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2,857,162

BOWLING BALL RETARDING DEVICE

Filed Nov. 29, 1955

2 Sheets-Sheet 1

FIG. 2

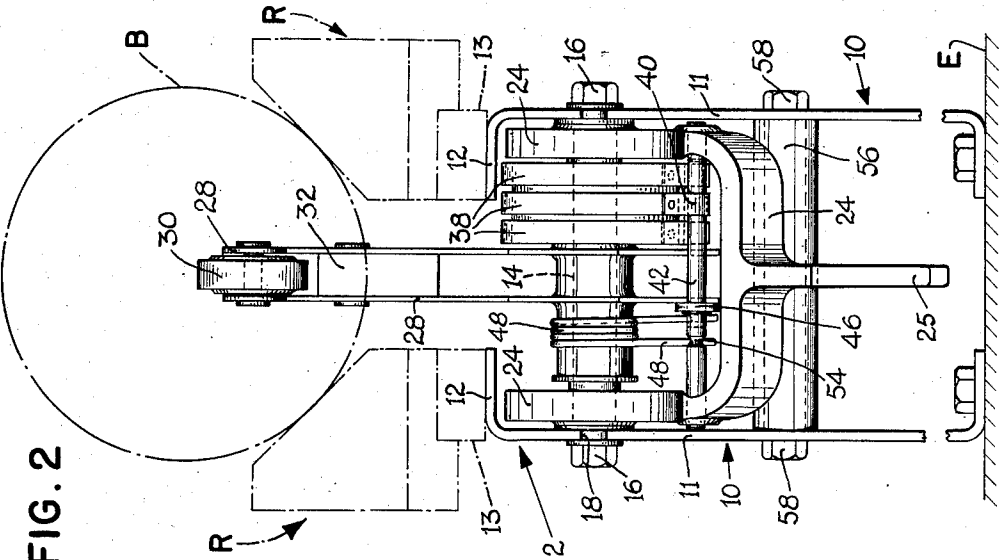
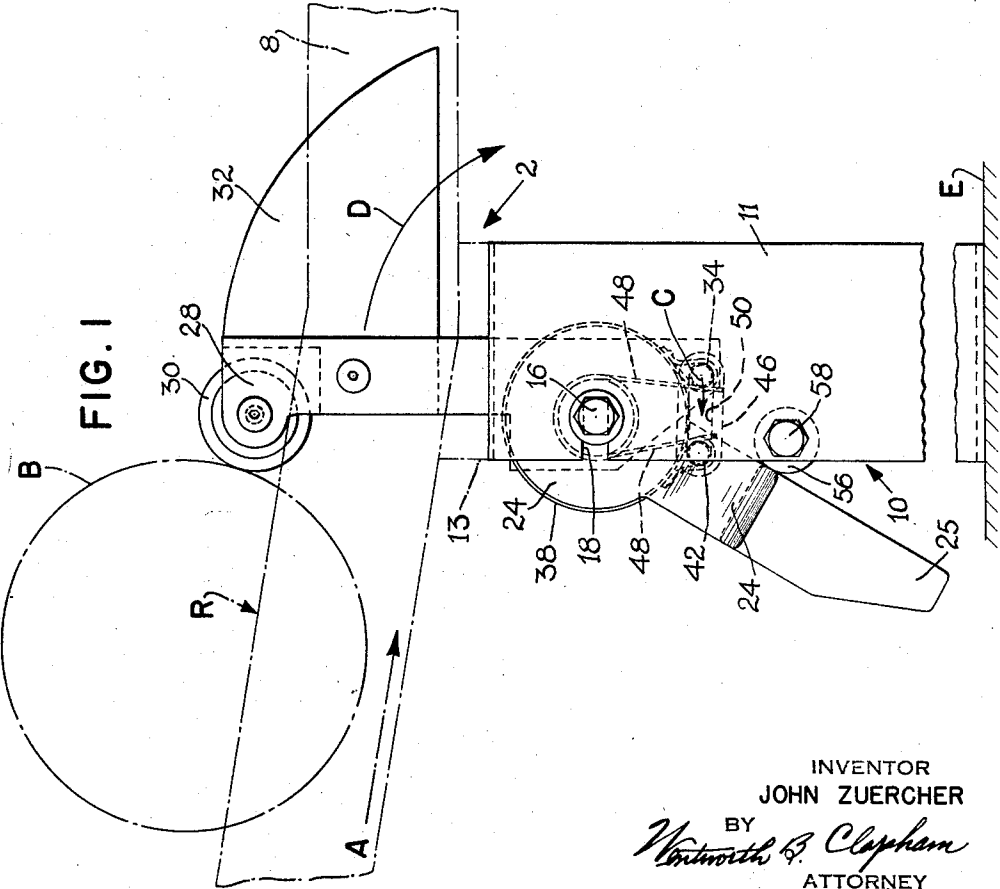


