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(54) **Height adjusting device for use in string puller of string pulling block of stringing machine**

(57) A height adjusting device for use in string puller of string machine comprises the string machine including a rod member (f) for connecting with a string pulling block (c) allowing to move relative to the rod member (f) and at least having a string puller (c1) and a lever (c2) disposed thereon, wherein the height adjusting device includes the string pulling block (c) having an upper support (c3) provided therein and having a tilted slidable mount (1) disposed thereon, includes a low-

er support (c4) mounted on the rod member (f), having a tilted coupling seat (2) affixed thereon and connecting with the string puller (c1), the coupling seat (2) is obliquely coupled with the lower support (c4) and involves an inclined rail (21) arranged thereon for axially moving a sliding member (211) therein, by attaching the slidable seat (1) onto the sliding member (211) for pivotally connecting with the rail (21), the upper support (c3) may obliquely move upward and downward along the rail (21), thus adjusting the height of the string puller (c1).

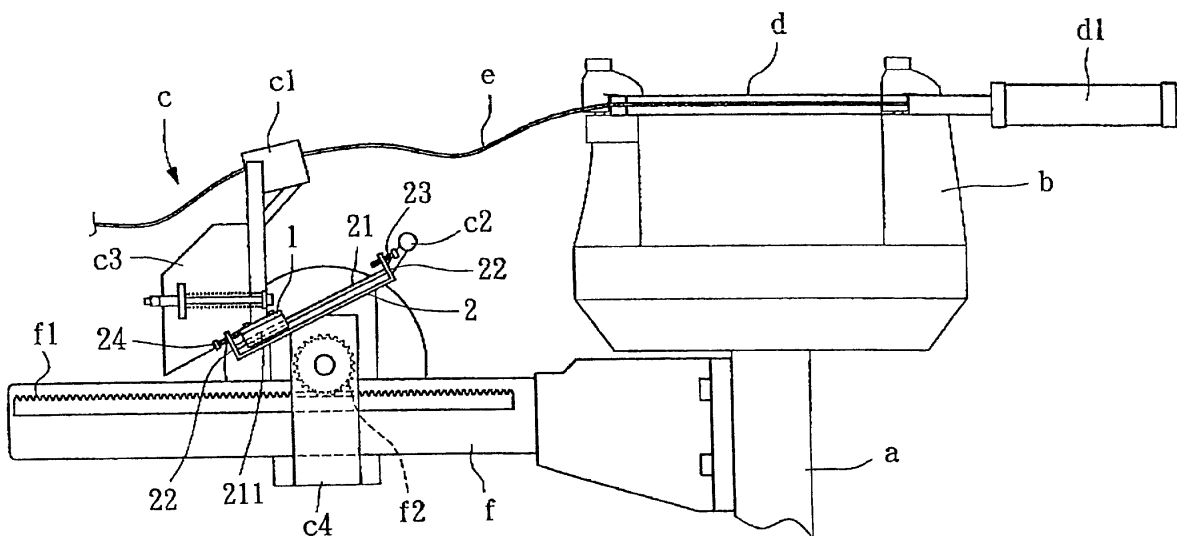


FIG. 5

Description**BACKGROUND OF THE INVENTION**Field of the Invention

[0001] The present invention relates to a height adjusting device for use in string puller of string pulling block of string machine that may improve the stringing quality and facilitate the height adjustment of the string pulling block.

Description of the Prior Arts

[0002] Tennis and badminton are both a healthy and intellectual sport. To develop the skill of playing tennis or badminton, a racket and strings with a precise pound number are both an indispensable winning factor in a tennis or badminton game. Besides, the string method of racket also influences the service lives of racket and strings.

[0003] A prior art string machine comprises a base a, a holder b and a string pulling block c (as shown in FIG. 1), wherein the holder b is axially connected to the top of the base a for 360 degree rotation and positioning, and the string pulling block c includes a string puller c1 and a lever c2 both arranged thereon. A rod member 10 for combining with the string pulling block c is coupled onto the upper side of the base a (as illustrated in FIG. 2) and includes racks 101 arranged thereon, such that the string pulling block c may move along the racks 11. In other words, the string pulling block c may move relative to the rod member 10.

[0004] In operation, the frame d is supported by the holder b, and the string e is fixed between the string puller c 1 of the string pulling block c and the frame d (as shown in FIG. 2), thereafter, the pound number of the string is set, and by rotating the lever c2, the set pound number of the string is achieved, thereby assembling the longitudinal and lateral strings e of the frame d in turns.

[0005] However, such a prior art string machine still has the following defects:

1. Easily harming the frame d and the string e: Since the various kinds of frames d are not provided with the same thickness, yet the heights of the holders b and the string pulling blocks c are fixed, after inserting the string e between the string puller c1 of the string pulling block c and the frame d, causing an included angle θ therebetween (as illustrated in FIG. 2), hence as pulling the string e, the force of the frame d is unequal because of a friction, obtaining an imprecise pound number. Furthermore, the string e or the frame d is easily broken because of the friction between the through holes formed in the frame d and the string e.

2. Disadvantageous operation: Since the various kinds of frames d are not provided with the same

thickness, yet the heights of the holders b and the string pulling blocks c are fixed, during the rotation of the frame d, a grip d1 of the frame d contacts with the string puller c1 (as illustrated in FIGS. 3 and 4), resulting in an disadvantageous operation.

