Oct. 13, 1964 R. M. CUMMINGS 3,152,812

ROLLER SKATE

Filed Oct. 11, 1963 2 Sheets-Sheet 1

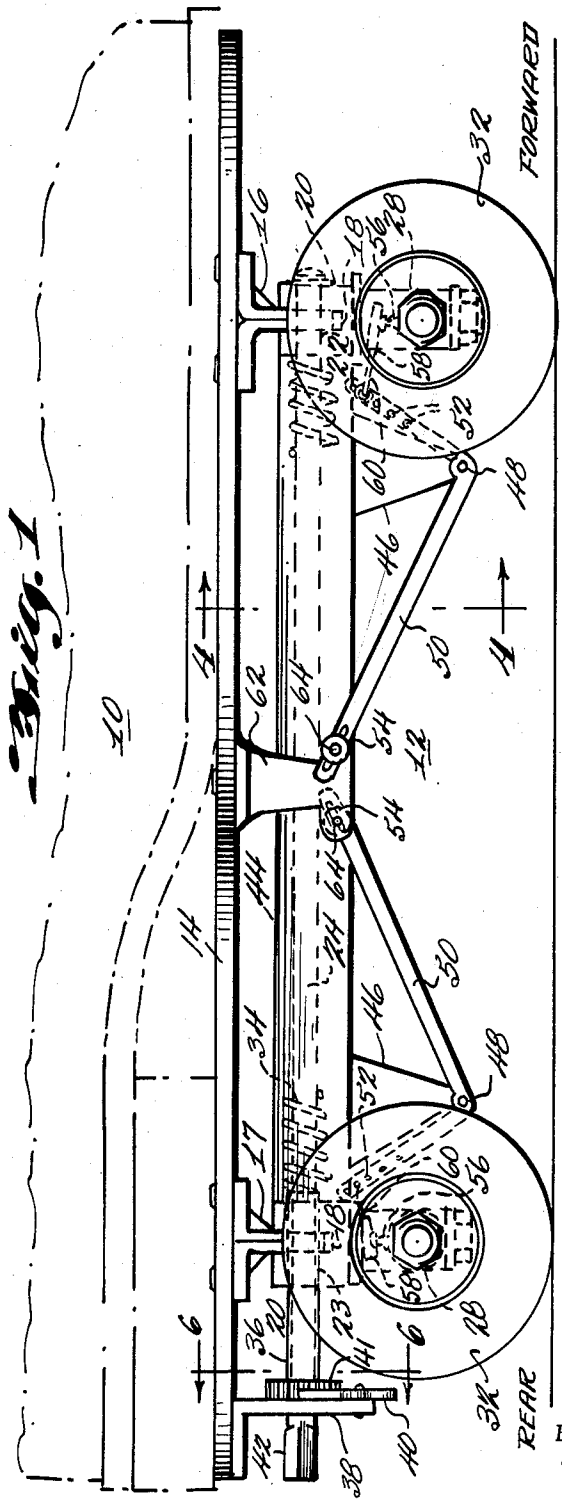

Fig. 1

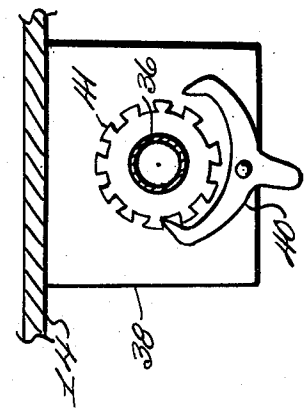

Fig. 6

