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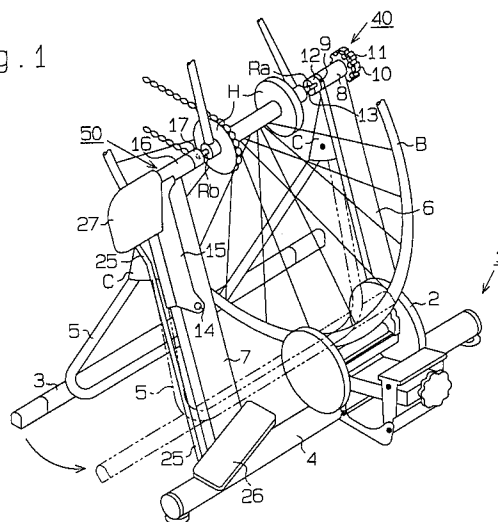
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CH-8610 Uster (CH)(54) **Bicycle exercise stand.**

(57) A bicycle exercising stand is disclosed. A frame (1) includes positioning sockets (9, 12) for engaging an axle (Ra) of hub (H) and positioning a drive wheel (B) of a bicycle, and holding mechanism arranged substantially opposite to the positioning sockets (9, 12) which are movable between extended and contracted positions wherein the holding mechanism is arranged to engage the other hub (H) of the bicycle in the extended position to cooperate with the positioning sockets (9, 12) to rotatably hold the drive wheel (B) which is lift off of the floor. A pedal (26) is mounted to a lower portion of the frame (1) and coupled to the holding mechanism for moving the holding mechanism between the extended and contracted positions by operating the pedal (26) by foot.

Fig. 1

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Technical Field

The present invention relates generally to a bicycle exercise stand. More particularly, it relates to an exercise stand which lifts the drive wheel of the bicycle off of the floor and holds the wheel, and permits a user to perform pedaling exercise while a resistance applying device applies a drag force to the drive wheel.

Related Background Art

Bicycles have long been used as indoor training devices over decades. Such training generally requires a stand which lifts a drive wheel (rear wheel) of the bicycle off of the floor and a resistance device which applies a drag force to the drive wheel. Representative prior art stands are disclosed in U.S. Patent Nos. 4,768,782 and 4,969,642. These stands each includes a frame constructed with a pair of front and rear pipes and having at least a pair of upward extending support legs. The legs in turn carry substantially horizontally extending longitudinally aligned support arms having facing sockets on their facing ends. The sockets are arranged to engage the hubs of the bicycle's wheel in a manner that lifts the wheel slightly off of the floor or ground. The outer periphery of the drive wheel's tire is also placed in frictional contact with a resistance applying device that is mounted on the frame. With this arrangement, the user may perform a stationary pedaling exercise by riding the bike in a normal manner.

In the stand disclosed in U.S. Patent No. 4,768 782, the support arms take the form of opposing threaded bolts. Thus to mount the bicycle on the stand, the user must lift the rear wheel to a position where the bicycle hubs correspond in height to the height of the support arms. The sockets are then positioned over the hubs by rotating knobs on the outer ends of the bolts. Thus, the user must hold the upper rear portion of the bicycle with one hand while at the same time, rotating one of the bolts to properly mount the bicycle. Although knobs on the end of the bolts make them easier to rotate, it requires a fair amount of dexterity to simultaneously hold the bicycle in position and turn the knob. Accordingly, the actions required to set the bicycle on the stand are somewhat difficult.

The stand disclosed in U.S. Patent No. 4,969,642 is quite similar to the stand described above. In effect it simply replaces one of the threaded bolts with a hand lever actuated cam and piston arrangement. That is, one of the support arms has a lever mounted thereon. The lever has a cam surface that drives a piston laterally to position the second socket. Mounting a bicycle on the stand is much like mounting a bicycle on the previously

described stand. That is, the user must lift the bicycle with one hand while reaching down to operate the lever with the second hand. Accordingly, the actions required to set a bicycle on the stands is also somewhat difficult.