[0006] The present invention has arisen to mitigate and/or obviate the afore-described disadvantages.

SUMMARY OF THE INVENTION

[0007] The primary object of the present invention is to provide a height adjusting device for use in string puller of string pulling block of string machine that may protect strings and a frame from harm.

[0008] Another object of the present invention is to provide a height adjusting device for use in string puller of string pulling block of string machine that may avoid the contact of the frame and a string puller during the rotation of the frame.

[0009] In accordance with one aspect of the present invention, there is provided a height adjusting device for use in string puller of string pulling block of string machine comprising a base, a frame, a string pulling block and a rod member, wherein the rod member includes racks provided thereon and having a gear meshed on the upper side thereof such that the string pulling block mounted on the rod member may be meshed with the racks by way of the gear and moved along the racks, the string pulling block at least contains a string puller and a lever disposed thereon.

[0010] The height adjusting device includes a string pulling block having an upper support provided therein and having a titled slidable mount disposed thereon, includes a lower support mounted on the rod member, having a titled coupling seat affixed thereon and having a string puller connected thereon, and includes a string puller fixed on the upper support, wherein the slidable mount is obliquely connected with the upper support and involves abutting portions formed on two sides thereof;

the coupling seat is obliquely coupled with the lower support and involves an inclined rail arranged thereon for axially moving a sliding member therein. Moreover, by attaching the slidable seat onto the sliding member for pivotally connecting with the rail, the upper support may obliquely move upward and downward along the rail, thus adjusting the height of the string puller. The coupling seat further includes two side plates in response to each other secured at two sides thereof for receiving the rail therein and for sliding the slidable mount between the two side plates thereof. Besides, one of the side plates includes a micro-adjustable screw screwed thereon, and another of the side plates includes a micro-adjustable screw screwed thereon, the micro-adjustable screw and the adjusting screw are in response to the abutting portions of the slidable mount respectively.

[0011] In assembly, a frame is supported on the holder,

and a string is fixed between a string puller of the string pulling block and the frame. Thereafter, the pound number of the string is set, in the meantime, since the string is in an extension state, the slidable mount of the upper support obliquely moves upward by means of the string pulling block, thereby the string inserted between the frame and the string puller is almost in a horizontal state, and one of the abutting portions is biased against the micro-adjustable screw of the coupling seat, then the micro-adjustable screw is rotated for having a micro adjustment to let the string become horizontal, and since the micro-adjustable screw abuts against the abutting portion, during the string pulling process, the string will be kept in a horizontal state. Finally, by rotating the lever, the gear urges the string pulling block to cause an upper movement on the rack, hence the set pound number of the string is obtained, assembling the longitudinal and lateral strings of the frame in turns.

[0012] If turning the frame for stringing, the string outside the frame becomes loose, therefore the slidable mount obliquely and downwardly moves toward another abutting portion which is biased against the adjusting screw of the coupling seat. To avoid a grip contacting with the string puller of the string pulling block during the rotation of the frame, the adjusting screw is rotated, simultaneously, the heights of the slidable mount, upper support and the string puller are descended without causing the grip to contact with the string puller, facilitating rotation in different directions.

[0013] The present invention will become more obvious from the following description when taken in connection with the accompanying drawings, which show, for purpose of illustrations only, the preferred embodiment in accordance with the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014]

FIG. 1 is a perspective diagram illustrating the exploded components of a prior art string machine;

FIG. 2 is a side diagram illustrating an angle occurring between a frame of the prior art string machine and a string;

FIG. 3 is a top plane diagram illustrating a grip contacting with a string puller of a string pulling block after the rotation of the frame of the prior art string machine;

FIG. 4 is a side diagram according to FIG. 3;

FIG. 5 is an assembly side diagram of a height adjusting device for use in string puller of string pulling block of string machine according to the present invention;

FIG. 6 is a perspective diagram illustrating the exploded components of the height adjusting device for use in string puller of string pulling block of string machine according to the present invention;

FIG. 7 is an operational side diagram of the height

adjusting device for use in string puller of string pulling block of string machine according to the present invention;

FIG. 8 is an operational side diagram illustrating a string puller of the present invention being moved upward;

FIG. 9 is an operational side diagram illustrating the string puller of the present invention being moved downward.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0015] Referring to FIG. 5, a height adjusting device for use in string puller of string pulling block of string machine in accordance with the present invention comprises a base a, a frame b, a string pulling block c and a rod member f, wherein the rod member f includes racks f1 provided thereon and having a gear f2 meshed on the upper side thereof such that the string pulling block c mounted on the rod member f may be meshed with the racks f1 by way of the gear f2 and moved along the racks f1, the string pulling block c at least contains a string puller c1 and a lever c2 disposed thereon (as illustrated in FIG. 6).

