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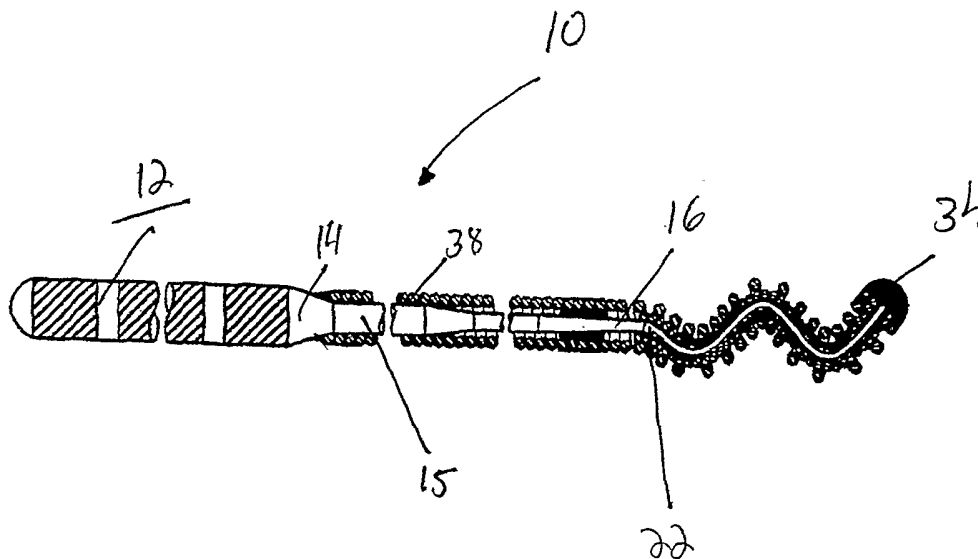
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(54) Title: S-SHAPE GUIDEWIRE



(57) Abstract: The invention is drawn to a guidewire comprising proximal, medial and distal segments and an S-shape portion. The S-shape in the guidewire allows for the guidewire to advance around sharp corners in the body. The curved S-shaped portion of the guidewire can act as a spring and absorb part of the pushing force of the guidewire as well as help redirect the end tip of the guidewire. This design allows for the curves of guidewire to push off the back side of a vessel and allow the end tip of the guidewire to enter into a side branch vessel with greater ease.

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## S-SHAPE GUIDEWIRE

### CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of the filing date of U.S. provisional application No. 60/477,969 filed June 12, 2003. This application is incorporated by reference.

### FIELD OF THE INVENTION

[0002] This invention relates generally to the area of medical devices. More specifically, this invention relates to devices known as guidewires. Guidewires are medical devices used in numerous medical procedures. More specifically, guidewires are usually used to navigate the vasculature of the human body prior to, or in conjunction with, the placement of a separate medical device, *e.g.*, a catheter, to perform a therapeutic or diagnostic procedure.

[0003] Most current guidewires are fairly straight, with a flexible portion of several centimeters at the distal end. The distal end may be straight or bent in a J-shape. Guidewires often have to be navigated through a maze of vessels. One problem with current guidewires is that when navigating them forward in a patient, the pushing force is transmitted directly to the distal end of the guidewire. This makes the direction of the guidewire rather fixed and difficult to change, especially when trying to position the guidewire in side vessels which branch off sharply from a main vessel. Additionally, guidewires often become looped when attempting to navigate them through branching vessels. Furthermore, forceful manipulation of the guidewire is often used to force the guidewire into the branching vessel, this can lead to damage of the vessel wall.

[0004] The present invention provides an improved guidewire having an S-shape portion.

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## SUMMARY OF THE INVENTION

[0005] The present invention comprises an S-shaped guidewire.

[0006] In one embodiment, the invention comprises a flexible guidewire comprising proximal, medial and distal segments. The guidewire also contains an S-shape portion. The S-shape portion contains at least three rounded curves. The first and third curve of the S-shape portion bend outward in a direction opposite from the bend in the second curve. The flexible S-shaped wire portion will retain its "S" shape in the body, but under direct manipulation, the flexible wire can be positioned into other curved shapes. Suitably the S-shape portion is located at or near the distal segment of the guidewire. The distal end of the S-shape can also contain an atraumatic tip.