Disclosure of the Invention

Accordingly, it is a primary objective of the present invention to overcome the drawbacks caused in the conventional stands and to provide a bicycle exercise stand that makes it easy to set a bicycle thereon.

To achieve the foregoing and other objects and in accordance with the purpose of the present invention, a bicycle stand is provided for supporting a drive wheel of a bicycle. The bicycle stand includes a frame, positioning means provided on the frame for supporting a first hub of a drive wheel of the bicycle to position the drive wheel, and holding means positioned substantially opposite to said positioning means for supporting a second hub of the drive wheel, wherein the drive wheel being rotatably held. The stand further has holding means being arranged to be rotatable between a first and a second positions, wherein the holding means 15 aligned against the positioning means in the first position, and the holding means is offsetted against the positioning means in the second position, pedal means mounted to the frame for moving the holding means.

In the exercise stand having the above construction, the positioning mechanism arranged on the frame set on the floor abuts against the one side of the hubs of the drive wheel of the bicycle so as to set the position of the drive wheel. The pedal is operated, such that the holding mechanism is pivoted from the separated position to the position corresponding to the positioning mechanism. Therefore, the holding mechanism together with the positioning mechanism lifts the drive wheel off of the floor, such that the drive wheel becomes rotatable.

Brief Description of the Drawings

The invention, together with objects and advantages thereof, may best be understood by reference to the following description of the presently preferred embodiments together with the accompanying drawings, in which:

Fig. 1 is a perspective view showing a bicycle exercise stand of the present invention together with part of a bicycle;

Fig. 2 is a cross-sectional view showing the linkage between the pedal and the socket when the socket is in the retracted position;

Fig. 3 is a cross-sectional view showing the linkage between the pedal and the socket shown in Fig. 2 when the socket is in the extended position;

Fig. 4 is a side view of the bicycle exercise stand according to the present invention; and

Fig. 5 is a cross-sectional view showing a pedal mounting structure.

Description of Special Embodiment

One embodiment of the present invention is shown in the drawings and will be explained in detail hereinafter. In this embodiment, the invention takes the form of a free standing bicycle stand that may rest on the ground, a floor or the like shown in Fig. 1. A resistance applying drum 2 is mounted to a lower portion of a frame 1 to provide frictional resistance to the drive wheel of a bicycle that is held by the stand. By way of example, the resistance device may take the form of a conventional magnetic or wind resistance device.

The frame 1 includes, front and rear tubular bases 3, 4 that are arranged in parallel. A U-shaped support 5 extends generally upward from the front base 3 such that both free ends thereof are inclined backward as they extend upward. A pair of legs 6, 7 extend upward and slightly forward from the rear base 4. The free ends of the U-shaped support 5 are pivotally coupled to form the upper ends of respective legs by hinges C. When the stand is in use, the U-shaped support 5 is pivoted to the extended position shown in Fig. 1. When not in use, the stand may be folded and collapsed for storage, as shown by the two-dot chain line in the same figure.

A cylindrical portion 8 is formed on or fixed to the upper end of the right leg 6. The portion 8 extends horizontally across the entire width of the leg 6. A positioning screw 9 is threadably inserted into the portion 8. The inner end of the screw 9 extends inward from the portion 8. An adjust knob 10 is secured to the outer end (right side in Fig. 1) of the screw 9. A lock knob 11 is threadably fitted onto the screw 9 between the adjust knob 10 and the outer wall of the portion 8. A positioning socket 12 is carried by the inner end of the screw 9. A receiving socket 13 is formed outward from the inner opening of the socket 12.

The distance that the screw 9 extends beyond the portion 8 may be adjusted to accommodate different size bicycles' wheels. Specially, the position of the socket 12 can be adjusted based on the width of the hub H of the bicycle's rear wheel B. Once the socket is properly placed in a selected position, the lock knob 11 is operated to lock the screw 9. This causes the socket 12 to be immovably held at the selected position. Then, a first one

of the axle hubs is placed in the positioning socket 12.

The rear wheel B is placed on the resistance applying drum 2. A first axle Ra which extends beyond the hub H of the rear wheel B is rotatably held by means of the socket 12 so as to position the rear wheel B.