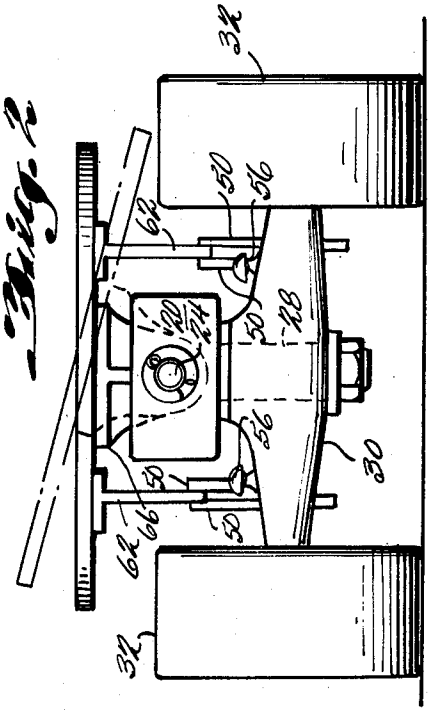

Fig. 2

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ROLLER SKATE

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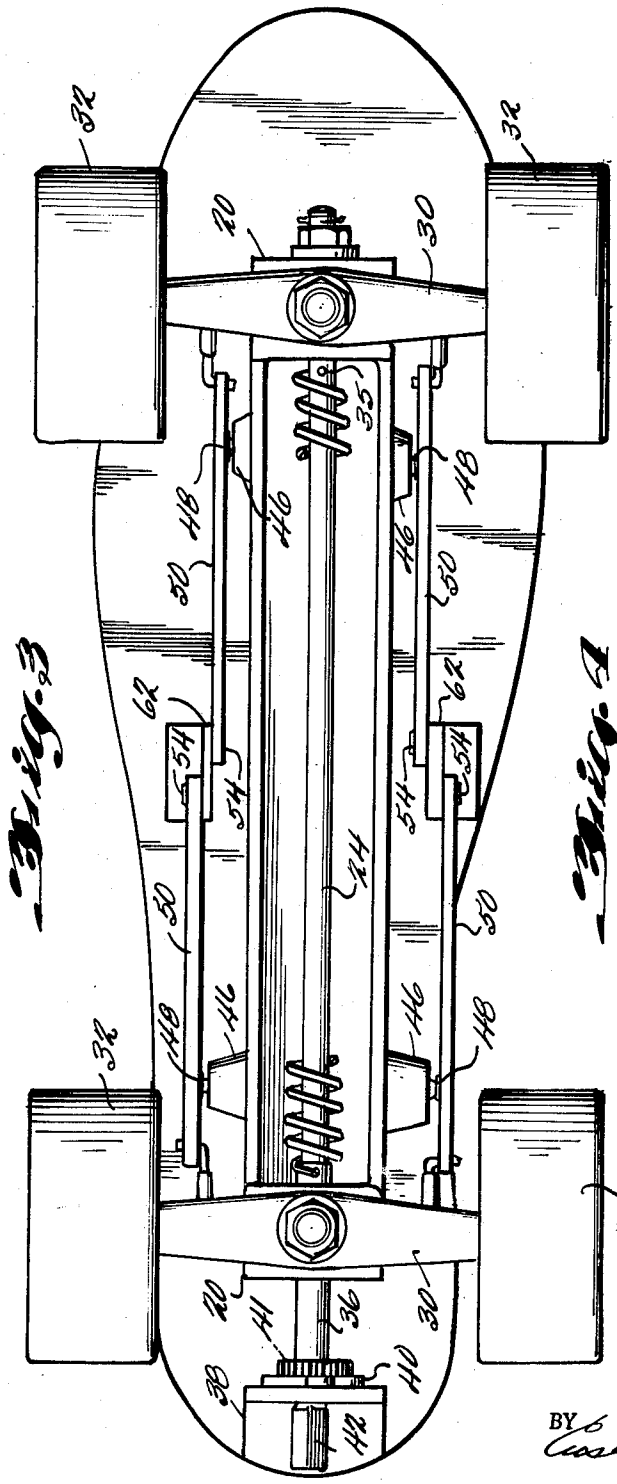