[0016] The height adjusting device includes a string pulling block c having an upper support c3 provided therein and having a titled slidable mount 1 disposed thereon (as shown in FIG. 6), includes a lower support c4 mounted on the rod member f1, having a titled coupling seat 2 affixed thereon and having a string puller c2 connected thereon, and includes a string puller c1 fixed on the upper support c3, wherein

the slidable mount 1 is obliquely connected with the upper support c3 and involves abutting portions 11 formed on two sides thereof;

the coupling seat 2 (as shown in FIGS. 5 and 6) is obliquely coupled with the lower support c4 and involves an inclined rail 21 arranged thereon for axially moving a sliding member 211 therein. Moreover, by attaching the slidable seat 1 onto the sliding member 211 for pivotally connecting with the rail 21, the upper support c3 may obliquely move upward and downward along the rail 21 (as illustrated in FIG. 7), thus adjusting the height of the string puller c1. The coupling seat 2 further includes two side plates 22 in response to each other secured at two sides thereof for receiving the rail 21 therein and for sliding the slidable mount 1 between the two side plates 22 thereof. Besides, one of the side plates 22 includes a micro-adjustable screw 23 screwed thereon, and another of the side plates 22 includes a micro-adjustable screw 23 screwed thereon, the micro-adjustable screw 23 and the adjusting screw 24 are in response to the abutting portions 11 of the slidable mount 1 respectively (as shown in FIG. 7).

[0017] In assembly, a frame d is supported on the holder b, and a string e is fixed between a string puller c 1 of the string pulling block c and the frame d (as shown in

FIG. 8). Thereafter, the pound number of the string e is set, in the meantime, since the string e is in an extension state, the slidable mount 1 of the upper support c3 obliquely moves upward by means of the string pulling block c, thereby the string e inserted between the frame d and the string puller c1 is almost in a horizontal state, and one of the abutting portions 11 is biased against the micro-adjustable screw 23 of the coupling seat 2, then the micro-adjustable screw 23 is rotated for having a micro adjustment to let the string e become horizontal, and since the micro-adjustable screw 23 abuts against the abutting portion 11, during the string pulling process, the string e will be kept in a horizontal state. Finally, by rotating the lever c2, the gear f2 urges the string pulling block c to cause an upper movement on the rack f1 hence the set pound number of the string e is obtained, assembling the longitudinal and lateral strings of the frame d in turns.

[0018] If turning the frame d for stringing, the string e outside the frame d becomes loose, therefore the slidable mount 1 obliquely and downwardly moves toward another abutting portion 11 which is biased against the adjusting screw 24 of the coupling seat 2 (as shown in FIG. 9). To avoid a grip d1 contacting with the string puller c1 of the string pulling block c during the rotation of the frame d, the adjusting screw 24 is rotated, simultaneously, the heights of the slidable mount 1, upper support c3 and the string puller c1 are descended without causing the grip d1 to contact with the string puller c1, facilitating rotation in different directions.

[0019] It can be clearly seen from the preceding accounts on the features of the present invention that the height adjusting device for use in string pulling block of string machine of the present invention has the following advantages:

1. Protecting the string e and the frame d from harm: Since the heights of the upper support c3 and the string puller c1 may be adjustable, enabling to adjust the frame d to move at different heights, such that the string e inserted between the frame d and the string puller c1 is in a horizontal state. In other words, no any angle occurs between the frame d and the string e, thus avoiding the contact of the string e and the through holes formed in the frame d, and the friction of the frame d and string e.
2. Avoiding the contact of the frame d and the string puller c1 during the rotation of the frame d, accordingly by rotating the adjusting screw 24 backward, the heights of the slidable mount 1, the upper support c3 and the string puller c1 may be further descended, and the grip d1 doesn't contact with the string puller c1 of the string pulling block c, facilitating the rotation in different directions.

[0020] On the other hand, the movement of the string puller c1 and the micro adjustments of the slidable mount 1 may be achieved by means of an electronic controlling

system, causing a precise position.

[0021] The invention is not limited to the above embodiment but various modifications thereof may be made. It will be understood by those skilled in the art that various changes in form and detail may be made without departing from the scope and spirit of the present invention.

Claims

1. A height adjusting device for use in string puller of string pulling block of string machine comprising:

the string machine including a rod member (f) for connecting with a string pulling block (c) allowing to move relative to said rod member (f) and at least having a string puller (c1) and a lever (c2) disposed thereon, wherein the height adjusting device includes said string pulling block (c) having an upper support (c3) provided therein and having a titled slidable mount (1) disposed thereon, includes a lower support (c4) mounted on said rod member (f), having a titled coupling seat (2) affixed thereon and connecting with said string puller (c1), said coupling seat (2) is obliquely coupled with said lower support (c4) and involves an inclined rail (21) arranged thereon for axially moving a sliding member (211) therein, by attaching said slidable seat (1) onto said sliding member (211) for pivotally connecting with said rail (21), said upper support (c3) may obliquely move upward and downward along said rail (21), thus adjusting the height of said string puller (c1).

2. The height adjusting device for use in string puller of string pulling block of string machine as claimed in claim 1, wherein said slidable mount (1) slides along said rail (21).
3. The height adjusting device for use in string puller of string pulling block of string machine as claimed in claim 2, wherein said slidable mount (1) is obliquely connected with said upper support (c3).
4. The height adjusting device for use in string puller of string pulling block of string machine as claimed in claim 1, wherein said coupling seat (2) includes two side plates (22) in response to each other secured at two sides thereof for receiving said rail (21) therein.
5. The height adjusting device for use in string puller of string pulling block of string machine as claimed in claim 4, wherein one of said side plates (22) contains a micro-adjustable screw (23) screwed therein, and another of said side plates (22) involves an adjusting screw (24) screwed therein.

6. The height adjusting device for use in string puller of string pulling block of string machine as claimed in claim 5, wherein said slidable mount (1) involves abutting portions (11) formed on two sides thereof for corresponding to a micro-adjustable screw (23) and an adjusting screw (24) individually.