As shown in Figs. 2 and 3, a support arm 15 is pivotally fitted to the left leg 7 by means of a support pin 14. As shown in Fig. 4, the arm 15 is formed so as to cover the upper half (i.e., a half of the left side portion) of the leg 7. A sleeve 16 is formed in the upper end of the left leg 7. The length of the sleeve 16 is approximately twice the width of the leg 7. About half of the sleeve 16 (i.e., a half of the right side portion) overhangs inward toward the inner side of the leg 7. A groove 7a is formed on the lower portion of the overhanging sleeve portion and extends its entire length.

As shown in Figs. 2 and 3, a socket 17 is securely attached to the inner portion of the sleeve 16, and extends inward from the sleeve 16. Therefore, the arm 15 pivots where the pin 14 is the pivotal center. Thus, the socket 17 switches its position between the horizontal position opposing to the socket 12 shown in Fig. 3, and the slant position not opposing the socket 12 shown in Fig. 2.

As shown in Fig. 4, a U-shaped first link 19 is pivotally coupled to the upper left end portion of the arm 15, via a supporting pin 20. A second link 21 and connecting rod 25 are pivotally coupled to the inner portion of the opened tip of the first link 19, via a supporting pin 22. The second link 21 is pivotally coupled to a supporting piece 23 which extends out and upward and cramps the piece 23. As shown in Figs. 2 and 3, after the piece 23 is inserted through the leg 7 along the width direction of the leg 7, the piece 23 is securely welded. A trapezoid-shaped groove is formed on the top surface of the piece 23, such that the groove regulates the pivotal motion of the links 19 and 21.

A pedal 26 formed at the lower portion of the left leg 7 is pivotally coupled to the lower portion of the rod 25 by means of a bolt 35.

A sleeve cover 27 formed of a hard resin such as polyvinyl chloride is attached to the sleeve 16 and arm 15 to cover the first and second links 19, 21, and piece 23. The lower portion of the sleeve cover 27 has a slit G that regulates the shift of the rod 25.

The pedal 26 is formed from a hard resin such as polyvinyl chloride or a metallic material, and has a plate like shape. As shown in Fig. 5, the pedal 26 includes a relatively thick abutting wall 28 that extends downward from a front portion (i.e., left end) of the pedal 26. A mounting wall 29 extends downward from a central portion of the pedal 26. A

bolt 34 is inserted through bores 30, 31 formed in the walls 28, 29, respectively, from the outer front side of the left leg 7, via a bore 32 formed in the leg 7. The pedal 26 is secured to the leg 7 by a nut and bolt combination 33, 34.

The pedal 26 is pivotally moveable between the non-engaging position shown in Fig. 2 and the engaging position shown in Fig. 3 by operating the pedal. When the pedal 26 is in the non-engaging position, the first and second links 19, 21 cross each other where the angle therebetween is acute. Therefore, the arm 15 is located at the slant position shown in Fig. 2, and the sleeve 16 and socket 17 are held at the non-engaging position.

On the other hand, when the pedal 26 is moved to the engaging position shown in Fig. 3 by operating the pedal, the rod 25 is pulled downward. This pulling downward operation causes the first and second links 19, 20 to pivot in generally straight manner. This in turn pivots the arm 15 clockwise where the pin 14 is the center of pivoting. When the sleeve 16 abuts against the groove 7a, the sleeve 16 is moved to the horizontal position. By this motion of the sleeve 16, the socket 17 is moved to the holding position which opposes the socket 12.

Thus, the socket 17 engages the second axle Rb which extends from the hub H of the rear wheel B. This causes the rear wheel B to be rotatably held on the dram 2 by means of the sockets 12, 17. Further, when both links 19, 21 are moved to the engaging positions, respectively, both links 19, 21 are aligned along a generally straight line. Therefore, motion suppressing force will act on the pedal 26 through the sleeve 16 to arm 15, which tends to hold the pedal 26 in place.

The resistance applying dram 2 is disclosed in U.S. Patent No. 4,826,150 by the applicant of this invention. Therefore, the explanations relating to the construction and operation of the dram 2 will be briefly explained herein.

