

- [54] **PLASTIC SKATE SOLE PLATE WITH ADJUSTABLE TOE-STOP MOUNT**
[75] Inventor: **Gordon K. Ware**, St. Charles, Ill.
[73] Assignee: **Chicago Roller Skate Company**, Cook, Ill.
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[58] Field of Search **280/11.2, 11.27; 85/1 SS; 151/24, 5; 16/2**

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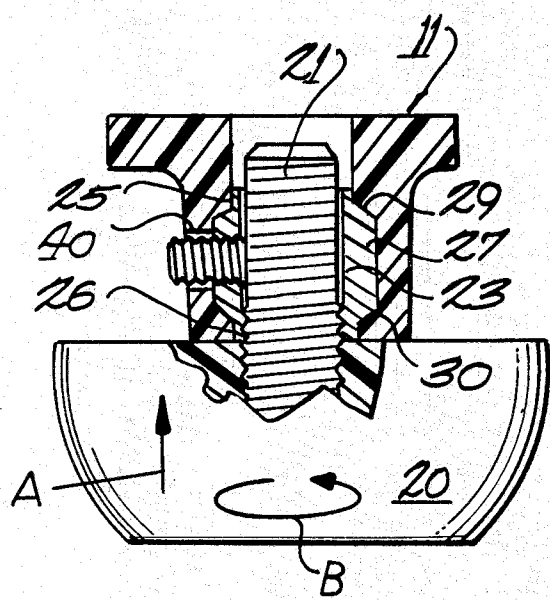
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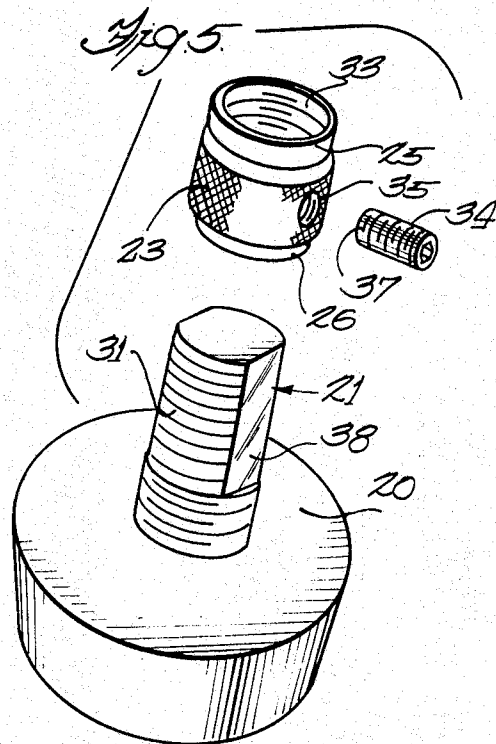
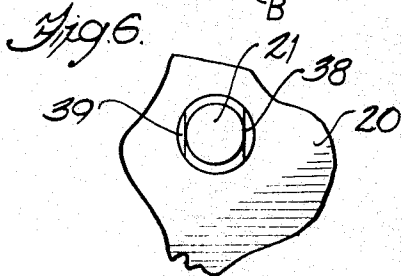
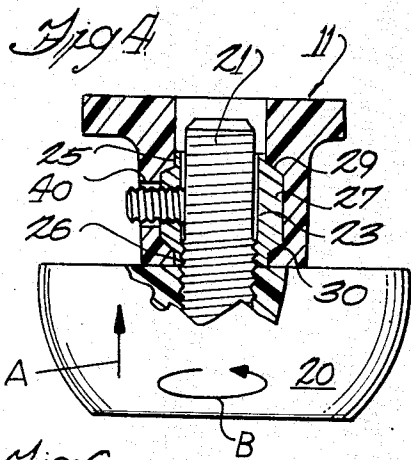
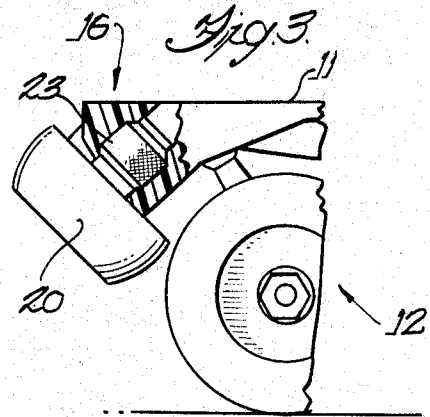
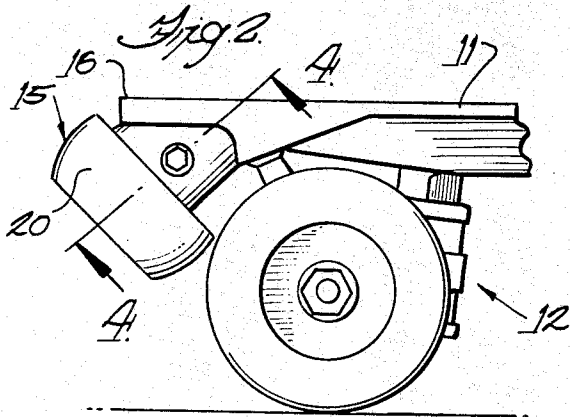
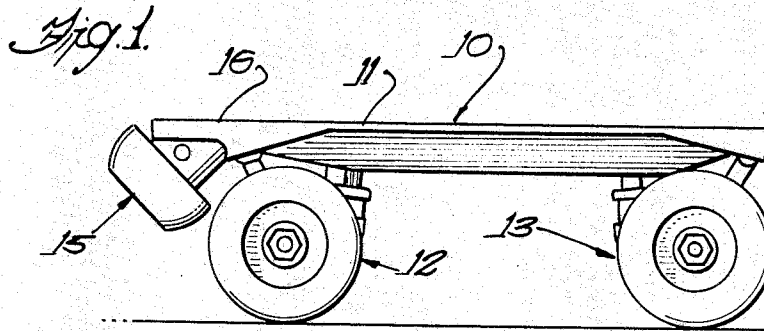
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Primary Examiner—David Schonberg
Assistant Examiner—David M. Mitchell
Attorney, Agent, or Firm—Olson, Trexler, Wolters, Bushnell & Fosse, Ltd.

