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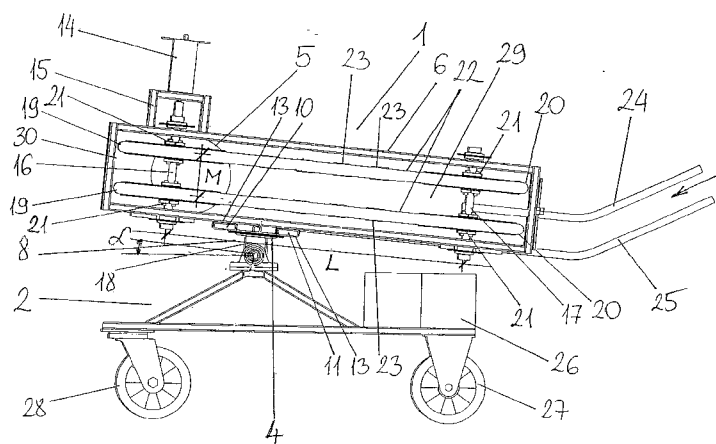
(54) Title: BALL SERVING APPARATUS

FIG. 1

(57) Abstract: The subject of the invention is ball serving apparatus, which allows serving of large balls, such as soccer ball or handball in a way that the shooting distance of the ball and the frequency of the shooting can be adjusted and the angle of shooting can be varied both in vertical and horizontal directions. The ball serving apparatus according to the invention consists of ball serving apparatus fixed on wheeled chassis, which ball serving apparatus can be turned in vertical and horizontal directions, and the ball serving apparatus contains a guiding space and shooting opening for guiding and shooting the ball. It is characterized by that, disks (19) are fixed with the help of fastening elements (21) at a distance M from each other within the supporting frame (6,7) on the driven shafts (16), which are driven by motors (14) mounted on the supporting skeleton (15) at one upper end of frames (6,7) that are provided with receiving openings (13) being at a distance S from each other at the lower surface of the ball serving apparatus (1), and disks (20) are placed with the help of fixing elements (21) on the freewheeling shafts (17) located at a distance L from the driven shafts (16) within the supporting frames (6,7), and V-belts (22), that create the guiding space, are fixed on disks (19,20) being in one plane, and shooting opening (30) is located at

one side of the guiding space (29) towards the disks (19), while rolling elements (24,25) are fixed at its other half for guiding the balls (5), and the balls (5) advancing on the rolling elements (24,25) pass through the guiding space (29) and leave the ball serving apparatus (1) through the shooting opening (30), and the shooting distance of balls (5) can be controlled by adjusting the speed of the V-belts (22), and furthermore, supporting rods (10,11) of the supporting unit (8) are placed in the receiving openings (13), and pins (9) are attached to the external surface of the vertical element (18) of the supporting unit (8), which pins (9) are connected in a rotating manner to the fixing unit (12) of the chassis (2), making possible to turn the ball serving apparatus (1) in vertical direction to an angle α , and at the same time, the ball serving apparatus can be turned in horizontal direction up to an angle β in the horizontal direction with the help of disk bearing (4) of the rotating unit (3).

Ball serving apparatus

The subject of the invention is a ball serving apparatus, which allows serving of large balls, such as soccer ball or handball in a way that the shooting distance of the ball and the frequency of the shooting can be adjusted and the angle of shooting can be varied both in vertical and horizontal directions.

Practicing by soccer players with balls is rather problematic during trainings because it is impossible to repeat the same situation for the desirable times. A person cannot accomplish the task of shooting balls to the same location with the same force repeatedly to the player engaged in practicing. Ball serving devices are known and often used in sports using small balls, such as ping-pong squash or tennis, but no such devices are in general use for sports using large balls.

According to the state of art, the Hungarian patent document HU 223 209 filing No. P 01 03725 makes known a procedure, which is suitable for teeing golf balls automatically and quickly in a simple manner. The operating procedure based on the said process may be described as follows. The ball hit from the tee flies into the ball catching net adjoining the net, where it loses most of its kinetic energy and falls onto the slopingly stretched bottom part of the net. The sloping part of the net is pulled down at the hopper inlet to the ball forwarding unit, and because this is the deepest point of the net, the balls roll into the ball forwarding unit via the hopper inlet. Then the air blower in the ball forwarding unit blows the balls into the temporary ball store, from which the ball feeder drops one ball onto the lifting scoop. The lifting scoop rotator raises the lifting scoop with the ball in it to above the feeder tee dropping the ball on the top of it. Then the tee lift starts to move up and raises the ball to the programmed height. From here, the golfer may hit the ball again any time and the process described above may commence from the beginning. The other subjects of the invention include the equipment required for the process and the special net arrangement designed to catch the golf ball after it has been hit.

The Hungarian patent document HU 194 059 filing No. 2097/85 makes known a ball serving equipment, which can be used at sports trainings, particularly for practicing tennis, ice hockey or other game played with ball. The ball serving equipment according to the solution contains a pipe stub that ensures the guiding of ball and which is connected to a supporting body, and it also contains a feeder provided with a hammer and connected to the supporting body, where the feeding mechanism is arranged on a driving shaft, which is mounted on the supporting body with bearings, arranged in a way, that it can be slid to vary its angle in a plane perpendicular to the shaft that drives the feeding mechanism. In one position the serving equipment is connected to the pipe stub, and in the other position it is connected to the hammer, and the serving equipment is linked to the feeding mechanism through a synchronizing device.