A pair of permanent magnets are arranged on opposite sides of holding a metallic rotating plate fixed to a rotating axle. This placement of the magnets is such that eddy currents are generated in the plate when it is rotated. A remote control switch that is connected to the dram 2 and regulates the strength of the magnetic field felt by the rotating plate may be attached to the handle or the like of a bicycle. The control switch allows the user to adjust the resistance generated by the permanent magnets, thereby adjusting the load.

The actions required to mount a bicycle on the described bicycle stand will now be explained. If desired, the user may first place the tire of the rear wheel B on the resistance applying dram 2. The receiving socket 13 of the positioning socket 12 is fitted over the first axle Ra of the rear wheel B.

When the first axle Ra of the hub H is securely fitted within the socket 13, the right side position of the rear wheel B is set by the socket 12 and the positioning screw 9.

Thereafter, the user holds the rear end of the bicycle by both hands such that the tire of the rear wheel B will not come off of the dram 2, and insure the position where the first axle Ra is held by the socket 12. In this position, the user may use his or her foot to move the pedal 26 between the non-engaging and engaging positions shown in Figs. 2, 3, respectively.

The rod 25 is pulled downward, the link 19 is pivoted counter-clockwise, and the link 21 is pivoted clockwise. The arm 15 is then pivoted clockwise where the pin 14 is the pivotal center. When the sleeve 16 abuts against the groove 7a, the sleeve 16 and socket 17 are moved to the holding position where opposes to the socket 12. Therefore, the second axle Rb of the hub H is held within the socket 18. Thus, the rear wheel B is rotatably held on the dram 2 of the exercise stand by the sockets 12, 17. This allows the user to use the bicycle as an exercise apparatus.

To release the bicycle from the stand, the pedal 26 located in the engage position shown in Fig. 2 is moved to the non-engage position shown in Fig. 3 by operating the pedal while the rear portion of the bicycle may be supported with both hands.

The rod 25 is pushed upward, the link 19 is pivoted clockwise, and the link 21 is pivoted counter-clockwise. As a result, the arm 15 is pivoted counter-clockwise and located at the inclined position with respect to the leg 7. As the arm 15 is pivoted, the sleeve 16 and socket 17 are moved to the non-engaging position shown in Fig. 2. Thus, the second axle Rb is released from the socket 18.

Thereafter, as the first axle Ra is released from the socket 12, the bicycle can be removed from the exercise stand.

As described above, the drive wheel may be set on the exercise stand by a simple operation. Specifically, the bicycle may be held by the user's hands to properly position the drive wheel. Then, the bicycle can be secured to the stand using a simple foot operation by simply depressing the foot pedal 26.

Although only one embodiment of the present invention has been described in detail herein, it should be apparent to those skilled in the art that the present invention may be embodied in many other specific forms without departing from the spirit or scope of the invention. Particularly, it should be understood that a lock mechanism could be provided to lock the pedal 26 when it is in the engaging position shown in Fig. 3. Therefore, the present examples and embodiments are to be con-

sidered as illustrative and not restrictive and the invention is not to be limited to the details given herein, but may be modified within the scope of the appended claims.