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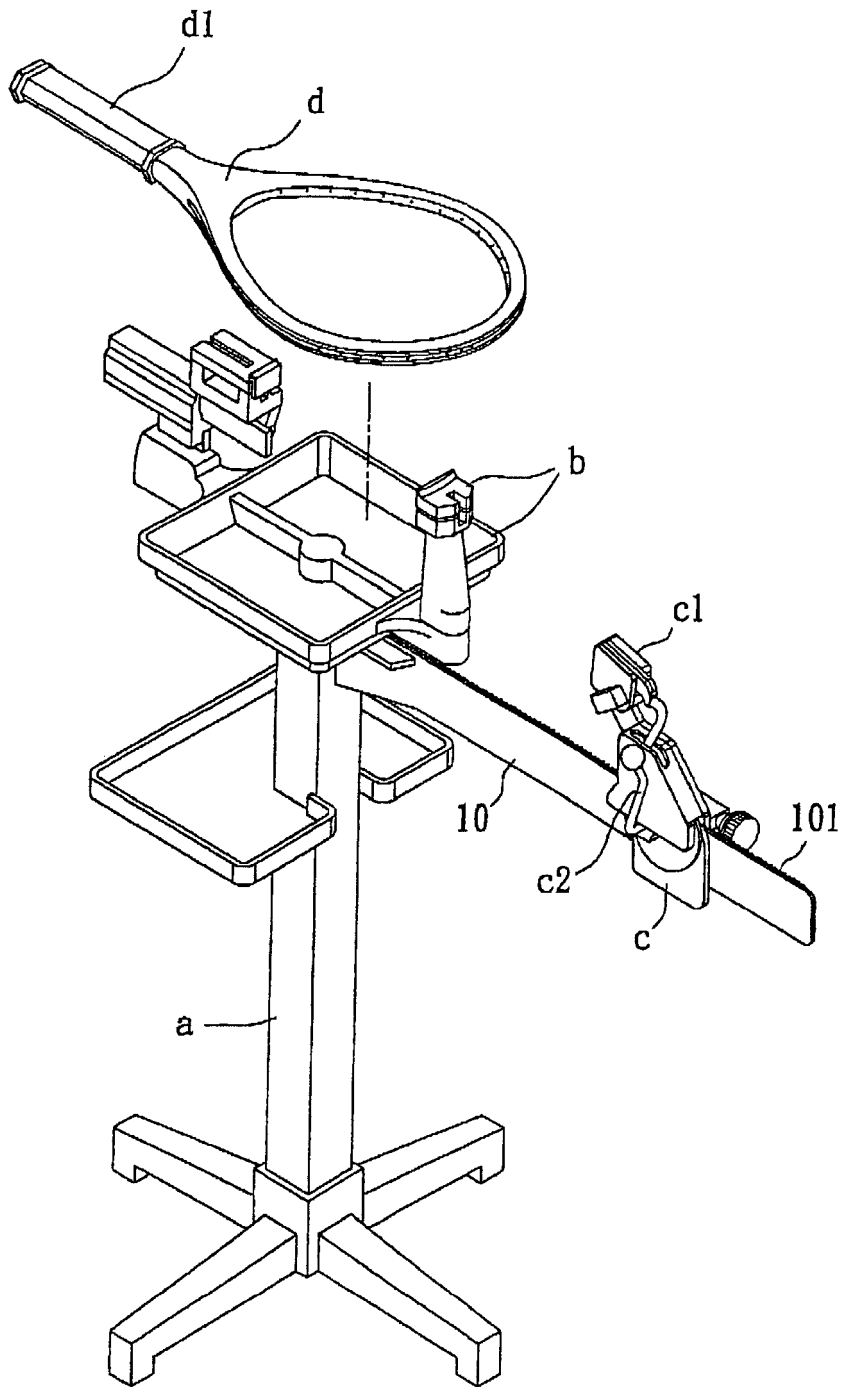


