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(54) Footwear with retractable studs

(57) Footwear having retractable studs (22) that provide enhanced traction on slippery surfaces when engaged. A pull cord (38) attached to a plate within the sole of the shoe allows the studs to engage. The working parts

of the shoe can be easily taken apart for cleaning or de-icing. An alternative embodiment of the shoe has a mechanism similar to that of a conventional ball point pen which is used to effectively engage or retract the studs.

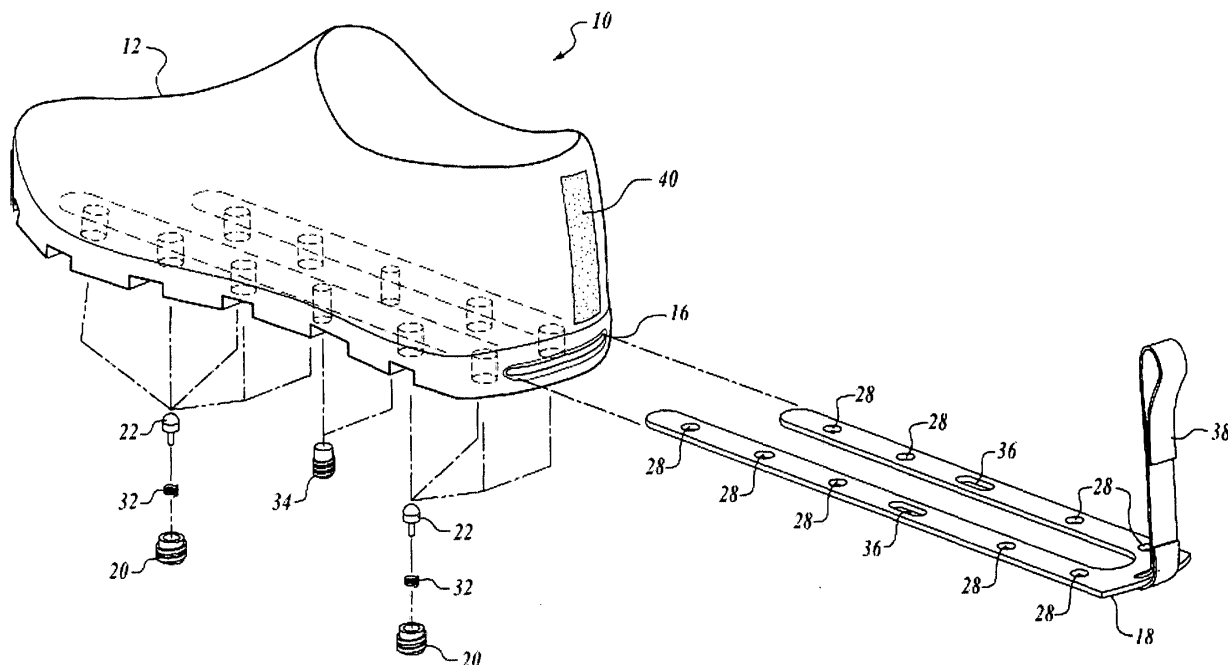


Fig. 1

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Description

Background of the invention

Field of the Invention

[0001] This invention relates in general to footwear for use on slippery surfaces such as ice and snow, and more particularly to footwear having retractable studs that provide enhanced traction on slippery surfaces when engaged.

Description of the Prior Art

[0002] In climates that experience ice and snow, especially during the winter season, many accidents occur when an unsuspecting person falls on an icy sidewalk or street resulting in injury due to an unrecognized danger. For example, in many cities a sidewalk may be bare and wet in places, but still have icy patches in the same block which are hazardous to pedestrians. Falls on icy sidewalks or streets can result in serious injury and even death. These injuries tend to occur with more frequency to middle-aged and older people. To address this situation, there are many well-known prior art devices, ranging from overshoes with enhanced traction to special inclement weather boots. Generally speaking, the well known winter footwear tends to have some value, if used. Many situations in the urban environment, however, occur in winter which require a "normal" shoe for indoor wear and a shoe with enhanced traction for navigating the outdoor walkways. Overshoes and conventional winter boots, even if used, are somewhat limited in value, especially on icy surfaces. The solution to the above mentioned problem, perhaps, is best met by footwear which can have an "upper" of any conventional design but yet have a sole which could adapt itself by extending studs to slippery outside conditions.

[0003] A preliminary search of the prior art has turned up three U.S. patents which address "retractable spikes" and their use, each in different ways, and are a typical sampling of the retractable spike art. These patents are: U.S. Patent No. 4,825,562 issued to Chuang, U.S. Patent No. 4,821,434 issued to Chein, and U.S. Patent No. 6,058,627 issued to Violette et al. Both the Chuang and Chein patents are quite different in structure, function, and result with respect to the present invention. Chuang has a sole which can allow two sets of nails to project therefrom when a key is used. To accomplish this extension of nails, a box is provided between the insole and sole. The particular structure appears to be somewhat complex and further could reduce the durability of the sole and insole due to accumulate water and dirt in spaces between the box, sole, and insole. The Chein patent also has this drawback, as it would appear that the structure of the sole would make walking on it rather stiff and unusual when compared to a normal shoe. Also to deploy the spikes, kicking the toe of the shoe on an object such

as a wall seems to be somewhat less than ideal, as this structure requires a "driving member 5" located in the toe of the shoe, extending the toe somewhat compared to a normal shoe, increasing the chance of tripping. The Violette et al patent has a retractable spike structure in its sole. Violette et al also has kick points on the toe and heel of his shoe for retraction and extension of traction spikes. A plate device 32 runs nearly the entire length and width of the shoe within the sole which is split into an upper portion 16 and lower portion 18. Several problems arise from this structure. The upper and lower portion of the sole must be sealed together with the plate device therein. It would appear that the durability of this shoe would be limited by the strength of the lamination on the periphery of the shoe. There is also significant "dead space" between the two layers which would tend to accumulate dirt and water, which could comprise the functioning of the plate device. Violette et al would also seem to present a significant tripping hazard. In contrast to the above patents, the present invention provides a simple, yet efficient, way to retract or extend traction studs and a mechanism which is easily serviceable and/or replaceable.

