Jan. 12, 1960 A. J. CRONE 2,920,899

ROLLER SKATE WITH SMALL TURNING RADIUS

Filed April 3, 1958 2 Sheets-Sheet 1

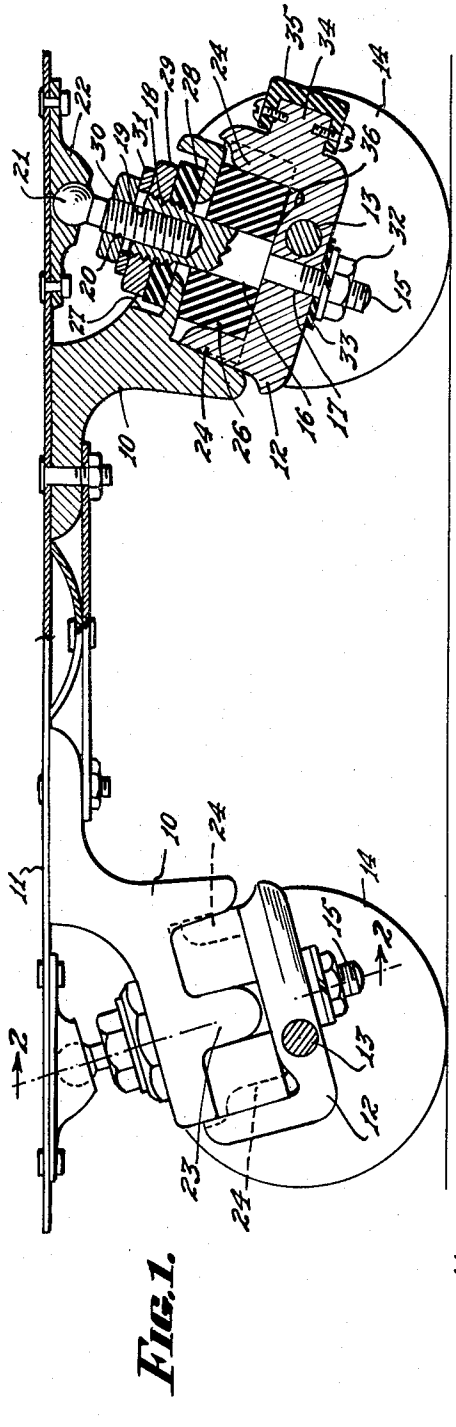


FIG. 1.

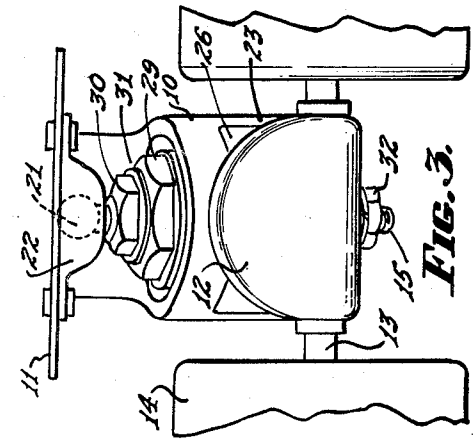


FIG. 3.

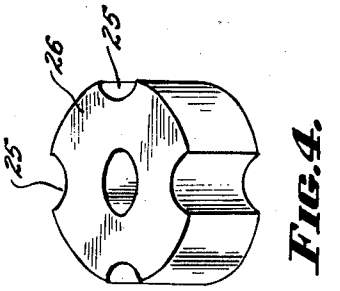


FIG. 4.

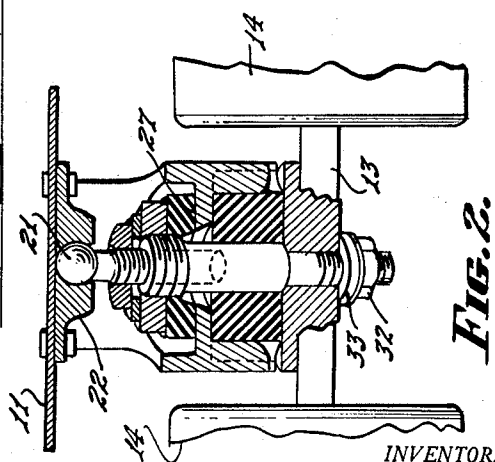


FIG. 2.

