# United States Patent [19]

**Douglas et al.**

[11] **3,860,264**

[45] **Jan. 14, 1975**


[54] **LEAN VELOCIPEDE**


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[52] **U.S. Cl.** ..... **280/266,** 280/282, 280/268

[51] **Int. Cl.** ..... **B62k 5/06,** B62k 21/10

[58] **Field of Search** ..... 280/266, 263, 268, 282



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[57] **ABSTRACT**

A velocipede having a front wheel assembly carrying a front wheel and a rear wheel assembly carrying a pair of co-axial rear wheels. The wheel assemblies are pivotally connected approximately midway between the axis of rotation of the front wheel and the axis of rotation of the pair of rear wheels by a pivotal coupling member that is rotatable around an axis that lies in the longitudinal plane of the velocipede at an angle of 20° from the vertical. A spring within the pivotal coupling member limits the relative displacement of the wheel assemblies to 25° on either side of the vehicle's normal forward position in response to sideways tilting of the front wheel assembly by means of a weight shifting or a leaning motion of the rider of the velocipede.


**5 Claims, 5 Drawing Figures**

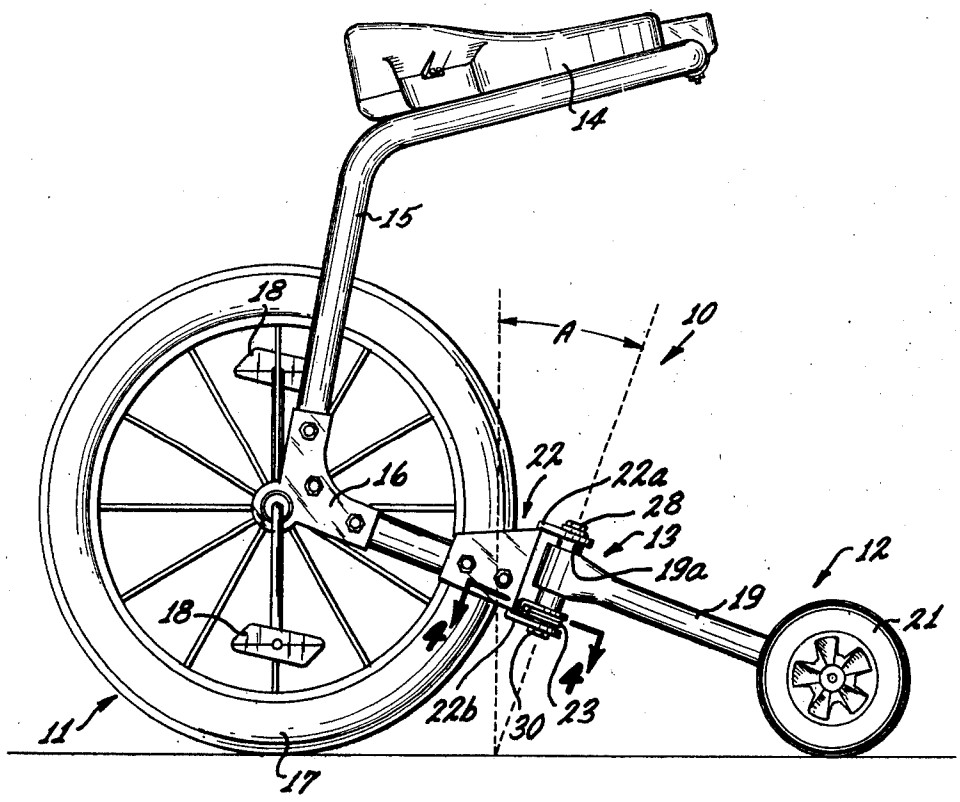
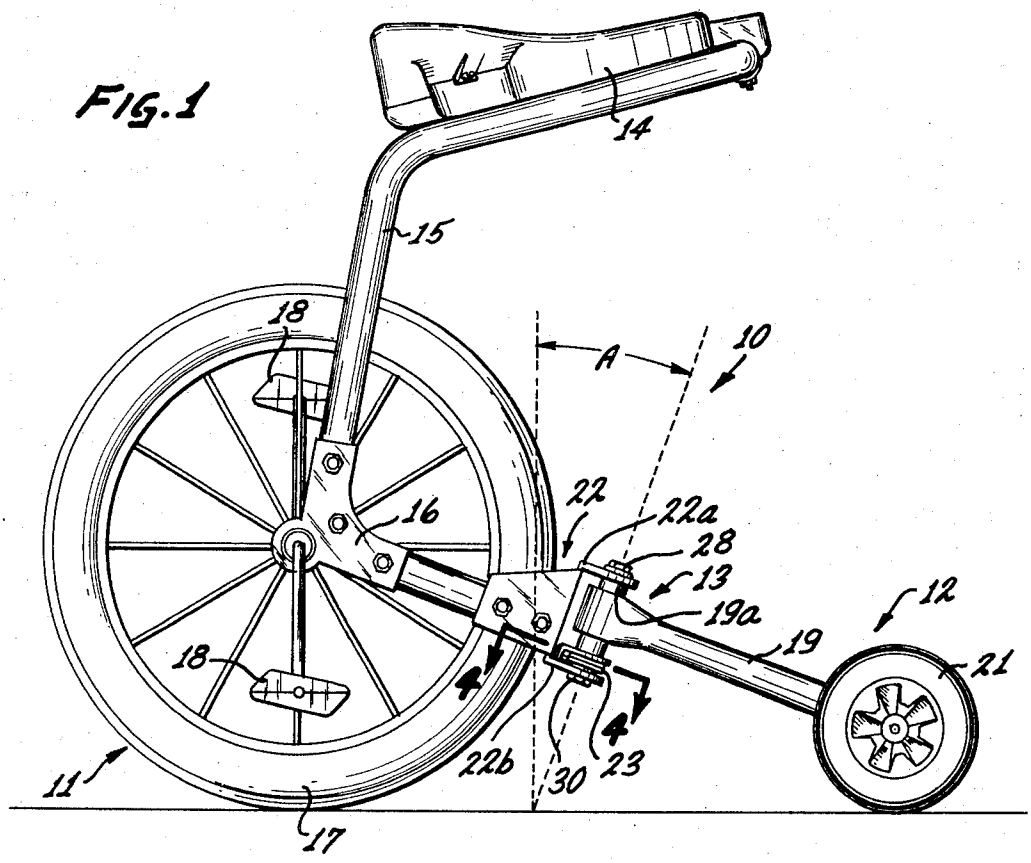