SUMMARY OF THE INVENTION

[0004] The present invention comprises footwear for use on slippery surfaces such as ice, snow, or the like which has retractable studs allowing enhanced traction on these surfaces. The footwear can be of any design with respect to its upper portion. The footwear would have a sole that was specially configured. The sole is adapted to receive a plurality of treads with the treads preferably threaded to the sole. The treads have a retractable stud mounted and retained therein. The studs have a top portion which is somewhat rounded and a bottom portion which extends from the sole of the footwear when the retractable studs are extended. The sole also has a cavity within it which holds a plate. The plate has two tracks which have holes therein. The holes in the plate receive the top portion of the retractable studs when the studs are in a retracted position and are slightly smaller in diameter than the greatest diameter of the studs. This configuration means that the top portion of the studs do not fully fit within the holes. The retainer for each stud within the tread is a spring which prevents the bottom portion of the stud from extending from the sole when the top portion of the studs fit within the holes of the plate. The plate can slide within the cavity such that movement of the plate in a rearward direction relative to the sole allows the plate to contact the top portion of the retractable stud. As the plate pushes over the top portion of the stud, the bottom portion of the stud is extended beyond the sole against the force of the retainer or spring to an engaged portion. Preferably the plate has small recesses which are located above the top portion of each stud when the studs are extended. The studs can be disengaged or retracted by a forward motion of the plate relative to the

sole which will once again center the holes over the top portion of the studs allowing the studs to retract and be retained in the tread. The rearward movement of the plate can be facilitated by a pull cord attached to the rear of the plate. The pull cord can be pulled in a rearward direction relative to the footwear resulting in the plate sliding rearwardly and the studs engaging. The forward movement of the plate can be accomplished by the wearer of the footwear by tapping the rear portion of the plate against an object such as the toe of the opposite shoe.

[0005] To limit the movement of the plate within the cavity in the sole, a retaining tread is provided. This retaining tread is connected to the sole of the footwear, preferably by a threaded connection. The retaining tread can be similar to the other treads which are used, but without a stud dispersed therein. The retaining tread fits through a slot within the plate, providing a limit to the forward and rearward movement of the plate.

[0006] The pull cord, which is connected to the rear of the plate, can be stored in the following manner. The cord can be attached to the back of the footwear using a hook and loop connection. To accomplish this connection, a strip is provided on the back of the footwear. Both the strip and cord can be hook and loop material. This connection is relatively simple and prevents the cord from becoming a nuisance when using the footwear. As an alternative to the pull cord to initiate rearward movement of the plate and engagement of the studs, a cylindrical mechanism like that used in a conventional ballpoint pen can be employed. To briefly describe this mechanism, a cylindrical portion is added to the plate of the present invention. The cylinder has a piston within it and the piston engages a wheel. The wheel has a series of projection on its circumference and is retained in the cylinder of the plate such that a forward movement of the piston allows the piston to disengage temporarily from projection of the wheel. The wheel can then rotate and, by rotating, lock the piston in a fixed position. The plate, therefore, moves rearwardly relative the sole thereby allowing the plate to contact the top portion of the retractable studs engaging the studs in a deployed position. The movement of the piston can be initiated by a tap on a central projection connected to the piston. The "tap" can be a strike against an object, i.e. the toe of the opposite shoe. To disengage the studs, another tap on the central projection would allow the piston to disengage from wheel projection and allow the wheel to rotate and lock the piston in a forward position, just as the point of a ballpoint pen is engaged or retracted.

[0007] It is, therefore, an object of this invention to provide footwear with retractable studs for enhanced traction on slippery surfaces.

[0008] Another object of the present invention is to provide a footwear with retractable studs that is easy to operate.

[0009] A further object of the present invention is to provide footwear with enhanced traction on icy surfaces which will not damage conventional flooring or carpeting.

[0010] Yet another object of the present invention is to provide footwear with deployable studs for use on icy surfaces which has easily removable and replaceable parts.

[0011] Still another object of the present invention is to provide footwear with retractable studs which has an operating mechanism that minimizes "jamming."

[0012] These and other objects and advantages will become more apparent from the following detailed description when taken in conjunction with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

Figure 1 is an exploded pictorial view of a shoe in accordance with the present invention.

Figure 2 is a side view of a shoe partially in cross section (along line 2-2 of Figure 6) showing the studs of the present invention in a retracted position.

Figure 3 is a side view of a shoe partially in cross section (along line 3-3 of Figure 7) showing the slide plate and the studs in an extended position.

Figure 4 is a detail view partially in cross section showing the stud of the present invention in a retracted position.

Figure 5 is a detail view partially in cross section showing the studs of the present invention in an extended position.

Figure 6 is a bottom view in cross section of the shoe in Figure 2 showing the slide plate and the studs in a retracted position.

Figure 7 is a bottom view in cross section of the shoe in Figure 3 showing the studs of the present invention in an extended position.

Figure 8 is a bottom view in cross section of a shoe (studs retracted) similar to Figure 1 showing an alternative mechanism to initiate extension of the studs.

Figure 9 is a bottom view in cross section of a shoe (studs extended) similar to Figure 6 showing an alternative mechanism to initiate extension of the studs.

Figure 10 is an exploded view of the alternative mechanism to initiate extension of the studs.

Figure 11 is an exploded elevation view showing part of the alternative mechanism for extending the studs.

Figure 12 is a cross sectional view taken through line 12-12 of Figure 11.

Figure 13 is a cross sectional view taken through line 13-13 of Figure 11.

Figures 14, 15, and 16 are elevation views of part of the alternative mechanism to extend the studs showing three successive stages in its operation.

Figure 17 is a detail view showing the cylindrical wheel almost fully disposed in the outer cylinder (studs retracted).

Figure 18 is a detail view showing the cylindrical wheel extending from the outer cylinder (studs extended).

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0014] Referring to the figures, and especially Figures 1 through 4 initially, the present invention can be described. Figure 1 shows an article of footwear 10 and for ease of description will be referred to as shoe 10. It is understood that the upper portion of the footwear can be in any well known configuration such as a conventional shoe, boot, athletic shoe, or any equivalent. The shoe 10 has an upper portion 12 with a lower portion or sole 14. Sole 14 runs the length of the shoe 10 on its bottom and has a narrow cavity 16 therein. Cavity 16 has a slide plate 18 fitted therein and the slide plate 18 is substantially U-shaped as best shown in Figures 2 and 4. Sole 14 also has a plurality of treads 20 fitted therein, preferably threadably connected to the sole as shown in Figures 1 and 3. Treads 20 fit with sole 14 such that they are neither extended nor retracted relative to the sole 14 when the shoe 10 is in use, but actually form part of the walking surface of the shoe 10. Contained within the treads 20 are studs 22. Stud 22 has an upper portion 24 and a lower portion 26, as best seen in Figure 5. The upper portion 24 of studs 22 have a rounded shape and fit within holes 28 in slide plate 16 when the studs 22 are in a retracted position. Plate 18 is provided with a plurality of recessed portions 30 which partially receive the upper portions 24 of studs 22 when the studs 22 are engaged. The studs 22 are retained in the treads 20 by a spring retainer 32 in each tread 20.

