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(54) DEVICE FOR TRAINING SPORTSMEN IMPACT MOVEMENTS

(57) The invention is intended for training and perfection of the technique and accuracy of striking motion in various kinds of sports: baseball, football, hockey, golf, tennis. The device contains frame 5, target 12 and the target reset block. The target reset block includes stick 1 one end of which is fixed on frame 5, and the second is connected to target 12. The stick is provided with roller stop blocks 9. The frame is cramp-like and is provided with the arc guides for the roller stop blocks. Shock absorbers 11 are located in the extreme positions of the stick travel. Bracing wire 8 and guides 7 for the bracing wire, made in the form of the rollers fixed on the perimeter of the frame, are introduced into the target reset block. The fastener assembly of frame 5 to post 16 is made in the form of metal fastening ring 15 provided with clips 6 for fastening on the post at the chosen height, and the carrying frame is provided with clips for fastening on the metal ring at the set angle. Frame 5 can be fixed at any angle on ring 15 by means of stop blocks 26 and a clip corresponding stick with thread 28 with nut 29, provided with handles-levers 30.

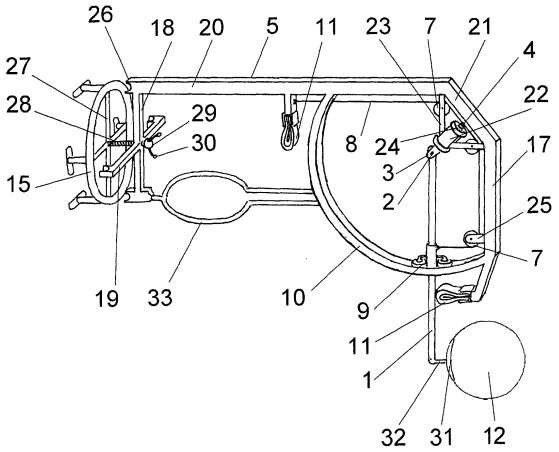

Figure 2

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Description

Tehcnology field

[0001] The invention relates to sports-training devices of striking type intended mainly for training and perfection of the ball striking technique motion in various kinds of sports, for example, such as baseball, football, hockey, golf, tennis.

Prior art background

[0002] The device for training of sportsmen' striking technique, containing a housing and a spring-loaded stick with elastic object of stroke mounted in it in a tubular guide is known (see Author's Certificate (A.C.) of the USSR №387720, MPK A63B69/00, published on November 19, 1974). The tubular guide is fixed in the housing movably, and one of its ends is spring-loaded.

[0003] However the reciprocating mechanism of the device provides ball's motion along a straight line while the hand moves arc-wise. Different trajectories of the ball and the hand lead to infringement of biomechanical conditions of impact which affects the quality of training. The device is insufficiently effective for training of the striking technique also because the restrictions on the freedom degree involve high accuracy requirements of the striking motion performance. It is unacceptable at training of sportsmen-beginners because they do not have motor skill of striking motion.

[0004] The device for tennis players' training, containing a pendular arm mounted on the post with possibility of rotation around the pendulum axis and fitted with the rotating element on the free end, simulating a tennis ball with the resilient elastic element installed to ensure rotation at a stroke with a racket, is known. After the stroke at the ball the pendulum automatically returns to the initial position. The device can be regulated on height. The pendulum can turn and stop in vertical or horizontal positions (see EP1728536, MPK A61B69/00).

[0005] However the device does not provide training of all kinds of striking motions in tennis, and also has small amplitude of the target motion and the long period of post-stroke vibration.

[0006] The closest to the proposed solution is the device for training and perfection of volleyball spike technique (see patent of the Russian Federation (RF) №2301696, MPK A63B69/00, published on June 27, 2007). The device contains a carrying frame, a ball, a block of ball reverse into the initial position, containing a stick, one end of which is fixed on the frame with possibility of guaranteeing of not less than two degrees of freedom, and the second end is connected to the ball, an elastic bracing wire, connected to the frame with one end, and to the stick with the second end, a stick restraining arm in the form of the trapezoid frame, fixed between the ends of the carrying frame, the shock absorbers located in extreme positions of the stick travel.