[57] **ABSTRACT**
A rink-type roller skate is provided with a plastic sole plate. To mount a toe stop on the skate, a novel bushing is embedded in the sole plate. The bushing has relatively small diameter ends and a large diameter mid-portion which is aggressively surfaced. Axial and rotational forces are transmitted to the sole plate through the bushing, while movement of the bushing in the plate and plate cracking are inhibited.

5 Claims, 6 Drawing Figures





PLASTIC SKATE SOLE PLATE WITH ADJUSTABLE TOE-STOP MOUNT

BACKGROUND OF THE INVENTION

This invention relates to toe stops for roller skates, and more particularly to structure for mounting a toe stop on a roller skate which has a sole plate fabricated of plastic or other relatively soft material.

Toe stops have long been mounted upon roller skates adapted for use on roller rink floors and elsewhere. U.S. Pat. Nos. 2,719,723, 2,954,984, 3,003,776, 3,016,246, 3,156,482, 3,180,651, 3,761,614, 3,580,594 and 3,580,595 disclose various stop structures which assist the skate wearer in performing leaps, spins, and other dance-like maneuvers. As the cited patents disclose, these toe stops usually include a rubber or resilient member mounted at a position forward and below the sole plate, and the toe stop is secured to the sole plate by a mounting pin.

Recently, the manufacture of rink or shoe skates has begun to be modified to utilize skate sole plates formed of relatively light weight, low cost, rigid resinous plastic material. This material has excellent dimensional stability, and includes various phenol and urea aldehyde condensation product resins, either filled or reinforced with suitable materials such as cellulose or chopped glass fibers. Other, similar resinous plastic material may be employed in forming sole plates. The use of such material in the formation of these sole plates and other skate parts has proved generally satisfactory, and it is now desired to improve the structure by which toe stops are attached to the sole plates.