The CN2487413 utility model description makes known pneumatic football training ball-serving apparatus. The pneumatic football training ball-serving apparatus comprises a base, wherein the base is provided with an accelerating alley support rack provided with an accelerating alley, a shooting drum, a shooting device support rack and a step motor; the left end of the accelerating alley is connected with a high pressure air storage tank through a pneumatic tube, while the right end of the accelerating alley is communicated with the shooting drum; the pneumatic tube is provided with a magnetic valve, the internal left end of the shooting drum is provided with a rotating ring and a support ring.

The CN102475961 patent description makes known football serving device, which belongs to sports equipment. In the football serving device wheels are arranged on four corners below an outer package; a motor, a power supply and a football serving base are fixed above the outer package, a handrail frame is welded behind the outer package, a serving drum is arranged in front of the football serving base, a football basket is arranged above the football serving base.

The drawback of the ball serving equipment described above is that the shooting distance of the ball, the frequency of shooting and the angle of shooting cannot be adjusted horizontally or vertically.

By developing the ball serving apparatus according to the invention we had the aim to create an mobil apparatus, which allows the setting of shooting distance and frequency of large balls, as well as the angle of shooting both in vertical and horizontal directions, and that the apparatus would be easy to move, in the given case it is self propelled, light and small.

In the process of developing the solution according to the invention we recognised that if disks are fixed at a distance M from each other by means of fixing elements within the supporting frame on a shaft driven by motors placed on the supporting frame at one of the upper ends of its frames having receiving holes at the lower surfaces located at a distance S from each other, and disks are fixed by means of fastening elements on the freewheeling shafts at a distance L from the driving shafts within the supporting frame, and if V-belts are mounted for creating guiding space on the disks being in the same plane, where a shooting opening is formed at the part of the guiding space towards the disks, while rolling elements for guiding the balls are fixed at the opposite end, and the balls rolling on the rolling elements advance in the guiding space and leave the ball serving apparatus through the shooting opening, and the shooting distance of the ball can be varied by adjusting the rotating speed of the V-belt, and when the rods of the supporting unit are inserted in the receiving openings, while pins are attached to the external surface of the vertical element of the supporting unit, which pins are connected in a rotating manner to the fixing unit of the chassis, thus allowing the turning of the ball serving mechanism in horizontal direction at an angle α , and the horizontal turning of the ball feeding apparatus and also in vertical direction with an angle β can be ensured with the help of the disk bearing of the rotating unit, then the set out aim can be achieved.

The invention is ball serving apparatus, which consists of ball serving apparatus fixed on wheeled chassis, which ball serving apparatus can be turned in vertical and horizontal directions, and the ball serving apparatus contains a guiding space and shooting opening for guiding and shooting the ball. It is characterized by that, disks are fixed with the help of fastening elements at a distance M from each other within the supporting fame on the driven shafts, which are driven by motors mounted on the

supporting skeleton at one upper end of frames that are provided with receiving openings being at a distance S from each other at the lower surface of the ball serving apparatus, and disks are placed with the help of fixing elements on the freewheeling shafts located at a distance L from the driven shafts within the supporting frames, and V-belts, that create the guiding space, are fixed on disks being in one plane, and shooting opening is located at one side of the guiding space towards the disks, while rolling elements are fixed at its other half for guiding the balls, and the balls advancing on the rolling elements pass through the guiding space and leave the ball serving apparatus through the shooting opening, and the shooting distance of balls can be controlled by adjusting the speed of the V-belts, and furthermore, supporting rods of the supporting unit are placed in the receiving openings, and pins are attached to the external surface of the vertical element of the supporting unit, which pins are connected in a rotating manner to the fixing unit of the chassis, making possible to turn the ball serving apparatus in vertical direction to an angle α , and at the same time, the ball serving apparatus can be turned in horizontal direction up to an angle β in the horizontal direction with the help of disk bearing of the rotating unit.

In one preferred application of the solution according to the invention the distance between the disks on the driven shaft, and between the disks on the freewheeling shafts is variable with the help of fixing elements.

In a further preferred application of the solution according to the invention the distance of the frames can be secured by shifting the receiving openings on the supporting rods.

In a further preferred application of the solution according to the invention the distance between the driven shaft and the freewheeling shaft can be modified slightly with the help of the adjusting screw of the freewheeling shaft.

In a further preferred application of the solution according to the invention the material of the V-belt is silicone rubber.

In a further preferred application of the solution according to the invention the V-belts are supported by supporting rollers.

In a further preferred application of the solution according to the invention the chassis is moved and the ball serving apparatus is moved with the power obtained from battery or from supply unit connected to the mains.

The solution according to the invention is set forth on the basis of the attached figures:

Fig. 1 shows the lateral view of possible embodiment of the ball serving apparatus according to the invention, where it is placed on a chassis, and it contains the rolling elements.

Fig. 2 shows the solution introduced in Fig. 1 as viewed from the direction of the shooting hole.

Fig. 3 shows the solution introduced in Fig. 1 as viewed from above.

Fig. 4 shows the perspective view of the ball serving apparatus according to the invention.

Fig. 5 shows the half lateral perspective view of the ball serving apparatus according to the invention.