FIG. 1



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FIG. 3

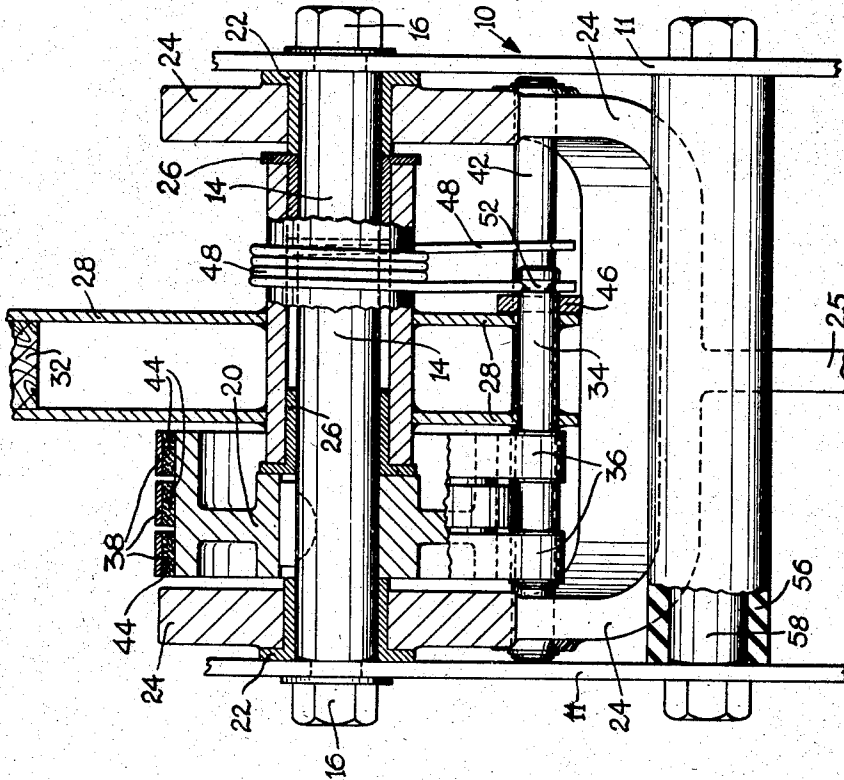
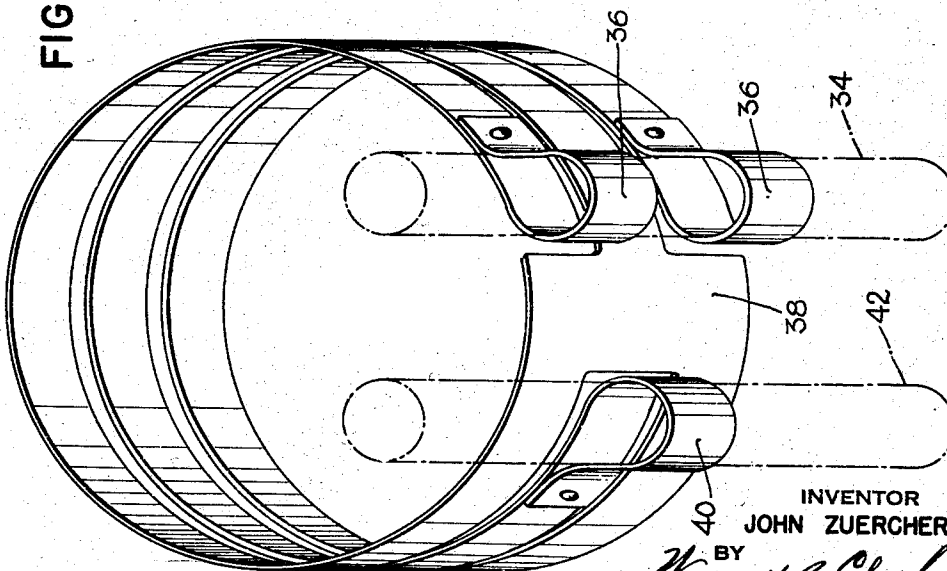