Claims

1. In an exercise stand for supporting the drive wheel of bicycle wheel to facilitate using the bicycle for stationary exercise, the exercise stand having a frame (1), positioning means (9, 12) provided on the frame (1) for supporting a first hub of a drive wheel (B) of the bicycle to position the drive wheel (B), and holding means (15, 16, 17) positioned substantially opposite to said positioning means (9, 12) for supporting a second hub of the drive wheel (B), wherein the drive wheel (B) being rotatably held, the improvement characterized by:
 - said holding means (15, 16, 17) being arranged to be rotatable between a first and a second positions, wherein the holding means (15, 16, 17) is aligned against the positioning means (9, 12) in the first position, and the holding means (15, 16, 17) is offsetted against the positioning means (9, 12) in the second position;
 - pedal means (26) mounted to the frame (1) for moving the holding means (15, 16, 17).
2. A bicycle exercise stand as set forth in claim 1, wherein said pedal means includes a pedal (26) which is mounted on the lower part of the holding means (15, 16, 17).
3. A bicycle exercise stand as set forth in claim 2, further including a motion converting mechanism (19, 21 25) for linking the pedal (26) to the holding means (15, 16, 17) and converting operation of said pedal (26) into a horizontal motion of the holding means (15, 16, 17).
4. A bicycle exercise stand as set forth in claim 3, wherein motion converting means includes:
 - a rod (25) a first end of which is linked to said pedal (26) to extend upward, said rod (25) being moved substantially vertically according to the pedal operation of the pedal (26);
 - first linkage means (19) for linking a second end of the rod (25) and end of the holding means (15, 16, 17);
 - second linkage means (21) for linking the second end of the rod (25) and end of the frame (1); and
 - said first and second linkage means (19) (21) converting the substantially vertical movement of the rod (25) into a rotational movement to transmit to the holding means (15, 16, 17).
5. A bicycle exercise stand as set forth in anyone of claims 1 through 4, wherein said holding means further includes:
 - a supporting arm (15) rotatably coupled to the frame (1);
 - a piston socket (17) provided at the end on the side extending from a sleeve (16) of said supporting arm (15).
6. A bicycle exercise stand as set forth in anyone of claims 1 through 5, wherein said positioning means further includes:
 - a threaded shaft (9) which is threadably inserted into a sleeve (8) internally threaded and extends from the sleeves (8); and
 - a positioning socket (12) which is provided at the extended end of said thread shaft (9) and supports a support rod (Rb) of the hub (H) of the bicycle.
7. A bicycle exercise stand as set forth in claim 6, wherein said positioning means further includes:
 - an adjust knob (10) which is provided at an end opposite to the extended end of said thread shaft (9) and operated to adjust the threadably inserted amount of the threaded shaft (9) into the threaded sleeve (8); and
 - a lock knob (11) which is threadably fitted onto the threaded shaft (9) between said adjust knob (10) and the end face of the threaded sleeve (8), and after the threadably inserted amount of the threaded shaft (9) into the threadably advanced on said threaded shaft (9) to the end face, and locks the threaded shaft (9) to fix the position of the positioning socket (12).
8. A bicycle exercise stand as set forth in anyone of claims 1 through 7, wherein resistance means (2) for applying a resistance to the rotation of said drive wheel (B) is further included.