Fig. 1 shows the lateral view of possible embodiment of the ball serving apparatus according to the invention, where it is placed on a chassis, and it contains the rolling elements. Fig. 2 shows the solution introduced in Fig. 1 as viewed from the direction of the shooting hole. Fig. 3 shows the solution introduced in Fig. 1 as viewed from above. Fig. 4 shows the perspective view of the ball serving apparatus according to the invention. Fig. 5 shows the half lateral perspective view of the ball serving apparatus according to the invention.

In the figures is shown the ball serving apparatus 1 with its supporting unit 8, and the frames 6,7 being at a distance S from each other, as connected through the openings of the receiving hole 13 to the supporting rods 10, 11 of the supporting unit 8. Furthermore, the figures show the pins 9 attached to the external surfaces of the vertical

6

elements 18 of the supporting unit 8, through which pins 9 the ball serving apparatus 1 is connected to the fixing unit 12 of the chassis in a rotating manner. The pins 9 ensure that the ball serving apparatus 1 can be moved to an angle α in vertical direction. The disk bearing 4 of the rotating unit 3 can also be seen in the figure, which allows the horizontal turning of the ball serving apparatus 1.

Shown in the figures are the motors 14 mounted on the supporting skeleton 15 of the frames 5,7, to which motors 14 the driven shafts 16 are connected. Two disks 19 are fixed on the top of another at a distance M by means of fixing elements 21 on the driven shafts 16 inside the frame 6, 7. Furthermore, two disks 20 are fixed on top of one another at a distance M with the help of fastening elements 21 to the freewheeling shafts 17 at the opposite part of the supporting skeleton 15 of the frames 6,7, and adjusting screw 31 is fixed to the freewheeling shaft 17. The disks 19, 20 are interconnected by means of V-belt 22 in pairs.

As can be seen in the figure, the V-belts 22 are guided by support rollers 23. The figures also show the ball serving apparatus 1, the rolling elements 24 fastened to the fixing element 32 of the frames 6,7, as well as the rolling element 25 fastened to the ball serving apparatus 1.

An arrow indicates the rolling direction of balls 5 in Fig. 1, where dashed line is used to indicate the rolling ball 5. The balls 5 get into the guiding space 29 bordered by the internal surfaces of the V-belt 22 between the rolling elements 24,25, from where they are shot through the shooting opening 30 according to the movement of the V-belt 22. The chassis 2 can also be seen in the figures, on which the ball serving apparatus 1 is fixed. Batteries 26 are mounted on the chassis 2 for feeding the motor 14. The chassis 2 is provided with wheels 27 and driving wheels 28.

The shaft t of the ball serving apparatus 1 is indicated in Fig. 3, which shaft t is aligned in parallel with the direction determined by the wheels of the chassis 2 in its basis condition. The shaft tf is also shown here, which has an angle β relative to the shaft t .

7

In case of a possible embodiment of the ball serving apparatus 1 according to the invention, a supporting unit 8 is created from vertical elements 18, which are provided with supporting rods 10, 11 and pins 9. A rotating unit 3 is also created with disk bearing 4.

Then the rectangular frames 6,7 are formed. The supporting skeletons 15 are fastened on the top of a longer side of the frames 6,7, on which the motors 14 are seated. A driven shaft 16 is connected to each motor 14. The disks 19 are fastened on the driven shafts 16 on top of one another at a distance M with the help of fixing elements 21 in the upper part of the frames 6,7.

Furthermore, freewheeling shafts 17 are fixed in know manner in the opposite part of the supporting skeleton 15 of the frames 6,7, and two disks 20 are fixed on them on top of one another at a distance M with the help of fixing elements 21. The driven shafts 16 and the freewheeling shat 17 are located in the frames 6,7 at a distance L, and ad adjusting screw 31 is attached to the freewheeling shaft 17. Then V-belts 22 are mounted on the disks 19,20 in pairs, and the supporting rollers 23 are fixed to the ball serving apparatus 1, which support and guide the V-belts 22.

Receiving openings 13 are fixed to the bottom of frames 6,7 at the part below the driven shafts 16. Also, the rolling elements 24 fastened to the element 32 of the frames 6,7 of the balls serving apparatus 1 are fastened together with the rolling element 25 fixed to the ball serving apparatus 1.

Then the supporting unit 8 is fitted together with frames 6,7 so that the frames 6,7 are located at a distance S from each other. Then the ball serving apparatus is fixed on the chassis 2.

In case of a possible application of the ball serving apparatus 1 according to the invention the ball serving apparatus 1 mounted on the chassis 2 can be moved to the appropriate location manually of mechanically with the help of the driven wheel 28. Then the inclination angle α is adjusted in vertical direction, depending on what an

angle relative to the horizontal the user want to shoot the ball 5. This is accomplished by turning the ball serving apparatus 1 around pin 9 to the desired angle α . Then the inclination angle β is adjusted horizontally with the help of the disk bearing 4 of the rotating unit 3. In this case the ball serving apparatus 1 is set to turned position t_f relative to the basic shaft alignment t .

Then the disks 19 start to rotate through the driven shafts 16 upon switching on the motors 14, which at the same time start to move the V-belts 22. The rotating direction of the motors 14 should be adjusted in a way that the disks 19 on the frames 6,7 rotate in opposite directions.

The speed of V-belts 22 may be controlled by the rotating speed of the disks 19, and the shooting distance of the balls 5 can be controlled by adjusting the speed of the V-belts 22.

