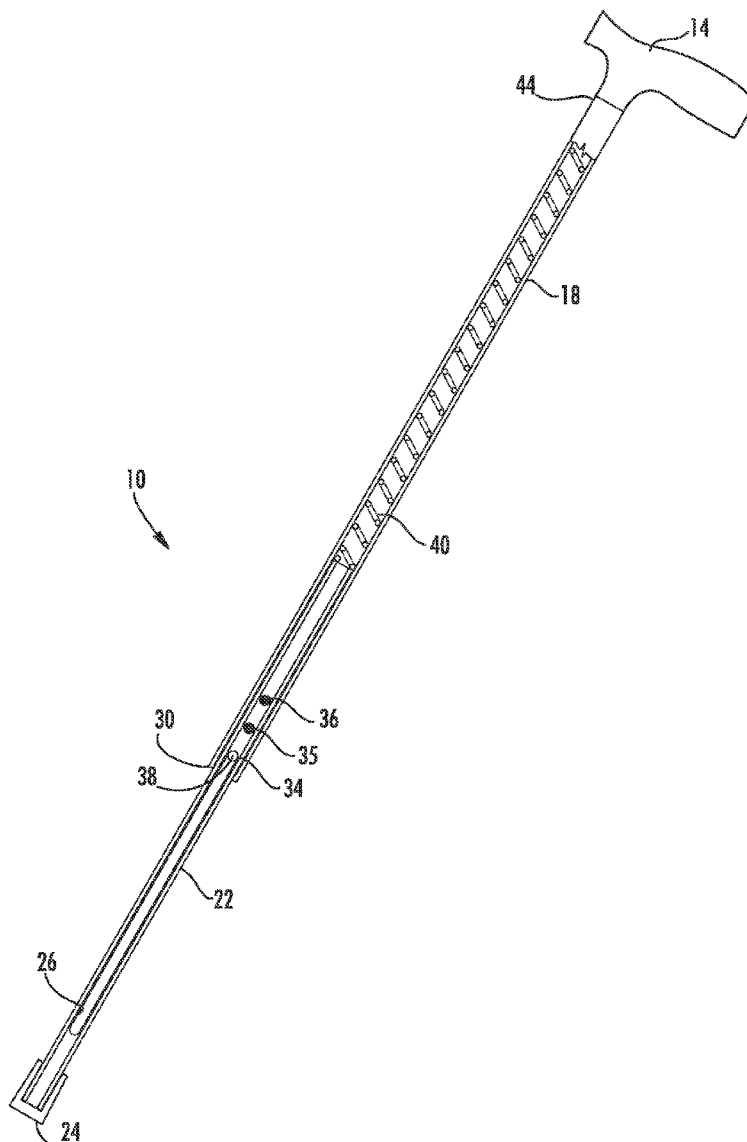


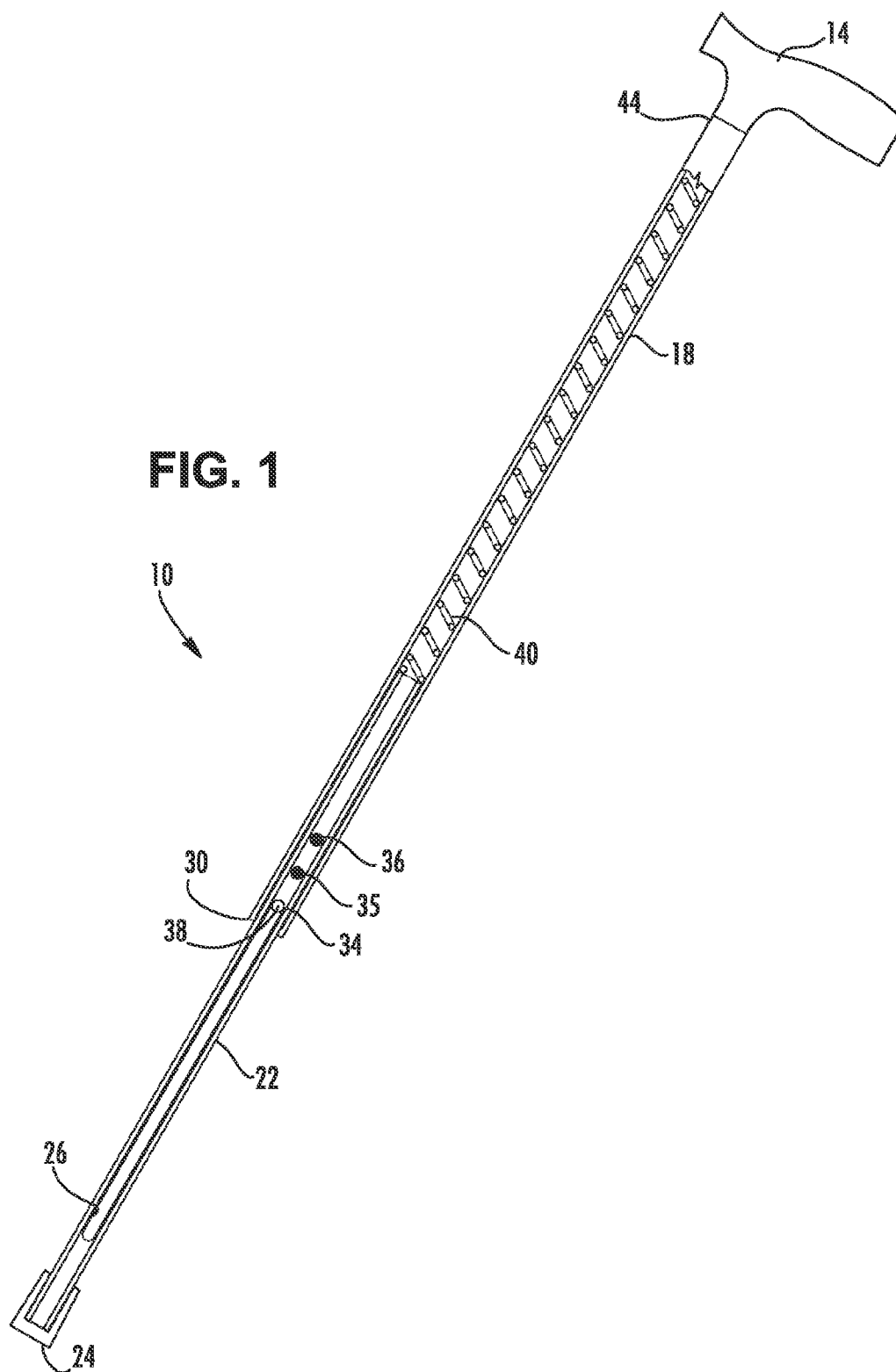


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(19) **United States**(12) **Patent Application Publication**
Senatro(10) **Pub. No.: US 2011/0271992 A1**(43) **Pub. Date: Nov. 10, 2011**(54) **CANE AND METHOD OF USE**(52) **U.S. Cl. 135/75**(76) **Inventor:** **Clement A. Senatro**, Newington,
CT (US)(21) **Appl. No.:** **13/051,124**(22) **Filed:** **Mar. 18, 2011****Related U.S. Application Data**(60) **Provisional application No. 61/395,155**, filed on May
7, 2010.**Publication Classification**(51) **Int. Cl.**
A45B 9/00 (2006.01)(57) **ABSTRACT**

A cane comprising: a handle; a first tube attached to the handle; a second tube in slideable communication with the first tube, the second tube in communication with a cane tip; a spring located in the first tube, and in operable communication with the second tube; the spring preloaded such that when the second tube is fully extended from the first tube, the spring exerts generally about a value F1 of force on the second tube, tending keep the second tube extended from the first tube. A method for using a retractable cane to assist in sitting down. A method of using a retractable cane to rise from a sitting position. A method of using a retractable cane to assist in picking an object up.