It is accordingly the general object of the present invention to provide a skate toe stop mounting structure for use with plastic sole plates which will not crack the plastic or become loose even under extremely hard use or abuse.

It is another object of the invention to provide an inexpensive toe stop mounting structure of rugged construction and long service life.

Other objects and advantages of the invention will become apparent upon reading the following detailed description and upon reference to the drawings. Throughout the drawings, like reference numerals refer to like parts.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view showing in its general aspect a typical roller skate sole plate and associated undercarriage structure and including a toe stop;

FIG. 2 is a fragmentary elevational view similar to FIG. 1 but showing the front portion of the skate;

FIG. 3 is a fragmentary elevational view similar to FIG. 2 but showing in sectional detail the structure by which the toe stop is mounted upon the skate;

FIG. 4 is an elevational view in partial section taken substantially in the plane of line 4-4 in FIG. 2 and showing in yet further detail the structure by which the toe stop is mounted to the skate;

FIG. 5 is an exploded perspective view showing in yet further detail the toe stop and the associated mounting structure; and

FIG. 6 is a plan view showing in further detail the appearance of a portion of the toe stop and the associated mounting pin.

DETAILED DESCRIPTION OF THE DRAWINGS

While the invention will be described in connection with a preferred embodiment, it will be understood that it is not intended to limit the invention to that embodiment. On the contrary, it is intended to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention.

Turning first to FIGS. 1 and 2, there is shown the bottom portion or undercarriage 10 of a typical rink-type roller skate. This bottom undercarriage 10 includes a sole plate 11 which supports a skate shoe and an enclosed skater's foot (not shown) on fore and aft roller trucks 12 and 13 respectively. The skater is assisted in performing sudden stops, quick starts, leaps, spins and other dance-like steps by a toe stop assembly 15 mounted on the front portion 16 of the sole plate 11. The toe stop assembly 15 includes a stop member 20 projecting as illustrated from a mounting pin 21 which is adapted for connection to the sole plate 11.

In accordance with the invention, connection of the toe stop mounting pin 21 to the sole plate 11 is accomplished through a novel bushing member 23 rigidly embedded in the sole plate 11 and adapted to receive the toe stop mounting pin 21. This cylindrical bushing 23 includes first and second relatively small diameter end portions 25 and 26 to provide directional stability and guidance to the mounting pin 21. Intermediate the end portions 25 and 26 is a relatively large diameter mid-portion 27. Interconnecting the surfaces of the end portions 25 and 26 with the surface of the mid-portion 27 are two annular steps 29 and 30. In the illustrated embodiment, the surfaces of these annular steps 29 and 30 take the form of truncated cones in their configurations.

As can be envisioned by reference to FIGS. 3 and 4, these step portions 29 and 30 are embedded in and engage the surrounding material forming part of the sole plate 11. The steps 29 and 30 and other parts of the bushing 23 transmit to the surrounding sole plate material forces which are imparted to the stop 20 in a direction indicated by the arrow A which tends to move the bushing in a direction parallel to the bushing axis.

It is a feature of the invention that the enlarged bushing mid-portion 27 is provided with an aggressive surface, as by a knurling operation, to enhance the frictional interengagement of the bushing 23 and the sole plate 11. This aggressive surface assists in transmitting to the sole plate 11 the arrow A axial forces imparted to the toe stop 20 which act in a direction parallel to the bushing axis. Further, the aggressive bushing surface assists in the transmission to the sole plate of forces which tend to rotate the bushing within the sole plate material, as indicated by the rotational arrow B. Such arrow B forces are encountered when a twisting motion is imparted to the toe stop 20 by the skate user, as when the skater turns sharply and engages only one side of the sole plate upon the stationary rink floor.