FIG. 1


14
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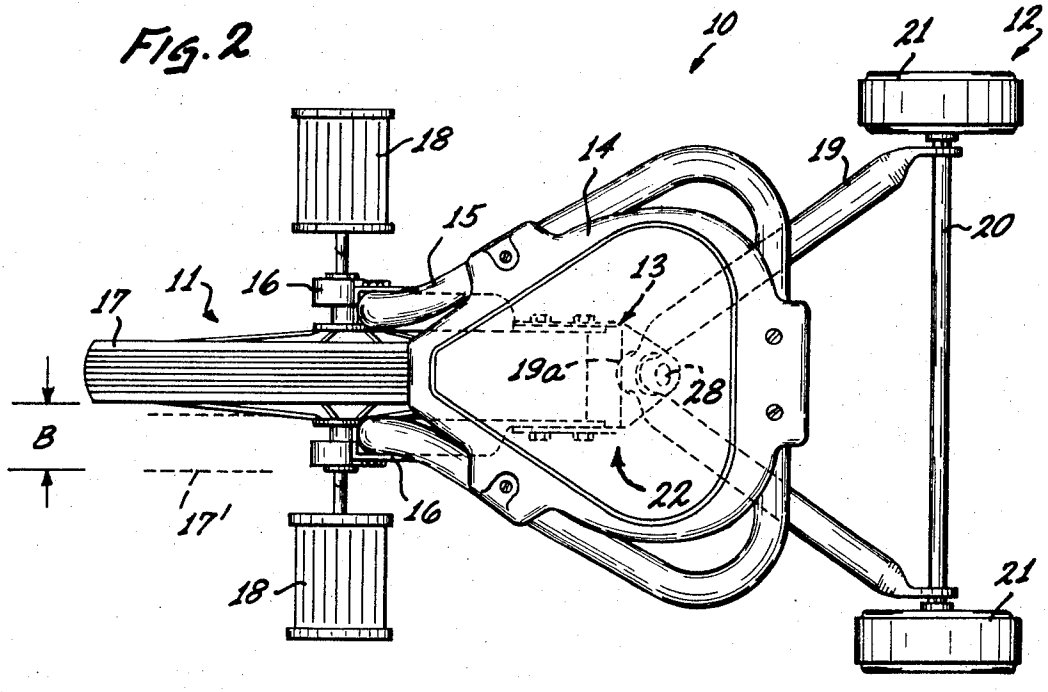
11
17