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ROLLER SKATE WITH SMALL TURNING RADIUS

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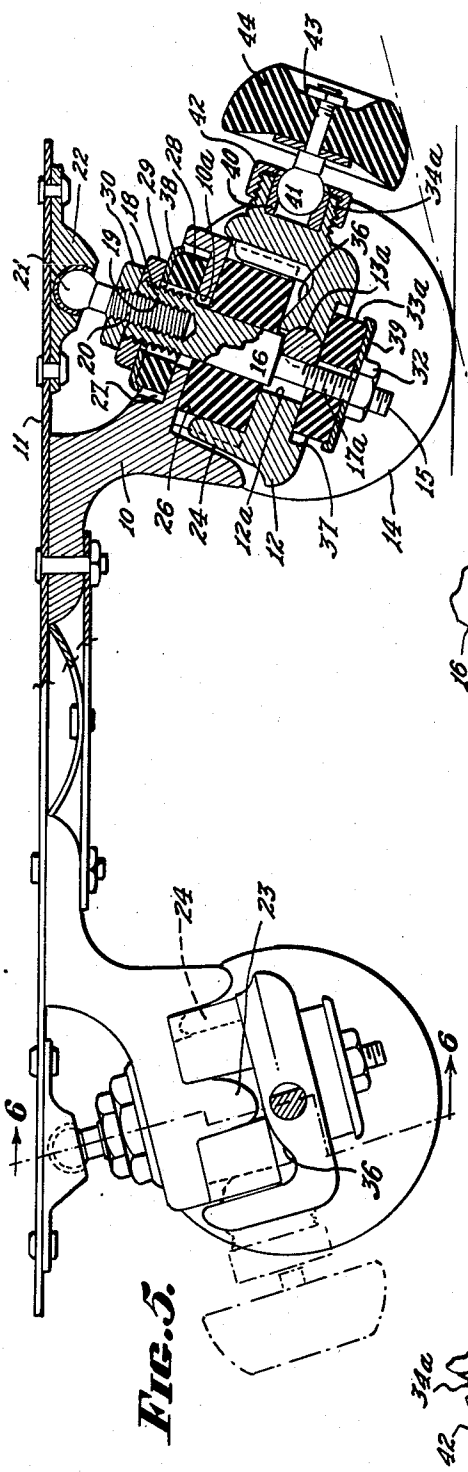


FIG. 5.

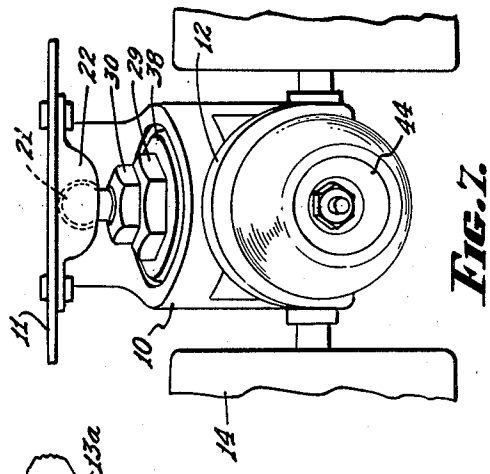


FIG. 7.

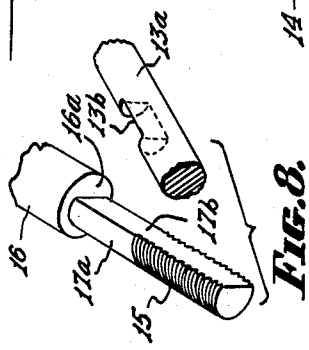


FIG. 8.