[0015] To limit the movement of slide plate 18 within the cavity 16, at least one retaining tread 34 is provided. Retaining treads 34 are similar to treads 20, but are studless and threadably connect to sole 14. Retaining treads 34 fit within a slot 36 within the slide plate, which is substantially elliptical and allows limited movement of the slide plate 18 relative to the sole 14 as best seen in Figures 2 and 4. A pull cord 38 is provided, which attaches to the rear of the slide plate 18. The pull cord 38, when not being used to move the slide plate 18, is attached to a strip 40 of material on the back of the upper portion 12 of the shoe 10. This attachment can be readily accomplished by having the strip 40 and pull cord being made of a conventional hook and loop material.

[0016] The operation of the shoe 10 to engage or retract the studs 22 can be described as follows. Initially, it is assumed that the shoe 10 is being worn with the studs in a retracted state. The "retracted" state is shown in Figures 1 and 2. In this state, the studs 22 have their lower portions 26 retained in the treads 20 by the springs 32. The top portion 24 of the studs 22 are at least partially fitted within the holes 28 of the slide plate 18. In the preferred embodiment, the top portions 24 of the studs 22 are not fully contained within the holes 28 of the plate 18.

This feature is best accomplished by having the holes 28 slightly smaller than the greatest width of the top portion 24 of stud 22 and having that top portion rounded. In this manner, the "jamming" of the mechanism can be minimized and allows for use of a thinner slide plate 18 can be used. With the slide plate 18 relatively thinner, the sole 14 of the shoe 10 will be more flexible and have less weight, resulting in it feeling similar to the sole of a conventional shoe to the wearer. In the retracted state, the retaining tread 34 is in a rearmost position with respect to slot 36 as shown in Figure 2. Also, the slide plate 18 is substantially contained within the cavity 16.

[0017] To engage the studs 22 when desired, the wearer of the shoe 10 would grab the pull cord 38 and detach it from the strip 40. A rearward tug on the pull cord 38 would move slide plate 18 within cavity 16 to a position shown in Figures 3 and 4. Retaining tread 34 would in a foremost position relative to slot 36 (see Figure 4), and the slide plate 18 would have worked against the top portion 24 of the studs 22 so that the bottom portion 26 of the studs 22 are extended from the sole 14. The recessed portions 30 in the slide plate 18 are now above the top portion 24 of the studs 22. The slide plate 18 is slightly extended from the rear of the cavity 16 (see Figure 3) and the pull cord 38 can once again be fastened against strip 40.

[0018] Referring now to the Figures (especially Figures 7 through 17), an alternative embodiment of the invention can be described which uses a different mechanism to engage and disengage the studs. Figure 7 shows a cylindrical track 42 included as part of plate 18. Cylindrical track 42 has an external sheath 44, which contains within the working mechanism of the embodiment. Disposed in external sheath 44 is an outer cylinder 46 having channels 47a and 47b (Figure 12) on its interior surface as best seen in Figure 9 formed by linear beveled portions 49. Outer cylinder 46 holds a notched cylinder 48 and receives partially a cylindrical wheel 50 at its forward end and a plunger 52 at its posterior end. Notched cylinder 48 has four tabs, collectively designated as 54, towards its forward end and tooth-like protrusions, collectively designated as 56, on its front edge. Cylindrical wheel has linear projection 58 along its length. These linear projections 58 contact the protrusions 56 of notched cylinder 48 when the mechanism is in place. A spring 60 fits in external sheath 44 and contacts the front surface of the cylindrical wheel, exerting a rearward force on the cylindrical wheel 50, notched cylinder 48, outer cylinder 46, and plunger 52.

[0019] The operation of this alternative mechanism can now be described especially with reference to Figures 10 through 17. Initially, it should be made clear that tabs 54 of notched cylinder 48 are disposed within channels 47a of outer cylinder 46. Also, channels 47b are adapted to receive linear projections 58 of cylindrical wheel 50 when the studs are retracted, as will be described shortly. For purposes of this description, it will be assumed that the studs are in an engaged state as shown

in Figure 8. It should be noted that cylindrical wheel 50 protrudes from the front of outer cylinder 46. This configuration corresponds to the configuration shown in Figure 13 where the linear projections 58 of cylindrical wheel 50 are contacting the protrusions 56 of notched cylinder 48. Beveled portion 49 of outer cylinder 46 engages the linear projections 58 and prevent the cylindrical wheel 50 from rotation, holding it in a forward position as shown in Figure 13. When the plunger 52 is depressed (as shown in Figure 14), a force is exerted forwardly on notched cylinder 48. This forward force moves the notched cylinder 48 within outer cylinder 46 to a more forward position, and thereby moves the linear projections 58 of cylindrical wheel 50 clear of the beveled portion 49 temporarily, as depicted in Figure 14. At this point, the bevel at the ends of the linear projections 58 co-operates with the bevel at the end of the beveled portion 49 and produces a rotation in the cylindrical wheel. After rotation, the linear projections 58 are disposed in the channels 47b which compresses spring 60 and forces plate 18 forward, thereby retracting the studs. Figures 16 and 17 show the relationship of the cylindrical wheel 50 and outer cylinder 46 upon retraction of the studs (Figure 16) and engagement of the studs (Figure 17).

[0020] To extend the studs, the plunger 52 is depressed again. This forces notched cylinder 48 forward against the spring tension to a position shown in Figure 13 where the ends of linear projections are engaged and held in the position shown by beveled portion 49 of outer cylinder 46.

Claims

1. Footwear with retractable studs comprising:

a) a sole having a cavity therein, said sole adapted to receive a plurality of treads, said treads having retractable studs with a top portion and a bottom portion mounted and retained therein by a stud retainer;

b) a plate fitting within said cavity, said plate having holes which receive the top portion of said retractable studs when said studs are retracted, said plates slidably mounted in said cavity whereby movement of said plate in a rearward direction relative to said sole allows said plate to contact the top portion of said retractable studs, extending said bottom portion of said studs beyond the sole of the footwear to an engaged position.

2. The apparatus of claim 1 which includes a plate retaining tread threadably connected to said sole and fitting through a hole in said plate, whereby the movement of said plate within said cavity is limited by said plate retaining tread.

3. The apparatus of claim 1 wherein said plurality of treads are threadably connected to said sole.

4. The apparatus of claim 1 wherein said plate has a pull cord fastened thereto to facilitate movement of said plate in a rearward direction relative to said sole.

5. The apparatus of claim 4 wherein a portion of said pull cord is fastened to the footwear with a hook and loop material when said retractable studs are retracted.