FIG. 4



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BOWLING BALL RETARDING DEVICE

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This invention relates to bowling apparatus, and more particularly to improvements in bowling ball retarding devices operative to reduce the momentum of bowling balls. While not limited thereto, the invention is advantageously employed in connection with bowling ball checks for retarding balls moving along the return runway of the bowling alley.

In known types of ball checks, there is always the possibility that, because of the construction of the ball check, a slowly moving ball will be unable to operate the check and move on to its final position of rest. This disadvantage is characteristic of so-called dash-pot types of ball checks.

The present invention constitutes the solution of the problem of providing a bowling ball retarding device which is free acting and one which always operates satisfactorily regardless of the momentum of balls to be retarded.

In one advantageous embodiment, the invention consists of a ball check having a check-arm supporting a pivotally mounted ball engaged element. The check-arm is connected to one end of a brake band loosely encircling a stationary brake drum. The other end of the brake drum is attached to an inertia member or counterweight. Spring means are provided for normally maintaining the brake band out of engagement with the brake drum. So long as this condition obtains, the check-arm can be moved downwardly between the rails of the ball return and a ball can move thereover. This operation occurs in the case of a slowly moving ball engaging the pivotally mounted element on the ball check arm. When, however, a ball moving more rapidly along the return runway strikes the pivoted element on the check-arm, the braking system is actuated and checks the momentum of the ball to a marked extent before the brake band is released and the ball can move the check-arm downwardly and roll thereover.

It is an object of the invention to provide a novel ball check for use with a bowling alley ball return.

It is a further object of the invention to provide a novel bowling ball check for a ball return runway wherein a brake band system is operative to stop the forward travel of rolling balls, and especially rapidly rolling balls.

The invention is further characterized by the provision of a novel free acting bowling ball check which is operative under all conditions of operation despite the variations in the momentum of balls whose movement is checked thereby.

It is a further object of the invention to provide a bowling ball check having a single pivot for its operating members, and wherein the ball check is free acting for all balls checked thereby, regardless of their rolling speed along the return runway of a bowling alley.

The invention is further characterized by the provision of a bowling ball retarding device having a selectively operated braking system which is set into operation when the force of a ball striking its ball check-arm is greater

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than the force exerted by a control mechanism associated with the braking system.

With these and other objects not specifically mentioned in view, the invention consists in certain combinations and constructions which will be described fully hereinafter, and then set forth in the claims hereunto appended.

Referring now to the following detailed specification taken in conjunction with the accompanying drawings, which form a part of this specification, and in which like characters of reference indicate the same or like parts:

Figure 1 is a side elevation showing a preferred embodiment of my invention;

Figure 2 is a front elevation of the ball check shown in Figure 1;

Figure 3 is a sectional view of the structure shown in Figure 1; and

Figure 4 is an isometric view disclosing the brake band which forms a part of the ball check.

The ball check made in accordance with the invention may be used on any type of bowling alley ball return as long as it can be mounted so that its operating or ball checking member can be located in the path of travel of a ball rolling on to the ball delivery section of a ball return on which it is installed.

In the form of invention illustrated herein, the ball check is designated generally 2. It comprises an upright support bracket 10 formed from two spaced channel members 11, the lower ends of which are suitably mounted on the approach end of a bowling alley. The upper ends 12 of members 11 have suitably attached thereto blocks 13 to which the ball return rails of runway R are fixed.

Members 11 support a transverse shaft 14. The ends of shaft 14 are seated in slots 18 in members 11, and are held secured therein, as by suitable machine screws 16 threaded into the ends of the shaft.