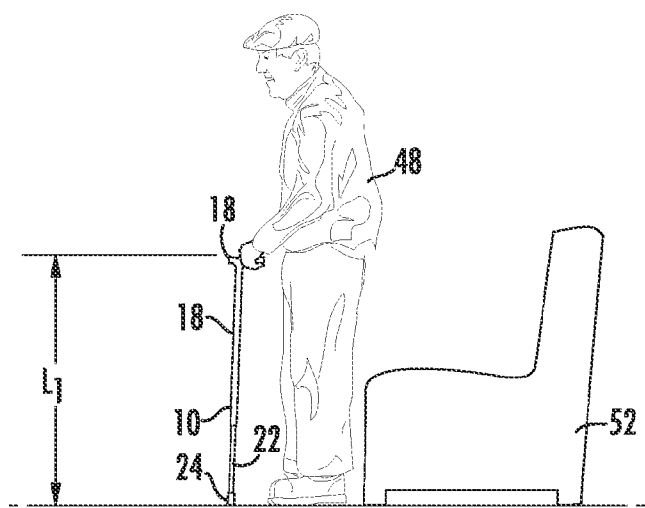


FIG. 2

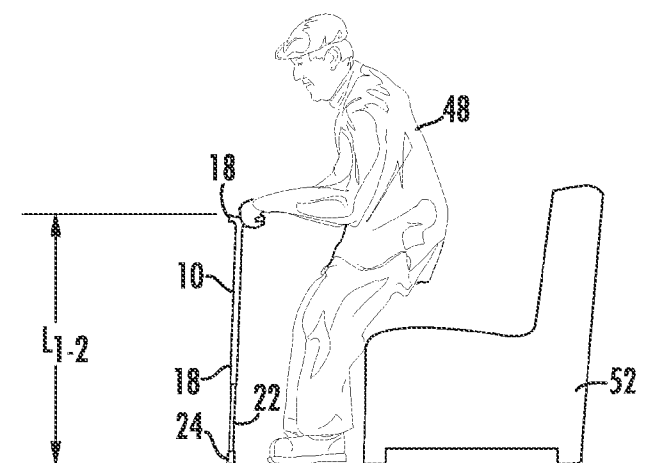


FIG. 3

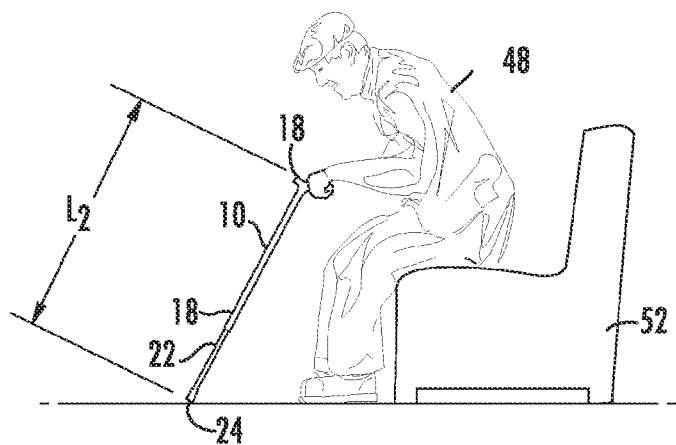


FIG. 4

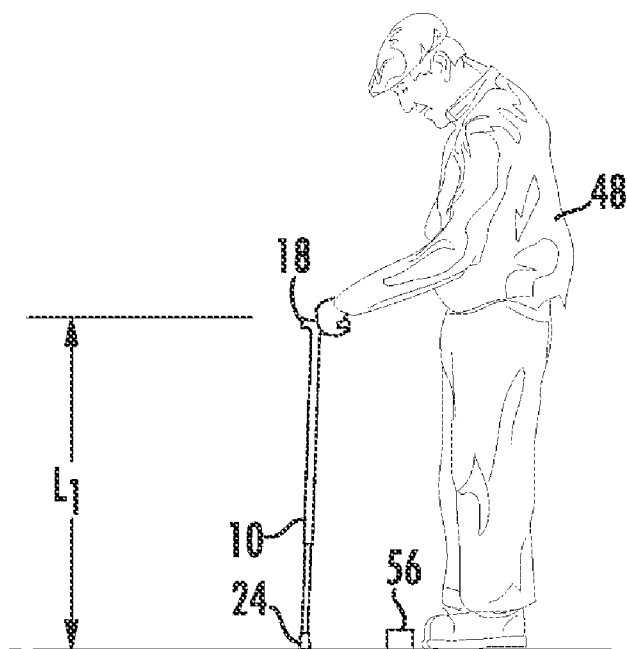


FIG. 5

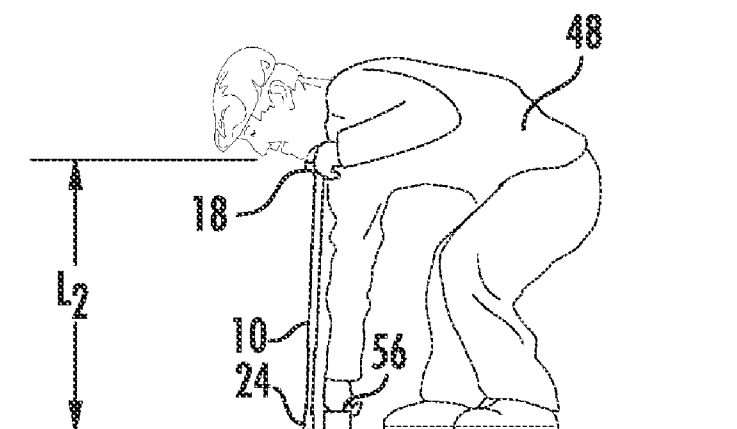


FIG. 6

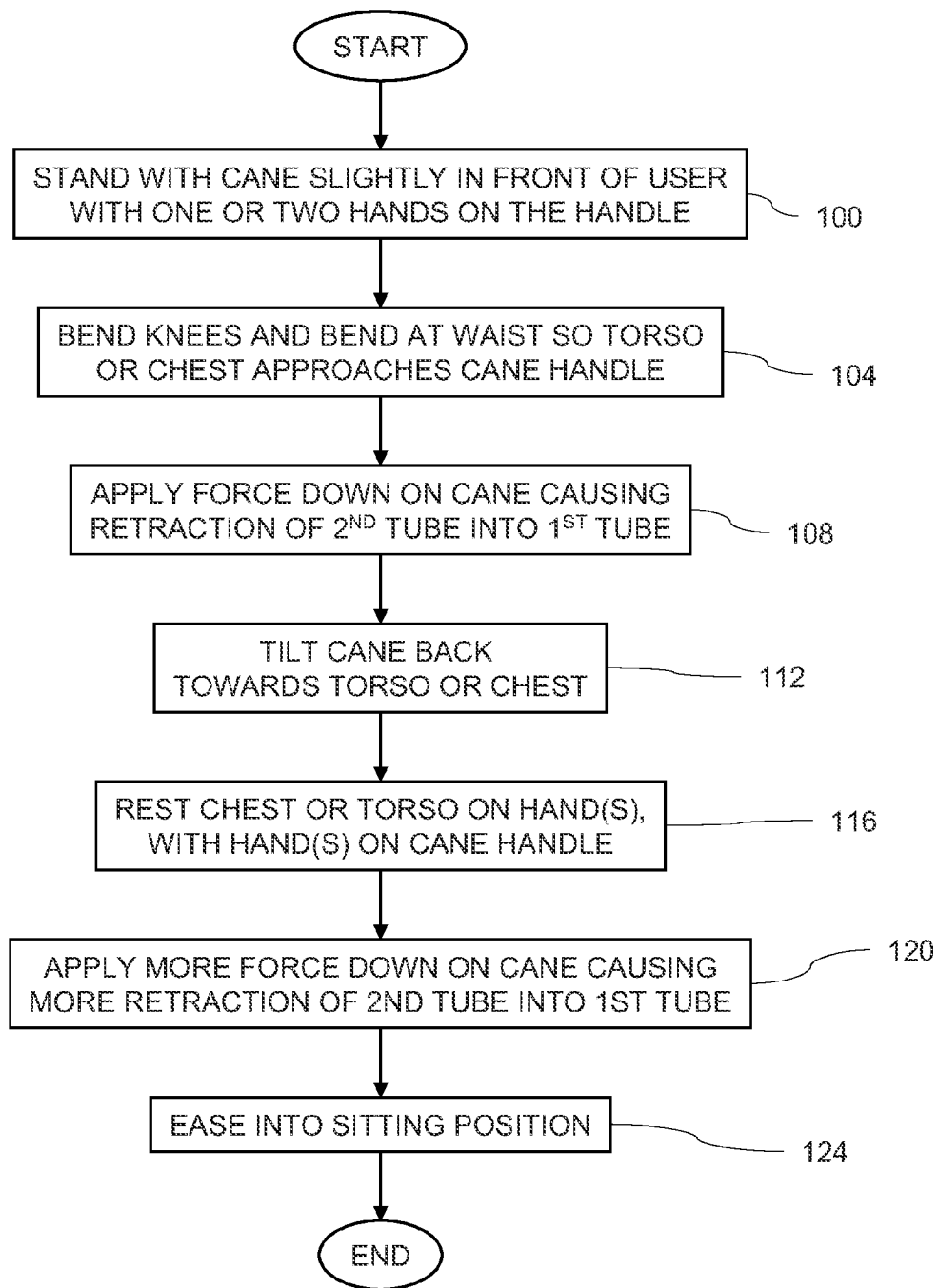


FIG. 7

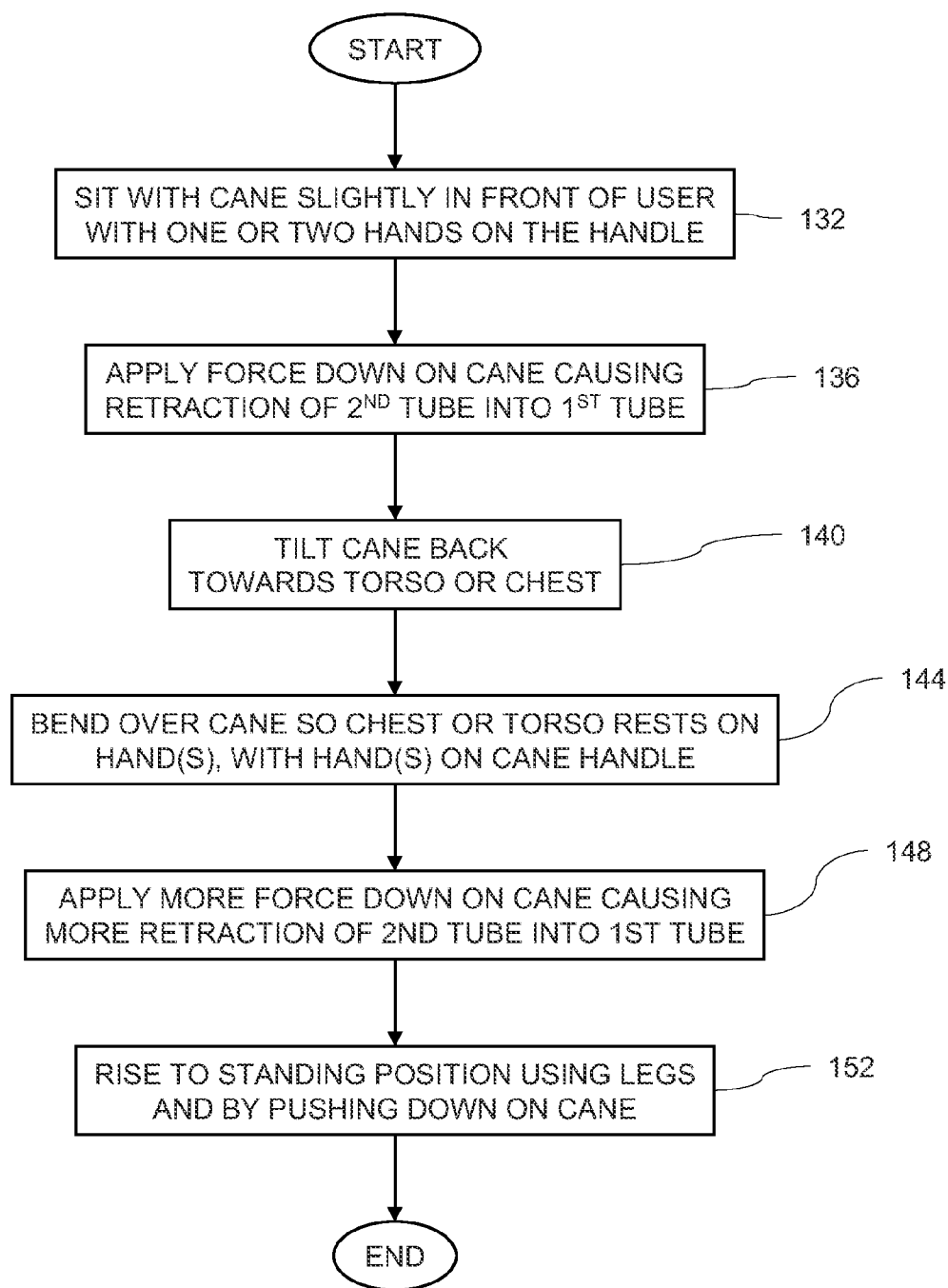


FIG. 8

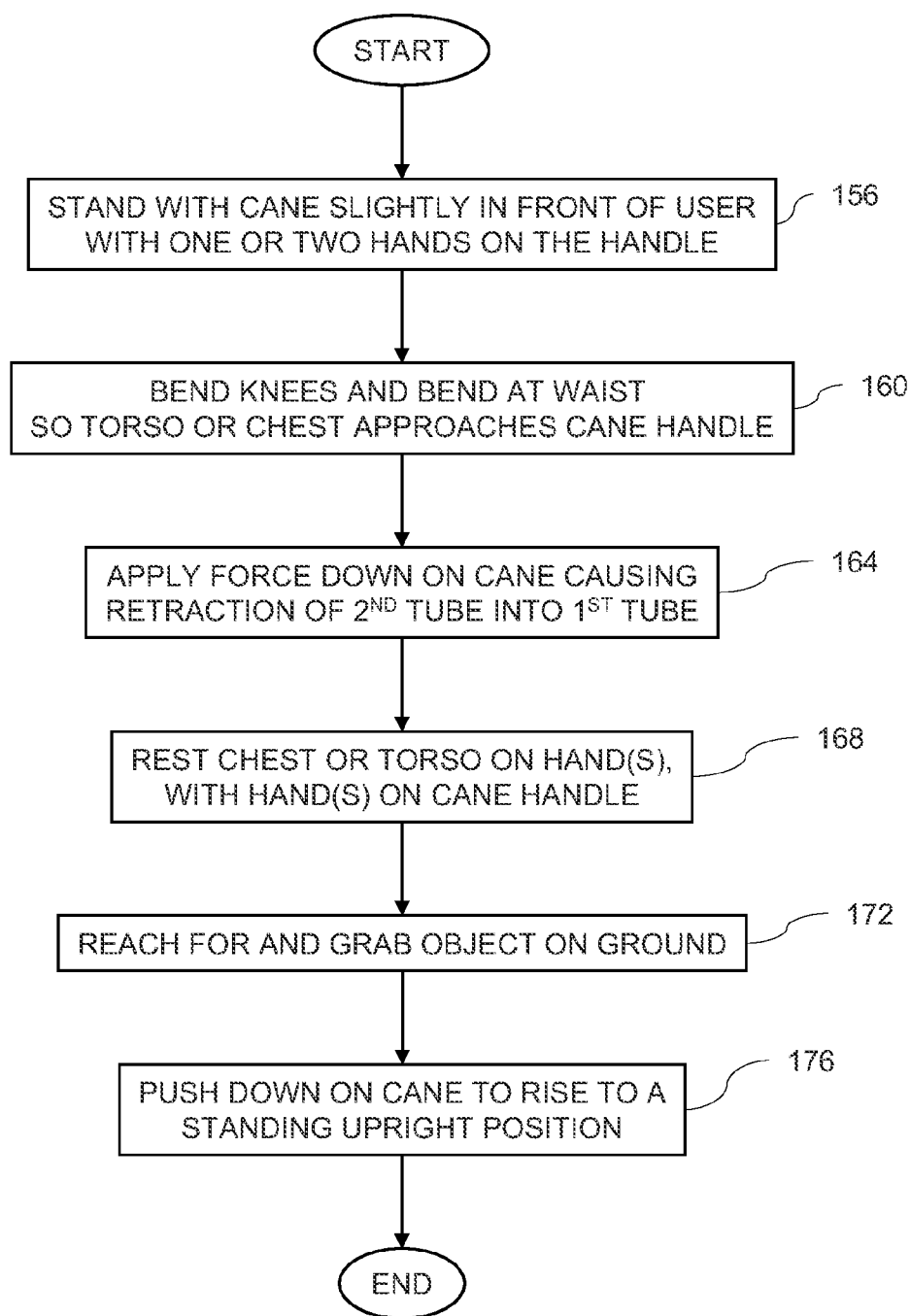


FIG. 9

CANE AND METHOD OF USE

CROSS-REFERENCES

[0001] The present application claims the benefit of provisional patent application No. 61/395,155 filed on May 7, 2010 by Clement A. Senatro, the entire contents of which are fully incorporated by reference herein. The present application is also related to patent application Ser. No. 12/927,909 filed on Nov. 29, 2010 by Clement A. Senatro, the entire contents of which are fully incorporated by reference herein.