Fig. 3

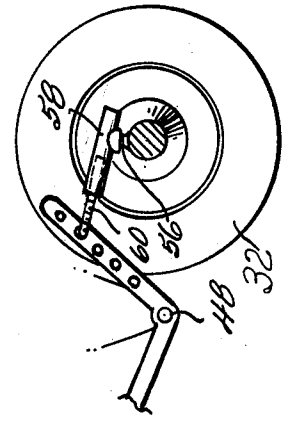

Fig. 5

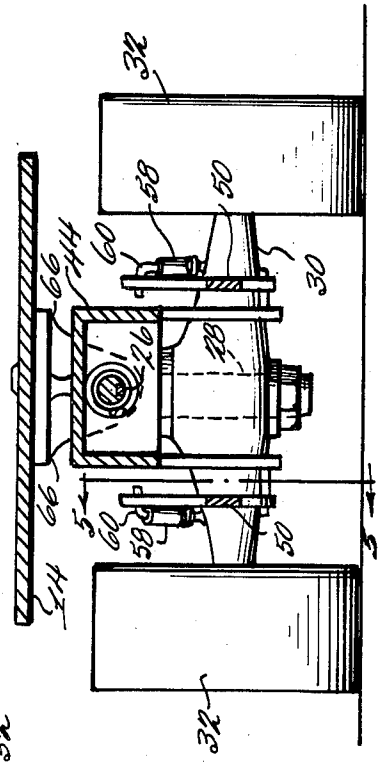

Fig. 4

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3,152,812

ROLLER SKATE

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3 Claims. (Cl. 280—11.19)

This invention relates to a roller skate and, more particularly, to an improved construction for steering the skate while simultaneously reducing the strain on the skater's legs during turning.

In known roller skate constructions provisions have been made for reducing the strain on the skater's legs by providing a tiltable base plate on which the skater's foot rests. Other constructions have provided means for steering the skate by arrangements which pivot the skate wheels. However, the prior art does not disclose a combination wherein the tiltable base plate for reducing leg strain is employed to actuate means interconnecting the front and rear wheels of the skate to provide a steering arrangement.

It is therefore an object of this inveniton to provide an improved roller skate construction for interconnecting the front and rear wheel trucks of the skate by means responsive to the skater's weight to control the relative positioning of the trucks thereby appropriately steering the skate.

Another object of the invention is to provide an improved roller skate construction for reducing the strain on the skater's legs while the skate is being steered.

Ancillary to the immediately preceding object, it is a further object to provide an arrangement for adjusting the skate construction in accordance with the weight of the skater to more effectively reduce the strain on the skater's legs during cornering.

A still further object is to provide means for selecting the amount of relative displacement of the interconnected front and rear wheel trucks which may be achieved in response to a particular manipulation by the skater.

These and other objects of the invention will become more apparant when considered in light of the following description of an illustrative embodiment of the invention and from the appended claims.

The illustrative embodiment is clearly shown in the accompanying drawings wherein:

FIGURE 1 is a side elevation view of the improved roller skate construction which constitutes the invention;

FIGURE 2 is a front elevation view of the roller skate construction of FIGURE 1;

FIGURE 3 is a bottom plan view of the roller skate construction of FIGURE 1;

FIGURE 4 is a vertical elevation view in section of the roller skate construction taken along line 4—4 of FIGURE 1;

FIGURE 5 is a fragmented vertical elevation view in section of the wheel actuating mechanism taken along line 5—5 of FIGURE 4; and

FIGURE 6 is a fragmented vertical elevation view in section of the mechanism for adjusting the roller skate in accordance with the skater's weight, taken along line 6—6 of FIGURE 1.

Briefly, the invention comprises a roller skate construction combining two unique features in a manner which distinguishes this construction from those previously known. The first feature relates to a tilting action for the purpose of reducing strain on the ankles of the user of the skate during cornering. The second feature pertains to a mechanism for guiding or steering the skate by appropriate manipulation of the weight of the skater.