A brake drum 20 is supported on and keyed to shaft 14 (Figure 3). Mounted adjacent the ends of shaft 14 are bushings 22 on which is swingably supported a forked inertia member 24. Also mounted on shaft 14 is a bushing 26 swingably supporting an arm 28, the upper free end of which carries a pivotally mounted roller 30. Roller 30 is freely rotatably mounted and preferably is provided with a shock absorbing surface or tire, such as a rubber tire, or it may be formed of rubber. This construction prevents damage to a ball when it strikes roller 30, and also tends to reduce shock in the ball check 2 when roller 30 is hit by a ball. The pivotal mounting for roller 30 insures that when it is struck by a ball, the ball will merely cause roller 30 to rotate and not tend to "climb" on it, as it might do if roller 30 were stationary.

Attached to and projecting rearwardly from arm 28 is a shroud 32. Shroud 32 is provided with a downwardly curved surface and acts to prevent possible injury to a player if his hand were in the path of movement of arm 28 when it is depressed by a moving ball.

The lower free end of arm 28 carries a substantially horizontal stud 34 which engages with a pair of loops 36 forming one end of a split brake band 38 (Figures 3 and 4). The other end of brake band 38 is provided with a loop 40 (Figures 2 and 4) which engages with a transverse shaft 42 supported by and secured to forked member 24 (Figures 1 and 2).

Shaft 34 on arm 28 and shaft 42 on forked member 24 both extend through the slot of a slotted link 46, so that shafts 34 and 42 are limited, by the ends of the slot, in their travel away from each other. A multi-turn torsion spring 48 is disposed with its turns encircling a hub fixed to arm 28 and with its ends extended and in engagement one with shaft 34 and one with shaft 42. Thus, one end of spring 48 is engaged in a groove 52, Fig. 3, in

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shaft 34, while the other end of the spring is engaged in a groove 54, Fig. 2, in shaft 42. It will thus be noted that the ends of the spring are disposed between the shafts 34 and 42, so that pivotal movement of arm 28 toward the pivoted counterweight comprising elements 24, 25 stresses spring 48. A similar action occurs when the counterweight assembly pivots toward arm 28. The spring 48 thus constitutes resilient means for transmitting pivotal movement between arm 28 and the counterweight.

Split brake band 38 is provided with a suitable conventional type of brake lining 44 (Figure 3) which engages with brake drum 20. Brake band 38 is so mounted on drum 20 that there is clearance therebetween. Its operation is such that when a slowly moving ball strikes roller 30, arm 28 is moved thereby downwardly between rails R and spring 48 elevates inertia extension 25 without causing gripping action of brake band 38 on drum 20. In the case of a rapidly moving ball striking roller 30, the tension of spring 48 is overcome by the force of the ball, and brake band 38 grips drum 20 thus checking the movement of a ball before downward movement of arm 28 takes place.

As shown in Figures 1, 2 and 3, forked member 24 is provided at its lower end with an inertia extension 25, preferably forming an integral part thereof. This extension functions as a counterweight, and normally biases member 24 to a position of rest against transverse bumper 56. In the illustrated embodiment, bumper 56 is tubular and covered with a resilient material, such as rubber. It is secured to support members 11 by a suitable bolt 58 extending through the tubular bumper 56 and secured in place by nuts threaded on each end of the bolt.

As shown, ball check 2 is located in the ball delivery portion 8 of a bowling alley ball return runway, and is so mounted that a ball will have rolled along substantially the entire length of the return runway R and approached the point where its momentum must be checked rapidly in a minimum of time in order that the ball will then move slowly to a position of rest without damaging other balls or bouncing off the ball rest.

When forked member 24 rests against bumper 56, as shown in Figure 1, arm 28, due to the coaction of link 46 and spring 48, is maintained in a substantially vertical position with roller 30 in the path of movement of a ball B in the direction of arrow A as it approaches the delivery portion 8 of return runway R. As ball B rolls along the rails of runway R and strikes roller 30, arm 28 has the tendency to swing downwardly between the rails of runway R in a clockwise direction of movement, as illustrated by the arrow D in Figure 1. However, if the ball strikes roller 30 with a force greater than the tension of spring 48 which by means of shafts 34 and 42 holds brake band 38 open, shaft 34 because of the movement of arm 28 under the impact of ball B, is quickly moved in the direction of arrow C, as indicated in Figure 1, thereby causing brake band 38 to be tightened momentarily about stationary brake drum 20. This action also momentarily arrests the movement of arm 28 and diminishes the force and consequently the speed of movement of ball B.