FIG. 2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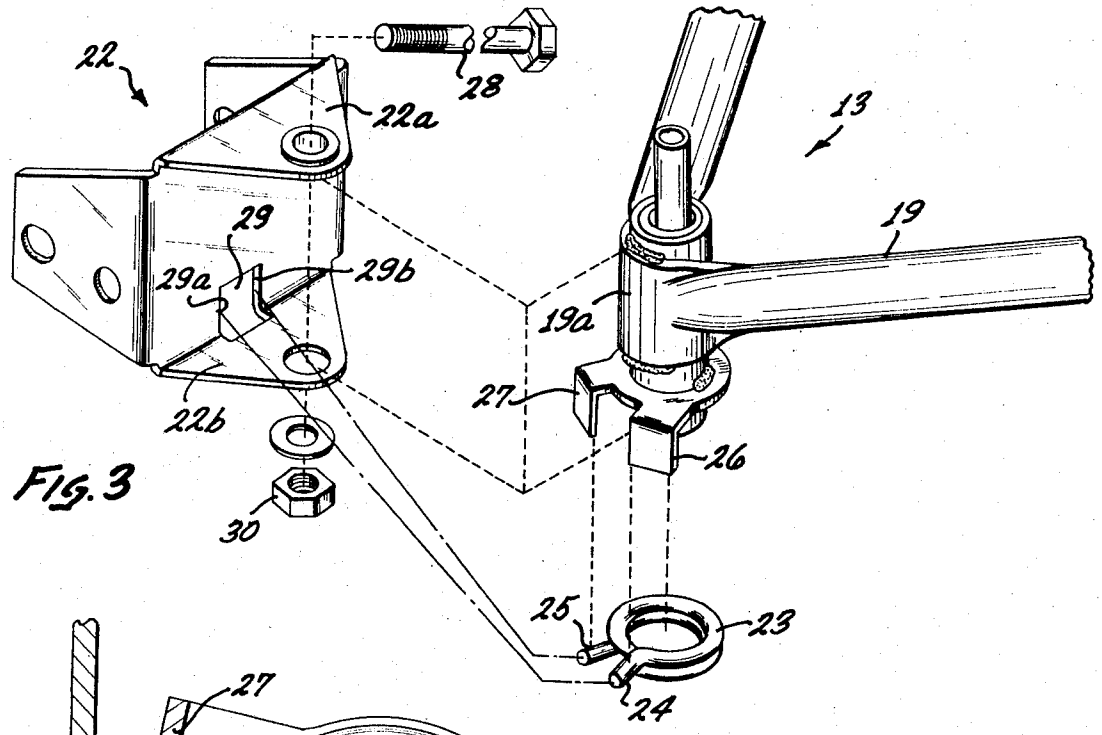