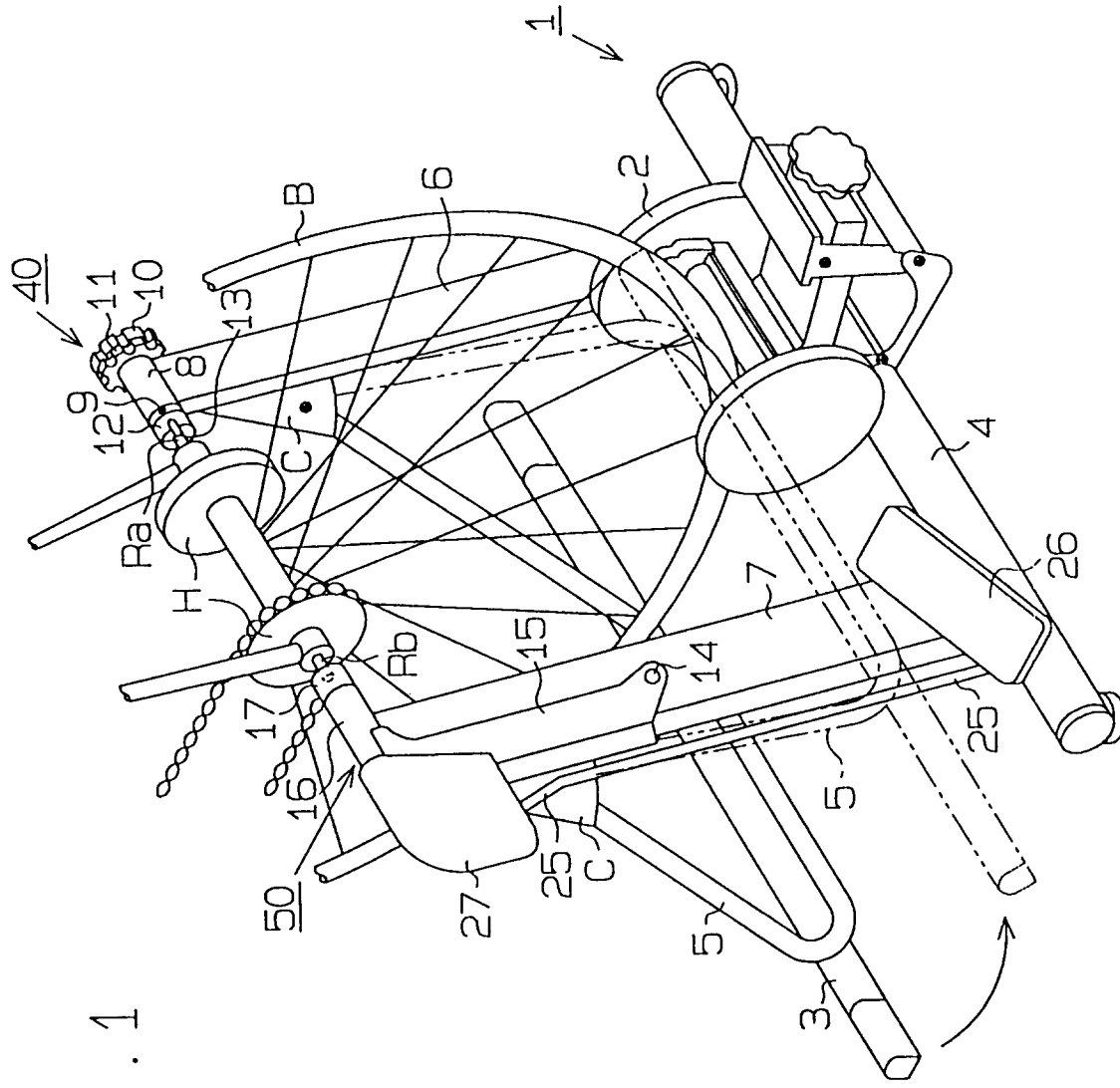


Fig. 1

Fig.2