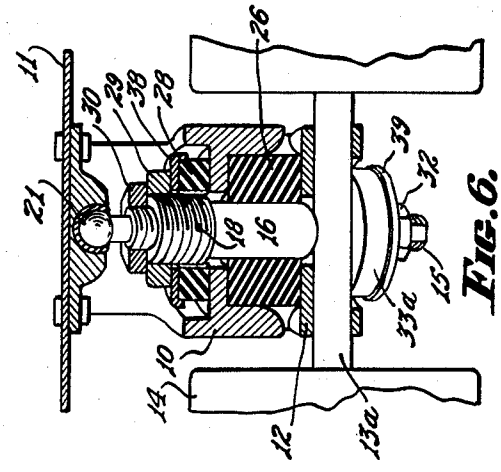


FIG. 6.

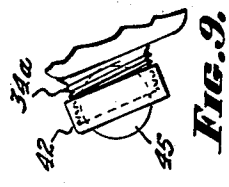


FIG. 9.

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ROLLER SKATE WITH SMALL TURNING RADIUS

Albert J. Crone, Cincinnati, Ohio

Application April 3, 1958, Serial No. 727,022

9 Claims. (Cl. 280—11.28)

My invention resides in the provision of a novel roller skate having a smaller turning radius than has been previously attained and which is distinguished by a structural arrangement in which the kingpin itself forms a part of the turning mechanism.

This application is a continuation-in-part of my copending application Serial No. 661,454 filed May 24, 1957 for Roller Skate With Small Turning Radius now abandoned.

It is an important object of my invention, as perhaps already noted, to provide a roller skate which enables one to make a safe turn very sharply.

Another important object of my invention is to enable one to achieve smooth skating by means of a skate having an efficient flexible coupling between the shoe plate and wheels.

Another object of my invention is to provide a skate by which greater safety is achieved in that the danger of careening is largely eliminated even though sharp turns are being made.

Before proceeding with a detailed description of my invention a few general remarks are in order. In the skate of my invention there are two truck assemblies employed, front and rear, for each skate; these trucks are identical and interchangeable.

Each truck assembly consists of an upper segment and a lower segment, a kingpin, a ball and stud, a small plate having a spherically shaped cavity or socket for the reception of a ball on the end of the threaded stud, a rubber aligner, rubber collars surrounding the kingpin proper, and means such as adjusting nut and washer to hold the complete truck assembly together so as to form a flexible coupling for the movement or action of the skate wheels in accordance with the desires of the skater. The upper segment is rigidly fastened to the shoe plate while the lower segment houses the axle for the wheels. Between the upper and lower segments and surrounding the kingpin is the rubber aligner which has four grooves into which the two lugs of the upper segment and the two lugs of the lower segment are fitted. The two upper lugs are an integral part of the rigidly fastened upper segment and thus serve to hold the upper part of the rubber aligner in a stationary manner. The two lugs of the lower segment fit into two of the grooves of the aligner at right angles to the upper lugs. When the lower segment, which houses the axle for the wheels, is turned in a lateral manner around the kingpin there is a twisting pressure of the lower lugs against the action of the stationary upper lugs through the rubber aligner, release of the turning pressure thus resulting in automatic alignment of the wheels. In addition there is a nut in threaded adjustable engagement with the kingpin shank. Under this nut is a washer over the upper end of a rubber collar which also surrounds the kingpin shank and this rubber member is adjusted by the nut to regulate turning pressure.

The turning radius provided by my novel skate is produced by pressure of the lugs as engaged in the grooves

of the rubber aligner and by lateral movement of the wheels around the slanting kingpin. The skate is distinguished by the fact that there is only one contact point for the turning action instead of the usual two. This one contact point makes it easier for the skater to maintain contact with the skating surface with all four wheels even while making turns, thus minimizing the danger of careening; the contact point is the ball and socket at the top of the kingpin.

Referring now to the various figures of the drawing I will describe in greater detail and designate by reference numerals the various parts generally outlined above. It will be understood and apparent that in these drawings like numerals are employed to designate like parts throughout.

Figure 1 is a side elevation with parts in section of one embodiment of a roller skate in which the features of my invention are embodied.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is an end view taken from the left side of Figure 1.

Figure 4 is a perspective view of the rubber aligner employed with my skate.

