (2), and an opposite end (24b) which is designed to act as an abutment for an abutting member (26), integrally associated to each hind leg (4).
7. A mechanical model as claimed in claim 6, wherein said first end (24a) of the rocker arm (24) is engaged with said drive bar (25) by means of a pivot (28), which is inserted in a sliding slot (27), formed in said drive bar (25).
 8. A mechanical model as claimed in any one of claims 2 to 7, wherein said additional support means (22) comprise an extension which projects from said model backwards, with respect to the forward sense of said model along said forward direction (X-X).
 9. A mechanical model as claimed in claim 8, wherein said extension (22) is the tail of said mechanical model.
 10. A mechanical model as claimed in any one of claims 2 to 9, wherein said additional support means (22) are associated to said body (2) so as to be able to reversibly pass from a first configuration to a second configuration, in which they are at a greater distance from said rear support means (4), to increase the extension of said second support area.
 11. A mechanical model as claimed in claim 10, wherein said additional support means (22) are associated to said body (2) so as to be able to reversibly pivot from the first configuration to the second configuration.
 12. A mechanical model as claimed in claim 10 or 11, comprising third drive means (11) for reversibly driving said additional support means (22) between the first configuration and the second configuration.
 13. A mechanical model as claimed in any one of claims 1 to 12, wherein said front support means (3) are associated to said body (2) so as to be able to pivot about a second axis of rotation (6) parallel to said first axis of rotation (5), said model comprising fourth drive means (12) for reversibly pivotally driving said front support means (3) between a forward position and a backward position, with respect to the forward sense of said model along said forward direction (X-X).
 14. A mechanical model as claimed in claim 13, wherein said front support means (3) comprise two opposed forelegs associated to said body (2) so as to be able to pivot about said second axis of rotation (6).
 15. A mechanical model as claimed in claim 2 or 14, wherein said first drive means (9) and said fourth drive means (12) are in kinematic operative connection so that, as a hind leg (4) pivots to the forward position, the corresponding foreleg (3) simultaneously pivots to the backward position, and vice versa, the movement of said support means (3, 4) imparting a forward movement in said forward direction (X-X) to said mechanical model on said support surface (P) in said first upright position.
 16. A mechanical model as claimed in claim 14 or 15, wherein each foreleg is composed of an upper connecting rod (3a), an intermediate connecting rod (3b) and an end connecting rod (3c), which are articulated together to reproduce the articulation of the forelegs of a horse, said upper connecting rod (3a) being associated to said body (2) so as to be able to pivot about said second axis of rotation (6).
 17. A mechanical model as claimed in claim 16, wherein:
 - said upper connecting rod (3a) and said intermediate connecting rod (3b) are connected at their ends by a first hinged joint, comprising a hinge pin (32) parallel to said second axis of rotation (6);
 - said intermediate connecting rod (3b) and said end connecting rod (3c) are connected at their ends by a second hinged joint, comprising a hinge pin (33) parallel to said first axis and
 - each foreleg (3) has respective means (34) for articulating said end connecting rod (3c) and said intermediate connecting rod (3b) to said upper connecting rod (3a), so that the foreleg (3) may reversibly pass from an extended configuration to a partially backwardly bent configuration, with respect to the forward sense of said model along said forward direction (X-X).
 18. A mechanical model as claimed in claim 17, wherein said articulating means comprise:
 - a tie connecting rod (35) for connecting a front portion of the intermediate connecting rod (3b), next to said first hinged joint, to a rear portion of the end connecting rod (3c), next to said second hinged joint;
 - elastic means (34), which exert a predetermined elastic force between said upper connecting rod (3a) and said intermediate connecting rod (3b) to rotate said intermediate connecting rod (3b) to said bent configuration;

- a crank and slotted link (38) adapted to perform a rotary and translational movement about said second axis of rotation (6), said crank and slotted link having the end turned toward said first hinged joint connected by a tie connecting rod (36) to a rear portion of the end connecting rod (3c) next to said first hinged joint, said crank and slotted link having the opposite end suitable to be driven by a cam (39), which is operatively associated to said fourth drive means (12) to drive said crank and slotted link (38) so that to cause the corresponding foreleg (3) to pass from the extended configuration to the bent configuration during the pivot of such foreleg from the forward position to the backward position, and vice versa.