Then the balls 5 are forwarded from the holding unit containing the balls 5 at predetermined intervals to the guiding space 29 through the rolling elements 24,25 of the ball serving apparatus 1. The frequency of shooting the balls 5 can be determined by the intervals the balls 5 are released from the holding unit. This could be done manually or with the help of a timer device, which allows the rolling out of the balls 5 to the ball serving apparatus 1 at predetermined equal or different intervals.

The balls 5 move to the guiding space 29 between the V-belts 22, and their forward movement is determined by the movement of the V-belts 22. After passing through the guiding space 29 the balls are shot out through the shooting opening 30 of the ball serving apparatus 1.

In line with the above description, the distance S of frames 6,7 should be adjusted in a way, that the distance between the V-belts of the frames 6,7 would be slightly less than the diameter of ball 5. The distance S of frames 6,7 can be adjusted by shifting the frames 6,7 on the supporting rods 10,11 to the desired distance with the help of the receiving openings 13 fastened to the frames 6,7.

Also, the distance M of disks 19,20 are to be adjusted relative to the size of the ball 5, so that the balls 5 could be forwarded by the V-belts 22 at both sides at an appropriate height.

The distance M of disks 19,20 can be secured by means of the fixing elements 21 located on the driven shafts 16 and on the freewheeling shafts 17.

In the given case it might be necessary to slightly modify the distance L between the driven shaft 16 and the freewheeling shaft 17 primarily for the purpose of facilitating the replacement of the V-belts 22.

The ball serving apparatus 1 can be turned in vertical direction by $\alpha = 0^\circ - 45^\circ$ relative to the horizontal direction, while the rotating unit 3 can be rotated horizontally relative to the shaft t with an angle β with the help of its disk bearing 4, where $\beta = 0^\circ - 90^\circ$.

The ball serving apparatus 1 and the chassis are made of metal, preferably aluminium, while the material of the V-belt 22 is preferably silicone rubber.

The ball serving apparatus 1 works with 2 batteries each having a capacity of 200 Ah. The 24 V drives operate the various function by means of D.C. motor.

The balls 5 are shot with the help of silicon rubber V-belts 22, which are about 1 m long and rotate in opposite directions in pairs.

In the given case the chassis 2 is manipulated by remote control, together with the other functions.

It is expected that the structure will be able to store 40 balls at a time after loading. The battery charger, as well as 40 balls belong to the standard accessories of the machine.

2000x1300 mm are overall dimensions of the ball serving apparatus 1 mounted on the chassis, while its weight is 180 kg.

The ball serving apparatus 1 mounted on chassis 2 is available with accessories and functionality in three different versions:

- Not self propelled, the apparatus cannot be operated with remote control, only from the control panel mounted on the machine. Accessories - 20 balls.
- Not self propelled, but the balls are shot by means of remote control, although it cannot be programmed independently. Accessories - 40 balls.
- Self propelled, all functions can be remote controlled on the machine, can be programmed for independent operation, its accessories include 40 balls, solar panel and air compressor.

The advantage of the solution according to the invention is that it allows the serving of large balls, such as soccer balls and handballs. Its advantages include that it provides a mobile apparatus which can be moved as required, and its various parameters can be set in advance, such as shooting distance of the ball, frequency of shooting and the angle of shooting.

List of references:

- 1 – ball serving apparatus
- 2 – chassis
- 3 – rotating unit
- 4 – disk bearing
- 5 – ball
- 6 – frame
- 7 – frame
- 8 – supporting unit
- 9 – pin
- 10 – supporting rod
- 11 – supporting rod
- 12 – fixing unit
- 13 – receiving opening
- 14 – motor
- 15 – supporting skeleton
- 16 - driven shaft
- 17 – freewheeling shaft
- 18 – vertical element
- 19 – disk
- 20 – disk
- 21 – fixing element
- 22 – V-belt
- 23 – supporting roller
- 24 – rolling element
- 25 – roiling element
- 26 – battery
- 27 – wheel
- 28 – driven wheel
- 29 - guide space
- 30 – shooting opening

31 – adjusting screw

32 – fixing element

M – distance

S – width

L - distance

α – angle

β – angle

t – shaft

tf – swung shaft

CLAIMS:

1. Ball serving apparatus, which consists of ball serving apparatus fixed on wheeled chassis, which ball serving apparatus can be turned in vertical and horizontal directions, and the ball serving apparatus contains a guiding space and shooting opening for guiding and shooting the ball,

characterized by that,

disks (19) are fixed with the help of fastening elements (21) at a distance M from each other within the supporting frame (6,7) on the driven shafts (16), which are driven by motors (14) mounted on the supporting skeleton (15) at one upper end of frames (6,7) that are provided with receiving openings (13) being at a distance S from each other at the lower surface of the ball serving apparatus (1), and disks (20) are placed with the help of fixing elements (21) on the freewheeling shafts (17) located at a distance L from the driven shafts (16) within the supporting frames (6,7), and V-belts (22), that create the guiding space, are fixed on disks (19,20) being in one plane, and shooting opening (30) is located at one side of the guiding space (29) towards the disks (19), while rolling elements (24,25) are fixed at its other half for guiding the balls (5), and the balls (5) advancing on the rolling elements (24,25) pass through the guiding space (29) and leave the ball serving apparatus (1) through the shooting opening (30), and the shooting distance of balls (5) can be controlled by adjusting the speed of the V-belts (22), and furthermore, supporting rods (10,11) of the supporting unit (8) are placed in the receiving openings (13), and pins (9) are attached to the external surface of the vertical element (18) of the supporting unit (8), which pins (9) are connected in a rotating manner to the fixing unit (12) of the chassis (2), making possible to turn the ball serving apparatus (1) in vertical direction to an angle α , and at the same time, the ball serving apparatus can be turned in horizontal direction up to an angle β in the horizontal direction with the help of disk bearing (4) of the rotating unit (3).