TECHNICAL FIELD

[0002] The present invention relates to a cane, and more specifically relates to a cane with a retractable member.

BACKGROUND

[0003] Known canes assist people in walking, maintaining balance, and providing support. However, when a cane user attempts to sit down, or get up from a seated position, a standard cane is difficult to use. The length of the cane makes it cumbersome to use as leverage when getting up or sitting down. The length of the cane requires a person to place a lot of stress and strain on his or her hands, wrists and arms when attempting to get up or sit down.

[0004] Thus, there is a need for a cane that overcomes the above listed and other disadvantages.

SUMMARY OF THE INVENTION

[0005] The invention relates to a cane comprising: a handle; a first tube attached to the handle; a second tube in slideable communication with the first tube, the second tube in communication with a cane tip; a spring located in the first tube, and in operable communication with the second tube; the spring preloaded such that when the second tube is fully extended from the first tube, the spring exerts generally about a value F1 of force on the second tube, tending keep the second tube extended from the first tube.

[0006] The invention also relates to a method for using a retractable cane to assist in sitting down, the method comprising: standing with the cane slightly in front of the user, with one or two hands on top of the handle; bending knees and at the waist so that user's torso or chest approaches the cane's handle; applying a force down on the cane, causing the retraction of the second tube into the first tube; tilting the cane back towards torso or chest; resting chest or torso on hands located on the cane's handle; applying more down on the cane, causing more retraction of the second tube into the first tube; and easing into a sitting position.

[0007] The invention, in addition, relates to a method of using a retractable cane to rise from a sitting position, the method comprising: sitting with cane slightly in front of a user, with one or two hands on top of the handle; applying a force down on the cane, causing the retraction of the second tube into the first tube; tilting the cane back towards user's torso or chest; bending over the cane so that chest or torso rests on hands that are on the cane's handle; applying more force down on the cane, causing more retraction of the second tube into the first tube; and rising to a standing position by pushing down on the cane, and using his or her legs.