[0007] However the given device permits to train only one type of the stroke from one position which is not enough for complex trainings and practicing of skills. Besides, the design does not provide durable work as at a wrong stroke (that is not a rarity at sportsmen-beginners) a rigid contact of the stick with the restraining arm takes place. It can lead to breakage of both the stick and its fastening to the frame.

Disclosure of the invention

[0008] The invention task is creation of the device for training and perfection of the striking motion techniques, permitting to practice all possible strokes (ball service, lateral strokes from the left and from the right, stroke at the ball at its being at the ground, strokes with the ball twisting), having a reliable design and long service life.

[0009] The technical result of the invention is possibility of practicing of all kinds of strokes with a hand, a foot, a bat, a stick, a tennis racket or something else at the target due to application of a special fastening providing installation of the training apparatus at various height and at various angles, increase of the training apparatus reliability due to impact load distribution among the fastening elements of the stick and removal of rigid contacts' possibility between the training apparatus details.

[0010] The specified technical result is reached by the fact that the device for training of sportsmen' striking motions, containing the carrying frame made with possibility of its fastening on the support, the target, the target reset block, containing the stick, one end of which is fixed on the frame with possibility of guaranteeing of not less than two degrees of freedom, and the second end is connected to the target, the elastic bracing wire, connected to the frame with one end, and to the stick with the second end, at that the frame is fitted with the stick restraining arm, *according to the invention,* the carrying frame is made with possibility of its turn relative to the horizontal axis with the subsequent fixing at the chosen position.

[0011] The fastening assembly of the frame to the support is made in the form of the metal fastening ring fitted with the clips for fastening on the support at the chosen height, and the carrying frame is fitted with the clips for fastening on the metal ring at the set angle.

[0012] The stick is fitted with the roller stop block, and the stick restraining arm is made in the form of two arcs of the circle with the possibility of the roller stop block moving between them.

[0013] The device contains the shock absorbers located in extreme positions of the stick travel.

[0014] The guides for the bracing wire made in the form of the rollers fixed on the perimeter of the carrying frame are introduced into the target reset block.

[0015] The device is fitted with the subframe connecting the stick restraining arm and the frame, having the form providing free moving of the stick with the target between the extreme positions of the stick travel.

[0016] The stick fastening on the frame is made in the

form of the mechanism containing a cramp on which the rod is fixed in the casing with eyes for the stick fastening and two inserts of the material with the shock-absorbing properties located at the opposite ends of the casing.

Brief description of the drawings

[0017] The invention is explained by the drawings in which variants of the device embodiment are given, where

1. Stick;
2. Axis of the stick fastening;
3. Eyes;
4. Rod;
5. Carrying frame;
6. Clips;
7. Guides for the bracing wire;
8. Elastic bracing wire;
9. Roller stop blocks;
10. Stick restraining arm (guides for the roller stop blocks);
11. Shock absorber of the stick restraining arm;
12. Target;
13. Elements of the bracing wire tension;
14. Device for target fastening;
15. Fastening ring;
16. Post;
17. Front beam;
18. Back beam;
19. Transverse beam;
20. Upper beam;
21. Crossbeam;
22. Casing;
23. Cramp;
24. Insert;
25. Cramp;
26. Stop block;
27. Crosswise frame;
28. Stick;
29. Nut;
30. Handle-lever;
31. Platform;
32. Base;
33. Subframe.