Spring 48 is designed for and tends normally to hold shafts 34 and 42 apart which results in brake band 38 being held open. Therefore, after recovery from the impact of ball B striking roller 30, it will slightly lift forked inertia member 24, which in turn slightly opens brake band 38. Release of the brake allows the ball B to continue its travel with reduced momentum. Further movement of the ball slowly depresses arm 28, the pivoted assembly comprising elements 24, 25 acting as a counterweight to further reduce the momentum of the ball as the ball rolls over roller 30. After ball B has rolled past depressed arm 28 and roller 30, forked member 24 swings downwardly to rest against bumper 56, and arm 28 moves to the position shown in Figure 1, awaiting the impact of the next ball as it rolls to delivery portion 8 of ball return runway R.

In the installation shown in Figure 1, ball return runway

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R is inclined slightly downwardly to the right. While this inclination is preferred, it is not essential because although the movement of a ball B is checked, as described above, when it strikes roller 30, when spring 48 lifts inertia arm or counterweight 25, the grip of brake band 38 on drum 20 is released and arm 28 can move freely downwardly as ball B rolls thereover.

A ball check made in accordance with the invention is not only simple in construction but also free acting. This is because in operation it can check and retard the movement of any ball which strikes its ball check-arm. A slowly moving ball will push the check-arm downwardly against the counter force of its inertia weight. On the other hand, a relatively fast rolling ball will cause the actuation of its brake band system and thereby effect a strong braking force acting to retard the momentum of the ball before it, also while moving slowly, depresses the check-arm and rolls thereover as in the case of the slowly moving ball first discussed.

I claim:

1. A ball retarding device for a bowling alley return runway comprising a pivotally mounted ball check-arm located in position to be engaged by a ball rolling along said runway, a pivotally mounted counterweight member having a weighted extension, a ball engaging member carried by one end of said arm, a shaft carried by the other end of said arm, a shaft carried by said counterweight member, a slotted link connecting both of said shafts, spring means engaging each of said shafts and normally maintaining said shafts at extreme positions in the slot of said link, a brake drum, a brake band encircling said drum, said brake band having its ends connected to said shafts, a stop for said weighted extension adapted to maintain said check-arm in substantially vertical position for engagement by a ball, said arm being operative in response to a ball striking said ball engaging member with a force greater than the force exerted by said spring means on said shafts to move said shafts towards each other and engage said brake band with said drum for checking the momentum of said ball.

2. The ball check defined in claim 1, wherein said spring means is operative after the initial impact of said ball on said ball engaging member, to effect a separation of said shafts in said slotted link and release said brake band whereby said ball may depress said check-arm and move thereover to a position of rest, said counterweight extension being operative in response to the movement of said ball over said depressed check-arm to return to its position of rest against said stop to relocate said check-arm in its normal operative position.

3. A ball return check device for checking the momentum of balls rolling along a bowling alley ball return runway comprising a ball check arm disposed in position to be engaged by a rolling ball, a support for said arm, a shaft mounted in said support pivotally mounting said arm, a counterweight pivotally mounted on said shaft, a brake drum attached to said shaft, a brake band encircling said brake drum, resilient means interconnecting said arm and said counterweight and operative to transmit pivotal motion between said members, said resilient means being connected to said brake band to normally maintain said brake band loose on said drum, and means connecting said brake band to said arm and said counterweight whereby said brake band is brought into operative engagement with said brake drum to prevent substantial movement of said arm, and thereby effectively retard movement of the ball, when said arm is subjected to a force exerted by the ball sufficient to distort said resilient means to a predetermined extent.

4. The return check device defined in claim 3 wherein said resilient means include a shaft carried by said check-arm, a shaft carried by said counterweight, a link having an elongated slot connecting said shafts, and a torsion spring encircling said first named shaft and provided with arms engaging and urging said last named shafts apart.