Figure 5 is a side elevation with parts in section of another embodiment of a roller skate in which the features of my invention are embodied.

Figure 6 is a section on the line 6—6 of Figure 5.

Figure 7 is an end view taken from the right side of Figure 5.

Figure 8 is a fragmentary perspective view of the kingpin and axle employed in the embodiment of Figure 5, and

Figure 9 is a fragmentary perspective view of a bumper member which may be used with the skate of my invention.

Referring now particularly to Figures 1 through 4, I will describe one embodiment of my invention in detail.

Each truck assembly comprises an upper segment **10** which is rigidly bolted to the shoe plate **11** of the skate. There is also a lower segment **12** in which is journalled the axle **13** for the wheels **14**. The kingpin is generally indicated at **15** and includes an intermediate shank portion **16**, a lower, threaded stem **17** and an upper threaded portion **18** having an interiorly threaded bore **19**. A stud **20** is threaded into the bore **19** of the kingpin **15**, which stud has a ball-shaped end **21**. The kingpin is thus comprised of the members **16**, **17** and **20**. A member **22** having a socket to receive the ball **21** is secured to the plate **11**.

The upper truck segment **10** has a pair of depending lugs **23**. The lower truck segment **12** has a pair of upstanding lugs **24** located at right angles to those on the segment **10**. The lugs **23** and **24** are received in the grooves **25** of a rubber aligner **26** placed about the kingpin shaft **16** between the segments **10** and **12**. These grooves **25** extend through the full height of the aligner **26** as distinguished from the arrangement of my prior aforementioned patent wherein the grooves for the upper lugs terminated midway of the aligner as did those for the lower lugs. I find the instant arrangement to be an improvement.

Seated within a recess **27** provided in the upper segment **10** and surrounding the exteriorly threaded portion **18** of the kingpin is a resilient collar **28**. A nut **29** engages the threads of the kingpin portion **18** and bears against the resilient compression collar **28**. The turning pressure may be regulated by adjustment of this nut **29**. The stud **20** threaded into the kingpin **15** may be locked in place by means of a nut **30** and washer **31** bearing against the adjustment nut **29**. The various items are maintained by another nut **32** on the lower end of the

kingpin 15. I find it desirable to provide a rubber washer 33 between the nut 32 and lower segment 12 in order to prevent binding. In addition it is desirable to provide a lug 34 by means of which a bumper 35 may be attached.

A very important structural feature of the skate of my invention resides in the provision of a downwardly curved recess in the lower segment 12 extending from the region of the kingpin 15 as indicated at 36. The surface of the lower segment 12 adjacent the juncture of the kingpin portions 16 and 17 is otherwise flat. The curved portion 36 provides space for the lug of the upper member 10, see 23, to bear downwardly against such inclined surface 36 so as to force the lower member 12 to swivel about the kingpin 15 according to the direction of lean employed by the skater, that is, either to the right or left.

In operation, as the skater leans either to the right or left, the downwardly side foot pressure on the ball 21 seating within the socket member 22, such ball actually being the top end of the kingpin 15, forces the kingpin 15 to twist or partly swivel the lower truck member 12, which carries the wheel axle 13, which in turn causes the axle and wheels to swivel to a limited degree. When the lower member 12 housing the wheel axle 13 swivels in this manner under the action of the skater's foot, the rubber aligner is compressed between the lugs 23 and 24 of the members 10 and 12 respectively. Should the wheels 14 be removed from the skating surface they would immediately be returned to their original straight line position due to this arrangement of lugs and aligner. This resilient aligner can be made of various degrees of hardness to suit the weight, taste and general requirements of the skater and while I have indicated that it may be made of rubber it will be apparent that other materials will prove suitable. Preferably no adjusting member for the rubber aligner itself is employed. Rather, turning pressure is regulated by the nut 29 and collar 28.

This concept and arrangement whereby the kingpin itself is an integral part of the mechanism for effectively turning the pairs of wheels 14 is believed novel and constitutes a very important part of this invention.