[0007] In another embodiment the guidewire comprises a core wire having proximal, medial and distal segments, an S-shaped portion, a primary wire coil, an outer secondary coil and an inner secondary coil.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1 shows a side view of one embodiment of the guidewire of the present invention

[0009] FIG. 2 shows a partial side view of one embodiment of the guidewire of the present invention.

[0010] FIG. 3 shows a partial side view of a part of the S-shape portion of the guidewire of the present invention.

[0011] FIG. 4 shows a partial side view of a part of the S-shape portion of the guidewire of the present invention.

[0012] Before the embodiments of the invention are explained in detail, it is to be understood that the invention is not limited in its application to the details of construction and/or the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of other embodiments and of being practiced or being carried out in various ways. Also, it is understood that the phraseology and terminology used herein are for the purpose of description and should

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not be regarded as limiting. The use of "including," "comprising," or "having," and variations thereof herein is meant to encompass the items listed thereafter and equivalents thereof, as well as additional items and equivalents thereof. The terms "connected" and "attached" are used broadly and encompass both direct and indirect connections and attachments. Furthermore, terms such as "top," "bottom," "side," "inner," "outer," "interior" and "exterior" and the like are only used to describe elements as they relate to one another, but are in no way meant to recite specific orientations of the apparatus, to indicate or imply necessary or required orientations of the apparatus, or to specify how the invention described herein will be used, mounted, attached, or positioned in use.

#### DETAILED DESCRIPTION OF THE INVENTION

[0013] The present invention is drawn to an S-shaped guidewire. The S-shape in the guidewire allows for the guidewire to advance around sharp corners in the body. Unlike previous guidewires, the curved portions of the S-shaped guidewire allows for the pushing force used when positioning the guidewire to not just be transmitted directly to the end tip of the guidewire. The curved S-shaped portion of the guidewire can act as a spring and absorb part of the pushing force of the guidewire as well as help redirect the end tip of the guidewire. This design allows for the curves of guidewire to push off the back side of a vessel and allow the end tip of the guidewire to enter into a side branch vessel with greater ease.

[0014] FIG.'s 1-4 show the guidewire 10 of the present invention. The guidewire 10 can be crafted to a diameter selected by one skilled in the art. One suitably diameter for coronary procedures is around .014". The guidewire 10 has a solid core wire 12 which extends the entire length of guidewire 10. The core wire 12 has a proximal segment 14, a medial segment 15 and a distal segment 16. Suitably the diameter of the core guidewire decreases from the proximal 14 to the distal 16 segment. The core wire 12 suitably is comprised of solid metal, most suitably stainless steel or other similar metal or alloy suitable for use in the human body.

[0015] A flexible S-shape portion 22 is suitably positioned on the core wire 12. The S-shape portion 22 is suitably constructed from a metal wire suitable for use in a human body. The S-shape portion 22 has a first curve 40, a second curve 42 and a third

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curve 44. Suitably, the first 40 and third 44 curve of the S-shape portion bend outward in a direction opposite from the bend in the second curve 42. The flexible S-Shape portion 22 will retain it's "S" shape in the body, but under direct manipulation, the flexible wire can be positioned into other curved shapes. Suitably the S-shape wire portion 22 is at least one inch in length.

[0016] Suitably the S-shape portion 22 is connected to the distal segment 16 of the core wire 12. The S-shape portion 22 can either be attached or integral to core wire 22. The S-shaped wire portion 22 can terminate in any number of suitable designs. In one design (FIG. 3) the S-shape portion 22 terminates in a J bend 50, in another design (FIG. 4) the S-shape portion terminates in straight lead 52 with an atraumatic tip 34. The atraumatic tip 34 can be made from any material suitable for use in the human body. In another embodiment the S-shape portion 22 terminates with an atraumatic tip 34 (FIG. 1 and 2)

[0017] The guidewire 10 can further include a flexible primary wire coil 38 attached to the core wire at its proximal segment 14. The primary wire coil 38 runs to the distal segment 16 of the core wire 12. The primary wire coil is connected to at least portions of the proximal 14 or medial 15 segments of the core wire 12. An outer secondary flexible wire coil 24 and an inner secondary flexible wire coil 26 extend the length of the flexible S-shaped wire portion 22. The outer 24 and inner 26 secondary coil wires are attached to at least a portion of the core wire 22 or S-shape portion 22. The primary wire coil 38 and secondary wire coils 24 and 26 can suitably be made from any metal suitable for use in the human body. More suitably the primary wire coil 38 and the outer secondary wire coil 24 can be made from stainless steel, and the inner secondary wire coil 26 can be made from platinum.