FIG. 1
PRIOR ART

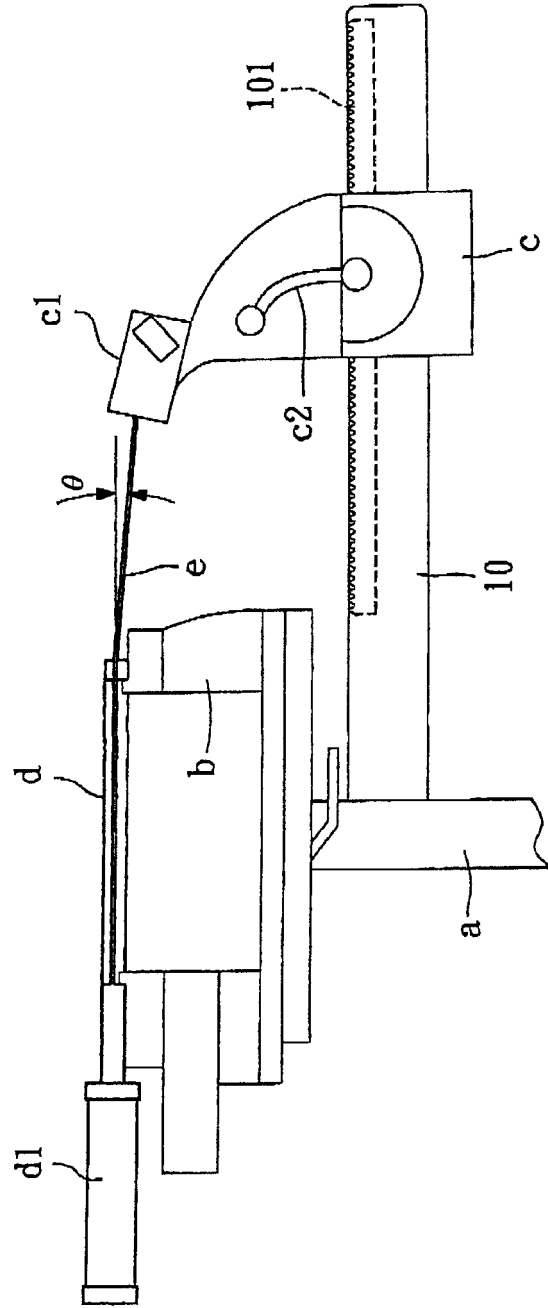


FIG. 2
PRIOR ART

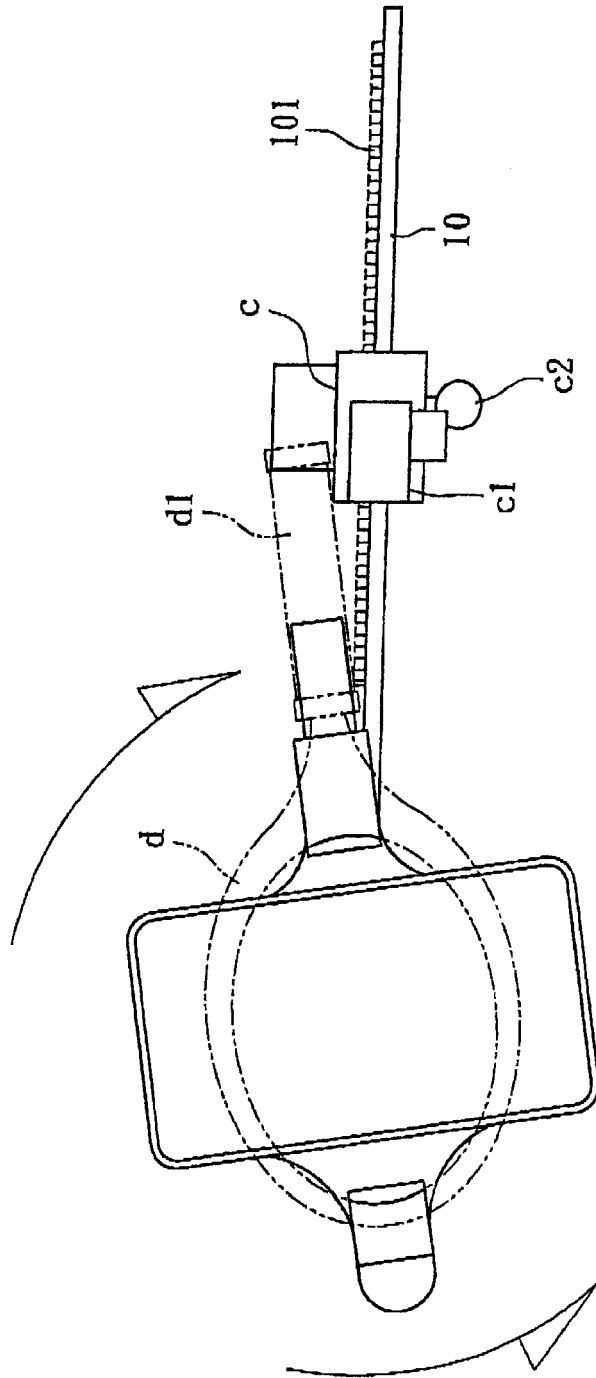


FIG. 3
PRIOR ART

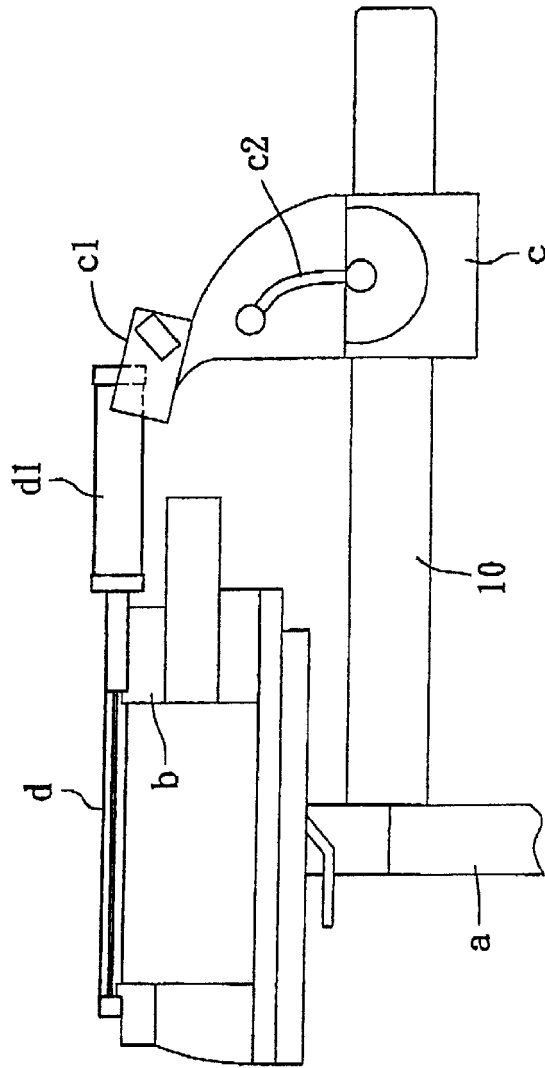


FIG. 4

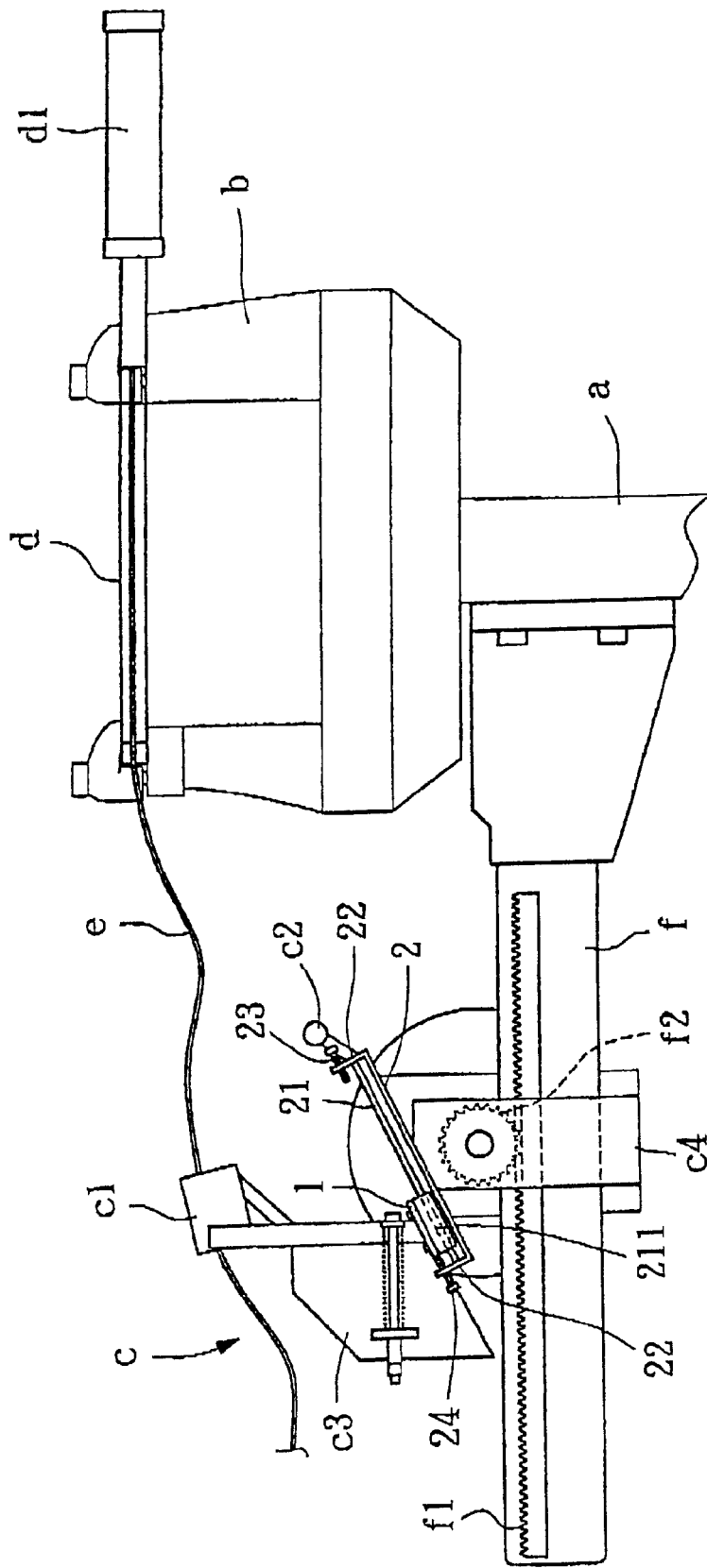


FIG. 5

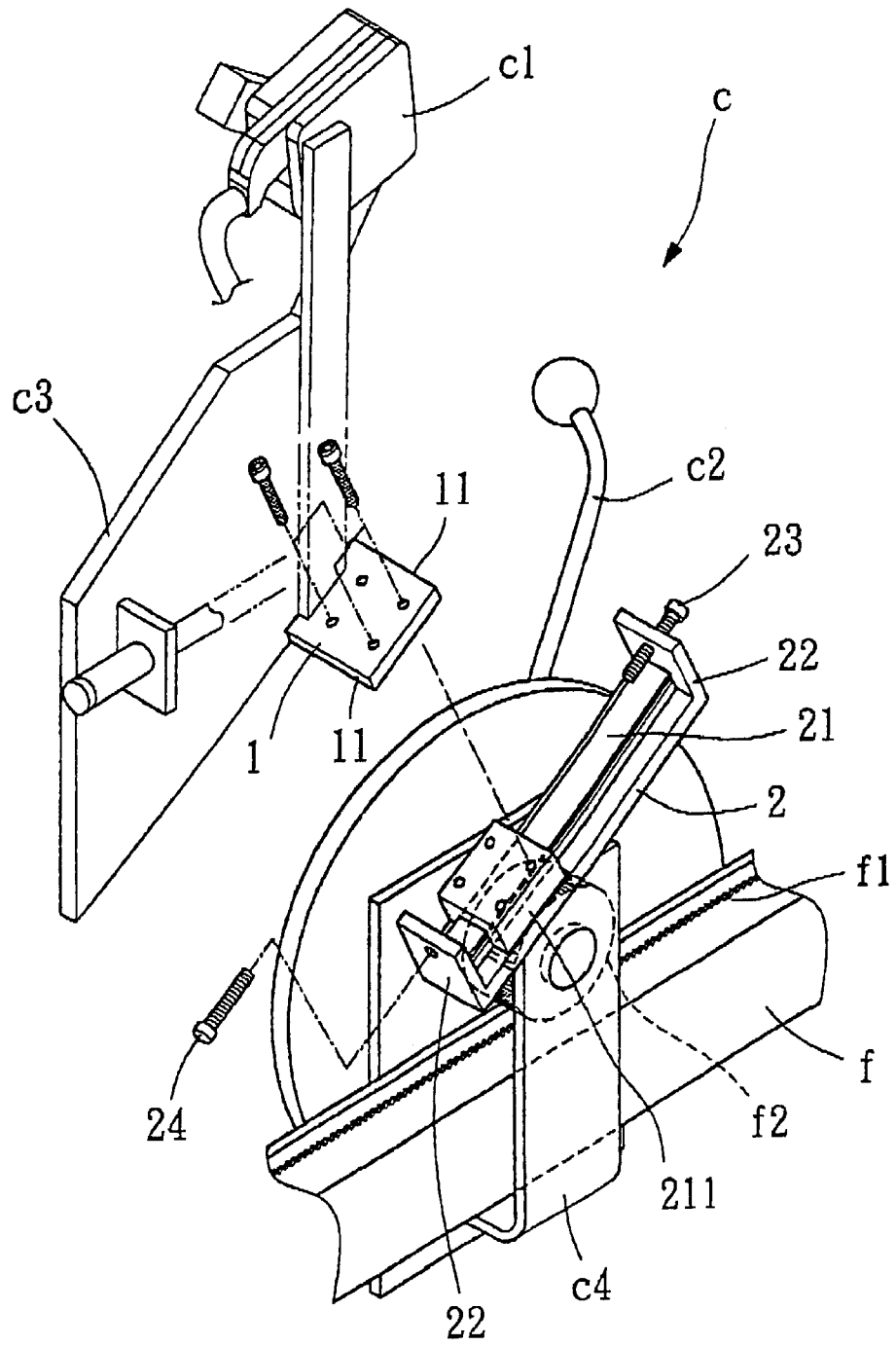


FIG. 6

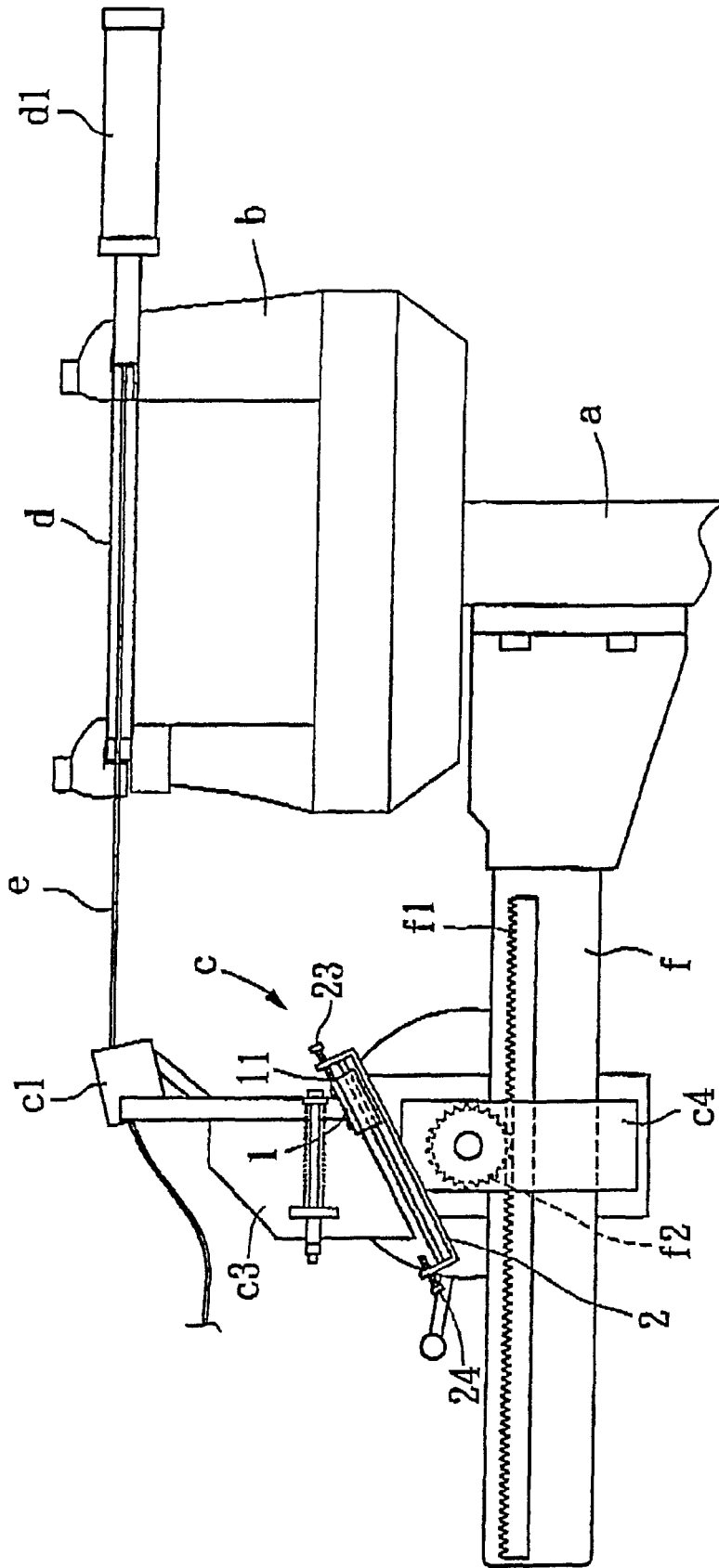