Referring now to Figures 5–9 I will explain the construction and operation of another similar embodiment of my invention. In my invention the complete skate truck assembly, as designed and arranged, constitutes a flexible coupling of upper and lower segments to provide the necessary universal action along with a very small turning radius. As will be explained, the operational parts of the skate must be properly designed and assembled to obtain correct maneuverability. It takes more than the lean of the roller skater to make the skate form a curve or pattern on the skating surface.

Flexibility of the coupling is produced by the design of the upper member 10 and lower member 12 together with the arrangement of the three basic rubber collars or cushions surrounding the kingpin 15. In the top member 10 there is a recess 27 in which the top rubber collar 28 rests. In the bottom surface of the lower member 12 there is a recess 37 for the reception of the lowest rubber collar 33*a* which surrounds the lower end of the kingpin 15. Sandwiched between the upper member 10 and lower member 12 is the rubber collar 26 (see also Figure 4) which has grooves 25 to engage the upper lugs 23 and lower lugs 24 of the two members 10 and 12. In this manner the rubber collar 26 functions as an aligner in addition to forming a part of the general flexible coupling.

The recesses 27 and 37 in the upper and lower members 10 and 12 respectively hold the rubber collars 28 and 33*a* in position to prevent shifting or skidding and help to establish a firm operational assembly.

The kingpin 15 extends from the ball socket 22 attached to the shoe plate 11 downwardly through the hole in the bottom of the recess in the upper segment or member 10, then through the center hole in the rubber aligner 26, then through hte hole in the recess 37 of the lower segment 12 and finally through the hole in the lowest rubber collar 33*a*. Around the top end of the kingpin in threaded association therewith is a nut 29 which together with a metal washer 38 on top of the rubber collar 28 forms the supporting element for the top end of the kingpin 15 and stud 20. This arrangement, together with the washer 39 and nut 32 at the extreme lower end of the kingpin, serves to hold the upper and lower segments 10 and 12 of the truck assembly firmly, yet flexibly, together.

To avoid binding of the kingpin the diameter of the holes in the recesses of the upper and lower segments 10 and 12 of the truck assembly is a little larger than the diameter of the kingpin as is clearly illustrated in Figure 5 at 10*a* and 12*a* respectively.

In the arrangement of Figure 5, as compared with the arrangement of Figure 1, a recess 37 has been provided in the bottom surface of the lower segment 12 and a larger rubber collar 33*a* has been placed therein. The wheel axle 13*a* has been moved towards the longitudinal center of the skate. Also, one side of the lower end 17*a* of the kingpin 15, extending from the extreme lower end of the kingpin to the shank 16 thereof, has been flattened as indicated at 17*b*, see also Figure 8. The flat surface of the kingpin against the flat surface of the notch 13*b* in the axle 13*a* prevents in positive manner turning of the lower segment 12 without turning the kingpin 15.

The bottom of the shank 16 where it meets the upper end of the flat surface 17*b* of the kingpin forms an extended shoulder 16*a* which is forced down on top of the axle 13*a* in the region of the axle notch 13*b* when the nut 32 at the bottom of the kingpin 15 is tightened. This shoulder 16*a* limits the binding pressure on the rubber collar 33*a* in the lower segment 12 and prohibits any pull against the free action of the aligner 26; it does, however, allow the kingpin to move upward with the lower segment 12 as this lower segment is forced closer to the upper segment 10 when the weight of the skater is applied to the skate.

When the skater leans to the right, for example, the foot plate 11 is tilted to the right and there is, therefore, pressure on the right side of the top washer 38 whereby the right side of the top rubber collar 28 is compressed. As this happens, the pressure at the bottom is on the left side of the washer 39 whereby the left side of the lower rubber collar 33*a* is compressed. These opposing pressures cause a gradual pull when the skate is tilted, thus providing a smoother turning action. This action produces an upward pull or push of the kingpin 15 thereby forcing a separation between the shoulder 16*a* and that part of the axle 13*a* in the region of the axle notch 13*b*. In this manner binding is avoided and a universal action of the lower segment 12 is achieved.