[0018] While the present invention has now been described and exemplified, those skilled in the art will appreciate the various modifications, including variations, additions, and omissions, that may be made in what has been described. Accordingly, it is intended that these modifications also be encompassed by the present invention and that the scope of the present invention be limited solely by the broadest interpretation that lawfully can be accorded the appended claims.

## CLAIMS

1. A guidewire comprising proximal, medial and distal segments and an S-shape portion.
2. The guidewire of claim 1 wherein the S-shape portion comprises a first curve, a second curve and a third curve.
3. The guidewire of claim 2 wherein the first and third curves bend outward in a direction opposite from an outward bend in the second curve.
4. The guidewire of claim 1 herein the S-shape portion further comprises a distal end which has an atraumatic tip.
5. The guidewire of claim 1 wherein the S-shape portion consists of a first curve, a second curve and a third curve.
6. The guidewire of claim 5 wherein the first and third curves bend outward in a direction opposite from an outward bend in the second curve.
7. A guidewire comprising a core wire having proximal, medial and distal segments; an S-shape portion; a primary wire coil; an outer secondary coil and an inner secondary coil.
8. The guidewire of claim 7 wherein the S-shaped portion comprises a first curve, a second curve and a third curve.
9. The guidewire of claim 8 wherein the first and third curves bend outward in a direction opposite from an outward bend in the second curve.
10. The guidewire of claim 7 herein the S-shape portion further comprises a distal end which has an atraumatic tip.
11. The guidewire of claim 7 wherein the S-shape portion consists of a first curve, a second curve and a third curve.

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12. The guidewire of claim 11 wherein the first and third curves bend outward in a direction opposite from an outward bend in the second curve.

13. A guidewire comprising a core wire having proximal, medial and distal segments; an S-shape portion; a primary wire coil; an outer secondary coil and an inner secondary coil; wherein the S-shape portion is adjacent to the distal segment of the core wire and comprises a first curve, a second curve and a third curve.