FIG. 3

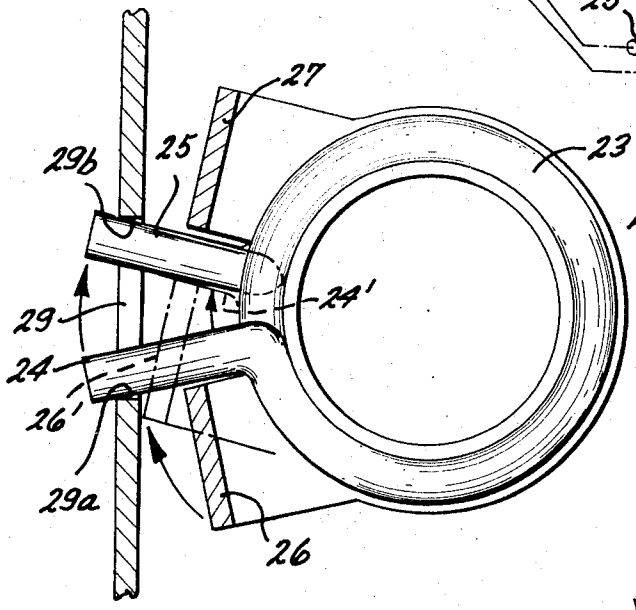


FIG. 4

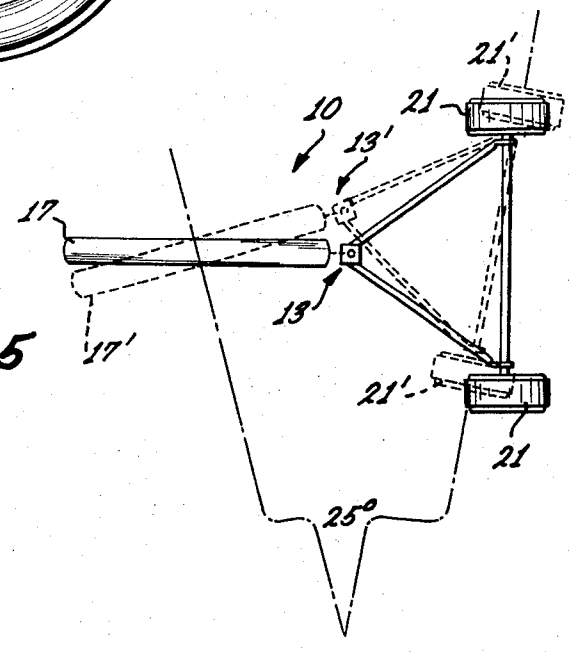


FIG. 5

# LEAN VELOCIPEDE

## FIELD OF THE INVENTION

This invention relates to velocipedes and more particularly to a novel three wheeled velocipede that simulates unicycle operation.

## DESCRIPTION OF THE PRIOR ART

Numerous types of three wheeled toy velocipedes are well known. For the most part, such velocipedes, or tricycles, are propelled by means of a pair of pedals mounted on the front wheel and are steered by means of handle bars which control the front wheel. While small children quickly master the operation of such standard tricycles, they experience great difficulty in attempting to operate a unicycle. Thus, the majority of small children are limited to riding tricycles, yet remain fascinated by a unicycle because it may be propelled and steered without the use of one's hands.

Accordingly, it is an object of the present invention to provide simulated unicycle operation in a three wheeled velocipede.

It is a further object of the present invention to provide a simulated unicycle that may be successfully mastered by small children after a relatively short training period.

It is a still further object of the present invention to provide an improved three wheeled velocipede that may be steered by means of a child without the use of his hands.

It is another object of the present invention to provide a three wheeled velocipede that may be safely steered by a small child through the shifting of his weight.

It is still another object of the present invention to provide a three wheeled velocipede having a mid frame pivot connection which provides unusual vehicle stability.

## SUMMARY OF THE INVENTION

In accordance with the objects set forth above, the present invention provides a velocipede having three wheels that simulates unicycle operation. The front and rear wheel assemblies of the velocipede are pivotally connected approximately midway between the axis of rotation of the front wheel and the axis of rotation of the pair of rear wheels. The pivotal coupling member is positioned in the longitudinal plane of velocipede at an angle 20° from the vertical. A spring within such pivotal coupling member limits the relative displacement of the axes of rotation of the wheels to approximately 25° on either side of the normal position of the pivotal coupling member in response to sideways tilting of the front wheel assembly.