[0008] Also, the invention relates to a method of using a retractable cane to assist in picking an object up, the method comprising: standing with the cane slightly in front of a user, with one or two hands on top of the handle; bending knees and

bending at the waist so that the user's torso or chest approaches the cane's handle; applying a force down on the cane, causing the retraction of the second tube into the first tube; resting user's chest or torso on user's hands located on the cane's handle; reaching and grabbing the desired object; and pushing down on the cane to rise to an upright standing position.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] The present disclosure will be better understood by those skilled in the pertinent art by referencing the accompanying drawings, where like elements are numbered alike in the figures, in which:

[0010] FIG. 1 is a cross-sectional view of the disclosed cane;

[0011] FIG. 2 is a side view showing a user standing with the cane;

[0012] FIG. 3 is a side view showing a user beginning to sit down using the cane;

[0013] FIG. 4 is a side view showing a user sitting down;

[0014] FIG. 5 is a side view showing a user standing with the cane;

[0015] FIG. 6 is a side view showing a user using the cane to assist in picking up an object that is in a low-lying place or on the floor;

[0016] FIG. 7 is flowchart illustrating a disclosed method of using the cane;

[0017] FIG. 8 is flowchart illustrating another disclosed method of using the cane; and

[0018] FIG. 9 is flowchart illustrating a still another disclosed method of using the cane.

DETAILED DESCRIPTION

[0019] FIG. 1 is a partial sectional view of the disclosed cane 10. The cane comprises a handle 14 attached to a first tube 18. The handle 14 may be permanently attached or removeably attached to the first tube 18. A second tube 22 is in slideable communication with the first tube 18. The second tube 22 is configured to slide within the first tube. The second tube 22 may have a slot 26 cut into it. In addition, the first tube may have one or more openings 34 located near the bottom end 30 of the first tube 18. In this embodiment, there are two additional openings 35, 36. However in other embodiments there may be only one or two openings, or more than three openings. A connecting member 38 removeably attaches to one of the openings 34 and is configured to be in slideable communication with the slot 26. The connecting member 38 may be any suitable fastener, including but not limited to a clevis and a cotter pin. The connecting member 38, opening 34, and slot 26 all work together to prevent the second tube 22 from extending so far out of the first tube 18 that it becomes disconnected from the first tube. The additional openings allow a user to adjust the fully extended length of the cane. The cane length may range from about 30 inches to about 40 inches. A compression spring 40 is located in the first tube 18, and is in operable communication with the second tube 22 and is fixed in place at the handle end 44 of the first tube 18. As the second tube 22 retracts into the first tube 18, the spring 40 is compressed and tends to exert more and more force on the second tube 22 and the handle end 44 of the first tube 18. Data Sheet 1 below is reproduced showing one design specification for one embodiment of the compression spring 40. The spring has a preload on it such that it always exerts a force tending to

keep the second tube **22** extended from the first tube **18**, even when the second tube **22** is fully extended. The second tube may be in communication with a cane tip **24**. This preload keeps the cane in a rigid condition such that it can be used for walking with the second tube generally extended from the first tube, much like a normal walking cane.

shown as L_1 . In one embodiment L_1 may be around 35 inches. In this figure, the user **10** is about to sit in a chair **52**, or sofa, or stool, or any means to allow a person to sit. In FIG. **3**, the user **48** is bending his knees and bending forward, and at the same time exerting a downward force on the cane, causing the second tube **22** to retract into the first tube **18**, thus causing the

TABLE 1

DATA SHEET 1					
Spring					
Cylindrical Compression Spring, Round Wire		Material:	Music Wire		
End Type:	Closed/Not Ground	Condition:	Not Preset/Not Peened		
Grade:	Commercial	Buckling Constraints:	End fixation not known		
Wire Dia. (in)	0.085	Coll Mean Dia. (in)	0.745	Active Coils	79
Wire Tolerance (in)	(+/-)0.0008	Coil ID (in)	0.66	Total Coils	81
Rate (lbf/in)	2.2971	Coil OD (in)	0.83	Dead Coils	0
Spring Index	8.7647	Diameter Tol. (in)	(+/-)0.035	Pitch (in)	0.3132
Nat. Frequency (Hz)	27.281	Shaft OD (in)		Pitch Angle (deg)	7.6226
Wire Length (in)	191.2207	Min. ID (in)	0.625	Free Len. Tol. (in)	(+/-)1.4809
Wire Weight (lb)	0.30816	Hole ID (in)	0.875	Allowable Solid Ht. (in)	
		Expanded OD (in)	0.8711		
	FREE	Point 1	Point 2	SOLID	BUCKLE
Load (lbf)	0	20.674	41.349	41.417	
Load Tolerance (lbf)	0	(+/-)4.2455	(+/-)5.089		
Length (in)	25	16	7		
Deflection (in)	0	9	18	18.03	
% of Max. Deflection	0	49.9	99.8	100	
Corrected Stress (psi)	0	74516	149032	149281	
% of Tensile Stress	0	26.7	53.5	53.6	
Design Status:	Direction of Coiling: Optional		Estimated Cycle Life: <1E5		

NOTE:

2 coats of high performance gloss oil base enamel on o.d. All other surfaces optional and may be incomplete.