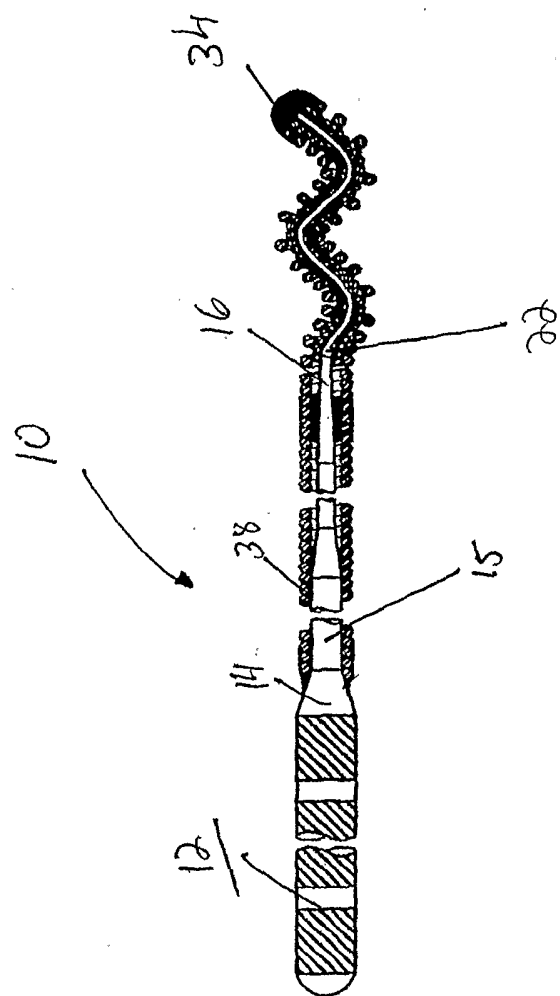


FIG. 1



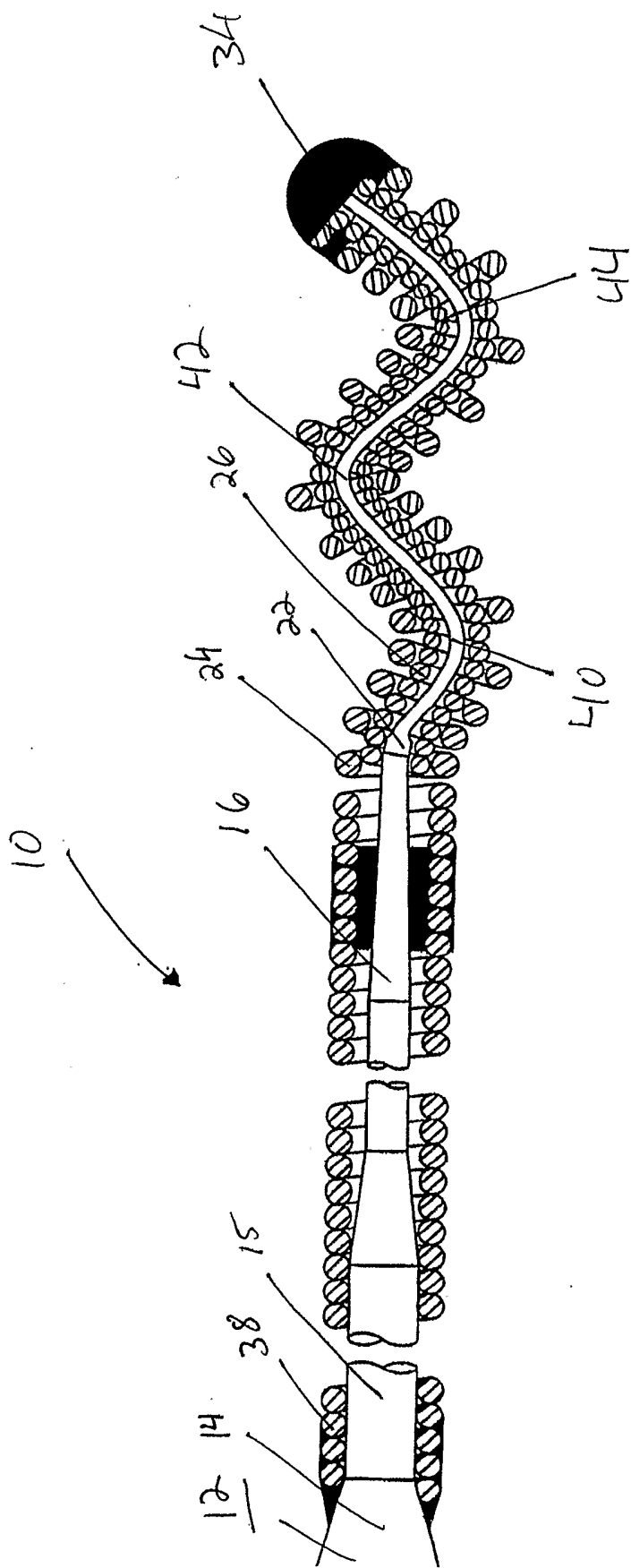


FIG 2