## BRIEF DESCRIPTION OF THE DRAWINGS

Additional objects, advantages and characteristic features of the present invention will become readily apparent from the following detailed description of the preferred embodiment of the invention when taken in conjunction with the accompanying drawings in which:

FIG. 1 is a side elevational view of a velocipede in accordance with the present invention;

FIG. 2 is a top plan view of the velocipede in accordance with the present invention;



FIG. 3 is an exploded perspective view of the steering means of the velocipede in accordance with the present invention;

FIG. 4 is an enlarged cross-sectional view of the steering means of the velocipede taken along line 4—4 of FIG. 1, in accordance with the present invention; and

FIG. 5 is a diagrammatic top plan view of the velocipede of the present invention illustrating the displacement of the velocipede in response to a weight shift or leaning motion of the rider.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIGS. 1 and 2, there is respectively shown a side elevational view and a top plan view of a velocipede **10** in accordance with the present invention. The velocipede **10** comprises three major portions; namely, a front wheel assembly **11**, a rear wheel assembly **12** and steering means **13**. The front wheel assembly **11** is mainly comprised of a seat **14**, a front L-shaped frame **15**, a bracket member **16**, a front wheel **17** and a pair of pedals **18**. Conventional retaining means, such as nut and bolt arrangements, may be employed to connect the seat **14** to the top of the L-shaped frame **15** and to connect the bracket member **16** to the front wheel **17**, pedals **18** and the L-shaped frame **15**. The rear wheel assembly **12** is mainly comprised of a triangular-shaped rear frame **19** having a rear axle **20** upon which a pair of rear wheels **21** may be mounted. The steering means **13** is located approximately half way between the axis of rotation of the front wheel **17** and the axis of rotation of the pair of rear wheels **21**. Furthermore, steering means **13** is positioned within the longitudinal plane of the velocipede **10** at an angle **20°** from the vertical as defined by the angle A in FIG. **1**. The combination of the steering means **13** being inclined at an angle up toward the rear and away from the vertical and being located at such approximate half way point causes the point of load application (rider's weight on the seat) to move away, relatively, from the direction in which the rider leans and in which the velocipede **10** would tend to topple; therefore, greatly improving the stability of the velocipede **10**. It has been found through extensive testing that the positioning of the steering means **13** at such an approximate midpoint and at such an angle improves the stability of the velocipede **10** and allows small children to quickly master the operation of the velocipede **10**. Thus, small children are able to enjoy a safe simulated unicycle-type ride. The steering means **13** may be more readily understood by referring to FIGS. **3** and **4**.

FIG. **3** is an exploded perspective view of the steering means **13**. The steering means **13** is mainly comprised of a bracket member **22**, a helical spring **23**, and a sleeve **19A** of the triangular-shaped rear frame **19**. The bracket member **22** may be mounted to the front L-shaped frame **15** of the front wheel assembly **11** by a conventional bolt and nut arrangement as shown in FIG. **1**. The bracket member **22** has a top and bottom extensions **22***a* and **22***b*, each of which have an opening as shown in FIG. **3**. In addition, bracket member **22** has a slot **29** having a width defined by the side walls **29***a* and **29***b*. The spring **23** may be a coil of suitable metal having first and second extended ends **24** and **25**, as shown. The sleeve **19***a* of the triangular-shaped rear frame **19** has two projections **26** and **27**. The spring **23**

may be mounted to the bottom portion of the sleeve **19***a* so that the first and second ends **24** and **25** of the spring **23** are located between the projections **26** and **27** of the sleeve **19***a*. Sleeve **19***a* and the mounted spring **13** may then be placed between the top and bottom extensions **22***a* and **22***b* of the bracket member **22** so that the bolt **28** may be placed through the opening of **22***a*, the hollow portion of the sleeve **19***a*, and the opening of **22***b*. The nut **30** may then be affixed to the bolt **28** to complete the construction of the steering means **13**.

Referring now to FIG. **4**, there is shown an enlarged cross-sectional view of the steering means **13** taken along lines **4—4** of FIG. **1**. As illustrated, the ends **24** and **25** of the spring **13** are confined within the limits of both the side walls **29***a* and **29***b* of the slot **29** and the projections **26** and **27** of the sleeve **19***a*. The distance between the side walls **29***a* and **29***b* and the distance between the projections **26** and **27** both limit the relative displacement of the velocipede **10** to 25° on either side of the longitudinal plane of the velocipede **10**. Referring now to both FIGS. **2** and **4**, if the rider were to lean to his left, or towards the bottom of the FIG. **2**, the front wheel **17** may be tilted to an approximate maximum of 8°, as defined by the distance B between the front wheel **17** and the tilted front wheel **17'**. As shown in FIG. **4**, such tilting motion would move the projection **26** in the clockwise direction to its new position **26'** and in turn, would force the end **24** of the spring **23** to its new position **24'** against the side wall **29***a*. It should be understood that the front wheel **17** both tilts and turns at the same time as respectively illustrated in FIGS. **2** and **5**.