2. Ball serving apparatus according to claim 1 characterised by that, the distance (M) between the disks (19) on the driven shaft (16), and between the disks (20) on the freewheeling shafts (17) is variable with the help of fixing elements (21).
3. Ball serving apparatus according to claims 1 or 2 characterised by that, the distance (S) of the frames (6,7) can be secured by shifting the receiving openings (13) on the supporting rods (10,11).
4. Ball serving apparatus according to any of the claims 1 - 3 characterised by that, the distance (L) between the driven shaft (16) and the freewheeling shaft (17) can be modified slightly with the help of the adjusting screw (31) of the freewheeling shaft (17).
5. Ball serving apparatus according to any of the claims 1 - 4 characterised by that, the material of the V-belt (22) is silicone rubber.
6. Ball serving apparatus according to any of the claims 1 - 5 characterised by that, the V-belts (22) are supported by supporting rollers (23).
7. Ball serving apparatus according to any of the claims 1 - 6 characterised by that, the chassis (2) is moved and the ball serving apparatus (1) is moved with the power obtained from battery (26) or from supply unit connected to the mains.

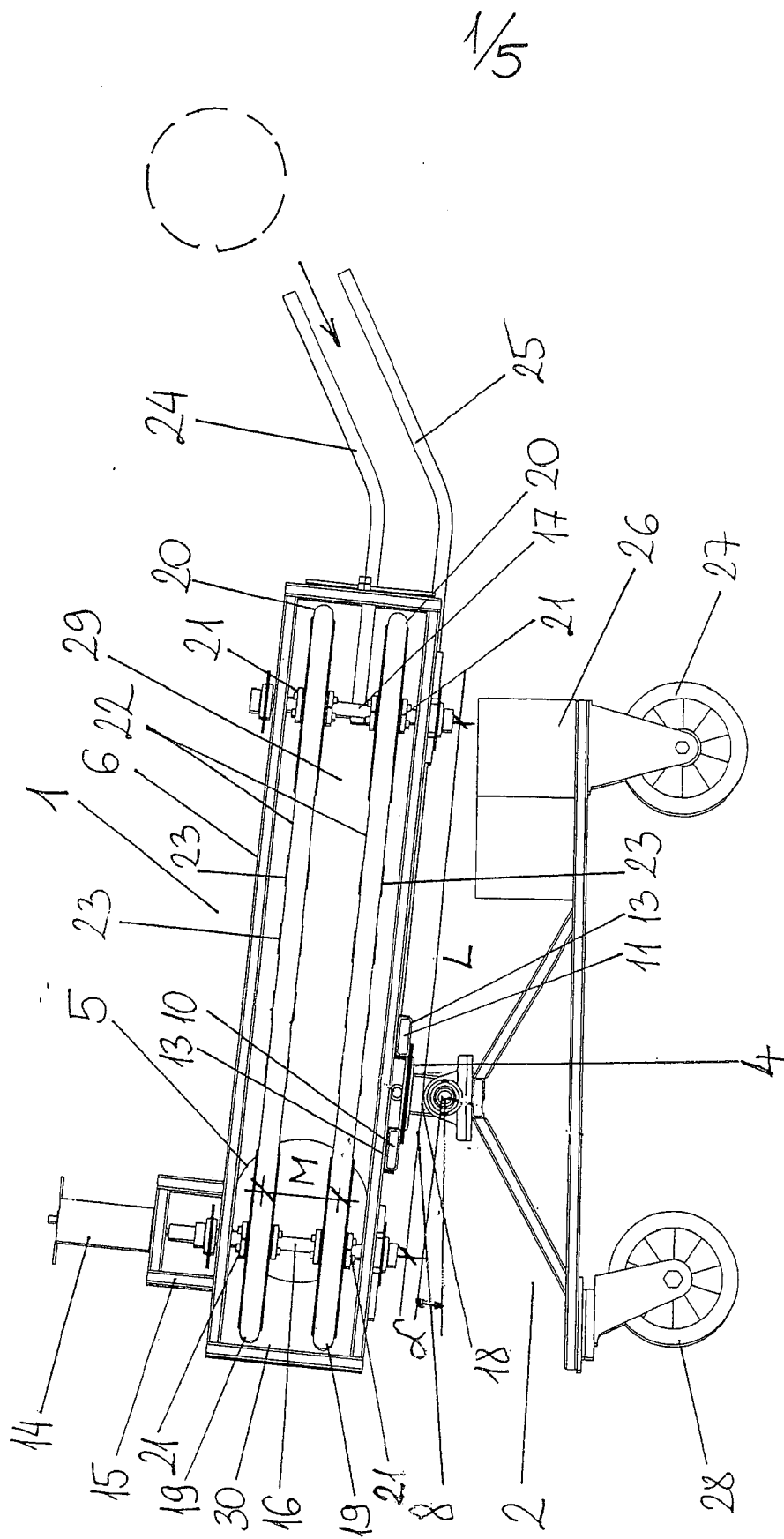


FIG. 1

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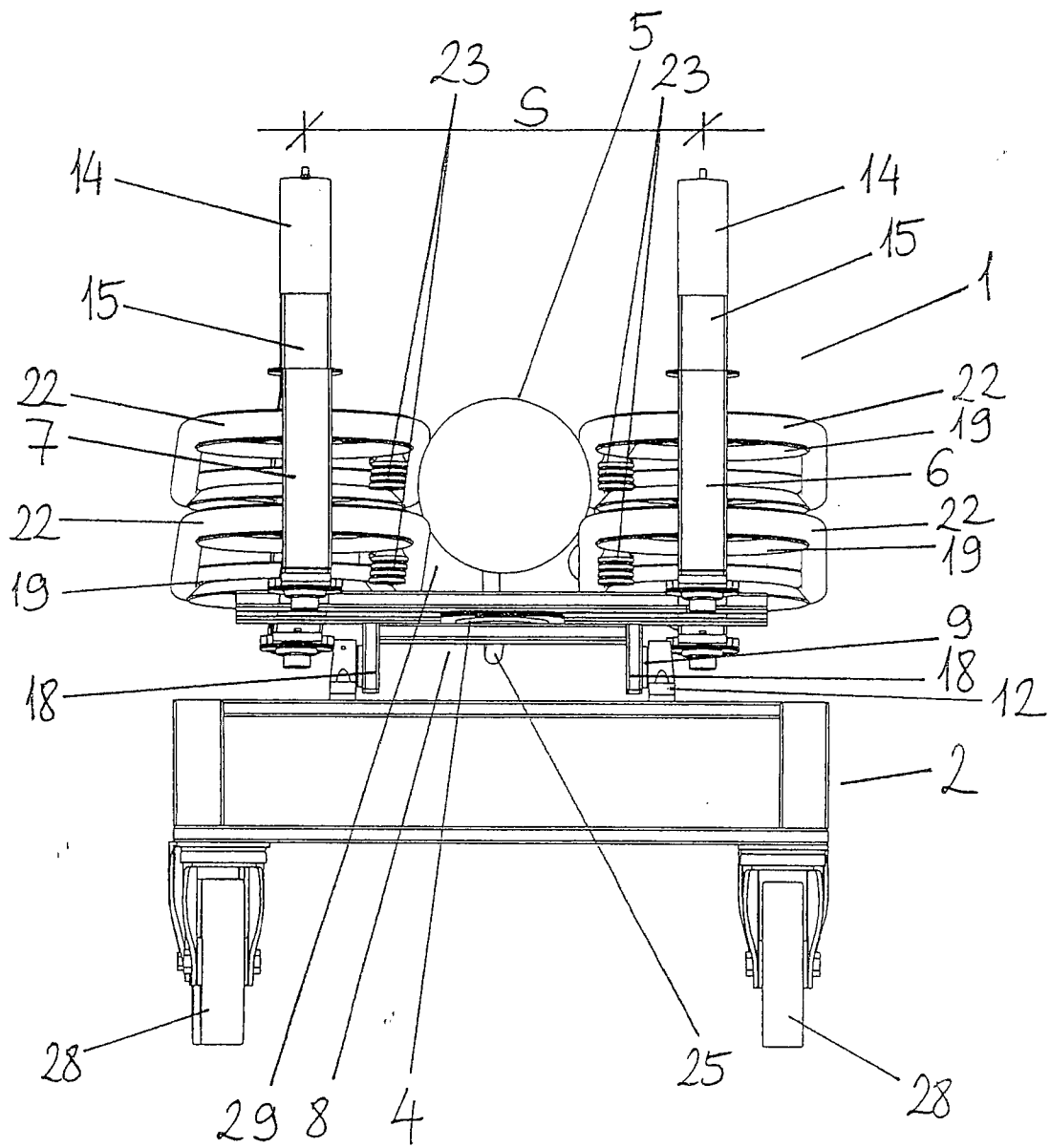
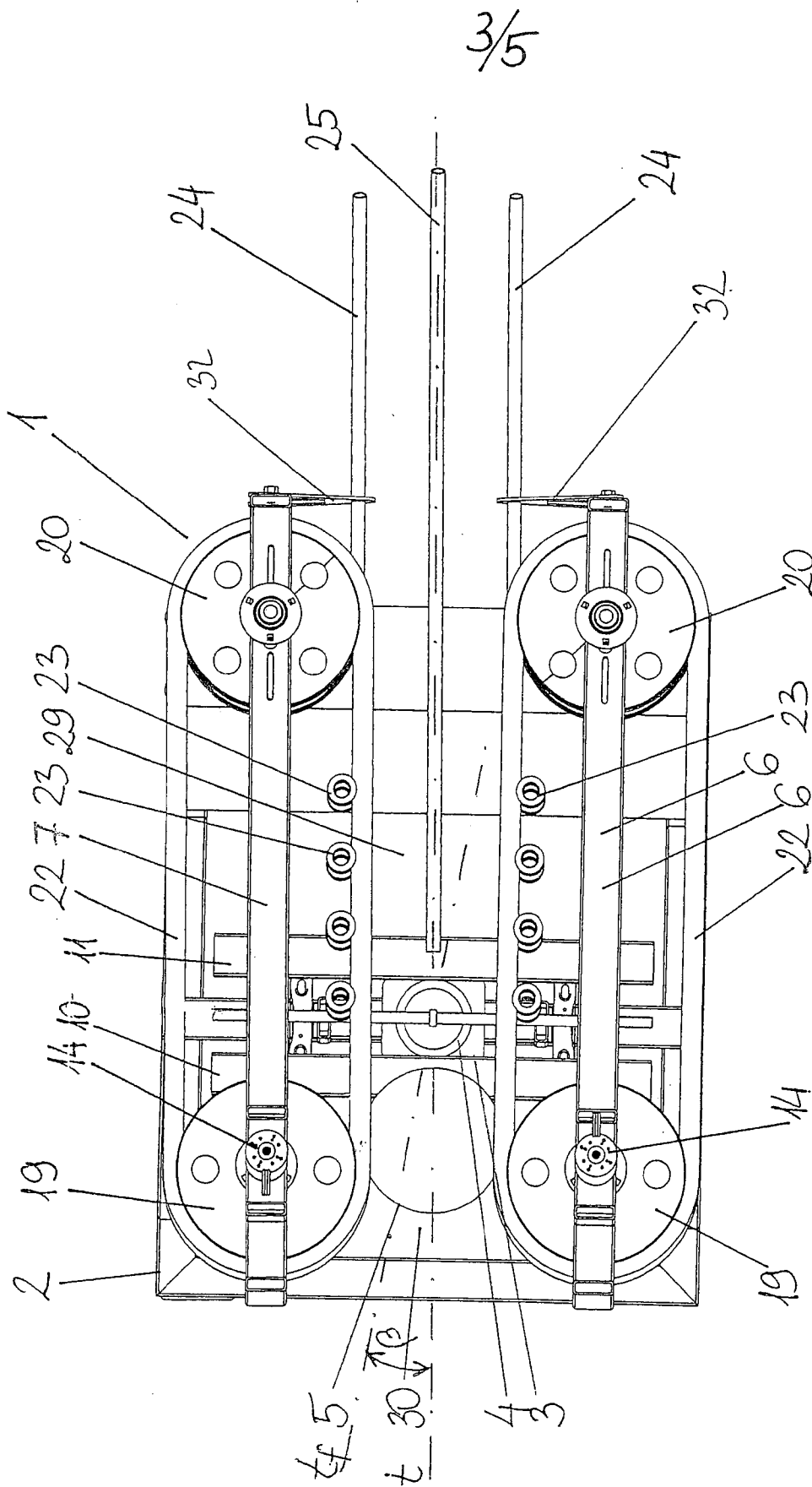