6. The apparatus of claim 1 wherein said stud retainer is a spring.

7. Footwear with retractable studs comprising:

a) a sole having a cavity therein, said sole adapted to receive a plurality of treads, said treads having retractable studs with a top portion and a bottom portion mounted and retained therein by a stud retainer;

b) a plate fitting within said cavity, said plate having a flat portion and a cylindrical portion, said flat portion of said plate having holes which receive the top portion of said retractable studs when said retractable studs are retracted, said plate slidably mounted in said cavity, said plate having piston disposed in said cylindrical portion of said cavity, said piston engaging a wheel having a plurality of projections on its circumference and retained in said cylindrical portion of said cavity such that a forward movement of said piston allows said piston to disengage from the plurality of projections and said wheel to rotate thereby locking said piston in a fixed position and moving said plate rearwardly relative to said sole allowing said plate to contact the top portion of said retractable studs extending said bottom portion of said studs beyond the sole of the footwear to an engaged position.

8. The apparatus of claim 7 which includes a plate retaining tread threadably connected to said sole, said plate retaining tread fitting through a hole in said plate, whereby movement of said plate within said cavity is limited by said plate retaining tread.

9. The apparatus of claim 7 wherein said plurality of treads are threadably connected to said sole.

10. The apparatus of claim 7 wherein said stud retainer is a spring.

11. The apparatus of claim 1 wherein said plate has two tracks.

12. The footwear of claim 7 in which a second forward

movement of said piston allows said piston to disengage from the plurality of projections and said wheel to rotate thereby locking said piston in a fixed position and moving said plate forwardly relative to said sole allowing the top portion of said retractable studs to fit within the holes in said plate thereby withdrawing said retractable studs to a retracted position within said sole. 5

13. The footwear of claim 12 includes a plate retaining tread threadably connected to said sole, said plate retaining tread fitting through a hole in said plate, whereby movement of said plate within said cavity is limited by said plate retaining tread. 10

14. The footwear of claim 12 wherein said plurality of treads are threadably connected to said sole. 15

15. The apparatus of claim 12 wherein said stud retainer is a spring. 20

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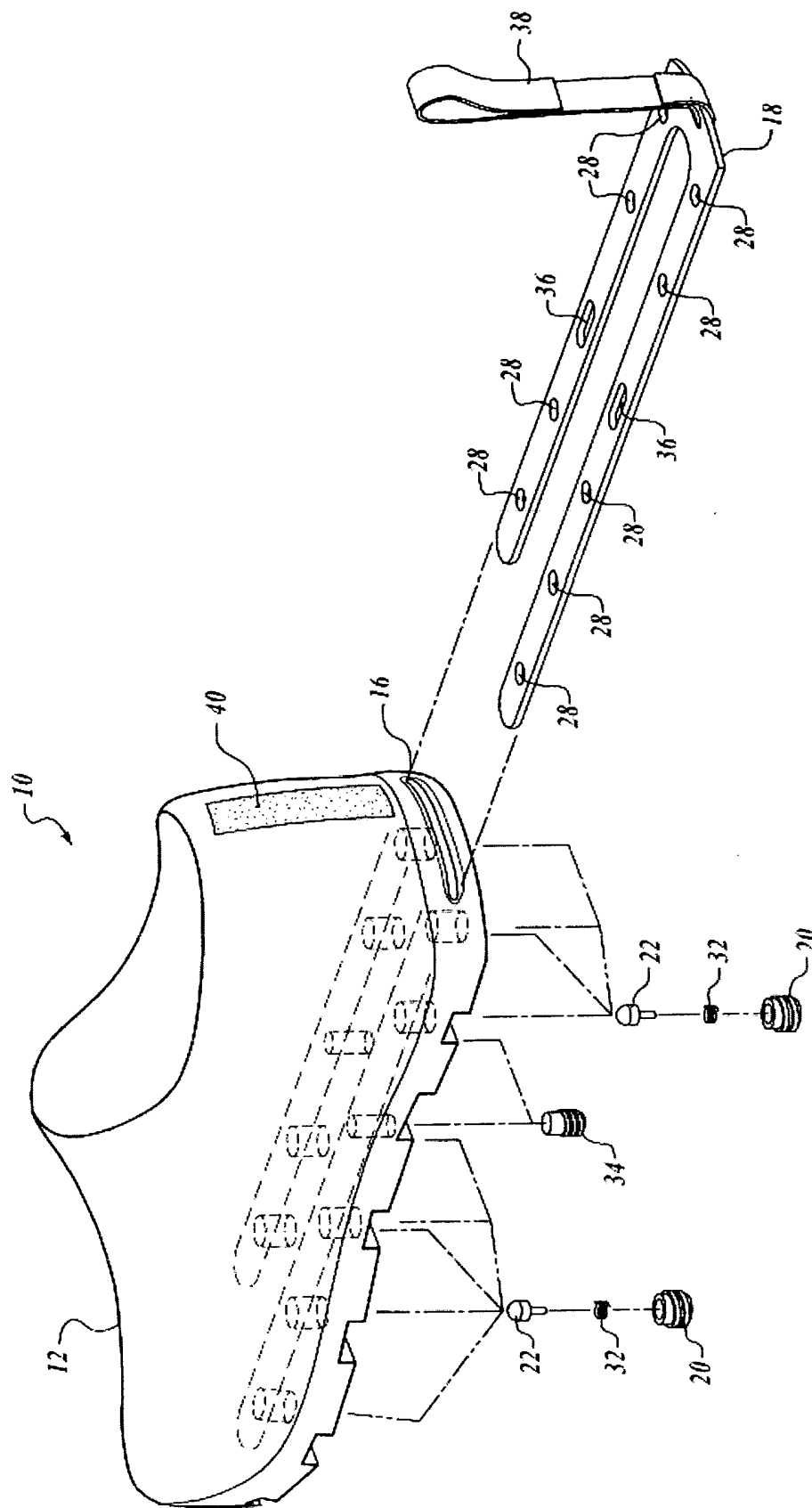