The best variants of the invention embodiment

[0018] The device is constructed in the pendular suspension circuit (a physical pendulum) to provide biomechanical coordinated interaction between the ball and the hand during "impact" as a sportsman's hand with a tennis racket basically can also be considered as "pendular suspension". In fig. 1 the best variant of the invention embodiment for tennis is given. The upper end of stick 1 is hingedly fixed by means of axis 2 in eyes 3 of rod 4 which is placed in the casing. The casing of rod 4 is fastened to carrying frame 5 with a cramp. It has two inserts made of the material with shock absorbing properties, for example, the rubber, located at the opposite ends of the casing (they are not shown in the drawing). They are intended for preventing vibration (excessive vibration) after impact of stick 1 with target 12 against shock absorbers of the stick restraining arm 11. Rod 4 is constructed so that it can revolve on its axis and produce small motions along the axis due to the inserts. As a result of such constructional approach the stick gets additional degree of freedom along and around the rod axis. Frame 5 can be fixed on fastening ring 15 by means of clips 6 at any angle. The ring 15 itself can be fixed on post 16 at any height. At fastening to the post the device can be additionally provided with the wedge-shaped stop to prevent spontaneous drop of the carrying frame at failure of the fastening elements. Stick reset block 1 with target 12 contains bracing wire 8 and guides 7 for it. Guides 7 can be constructed in the form of rollers through which bracing wire 8 (the rubber shock absorber) goes. Stick 1 is provided with roller stop blocks 9.

[0019] In the lower part of carrying frame 5 restraining arm of stick 10 is fixed, which simultaneously functions as guides for roller stop block 9, having, for example, the form of two arcs of the circle connected on the ends. The radius of the arcs is equal to the distance from the axis of stick fastening 2 to roller stop block 9, at that the roller stop blocks are rigidly connected to the stick.

[0020] Connections of the arcs restrict stick vibration longitudinally, and the arcs themselves - in cross direction. In the extreme positions of stick 1 frame 5 is provided with shock absorbers 11 which can be made of the rubber plates of different length gathered in the stack and folded up in two. The edges of shock absorbers stacks 11 can be fastened with the cramps which can be the bases of the restraining arm or be fixed to them.

[0021] Target 12 for tennis players' training can be a fluoroplastic disk in a rubber ring. On the lower end of the stick a device for target 12 fastening is located. It can be a metal cramp, fixed at the angle of 90 ° at the distance of 50 mm from the stick. It excludes hit of the racket against the stick and by that provides safety at the stroke performance. In the cramp the axis for target revolving is located in parallel to the stick. Instead of disk a tennis ball fixed on the mentioned axis can be used.

[0022] In other variant of embodiment the device contains frame 5 made of steel pipes of rectangular section (figs. 2). Frame 5 consists of front 17, back 18, transverse 19 and upper 20 beams, at that back 18 and upper 20 beams are connected inter themselves at the right angle. Transverse beam 19 is located in the central part of the back beam perpendicularly to it and the upper beam and is intended for the better fixing of frame 5 on ring 15. Front beam 17 is located in parallel to back beam 18 and connected to upper beam 20 by means of inclined crossbeam 21. The device also contains movable stick 1, the upper end of which is fixed hingedly by means of axis 2 in eyes 3 of rod 4 which is placed in casing 22. Casing 22 of rod 4 is fixed on carrying frame 5 by means of cramp

23. Cramp 23 retaining casing 22 is fixed to the frame in places of crossbeam 21 fastening to beams 17 and 20. Inside cramp 23 guiding rollers 7 are placed. On the lower end of front beam 17 shock absorber 11 of stick restraining arm is constructed. The similar shock absorber 11 is located on the upper beam of the frame in such a way that in the extreme position stick 1 is placed horizontally in parallel to the upper beam. On the front beam additional roller 7 is fixed by means of cramp 25. In the initial position stick 1 is located vertically and is appressed to shock absorber 11 on the front beam by means of bracing wire 8 fixed with one end to the stick (with formation of the right angle in the initial position), going through guiding rollers 7 and fixed with other end to the cramp of the shock absorber on the upper beam. Back 18 and transverse 19 beams are connected by their middles and are provided with semicircular stop blocks 26 on the ends made so that they can be tightly set on ring 15. Ring 15 is fixed on crosswise frame 27 provided with fastenings for placing on post 16 or a wall at any height. Ring 15 and stop blocks 26 are tightly connected inter themselves by means of a clip corresponding a stick with thread 28, fixed in the centre of crosswise frame 27 and going through the aperture made in the place of fastening of transverse 19 and back 18 beams, at that nut 29 provided with handles-levers 30 is screwed on threaded stick 28. Frame 5 can be fixed on fastening ring 15 at any angle. Stick 1 is provided with stop blocks 9 corresponding two rollers, located in the initial position in the horizontal plane. Inside frame 5 guides 10 for roller stop blocks 9, having the form of two arcs of the circle connected by the ends with front and upper beams, are installed. Guides 10 restrict stick vibrations in the transverse direction. On the lower end of stick 1 the device for target 12 fastening, for example, a football, is located. In this case the device for target fastening is platform 31 with base 32 rigidly fixed to stick 1 at the right angle. The lower end of back beam 18 is connected with guides 10 by means of subframe 33 bent in such a way that stick 1 with ball 12 could move freely from one shock absorber 11 to another.