19. A mechanical model as claimed in any one of claims 1 to 18, wherein said mechanical model comprises a jaw (40), which is associated to said body (2) in such a manner as to move from an open position to a closed position, in which fifth drive means (13) are provided to drive the jaw (40) between said open and closed positions.

20. A mechanical model as claimed in claim 19 or 15, in which said jaw (49) is rotatably supported by a pivot (42), which is integral with said body (2) and said fifth drive means (13) comprise a rocker lever (41) having a first end designed to be driven by a slider associated to said fourth drive means (12), and an opposite end connected to said jaw (40) by two interposed connecting rods (43), which are designed to control the rotation of the jaw about said pivot (42).

21. A method of operating a mechanical model of an animal as claimed in any of claims 1 to 20, said model comprising:

- a body (2) having rear support means (4) and front support means (3), which cooperate to support said mechanical model on a support surface (P), in a first upright position, in which the vertical drawn from the centre of mass (G) of said model passes through a first support area defined by said front support means (3) and said rear support means (4),
- additional support means (22), which are in a more backward position than said rear support means (4), with reference to a predetermined forward direction (X-X), that said mechanical model can follow in said first upright position on said support surface (P), thanks to the movement of the rear support means (4),

said method providing the step of pivotally driving in a reversible manner the rear support means (4) relative to the body (4), from a forward position to a

backward position, with respect to the forward sense of said model along said forward direction (X-X), by causing them to pivot about a first axis of rotation (5) transverse to the predetermined forward direction (X-X), to obtain a forward movement of the mechanical model into an upright position on said support surface (P),

characterized in that it comprises a step of rotating said rear support means (4) to an operating position that is more forward than said forward position, with respect to the forward sense of said model along said forward direction (X-X), to such an extent that said rear support means (4) are more forward than the vertical drawn from the centre of mass (G) of the mechanical model, said step of rotating said rear support means (4) to the operating position causing a backward rotation of said body (2), which brings said mechanical model to a second upright position in which said model is supported on said support surface (P) by said rear support means (4) and by said additional support means (22).

22. A method as claimed in claim 21, providing a subsequent step of rotating said rear support means to the backward position to cause said body (2) to rotate forwards, considering its forward direction along said forward direction, until said mechanical model rests on both front support means (3) and rear support means (4), thereby causing said mechanical model to pass from the second upright position to the first upright position.

23. A method as claimed in claim 21 or 22, wherein said rear support means (4) are two opposed hind legs and, before said step of rotating said hind legs into the operating position, said method provides a step in which said hind legs are substantially aligned in a direction substantially perpendicular to said forward direction (X-X).

24. A method as claimed in any of claims 21 to 23, wherein said rear support means (4) are two opposed hind legs and said method provides the step of rotating said hind legs to the operating position while maintaining said hind legs in substantial alignment in a direction substantially perpendicular to said forward direction (X-X).

25. A method as claimed in any one of claims 21 to 24, providing the step of rotating the rear support means (4) from the operating position to the forward position while said mechanical model is in said second upright position to raise said body (2) with respect to said support surface (P).

26. A method as claimed in any one of claims 21 to 25, wherein said additional support means (22) are associated to said body (2) in such a manner that they

can reversibly pivot relative to it from a first configuration to a second configuration, in which they are at a greater distance from said rear support means (4), thereby increasing the stability of said mechanical model in said second upright position, said method providing the step of rotating said additional support means (22) from the first to the second configuration, as said rear support means (4) move from the forward position to said operating position.