[0020] The data sheet above shows one embodiment of the spring **40**. In this embodiment the spring is about 25 inches in length. Table 1 shows the force generated by the spring **40** during compression. In column FREE no compression is on the spring, and the spring is at 25 inches (see row labeled Length). Referring to column Point 1, in order to compress the spring by 9 inches (listed at row labeled Deflection), a force value F of about 20.674 pounds is required. The spring may be configured to have a preloaded compression of 9 inches when in the first tube **18**, and the second tube **22** is fully extended. Referring now to column Point 2, in order to compress the spring by 18 inches, a force of about 41.349 pounds is required. Referring now to column solid, to compress the spring about 18.03 inches, a force of about 41.417 is required (the spring in this embodiment is fully compressed when compressed by 18.03 inches.) The spring may be coated with any suitable lubricant, including but not limited to Teflon, grease, graphite, high performance gloss oil based enamel (in one embodiment two coats or three coats of the enamel may be used). The lubricant may help the spring to move within the first tube **18** with reduction in frictional losses, and with a reduction in noise generated by the spring rubbing against the interior of the first tube **18**.

[0021] Due to the configuration of the disclosed cane **10**, the cane may be used to assist users in getting into and out of a seated position. The cane may also be used to assist a user to bend over from a standing position in order to pick something up from the ground. FIG. **2** shows a user standing with the cane **10**. The cane **10** is fully extended, thus its length is

length of the cane to compress to somewhere from L_1 to L_2 . In one embodiment L_2 may be about 26 inches. In FIG. **4**, the user is shown just about seated in the chair **52**. The cane has compressed so that its length is at L_2 . One can see that the handle of the cane may be held very close to or against the chest of the user **48**, thereby giving support to the weight of the user as he sits down in the chair **52**.

[0022] FIG. **5** shows how the cane **10** may assist a user in reaching an item **56** on or near the ground. In FIG. **5** the user **48** is standing up with the cane **10** fully extended to its full length L_1 . In FIG. **6**, the user **48** has bent his knees, and is bent over the cane **10**, with his chest near or against the handle **18**, thereby able to reach the item **56** on the ground. The cane is at length L_2 .

[0023] FIG. **7** is a flowchart illustrating a method for using the disclosed cane. At act **100**, the user stands with the cane slightly in front of the user, with one or two hands on top of the handle. At act **104**, the user bends his or her knees, and bends at the waist to the user's torso or chest approaches the cane's handle. At act **108**, the user applies a force down on the cane, causing the retraction of the second tube into the first tube. At act **112**, the user tilts the cane back towards his or her torso or chest. Optionally, at act **116** the user rests his or her chest or torso on his or her hands located on the cane's handle. At act **120**, the user applies more force down on the cane, causing more retraction of the second tube into the first tube. At act **124**, the user eases into a sitting position.

[0024] FIG. **8** is a flowchart illustrating a method for using the disclosed cane to rise from a seated position. At act **132**,

the user sits with the cane slightly in front of the user, with one or two hands on top of the handle. At act 136, the user applies a force down on the cane, causing the retraction of the second tube into the first tube. At act 140, the user tilts the cane back towards his or her torso or chest. At act 144 the user bends over the cane so that his or her chest or torso rests on his or her hands that are on the cane's handle. At act 148, the user applies more force down on the cane, causing more retraction of the second tube into the first tube. At act 152, the user rises to a standing position by pushing down on the cane, and using his or her legs.

[0025] FIG. 9 is a flowchart illustrating a method for using the disclosed cane to pick up an object. At act 156, the user stands with the cane slightly in front of the user, with one or two hands on top of the handle. At act 160, the user bends his or her knees, and bends at the waist so that the user's torso or chest approaches the cane's handle. At act 164, the user applies a force down on the cane, causing the retraction of the second tube into the first tube. Optionally, at act 168 the user rests his or her chest or torso on his or her hands located on the cane's handle. At act 172, the user reaches and grabs the desired object located on the ground or another low-lying place. At act 176, the user pushes down on the cane to rise to an upright standing position.

[0026] Tests have shown that when a person uses the disclosed cane in order to get up and or sit down, this creates forces in the handle of the cane. These forces can be used to compress the cane to a configuration gives a better "mechanical advantage" to the user when the user attempts to sit, get up from sitting, or to reach down to pick something up, and to return to standing position. This compressed cane configuration results in lower forces in the hand and arm when tested side by side with a known standard cane. In addition, when the cane is in the compressed position, there is energy stored in the spring of the cane that may be used to assist the user back to an upright or standing position. It should be noted that there are many different up and down movements that a person who uses a cane, must perform each day. The disclosed cane can assist those users.

[0027] The following are test results.

[0028] A disabled person lowers him/herself into the seat of a chair using both hands cupped on the cane handle. The disclosed cane had a 25% less force on the hand and arms compared to the standard cane.

[0029] A disabled person on the floor in a kneeling position uses both hands to get up using one hand on the handle and the other on the shaft. The disclosed cane in the compressed position lowered the force on the hand and arm by 31% over the standard cane.

[0030] A disabled person picking up an item off of the floor requires one hand on the cane handle and the other to reach the item. With the disclosed cane, when the person reaches down, the body-weight of the person "compresses" the cane. This reduces the distance for the person to reach making this an easy exercise. At this compressed position, the disclosed cane has now captured the kinetic energy in the spring which will now help bring the person back up to an upright position. This compressed position reduced the load on the hand and arm by 33% over the standard cane.

[0031] A disabled person getting up from a chair requires putting both hands on the cane handle with the cane positioned between the legs and in front of the chair. The person must now push up and over the cane to get up. The disclosed

cane now in a compressed position reduced the force on the hand and arm by 42% over the standard cane.

[0032] A disabled person with an injured leg going down the stairs lowers him/her self with one hand on the railing and the other using a cane. Putting first the cane on the next lower step and leaning on the cane to lower his/her leg to the next lower stair in a gentle way. The disclosed cane in a compressed position reduced this force thru the hand and arm by 40% over the standard cane.