To immobilize the toe stop 20 on the skate, the toe stop mounting pin 21 is immobilized within the bushing 23. This is accomplished, in the illustrated embodiment, by forming male threads 31 on the mounting pin 21 and mating female threads 33 within the bore of the bushing 23. A set screw 34 is received in a threaded bore 35 formed within the enlarged mid-portion 27 of the bushing 23. To maximize the immobilizing effect of the set screw 34 on the mounting pin 21, the set screw

34 is provided with a relatively planar end 37 adapted to engage a flat 38 formed upon the mounting pin 21. As illustrated in FIGS. 5 and 6, at least one additional flat 39 can be formed upon the mounting pin 21. These flats extend over a plurality of turns of the mounting pin thread 31 to permit the toe stop 20 to be mounted at any one of a range of positions. When the toe stop 20 is rotated, the mounting pin 21 is turned into or out of the bushings 23, and the flats 38 and 39 are successively positioned or oriented for engagement by the set screw 34. When the toe stop 20 is located as desired and flat 38 or 39 is appropriately positioned, the set screw 34 is turned into engagement with the pin 21, and thereafter exerts an immobilizing force upon the pin.

To inhibit the set screw 34 from being forced out of the bushing 20, and to inhibit sole plate cracking or motion of the bushing within the embedding plastic material, the total thickness of the bushing mid-portion 23 is at least one half the diameter of the mounting pin 21. In the illustrated embodiment, the total thickness of the bushing mid-portion 23 substantially equals the diameter of the mounting pin 21.

It is another feature of the invention that forces inadvertently transmitted to the set screw 34 do not act directly upon the relatively soft material comprising the sole plate 11. To this end, the sole plate 11 is provided with an oversized counterbore 40 surrounding the set screw 34, which prevents contact and transmission of force between the set screw 34 and the adjacent sole plate material. In this manner, crack formation in the surrounding sole plate material is discouraged.

The invention is claimed as follows:

1. A roller skate structure comprising a relatively soft sole plate, a toe stop projecting from the sole plate, a toe stop mounting pin rigidly connected to the toe stop, and a relatively hard bushing rigidly embedded in the sole plate and adapted to receive the toe stop mounting pin, the bushing including relatively small diameter end portions and a relatively large diameter mid-portion intermediate the end portion adapted to immobilize the bushing from movement within the sole plate, a set screw threadably engaging the bushing mid-portion and engaging the mounting pin to immobilize the mounting pin in the bushing, the sole plate being counterbored to

prevent contact between the set screw and the adjacent sole plate material and thereby prohibit transmission of force from the set screw directly to the sole plate.

2. A structure according to claim 1 wherein at least the bushing mid-portion is aggressively surfaced to inhibit rotational movement and further inhibit axial movement of the bushing relative to the sole plate.

3. A structure according to claim 1 wherein said bushing is provided with female threads, said mounting pin is provided with male threads mating with the bushing threads, and at least one flat surface extending over a plurality of mounting pin thread turns and oriented for engagement by the set screw throughout a range of positions, the set screw being provided with a planar end adapted to engage the mounting pin flat surface and exert an immobilizing force thereon.

4. A structure according to claim 1 wherein the total thickness of the bushing mid-portion is at least one-half the diameter of the mounting pin to inhibit the set screw from being forced out of the bushing, to inhibit sole plate cracking, and to inhibit motion of the bushing within the sole plate.

5. For use with a roller skate having a relatively soft plastic sole plate and a toe stop, toe stop mounting means being affixed to the toe stop, a relatively hard cylindrical bushing adapted for embedment in the sole plate for connecting the toe stop mounting means to the sole plate, the bushing including relatively small diameter end portions, a relatively large diameter mid-portion, and truncated conical annular step portions interconnecting the small diameter end portions and the large diameter mid-portion, at least one annular step portion being of radial extent sufficient to engage material forming the sole plate and transmit to said sole plate forces imparted to the toe stop and toe stop mounting means in a direction which tend to move the bushing in a direction parallel to the axis of the bushing, the bushing further including an aggressive surface on at least the mid-portion for transmitting to the sole plate forces imparted to the toe stop and toe stop mounting means which act in a direction tending to move the bushing in a direction parallel to the axis of the bushing and forces tending to rotate the bushing in the sole plate material.

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