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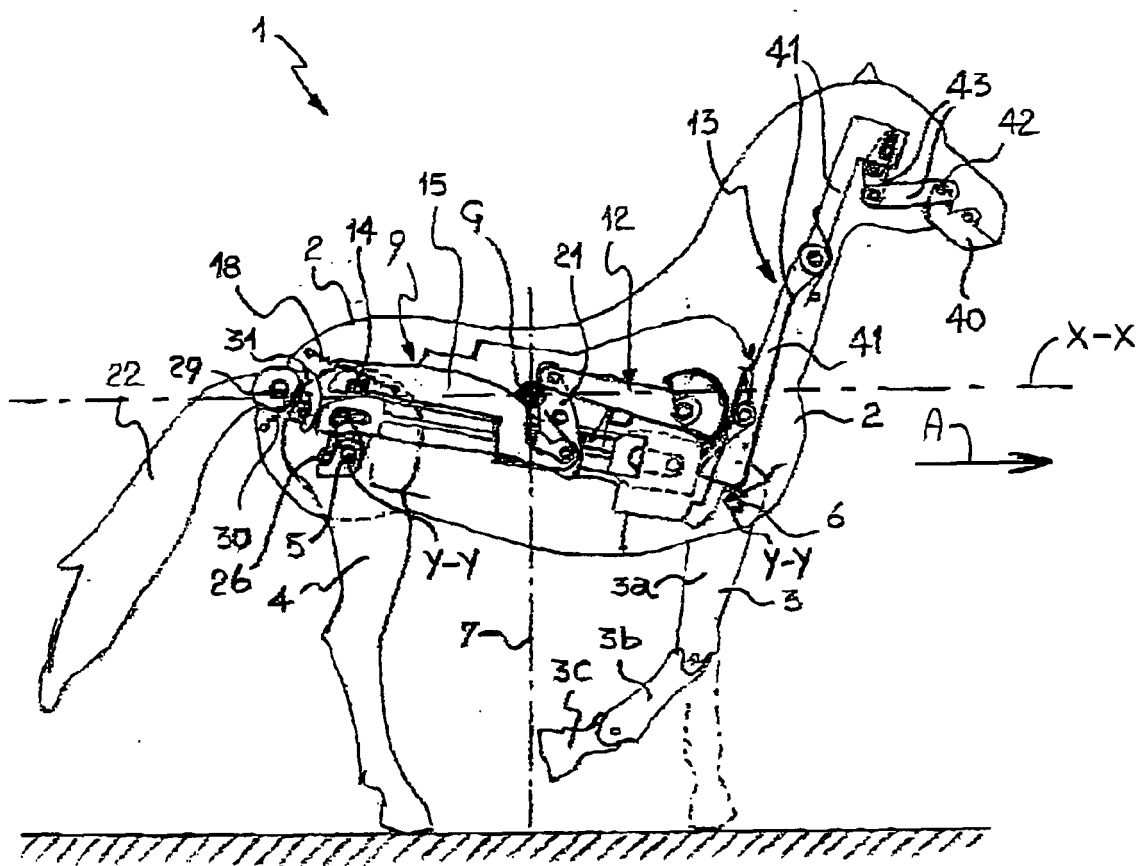