The first feature is achieved by mounting the base plate of the skate on a shaft for rotation about an axis which is parallel to the longitudinal axis of the skate. The shaft cooperates with a spring arrangement which

normally holds the base plate in a horizontal plane. When the weight of the skater is positioned, as in cornering, to tilt the base plate thereby rotating the shaft, the strain of this movement is absorbed by the spring rather than by the legs of the skater. Adjusting means are provided to regulate the torsion of the spring in accordance with the weight of the skater.

The feature of assisting the turning action of the skate by manipulating the skate wheels is accomplished by connecting the base plate to a linkage which is operatively associated with the wheel axles associated with the front and rear wheel trucks. When the base plate is tilted, the linkage moves the forward wheels in the direction of the turn while simultaneously pivoting the rear wheels in the opposite direction thereby permitting the skate wheels to smoothly describe an arc on the skating surface. The linkage is adjustable to regulate the amount of turning which may be achieved by a given amount of tilt of the base plate.

Now that the structure has been briefly described, the details thereof will be set forth. The first feature of the invention may most clearly be described with reference to FIGURES 1 through 3. In FIGURE 1 there is illustrated a roller skate construction of the shoe type in which the shoe portion is shown generally at **10** and the skate portion at **12**. Although this description is made with reference to the roller skate of the shoe variety, it will also be apparent that the invention is applicable to the other standard type skate in which the skate portion is clamped onto conventional footwear.

The skate portion **12** comprises a base plate **14** on which the skater is supported. To the base plate there are attached a pair of spaced downwardly projecting bosses **16** and **17**. These bosses extend into U-shaped slots **18** within journal blocks **20**. The bosses **16** and **17** are provided with apertures which are coaxial with bore holes **22** and **23**, respectively, passing through the journal blocks. The apertures of boss **17** and bore hole **23** are larger than the corresponding aperture and bore hole of the forward end of the skate for a purpose to be hereinafter described in detail. These apertures and bore holes are oriented so that a shaft **24** passing therethrough is directed along an axis parallel to the longitudinal axis of the base plate **14**. Boss **16** is suitably attached to the shaft **24** for rotation therewith. This may be done by keying these two members together as illustrated at **26** of FIGURE 4. Projecting downwardly from the journal blocks are shafts **28**. To each of these shafts there is connected for rotation thereabout a wheel axle **30**. The attachment illustrated is one wherein the axle rotates with respect to the underside of the journal block and is attached to the shaft **28** by means of a washer and nut. At the outer ends of the axles there are provided wheels **32**. The wheels and axles form front and rear wheel trucks. Coiled about the shaft **24** intermediate the journal blocks **20** is a spring **34**. The forward end of this spring is fastened to the shaft **24** by passing the spring end through a hole bored transversely of the axis of the shaft at **35**. The other end of the spring is operatively connected to a cylindrical shaft **36** extending through the enlarged aperture aperture in boss **17** and bore hole **23** to be positioned coaxially about the rear end of shaft **24**. The rearward portion of shaft **36** passes through an aperture provided in a plate **38** mounted to the underside of the base plate **14**. Pivotally attached to the bottom of plate **38** is a two-ended locking device **40**, more clearly shown in FIGURE 6. This locking device cooperates with a gear-like disc **41** mounted for rotation with shaft **36**. The outer end of shaft **36** is formed with a square head **42** over which a key (not shown) may be positioned to rotate shaft **36** with respect to shaft **24**. When the lock **40** is released, the shaft **36** may be rotated in either

direction to vary the torsion on spring 34. When the spring is adjusted as desired, the lock 40 is set to prevent release of the spring. The spring serves to maintain the base plate 14 in a neutral position in the horizontal plane The force necessary to return the base plate 14 to this horizontal plane when the cornering of the skate is completed and the skate is moving directly forward, is a function of the weight of the skater. Accordingly, for a heavy person, the torsion in the spring required to return the base plate to the horizontal position is appreciably greater than is necessary for a lighter skater. Accordingly, the shaft 36 is rotated to properly set the skate by an amount which is a function of the skater's weight. To assist in properly adjusting the skate, a calibrated indicator (not shown) may be mounted on the plate 38 so that the skater may adjust the torsion of spring 34 in accordance with his weight.