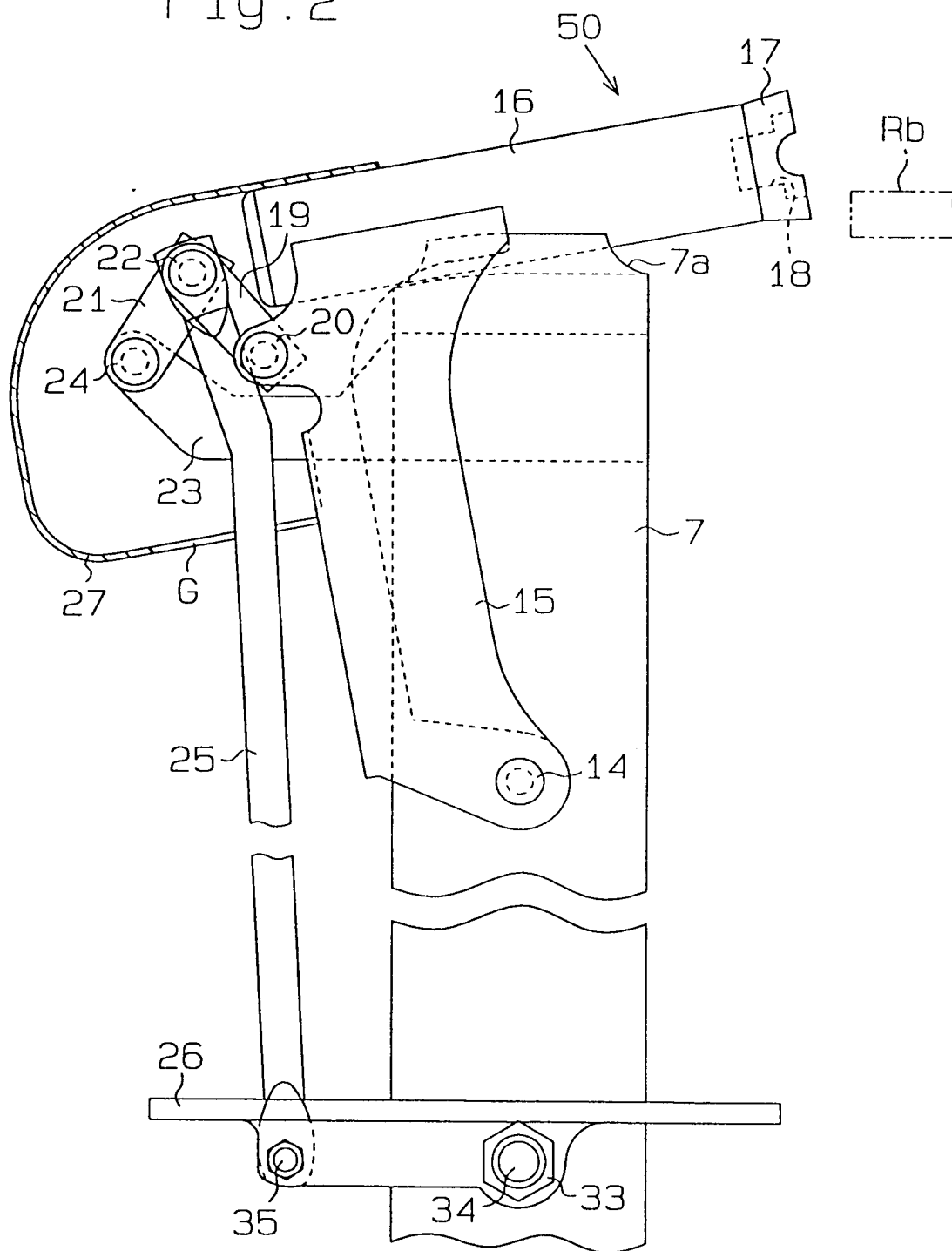


Fig. 3

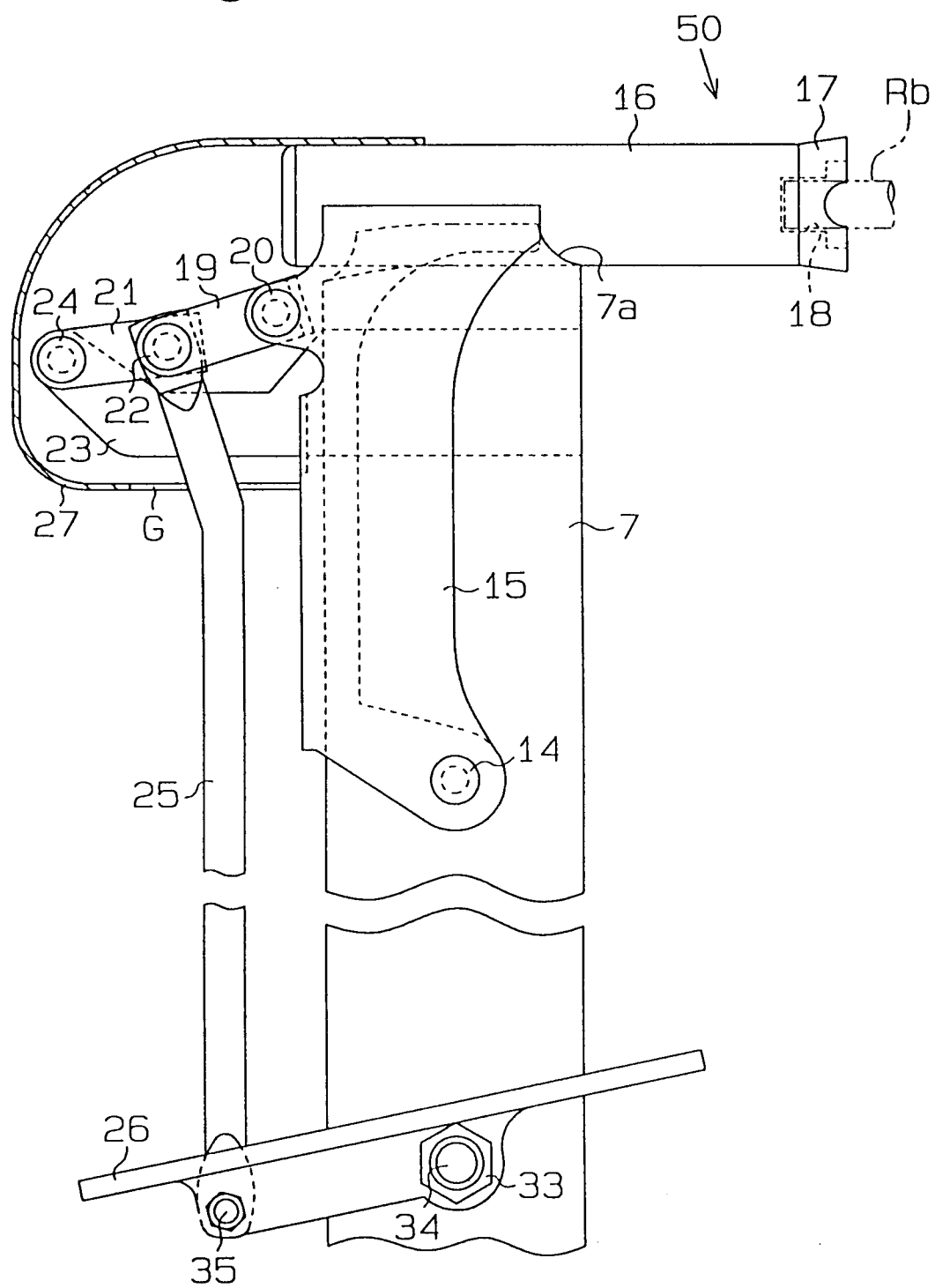