[0023] As a target in the given variant volleyball, football, etc. appropriately fixed on stick 1 can be used.

[0024] Work with the device is carried out in the following way.

[0025] The device (target upper edge) is set at the necessary height by means of two clips 6 fixed on fastening ring 15, and then on carrying frame 5 at the necessary angle by means of clips 6 (in the first variant of embodiment). In the second variant after frame rotation to the necessary angle it is fixed by means of nut 29 with handles-levers 30. In the initial condition the pendulum in the form of stick 1 is fixed near front shock absorber 11 by the system of rollers 7 with bracing wire 8 (elastic rubber shock absorber cord), which corresponds to specifications of the target angular direction to the surface of the playground after the striking action. As the target after the stroke moves arc-wise with the radius equal to the stick length, thus the least effort to the target for taking its out from quiescence should be applied tangentially to the arc. Any other direction of the racket striking motion will entail considerable efforts, which the sportsman, in his turn, will feel at once, i.e. he will get information on correctness of the stroke and will be obliged to make corrections during next attempt. To regulate the effort for target taking out from the quiescence the preliminary tension of bracing wire 8 by means of elements 13 is used. If the racket stroke against target 12 was made incorrectly the efforts occur, aspiring to turn stick 1 around its own axis and to destroy its fastening to frame 5. Roller stop blocks 9 receive these efforts, preventing undesirable motions of stick 1.

[0026] The sportsman occupies the position, corresponding to the stroke phase standing with footing or without footing in jumping. The striking action against the target is made. The target, having received a considerable charge of kinetic energy (impulse of force) and acceleration after the stroke, easily suppresses tension of the bracing wire, moves arc-wise with the radius equal to the length of stick 1 and bumps against back shock absorber 11. The distance (free running) which the target overcomes at the speed of 20-25 m/sec., is equal to 930-950 mm while the stick length is 800 mm. At the racket stroke the target also gets rotational energy, simulating twisting of the tennis ball. Having bumped against the shock absorber the target stalls and slows down to zero and due to the bracing wire tension force the ball returns to the initial position. Having exhausted the inertial energy after 3-4 reciprocating vibrations (about 1-1,5 sec.) the target stalls in the initial position on bumping against the front shock absorber. The device is again ready to work.

Industrial applicability

[0027] The given device can practically realize training of striking motions in tennis and from the very beginning can start development not only kinematical and rhythmic structures of striking motions but what is more important - the dynamic structures making the base of all striking motions. It permits to develop not only ball service, but also lateral strokes from the left and from the right. The device permits to get urgent information on correctness of the stroke performance.

Claims

1. A device for training of the sportsmen' striking motions, containing the carrying frame constructed so that it can be fastened to the support, the target, the target reset block containing the stick, one end of which is fixed on the frame so that it can provide not less than two degrees of freedom, and the second is connected to the target, the elastic bracing wire, connected to the frame with one end and to the stick

with the second end, at that the frame is provided with the stick restraining arm, ***wherein*** the carrying frame is constructed so that it can be turned relative to the horizontal axis with the subsequent fixing in the chosen position.

2. The device according to claim 1, wherein the fastener assembly is constructed in the form of the metal fastening ring provided with clips for fastening on the support at the chosen height, and the carrying frame is provided with clips for fastening on the metal ring at the set angle.