[0033] A study has shown that the maximum normal load a person bears down on a cane handle, while walking or for balance, results in a 20 lb. load. The disclosed cane has a spring preload of about 20 lbs, thereby providing for use as a standard cane for walking and balancing.

[0034] Further, the preload of about 20 lbs in the assembled condition and the subsequent increase in spring compression, prevents a user from feeling that the cane is not sturdy enough to support him or her. Further, the retraction of the second tube 22 into the first tube 18 is limited to about 9 inches.

[0035] Also, a study was concluded showing people trying to pick up an object off the floor. The study showed that when a person bends over the cane handle (for stability) the person was about 6-8 inches short of reaching an object located on the floor, when using a standard cane, depending on the size of the person (this is when a person has the cane handle against his or her chest/torso for support).

[0036] The disclosed invention has many advantages. It allows a user to use the cane to help the user get into or out of a sitting position, while putting less stress and strain on the user's wrists, hands, and arms. In addition, the cane allows a user to pick something up that is position in a hard to reach place, such as the floor. The cane may also use a lubricated spring, for quite use.

[0037] It should be noted that the terms "first", "second", and "third", and the like may be used herein to modify elements performing similar and/or analogous functions. These modifiers do not imply a spatial, sequential, or hierarchical order to the modified elements unless specifically stated.

[0038] While the disclosure has been described with reference to several embodiments, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the disclosure. In addition, many modifications may be made to adapt a particular situation or material to the teachings of the disclosure without departing from the essential scope thereof. Therefore, it is intended that the disclosure not be limited to the particular embodiments disclosed as the best mode contemplated for carrying out this disclosure, but that the disclosure will include all embodiments falling within the scope of the appended claims.

What is claimed is:

1. A cane comprising:

a handle;

a first tube attached to the handle;

a second tube in slideable communication with the first tube, the second tube in communication with a cane tip;

a spring located in the first tube, and in operable communication with the second tube;

the spring preloaded such that when the second tube is fully extended from the first tube, the spring exerts generally about a value F_1 of force on the second tube, tending keep the second tube extended from the first tube.

2. The cane of claim 1, wherein F_1 ranges from about 5 pounds to about 15 pounds.

3. The cane of claim 1, wherein F_1 is about 10 pounds.
4. The cane of claim 1, wherein when the second tube is fully extended from the first tube, the total cane length is about 35 inches.
5. The cane of claim 1, wherein when the second tube is retracted into the first tube by about 9 inches from the fully extended position, thus making the cane about 26 inches in length in this retracted configuration, the spring exerts generally about a value F_2 of force on the second tube, tending keep the second tube extended from the first tube.
6. The cane of claim 5, where F_2 ranges from about 30 to about 50 pounds.
7. The cane of claim 5, wherein F_2 is about 41 pounds.
8. The cane of claim 1, wherein when the spring is not in a compressed state, the spring has a length of about 25 inches.
9. The cane of claim 1, further comprising:
 - a slot located generally along a portion of the length of the second tube;
 - a first opening located on the surface of the first tube;
 - a connecting member attached to the first opening and in slideable communication with the slot.
10. The cane of claim 9, further comprising:
 - a second opening located on the surface of the first;
 wherein the connecting member is removeably attachable to either the first opening or the second opening, and when the connecting member is attached to the second opening the fully extended length of the cane is greater than when the connecting member is attached to the first opening.
11. The cane of claim 9, further comprising:
 - a third opening located on the surface of the first;
 wherein the connecting member is removeably attachable to either the first opening or the third opening, and when the connecting member is attached to the third opening the fully extended length of the cane is less than when the connecting member is attached to the first opening.
12. The cane of claim 1, wherein the connecting member is a clevis and cotter pin.
13. The cane of claim 1, further comprising:
 - a lubricant located on the surface of the spring.
14. The cane of claim 1, wherein the lubricant is an oil based enamel.

15. The cane of claim 1, further comprising:
 - a lubricant located on the inner surface of the first tube.
16. A method for using a retractable cane to assist in sitting down, the method comprising:
 - standing with the cane slightly in front of the user, with one or two hands on top of the handle;
 - bending knees and at the waist so that user's torso or chest approaches the cane's handle;
 - applying a force down on the cane, causing the retraction of the second tube into the first tube;
 - tilting the cane back towards torso or chest;
 - resting chest or torso on hands located on the cane's handle;
 - applying more down on the cane, causing more retraction of the second tube into the first tube; and
 - easing into a sitting position.
17. A method of using a retractable cane to rise from a sitting position, the method comprising:
 - sitting with cane slightly in front of a user, with one or two hands on top of the handle;
 - applying a force down on the cane, causing the retraction of the second tube into the first tube;
 - tilting the cane back towards user's torso or chest;
 - bending over the cane so that chest or torso rests on hands that are on the cane's handle;
 - applying more force down on the cane, causing more retraction of the second tube into the first tube; and
 - rising to a standing position by pushing down on the cane, and using his or her legs.
18. A method of using a retractable cane to assist in picking an object up, the method comprising:
 - standing with the cane slightly in front of a user, with one or two hands on top of the handle;
 - bending knees and bending at the waist so that the user's torso or chest approaches the cane's handle;
 - applying a force down on the cane, causing the retraction of the second tube into the first tube;
 - resting user's chest or torso on user's hands located on the cane's handle;
 - reaching and grabbing the desired object; and
 - pushing down on the cane to rise to an upright standing position.

* * * * *