Fig. 4

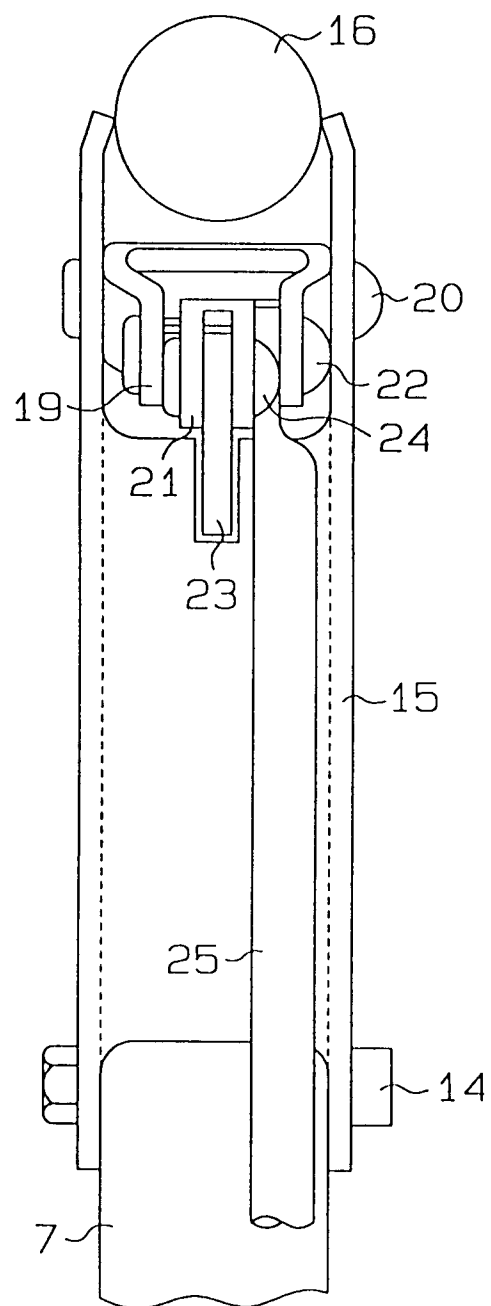


Fig. 5