Fig. 1

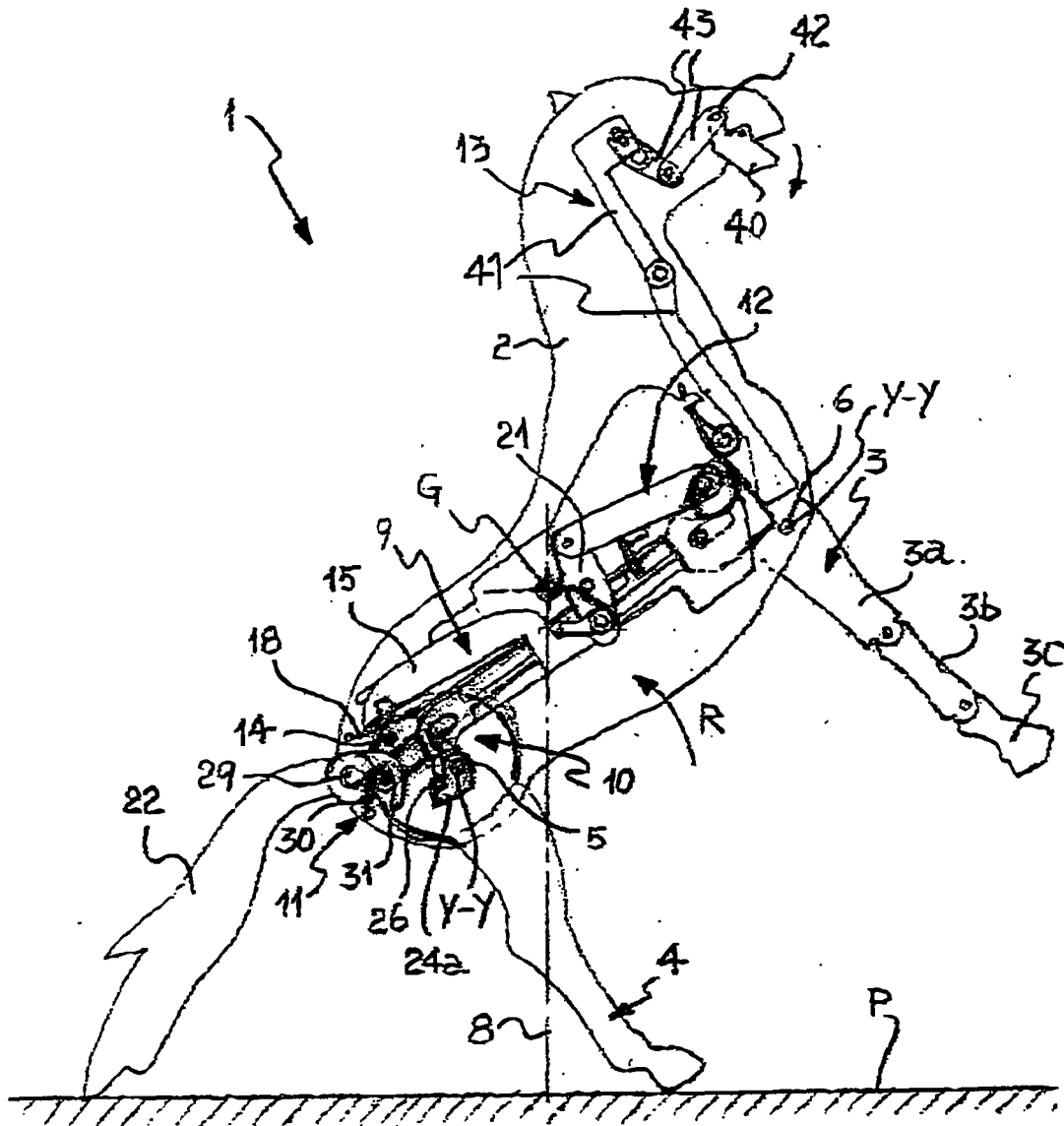