FIG. 2



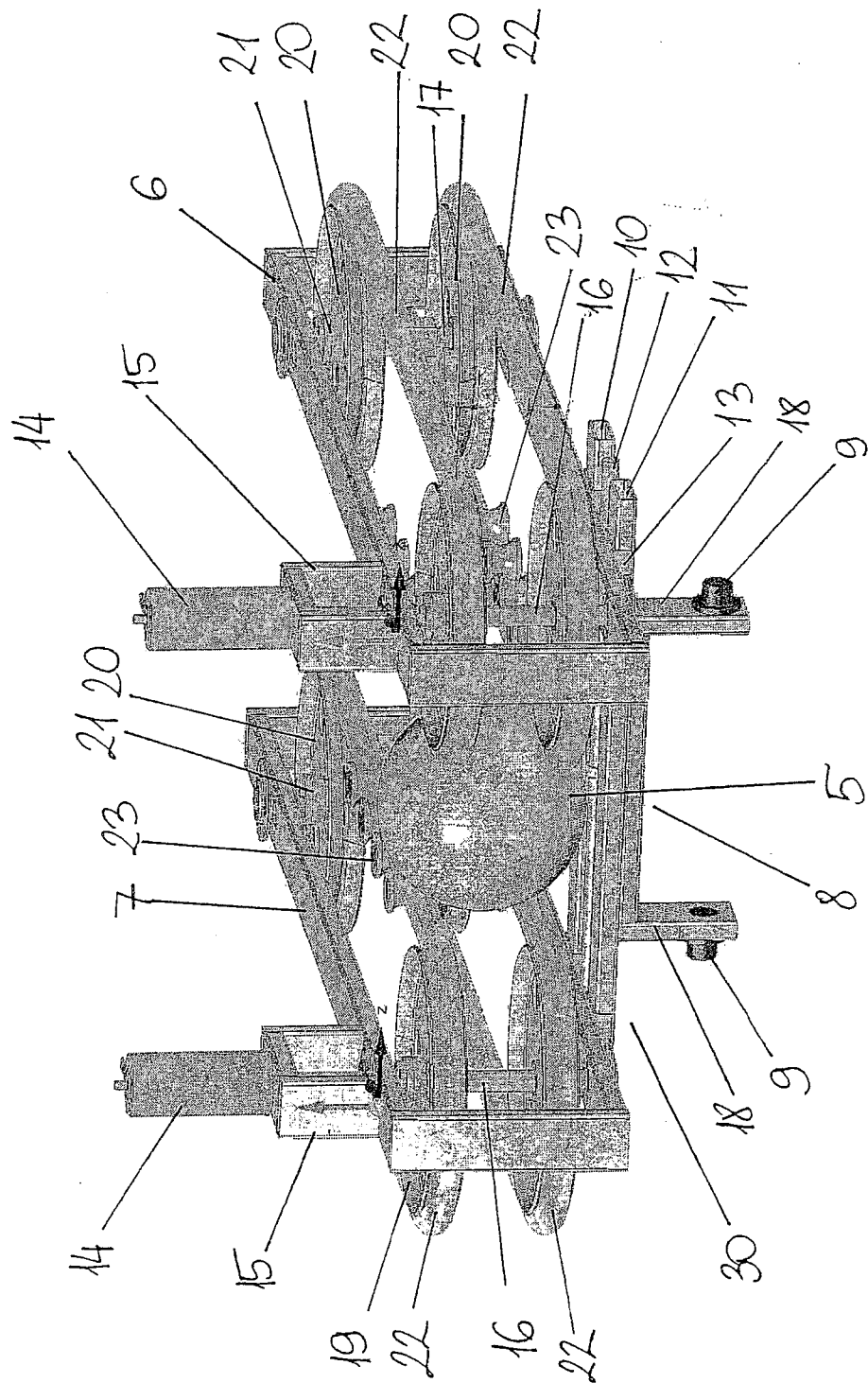
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FIG. 4