FIG. 8

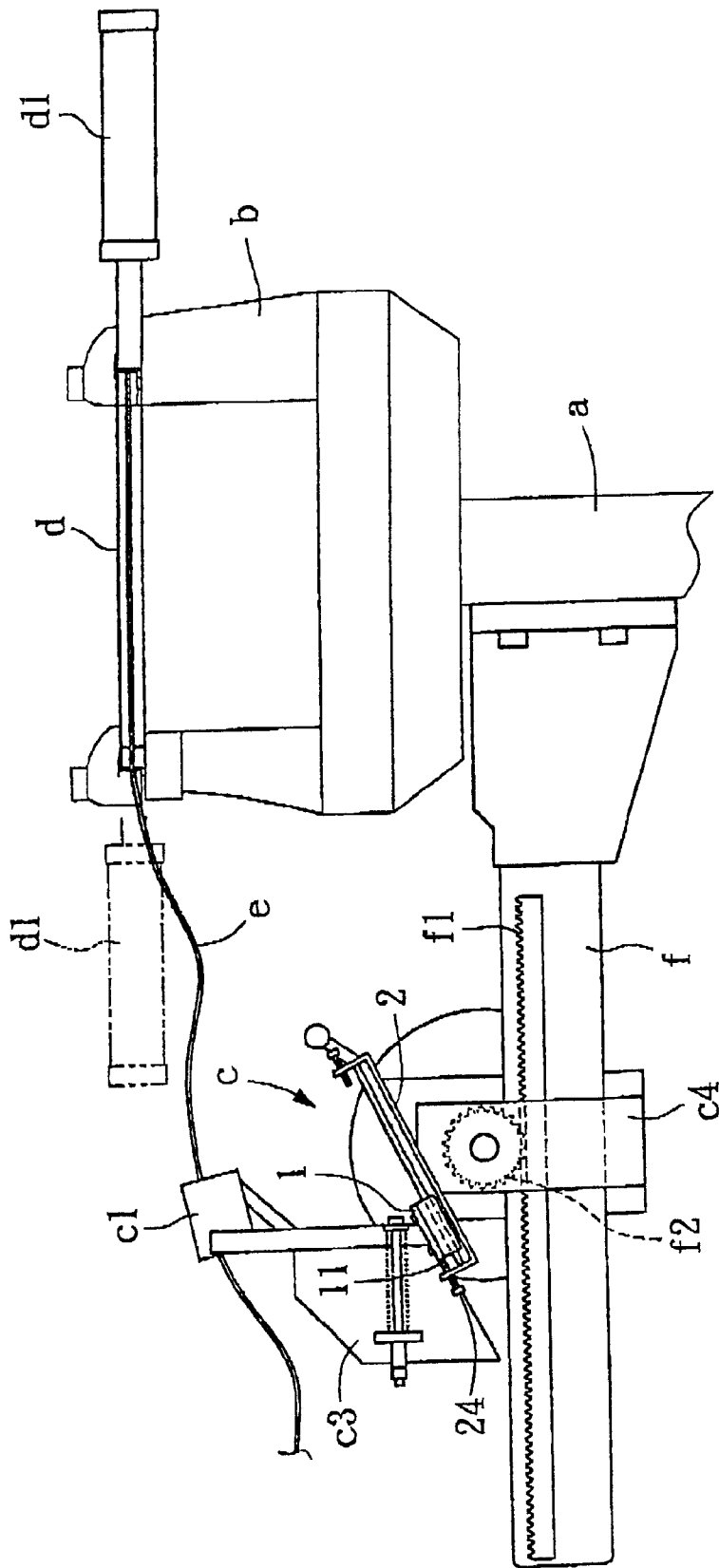


FIG. 9



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	EP 0 382 652 A (BABOLAT VS [FR]) 16 August 1990 (1990-08-16) * column 2, line 41 - line 48 * * column 3, line 6 - line 14 * * column 4, line 1 - line 25 * * column 10, line 36 - line END * * column 11, line 1 - line 35 * * claims 9,10 * * figures 1,8-10,12,13 * -----	1	INV. A63B51/14
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A	WO 95/11728 A (PRINCE SPORTS GROUP INC [US]) 4 May 1995 (1995-05-04) * abstract; figures 5,7 * -----	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			A63B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		9 January 2008	Tejada Biarge, Diego
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 07 11 5594

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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09-01-2008

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