3. The device according to claim 1, wherein the stick is provided with the roller stop blocks, and the stick restraining arm is made in the form of two arcs of a circle which permit the roller stop blocks to move between them.

4. The device according to claim 1, wherein it contains the shock absorbers located in the extreme positions of the stick travel.

5. The device according to claim 1, wherein the guides for the bracing wire, constructed in the form of the rollers fixed on the perimeter of the carrying frame are introduced into the target reset block.

6. The device according to claim 1, wherein it is provided with the subframe connecting the stick restraining arm and the frame, having the form providing free moving of the stick with the target between the extreme positions of the stick travel.

7. The device according to claim 1, wherein the stick fastening on the frame is made in the form of the mechanism containing a cramp on which the rod is fixed in the casing with eyes for fastening of the stick and with two inserts made of the material with the shock-absorbing properties located on the opposite ends of the casing.

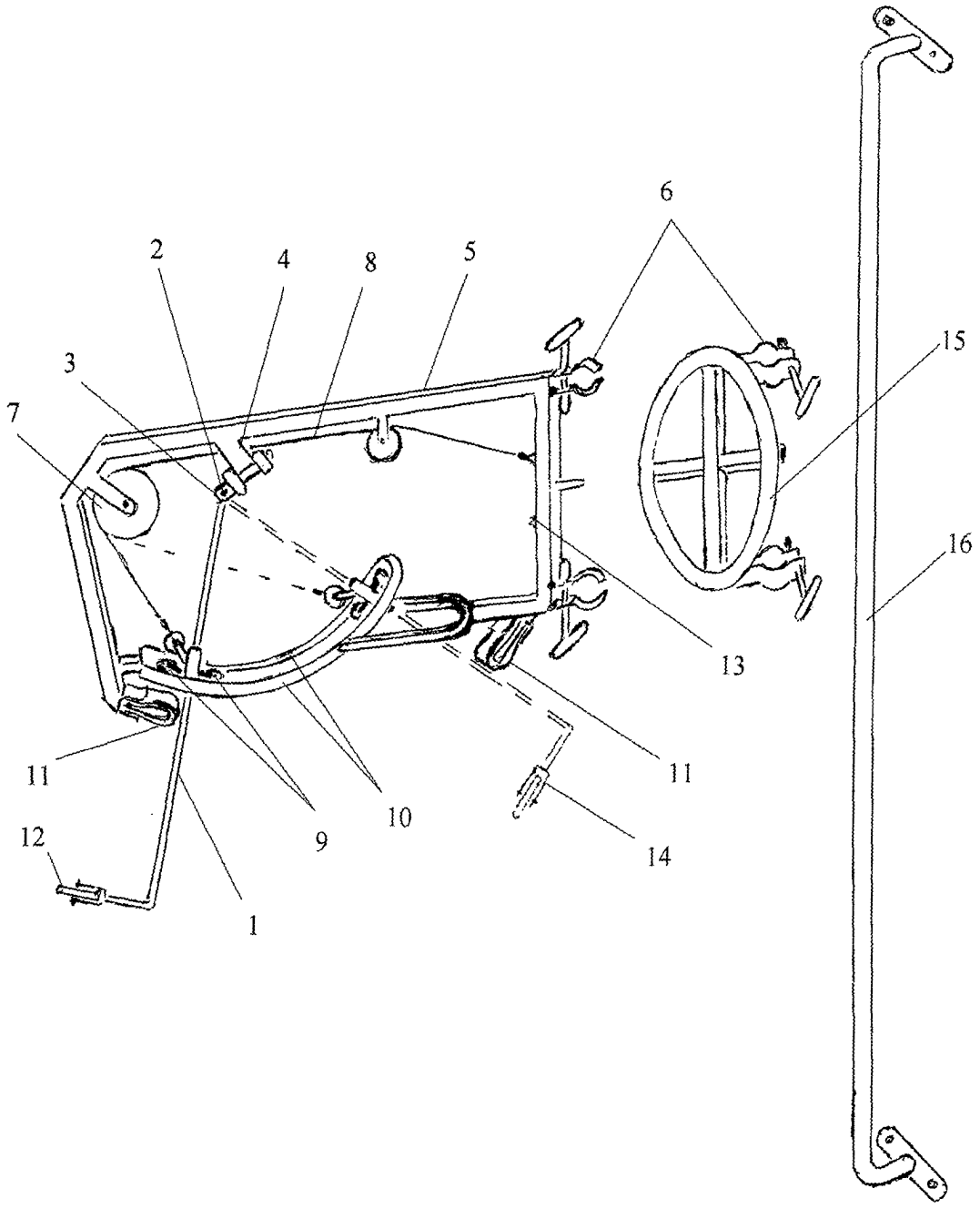

Figure 1

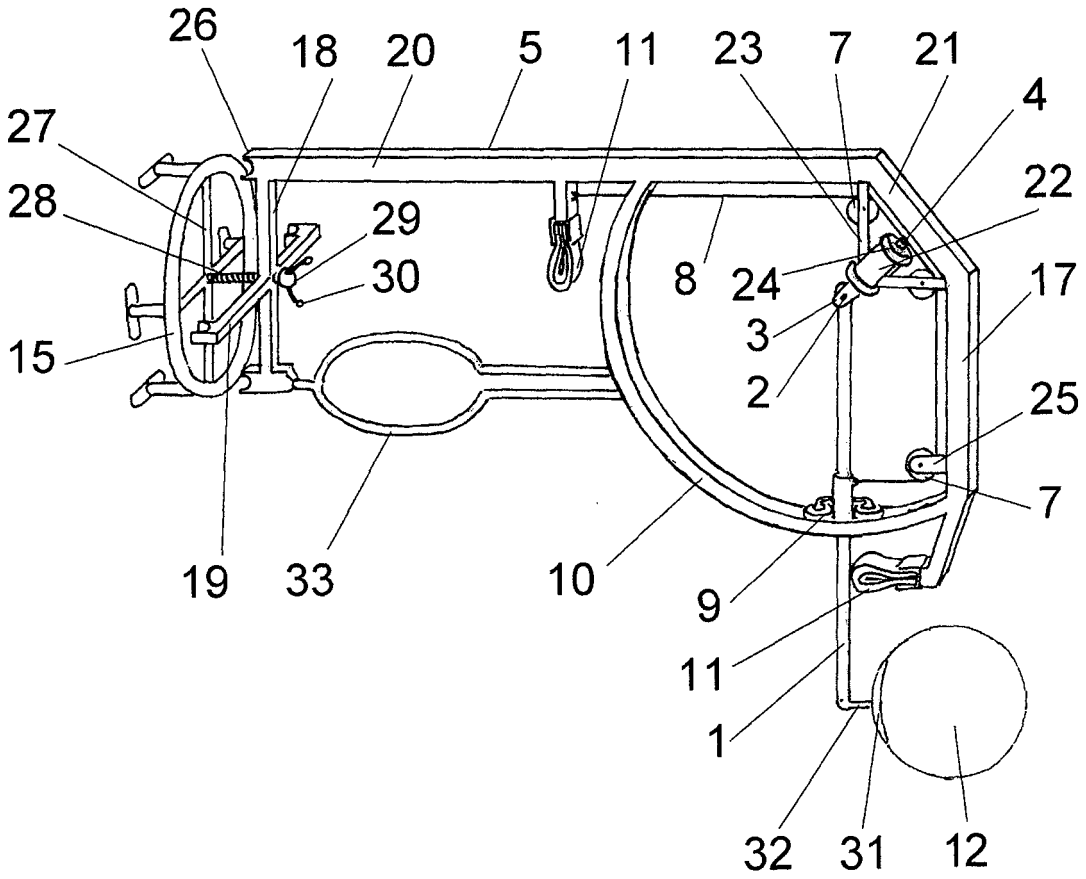
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Figure 2

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- RU 387720 **[0002]**
- EP 1728536 A **[0004]**
- RU 2301696 **[0006]**