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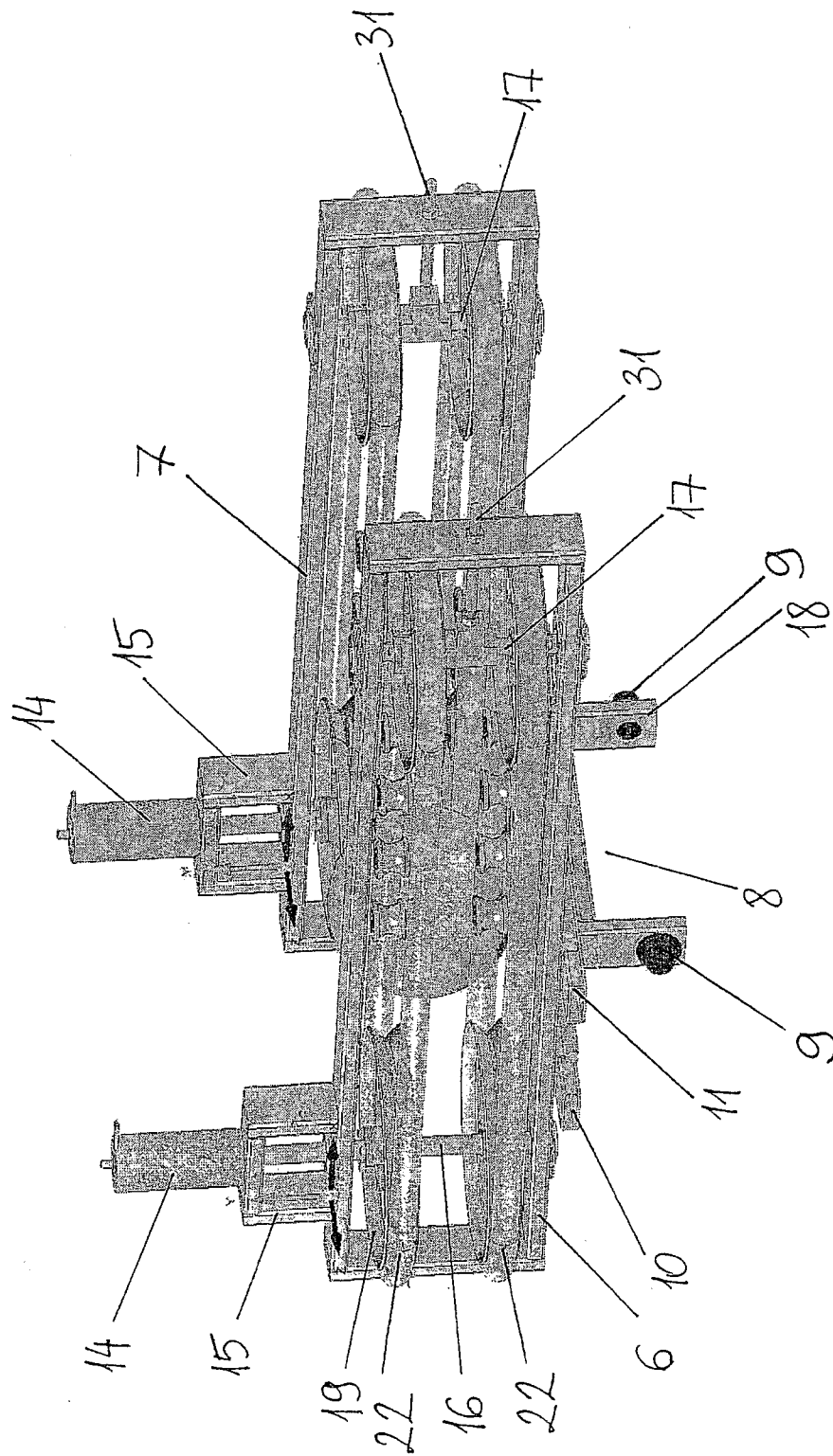


FIG. 5