As described in the discussion of FIG. **5**, the velocipede **10** would travel to the left of the rider. Of course, any tilting of less than 8° would rotate the end **24** of the spring **23** and the projection **26** proportional to the amount of tilting of the front wheel **17**. If the rider were to lean to his right, or shift his weight towards the right, the wheel **17** may tilt within a maximum of 8° to the right, in which case, the projection **27** would urge the end **25** of the spring **13** towards the end **24** of the spring **13**.

Referring now to FIG. **5**, there is shown a diagrammatic top plan view of the velocipede **10** of the present invention illustrating the displacement of the front wheel **17** and the pair of back wheels **21** in response to a weight shift or leaning motion of a rider. If a rider were to shift his weight to the left on the velocipede **10** as shown in FIG. **2**, the projection **26** would urge the end **24** of the spring **23** to its new position as illustrated by the numeral **24'** of FIG. **4**. In turn, the steering means **13** would shift a short distance to a new position **13'** and the front wheel **17** and rear wheels **21** would be displaced to new position **17'** and the new positions **21**, respectively, as shown in FIG. **5**. An **8°** tilting of the front wheel **17** to the right or the left provides a maximum displacement of the end **24** or the end **25** of the spring **23** so that the relative displacement between the axis of rotation of front wheel **17** and the axis of rotation of the rear wheel **21** is **25°**. Such displacement allows velocipede **10** to execute a complete circle having a radius of 3½ feet. FIG. **5** illustrates the turning of the front wheel **17** to its new position **17'** and FIG. **2** illustrates the tilting of the front wheel **17** to its new position **17'** in response to the rider shifting his weight to his right side.

What is claimed is:

**1.** A velocipede comprising:

**1.** a front wheel assembly having a front wheel rotatably mounted thereto on a first axis of rotation;

**2.** a rear wheel assembly having a pair of rear wheels rotatably mounted thereto on a second axis of rotation; and

**3.** steering means coupling said front wheel assembly to said rear wheel assembly, said steering means located approximately half-way between the respective vertical planes of said first axis of rotation and said second axis of rotation and normally biasing said front and rear wheel assemblies to maintain said respective vertical planes in a parallel relationship, and said steering means being responsive to the weight shifting of a rider of said velocipede to provide horizontal displacement of said respective vertical planes, said steering means comprising:

A. a sleeve member affixed to said rear wheel assembly, said sleeve member having a pair of projections and a hollow portion;

B. a bracket member mounted to said front wheel assembly, said bracket member having a first opening thereon and further having a top and bottom extension, each of which has a respective opening;

C. retaining means for rotatably coupling said sleeve member to said bracket member, part of said retaining means passing through said hollow portion of said sleeve member and said respective openings of said top and bottom extensions of said bracket member; and

D. biasing means rotatably mounted to said sleeve member, said biasing means having a first end and second end, said first and second ends being retained between said pair of projections of said sleeve member and further retained within said first opening of said bracket member.

**2.** A velocipede as recited in claim **1** and further including:

a seat for supporting a rider mounted on said front wheel assembly; and

said steering means determining the direction in which said velocipede travels in accordance with said weight shifting of the rider, shifting of weight to the right of said seat initiates a circular path to the rider's right and shifting of weight to the left of said seat initiates a circular path to the rider's left.

**3.** A velocipede as recited in claim **1** wherein said biasing means includes a helical spring, and said first and second ends are radially disposed portions of said helical spring.

**4.** A velocipede as recited in claim **1** wherein the width of said first opening of said bracket member retaining said ends of said biasing means limits the maximum horizontal displacement of said respective vertical planes to 25° in either direction from the longitudinal plane of said velocipede.

**5.** A velocipede as recited in claim **1** wherein said steering means has an axis of rotation normally located approximately 20° from the vertical.

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