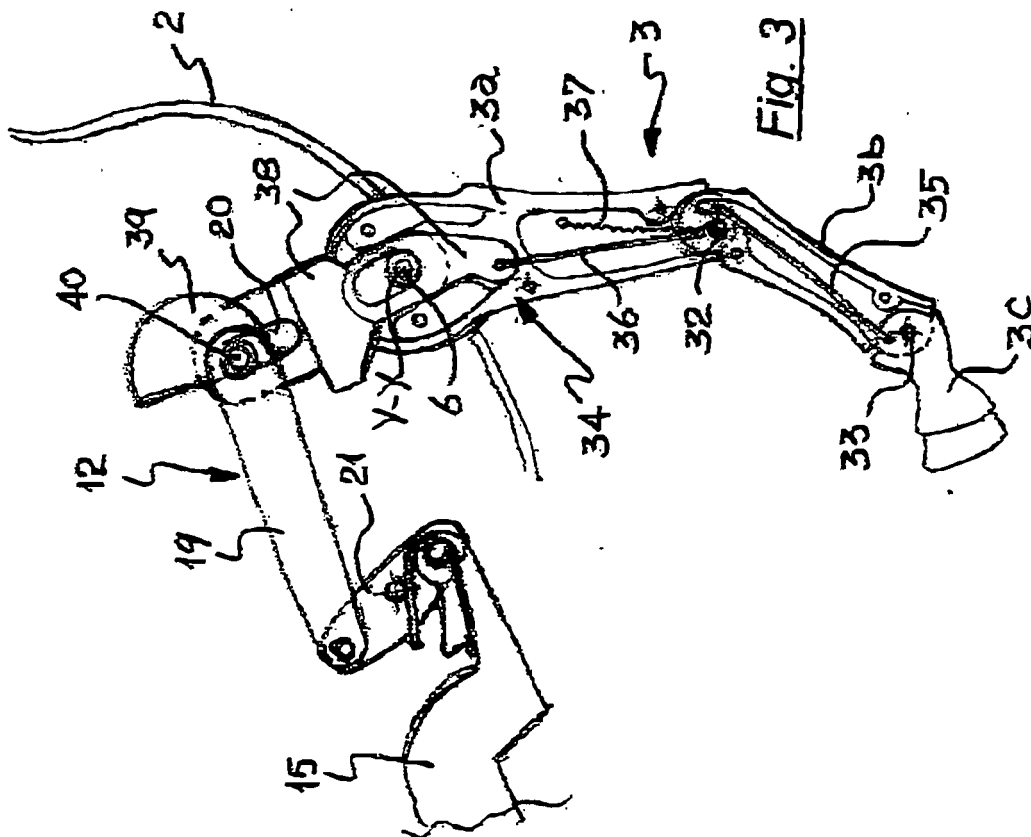
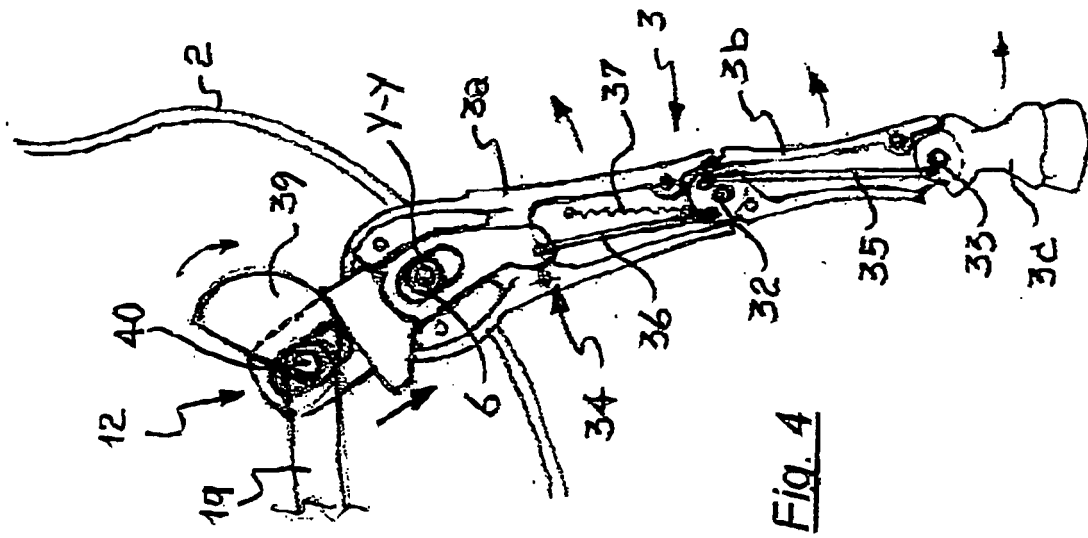