Fig. 1

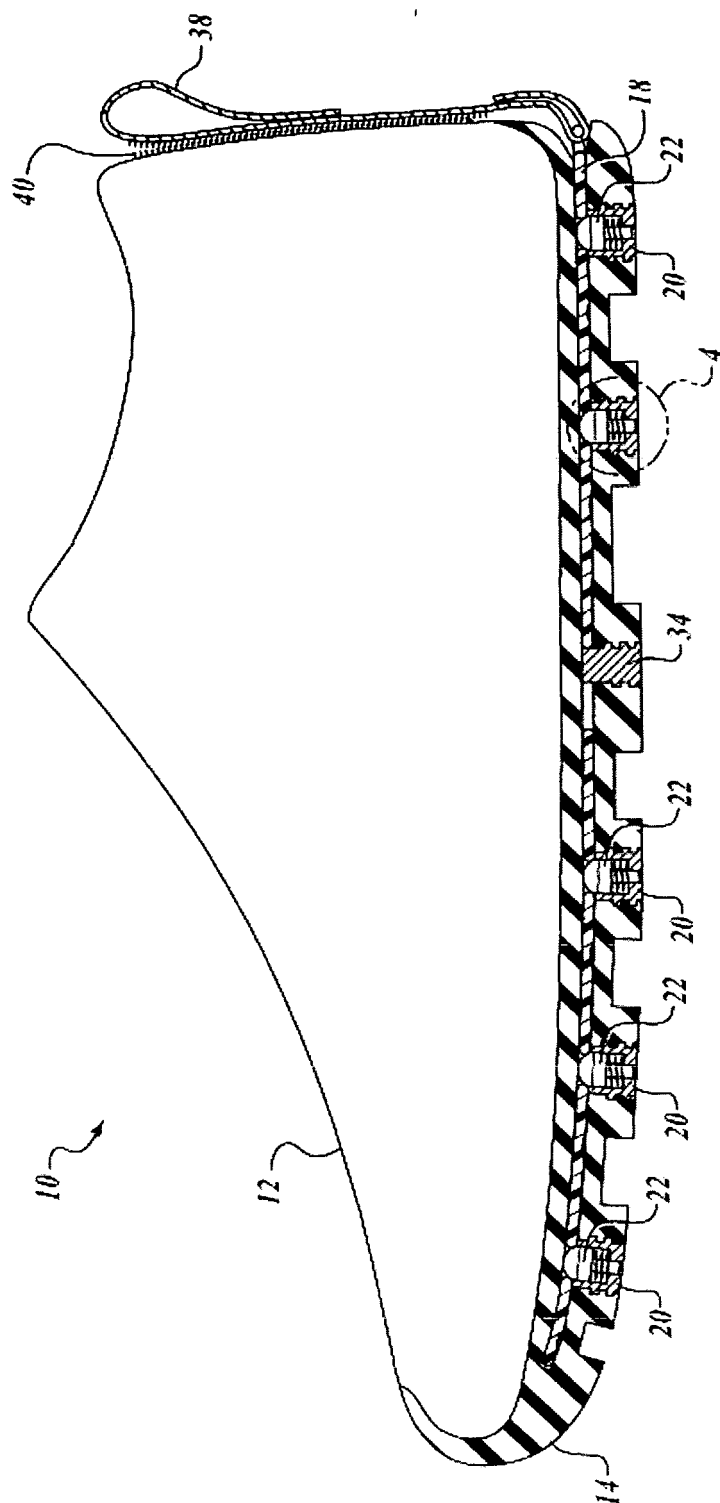


Fig. 2

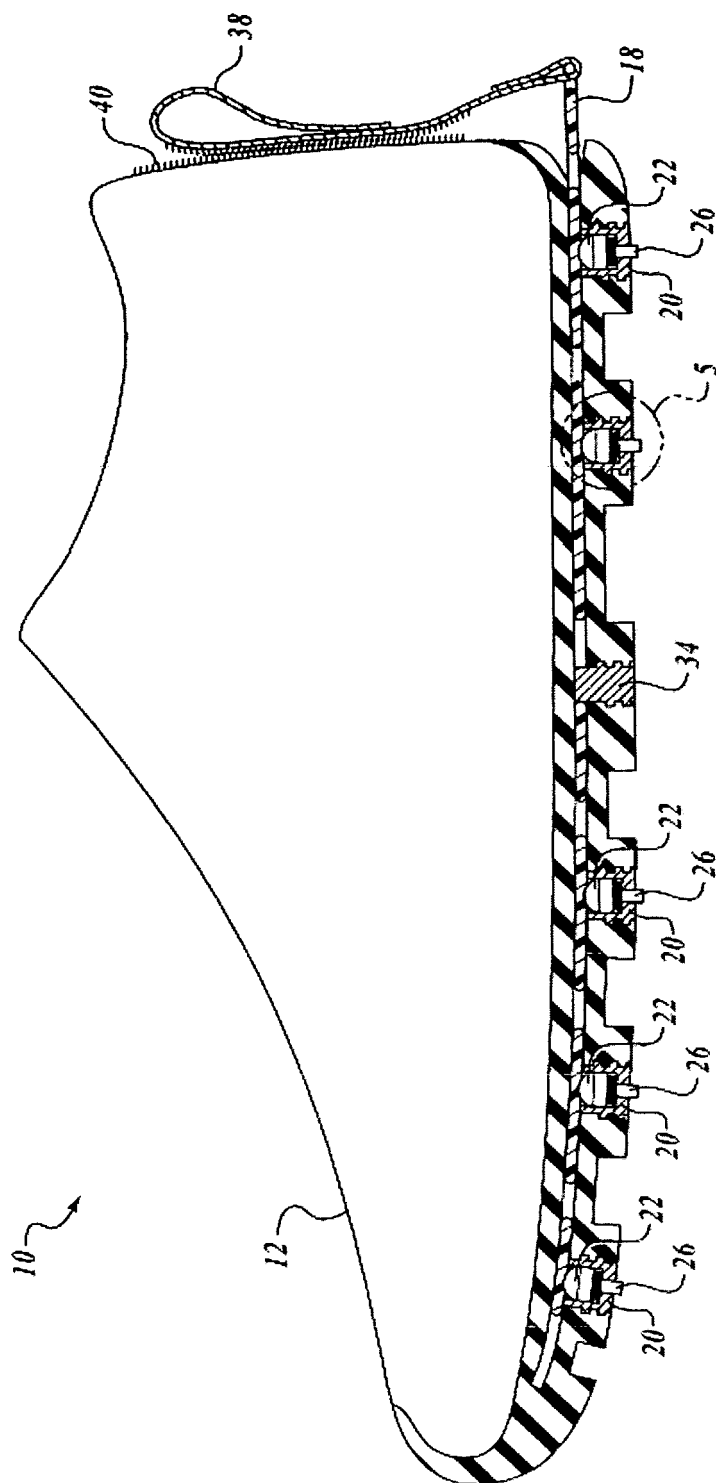


Fig. 3

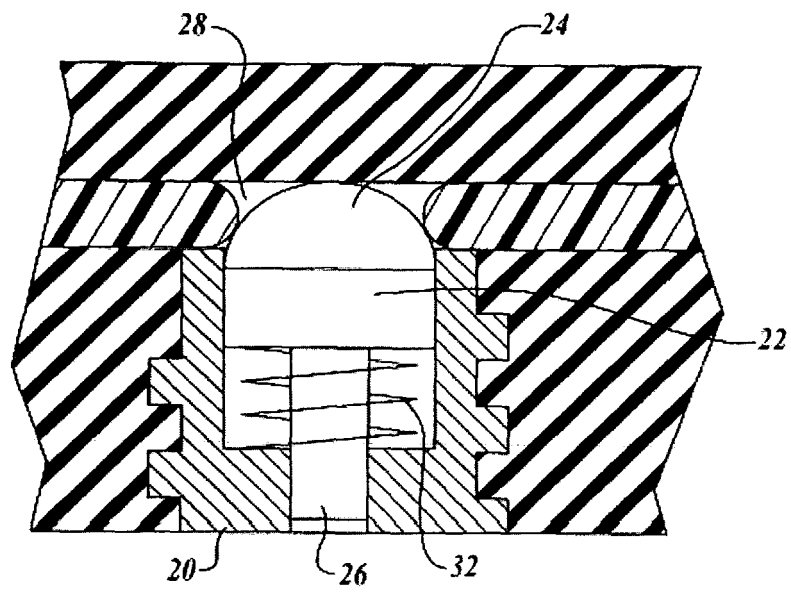