In my design the start of the skate turn takes place as the leaning pressure of the skater causes the socket 22 to bear downwardly and forwardly on the ball-head 21 of the kingpin 15, thus causing the kingpin 15 to turn the lower segment 12, to which it is fastened as above described, in a pivotal, lateral motion. This pulls one end of the axle and wheels backwardly of the skate, and as the skater increases his leaning side pressure the lug 23 of the upper segment 10 comes further downwardly forward thereby increasing its pressure toward the curved surface 36 of the lower segment 12. As the side of the lower segment 12 housing the axle 13*a* is pushed back in a semi-pivotal movement, the wheel is pulled back with it and the skate turns.

In Figure 5 I have shown an improvement in connection with the lug 34*a*. In this lug I mount a socket 40 to receive a ball 41. The ball 41 is rotatably retained in position within the socket 40 by means of the cap 42. Fixed to the ball 41 is a shaft 43 on which is fixedly mounted a circular rubber member 44 which may serve as a spinning means or as a brake.

An alternative arrangement is shown in Figure 9 wherein the lug 34*a* receives a ball 45 which may be operably retained in position by the member 42. This ball may be used for fancy spins and the like.

It will be apparent to those skilled in the art that changes may be made in the general arrangement of the skate of this invention without departing from the scope and spirit of such invention. It will be further understood that while I have shown my invention as embodied in a particular arrangement of structures I am not to be limited to such particular structures except insofar as they are specifically set forth in the subjoined claims.

Having thus described my invention, what I claim as new and what I desire to protect by United States Letters Patent is:

1. A roller skate comprising a shoe plate and a pair of wheel carrying truck assemblies, each said truck assembly comprising an upper segment fixed to said shoe plate, a lower segment, a kingpin passing through said segments, said kingpin having a ball-shaped end, a socket on the underside of said shoe plate to receive said ball-shaped end, said socket being spaced from and separate from said upper segment, a resilient aligner about said kingpin between said upper and lower segments, lugs on said segments received in said aligner, and means on the other end of said kingpin to maintain said upper and lower segments in contact with said aligner.

2. The skate of claim 1 in which said last mentioned means includes a resilient pad located adjacent said lower segment and a nut on said kingpin.

3. The skate of claim 1 in which said upper segment is provided with a recess on that side of said upper segment which is opposite from said aligner, a resilient collar in said recess, said collar engaging said kingpin, and means to tighten said collar about said kingpin.

4. The skate of claim 1 in which said kingpin comprises a two-piece member, one member having the ball-shaped end, and means fixing said one member to the other.

5. The skate of claim 1 in which said lower segment has an interior flat adjacent said kingpin and a downwardly curved portion extending away from said flat and said kingpin to allow relief for a lug on said upper segment.

6. The roller skate of claim 1 including a wheel carrying axle mounted in said lower segment, said axle having a notch, the lower end of said kingpin having a flat side, and said flat side end of said kingpin being located within said notch.

7. The skate of claim 6 in which the interior of said notch terminates in a flat side against which the flat side of said kingpin abuts, and said lower segment being provided with an interior flat adjacent said kingpin and a downwardly curved portion extending from said flat and from the flat side of said kingpin to allow relief for a lug on said upper segment.

8. The roller skate of claim 1 in which said segments have bores through which said kingpin passes, said bores being of appreciably greater diameter than the diameter of said kingpin.

9. The roller skate of claim 1 in which said lower segment is provided with a recess, a resilient collar in said recess, said collar engaging said kingpin, and the said means on the lower end of said kingpin to maintain said upper and lower segments in contact with said aligner including a washer covering the lower surface of said last mentioned collar, and a nut engaging said washer.

References Cited in the file of this patent

UNITED STATES PATENTS

339,318	Peer	Apr. 6, 1886
2,166,767	Peterman	July 18, 1939
2,341,576	Shye	Feb. 15, 1944
2,424,072	Allred	July 15, 1947
2,510,722	Snyder	June 6, 1950
2,558,696	Van Horn	June 26, 1951
2,595,751	Balstad	May 6, 1952
2,763,490	Crone	Sept. 18, 1956

FOREIGN PATENTS

494,395	Germany (Addition to No. 484,159)	Apr. 14, 1928