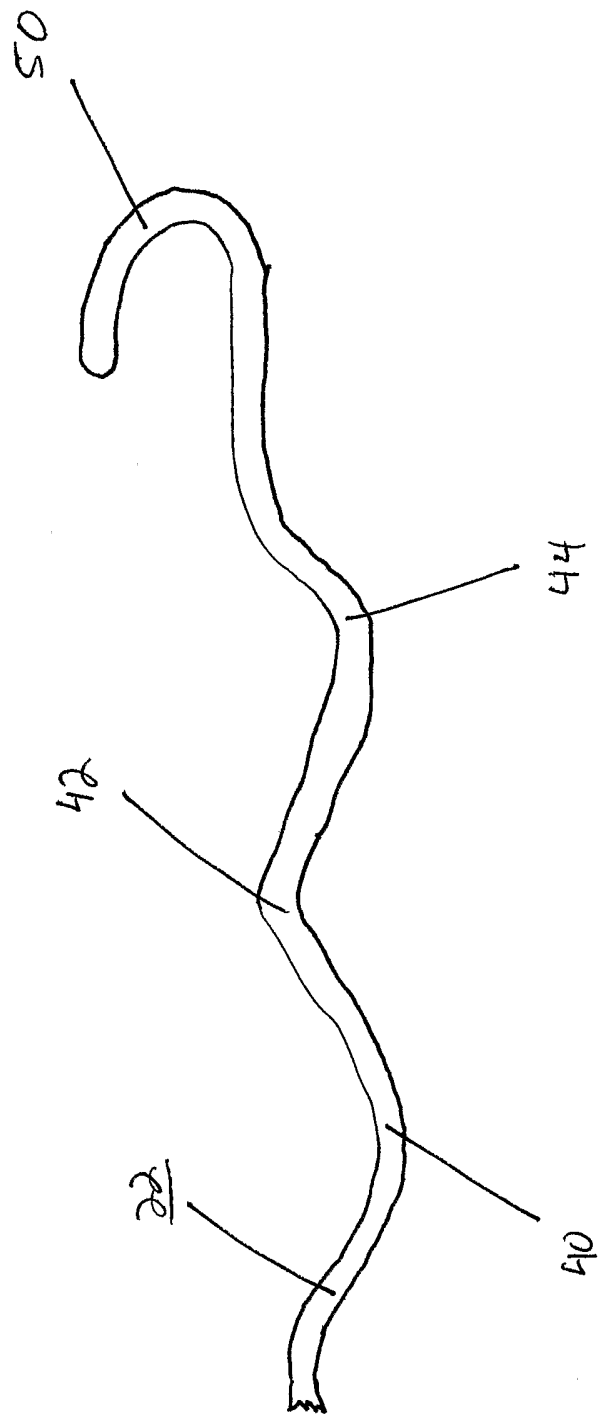


FIG. 3

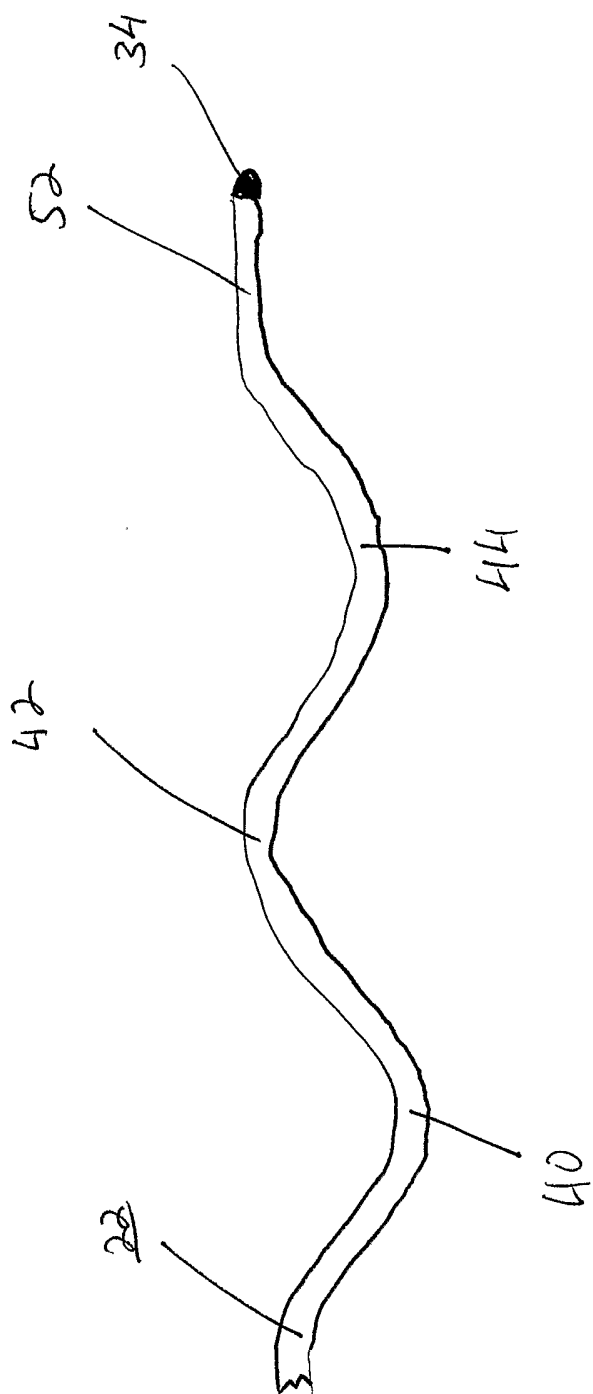


FIG. 4