Fig. 2



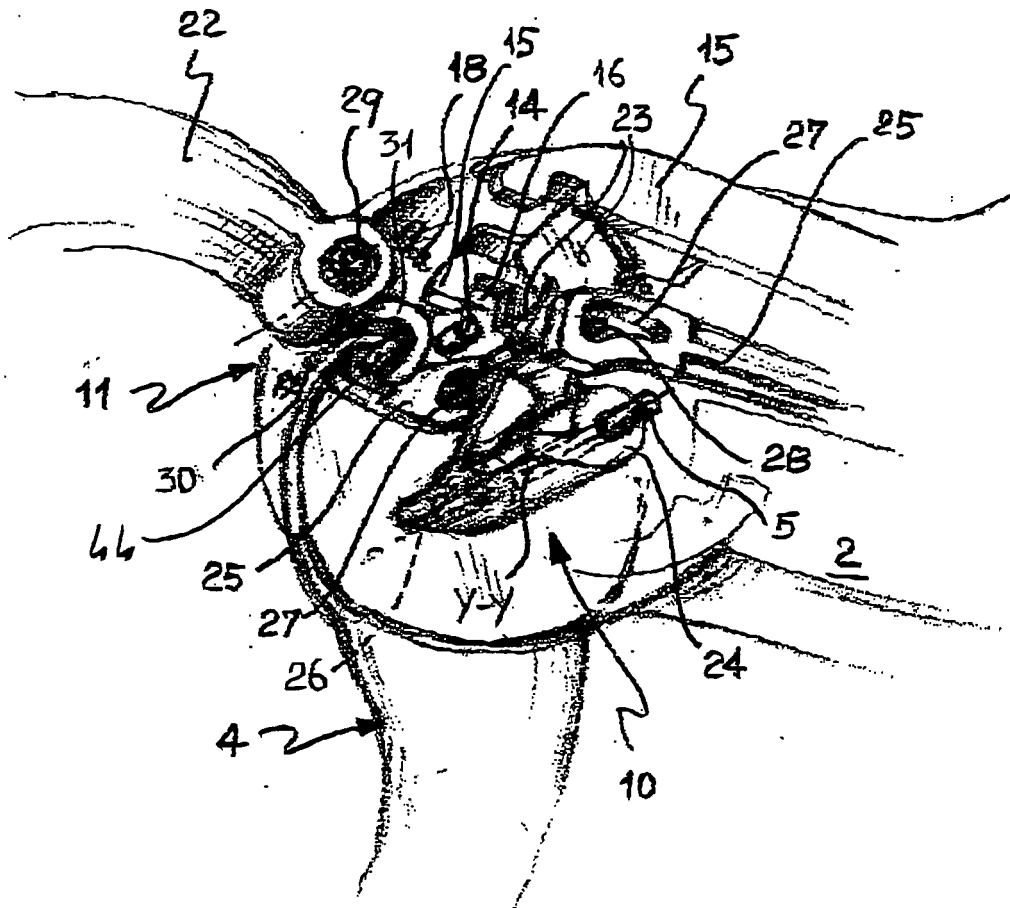
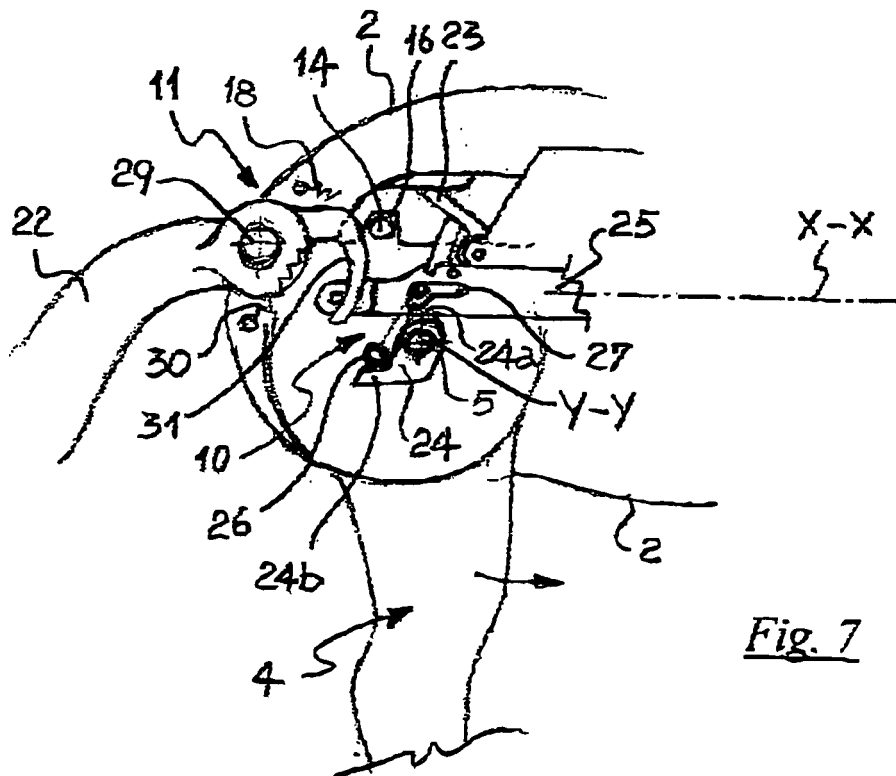
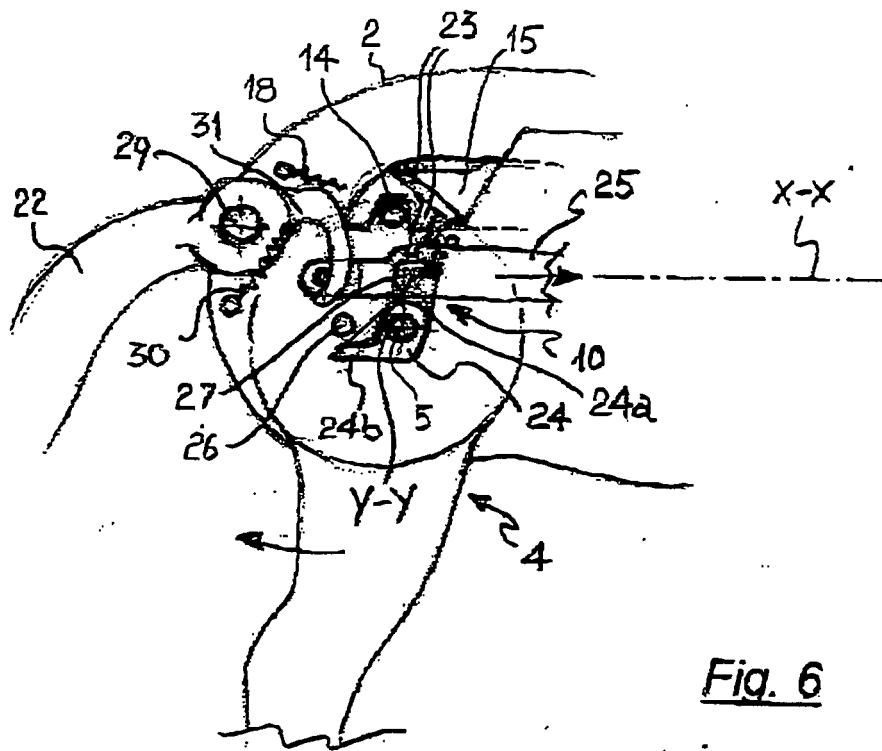