Fig. 4

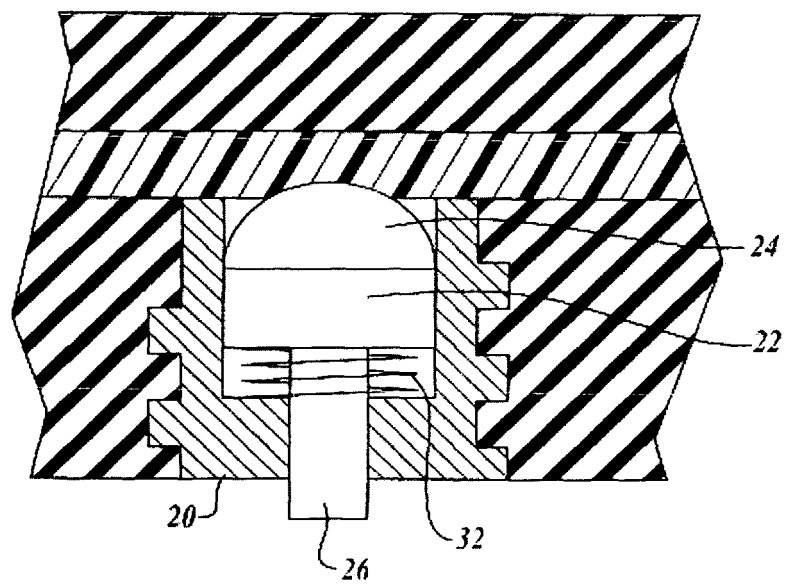


Fig. 5



Fig. 6

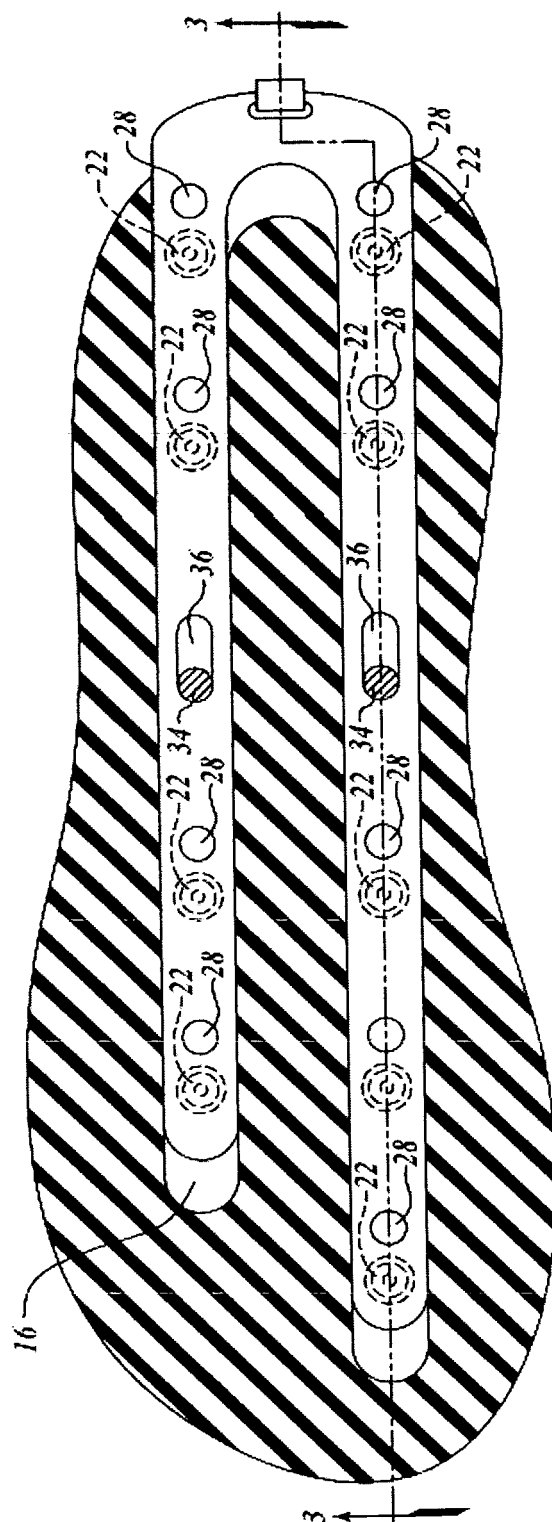


Fig. 7

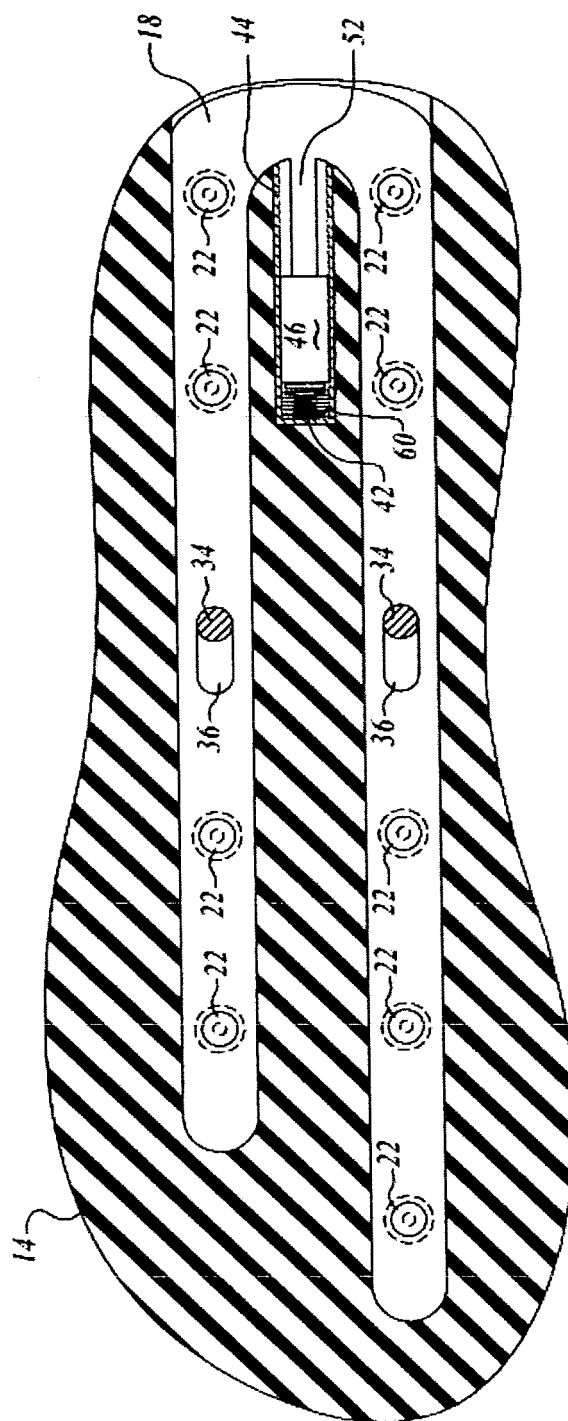