Now that the structure of the first feature has been set forth, that structure associated with the second feature of the invention will be described. Suitably mounted to the journal blocks 20 is a U-shaped channel member 44, shown most clearly in FIGURE 4, the web of which lies in a horizontal plane just above the spring 34 longitudinally of the skate. The flange elements of the U-shaped member extend downwardly. On opposite sides of the channel member 44 are spaced pairs of projecting elements 46. These projecting elements are resilient for a purpose to be described hereinafter. Pivotally connected to the lower ends of the projecting elements 46 and 48 are bell cranks shown generally at 50. Each of the bell cranks comprises a first arm having spaced apertures 52 therein at the end of the arm remote from the pivot 48 and a second arm having a slot 54 therein. To each of the axles 30, adjacent the wheels 32, there is attached a pair of ball and socket joints 56 as shown in FIGURES 2, 4 and 5. Connected to the ball and socket joints are internally threaded cylinders 58. Mounted for longitudinal movement with respect to cylinders 58 are threaded arms 60 which are adapted to be selectively positioned within the apertures 52 of bell cranks 50. Connected to the underside of the base plate 14 on opposite sides thereof are downwardly extending projections 62. Each of these projections is provided with a pair of pins 64 extending outwardly from the projections on opposite sides thereof. Each pin is associated with a bell crank by passing through the slots 54 of the bell cranks 50. By this arrangement a linkage is achieved between the base plate and the wheel assemblies.

Now that the structure of the skate has been set forth, its operation will be described. During the forward movement of the skate, the base plate 14 is in a substantially horizontal plane due to the distribution of the skater's weight and the effect of spring 34. In this position the wheel axles 30 are parallel and extend transversely to the longitudinal axis of the base plate. However, when the skater decides to negotiate a corner, his weight is adjusted to tilt the base plate downwardly on one side in a direction which will constitute the inside of the curve to be described. This is shown in dash lines in FIGURE 2. The tilting action is limited by the configuration of the bosses 16 and 17 which have projecting edge portions 66 at their undersides which engage the journal blocks at positions defined by the generally U-shaped configuration of the slots 18 therein. This stopping means prevents the base plate from being tilted to an extent whereby it may contact the wheels. As the skater tilts the base plate as described, the plate 14 and shaft 24, connected thereto as a unit by boss 16, rotate to place the coil spring 34 in torsion. This spring thereby absorbs the strain of the curve which would, in conventional skates, be absorbed by the ankles of the skater. Simultaneously, the tilting of the plate lowers the position of the projection 62 on the side of the skate on the inside of the curve and raises the projection 62 on the outside of the curve. The dropping of one of the projections 62 is translated to the bell cranks 50 through pins 64 to pivot the forward bell crank in a counterclockwise direction and the rear bell crank in a clockwise direction. This bell crank action pivots the forward axle 30 in the direction of the curve and the rear axle 32 in the opposite direction thereby allowing the wheels to describe an arc which is a function of the amount of tilting of the base plate 14. The elevation of the opposite projection 62 assists in this operation by pivoting the forward bell crank in a clockwise direction and the rear bell crank in a counterclockwise direction. The ball and socket joints 56 mounted on the axles 30 and the resilient projections 46 from the U-shaped channel 44 absorb the lateral movement of the bell cranks generated by the tilting of the base plate 14. When the curve is negotiated, the skater straightens to readjust his weight to be applied through the center of gravity of the base plate. The plate is assisted in its movement to the horizontal position by means of the spring 34 such that the skate wheels will straighten to move the skate forward. The movement of the plate 14 to its position in a horizontal plane returns the bell crank linkage to its normal position thereby pivoting the front and rear wheel trucks so that they are oriented for straight line movement. The slots 54 in the bell crank allow for the relative movement between the front and rear wheels during the turn. The plurality of apertures 52 in the bell crank serve as an adjustment to control the amount of turning which may be achieved for a given amount of tilt of the base plate 14. The use of the adjustable arm 60 connecting the bell crank to the ball and socket joint and to the axle is necessary since these apertures 52, in the neutral position of the roller skate are at different distances from the axle.