Fig. 5



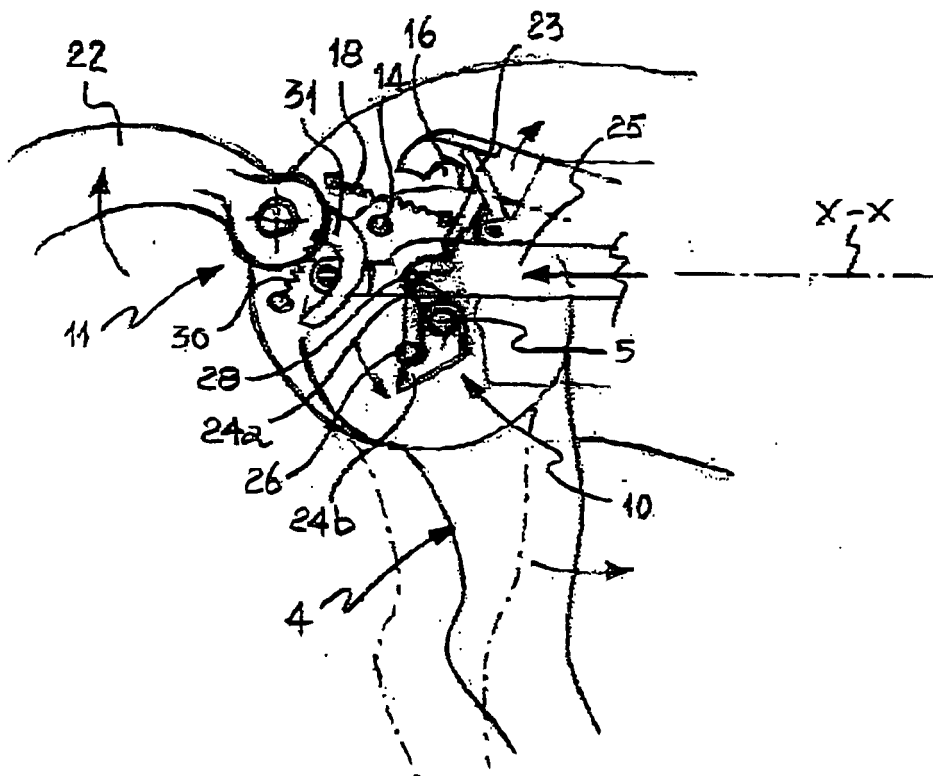


Fig. 8



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EUROPEAN SEARCH REPORT

Application Number
EP 05 01 1588

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	DE 586 947 C (M. KOHNSTAM & CO) 27 October 1933 (1933-10-27)	1-15, 21-26	A63H11/18
Y	* the whole document *	16-20	
Y	US 6 752 683 B1 (GODFREY THOMAS P) 22 June 2004 (2004-06-22) * column 3, line 12 - column 5, line 34; figures *	16-18	
Y	US 2001/041497 A1 (HORNSBY JAMES R ET AL) 15 November 2001 (2001-11-15) * page 3, paragraph 36; figure 12 *	19,20	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			A63H
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 18 October 2005	Examiner Bagarry, D
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18-10-2005

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