Fig. 8



Fig. 9

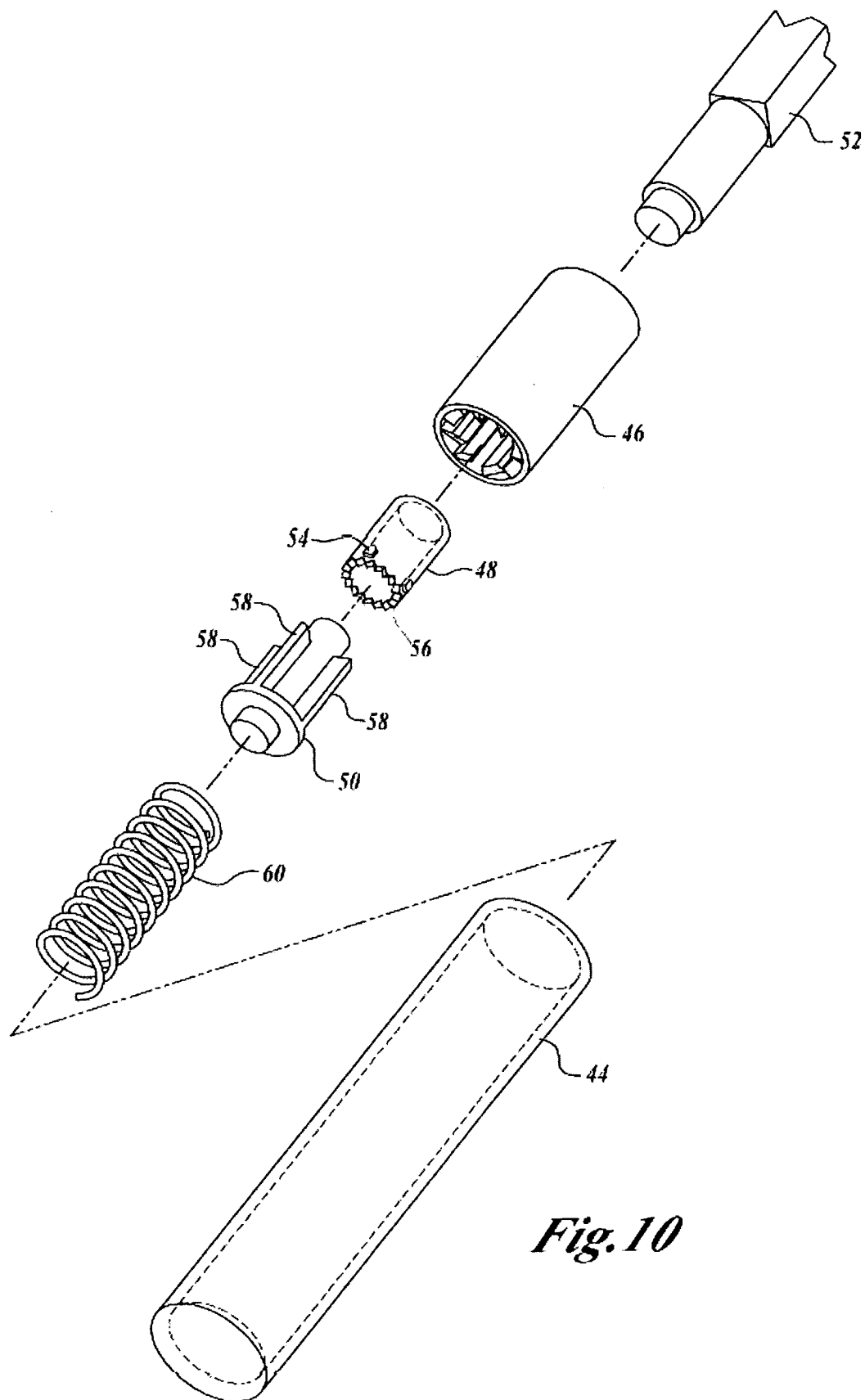


Fig. 10

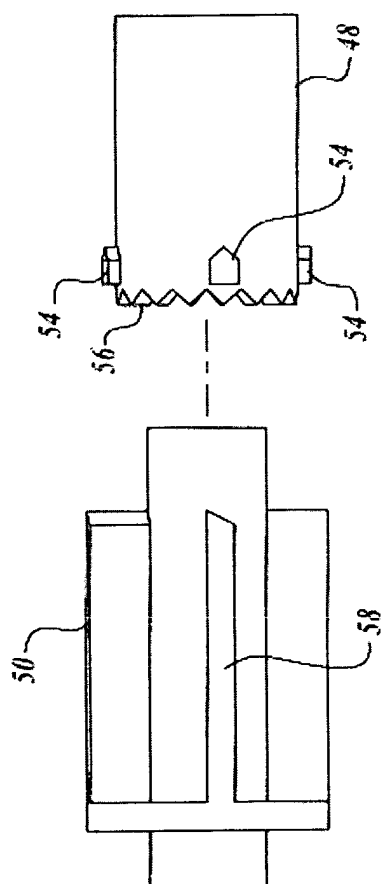
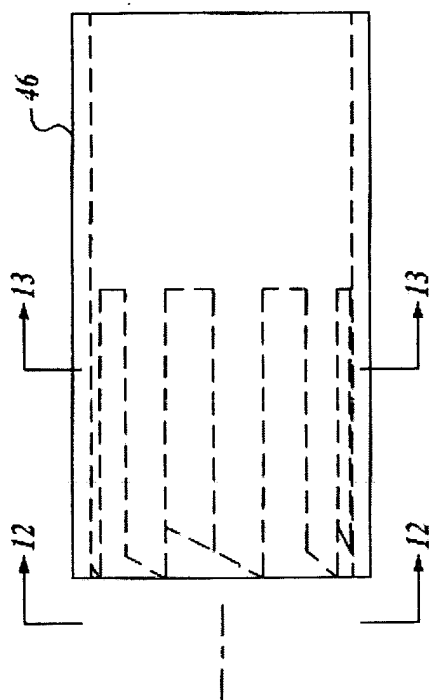