The above described embodiment is illustrative of a preferred embodiment of the invention but is not intended to limit the possibilities of insuring steerability of a roller skate and a reduction of strain on the legs of the skater during cornering. The embodiment disclosed herein is an example of structure in which the inventive features of this disclosure may be utilized, and it will become apparent to one skilled in the art that certain modifications may be made within the spirit of the invention as defined by the appended claims.

What is claimed is:

1. In a roller skate construction of the type having a base plate for supporting the skater and front and rear wheel trucks connected to the underside of the base plate, the improvement comprising means for pivoting said base plate about an axis parallel to the longitudinal axis of said base plate, spring means operatively associated with said pivoting means, said spring means normally maintaining said base plate in a horizontal plane and responsive to the pivoting of said base plate by the skater to store energy to support the skater and to assist in the subsequent restoration of the base plate to the horizontal plane; and means interconnecting the front and rear wheel trucks and the base plate, said interconnecting means responsive to the pivoting of said base plate to pivot said wheel trucks with respect to the base plate thereby controlling the direction of movement of the roller skate; said interconnecting means comprising a downwardly extending projection from said base plate intermediate said front and rear wheel trucks, a support means, a first bell crank pivotally mounted to said support means intermediate the projection and said front wheel truck, one arm of said first bell crank being pivotally connected to said projection and the other arm being attached to said front wheel truck; a second bell crank pivotally mounted to said support means intermediate the projection and said rear wheel truck, one arm of said second bell crank being pivotally connected to said projection and the other arm being attached to said rear wheel truck; said interconnecting means responsive to the pivoting of said base plate to pivot the first and second bell cranks in opposite direc-

tions thereby pivoting said wheel trucks in opposite directions.

2. In a roller skate construction as defined in claim 1, the improvement further comprising means for adjusting the effective lengths of the second arms of said bell cranks to thereby vary the amount of pivotal movement of said wheel trucks for a given amount of pivotal movement of said base plate.

3. In a roller skate construction of the type having a base plate for supporting the skater and front and rear wheel trucks connected to the underside of the base plate, the improvement comprising means for pivoting said base plate about an axis parallel to the longitudinal axis of said base plate, spring means operatively associated with said pivoting means, said spring means normally maintaining said base plate in a horizontal plane and responsive to the pivoting of said base plate by the skater to store energy to support the skater and to assist in the subsequent restoration of the base plate to the horizontal plane; and means interconnecting the front and rear wheel trucks and the base plate, said interconnecting means responsive to the pivoting of said base plate to pivot said wheel trucks with respect to the base plate thereby controlling the direction of movement of the roller skate; said interconnecting means comprising a pair of downwardly extending projections from said base plate on opposite sides thereof, said projections being positioned intermediate said front and rear wheel trucks a support means, each of said projections having associated therewith: a first bell crank pivotally mounted to said support means intermediate the projection and said front wheel truck, one arm of said first bell crank being pivotally connected to said projection and the other arm being attached to said front wheel truck, a second bell crank pivotally mounted to said support means intermediate the projection and said rear wheel truck, one arm of said second bell crank being pivotally connected to said projection and the other arm being attached to said rear wheel truck; said interconnecting means responsive to the pivoting of said base plate to pivot in opposite directions the first and second bell cranks associated with each projection, the lowering of one projection by the pivoting of said base plate also resulting in the pivotal movement of its associated first bell crank in an opposite direction to that of the first bell crank associated with the other projection which is raised by the pivoting of the base plate, the resultant movement of the bell cranks thereby pivoting said wheel trucks in opposite directions.

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