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5. In a device for retarding movement of a bowling ball, the combination of a pivoted ball retarding means, a pivoted counterweight, a friction brake associated with said ball retarding means and actuable to brake the same, resilient means interconnecting said ball retarding means and counterweight and operative to transmit pivotal motion from one such pivoted member to the other, said resilient means yielding during transmittal of motion from said ball retarding means to said counterweight, and means connected to said resilient means and operatively associated with said brake to actuate the latter to brake said ball retarding means in response to a predetermined yielding of said resilient means.

6. In a device for retarding movement of a bowling ball, the combination of a movable ball retarding means, means for mounting said ball retarding means in the path of travel of a ball on the return runway, an inertia member, means movably mounting said inertia member, resilient means interconnecting said ball retarding means and inertia member and effective to transmit motion therebetween, said resilient means yielding under forces applied thereto by movement of said ball retarding means, a friction brake operatively associated with said ball retarding means and actuable to brake the latter, and means connected to said resilient means and operatively associated with said brake to actuate the same to brake said ball retarding means in response to a predetermined yielding of said resilient means.

7. In a bowling ball retarding device, the combination of a shaft, a ball retarding means pivotally mounted on said shaft, a fixed brake drum carried by said shaft, a brake band embracing said drum, a counterweight mounted to pivot on said shaft, means connecting the ends of said band one to said retarding means and one to said counterweight whereby relative pivotal movement of said retarding means and counterweight in one direction is effective to tighten said band on said drum and thereby brake said retarding means and a torsion spring having one end connected to said retarding means and one end connected to said counterweight to resiliently bias said retarding means and counterweight against such relative pivotal movement.

8. In a bowling ball retarding device, the combination of a ball retarding means, a counterweight, means mounting said check and counterweight for pivotal movement in substantially parallel planes, brake means including a fixed friction member and a movable friction member, said movable friction member being connected both to said retarding means and said counterweight and constructed to be brought into engagement with said fixed brake member by relative pivotal movement of said retarding means and counterweight toward each other, and yieldable means interconnecting said retarding means and counterweight to transmit pivotal motion therebetween.

9. In a device for retarding movement of a bowling ball, the combination of ball retarding means including

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a pivotally mounted arm, a counterweight, means pivotally mounting said counterweight, resilient means interconnecting said arm and said counterweight and effective to transmit pivotal motion from one such member to the other, normally inactive friction brake means operatively associated with said retarding means to restrain movement of said arm when said brake means is actuated to braking position, and means operated by distortion of said resilient means to a predetermined extent by pivotal movement of said arm for actuating said brake means to braking position.

10. In a bowling ball retarding device, the combination of a ball retarding member, means mounting said member for pivotal movement about an axis displaced from the path of travel of balls to be retarded, a brake operatively associated with said member and actuable to brake the same against such pivotal movement, a pivoted counterweight connected to said member to bias the same against such pivotal movement, yieldable means also connected to said member and yieldable in response to pivotal movement of said member about said axis when the same is engaged by a rapidly moving ball, and means connected to said yieldable means and operatively associated with said brake and effective to actuate the same to brake member in response to said yielding of said yieldable means.

11. In a device for retarding the movement of a bowling ball, the combination of a retarding member mounted for pivotal movement about an axis removed from the path of travel of balls to be retarded, biasing means connected to said member and effective to bias the same against such pivotal movement to an extent which can be overcome by the force applied to said member by a slowly moving ball, brake means operatively connected to said member and actuable from a non-braking condition to a braking condition, and actuating means connected to said brake means and operative to actuate said brake means to braking condition, said actuating means comprising means connected to said retarding member and operated only in response to abrupt pivotal movement thereof about said axis.

12. In a device for retarding movement of a bowling ball, the combination of retarding means mounted for pivotal movement about an axis displaced from the path of travel of balls to be retarded, a friction brake operatively associated with said retarding means to brake the same against pivotal movement about said axis, and actuating means connected to said brake and operative to actuate the same to brake said retarding means, said actuating means comprising means connected to said retarding means and operated only in response to abrupt pivotal movement thereof about said axis.

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