Fig. 11

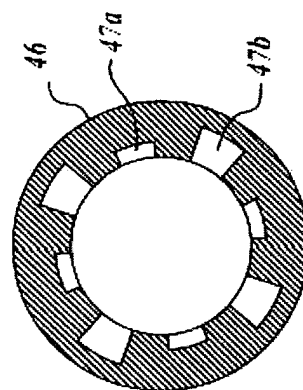


Fig. 13

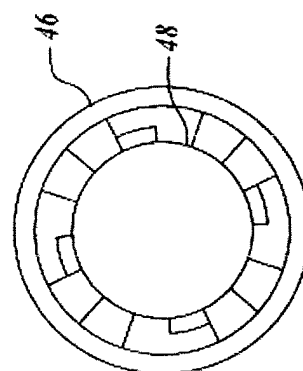


Fig. 12

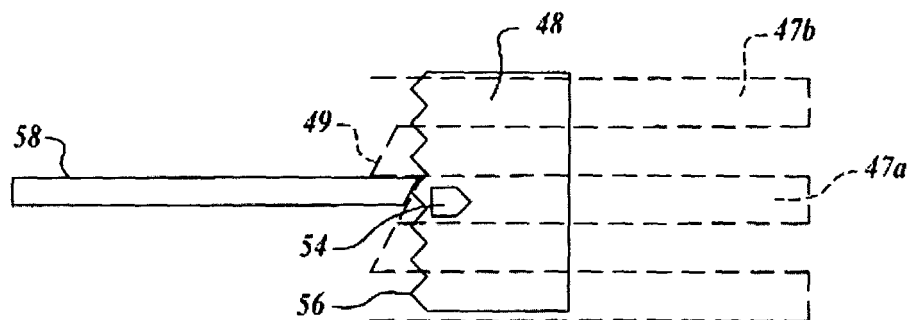


Fig. 14

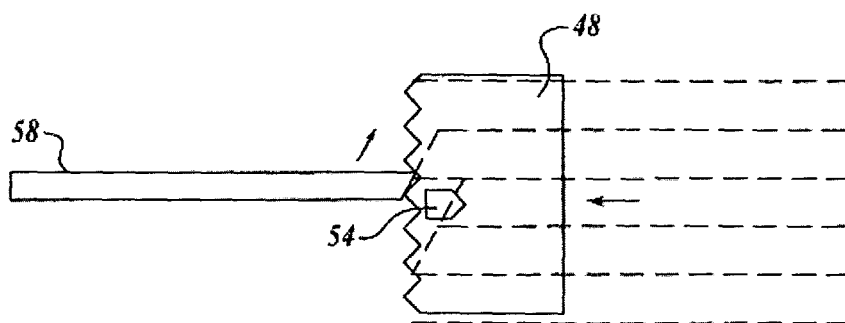


Fig. 15

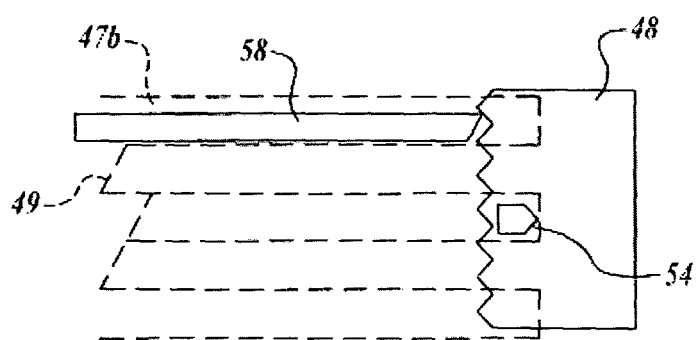


Fig. 16

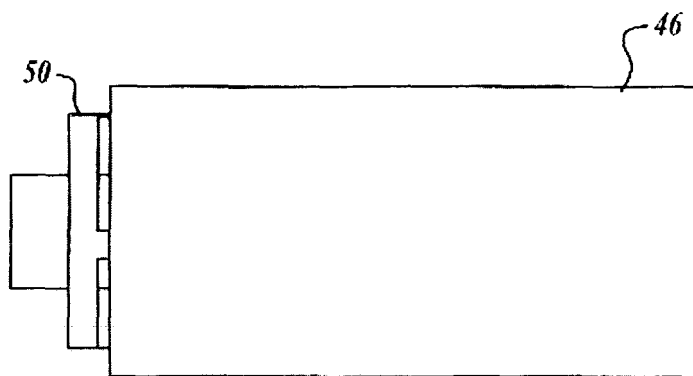


Fig. 17

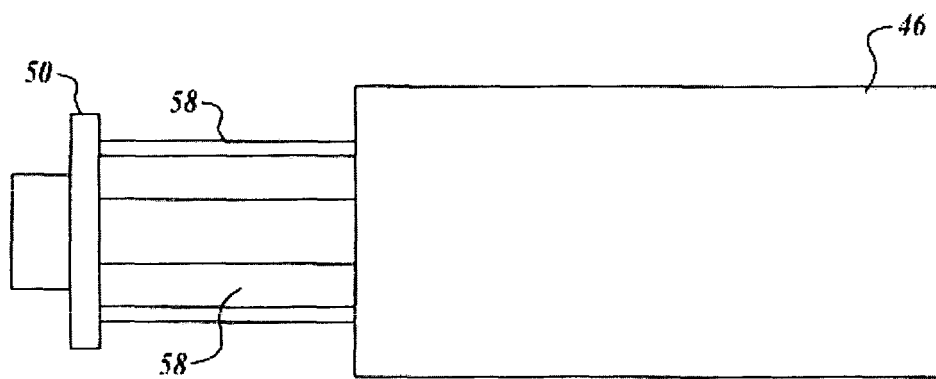


Fig. 18