



- (51) International Patent Classification:
A61B 17/132 (2006.01)
- (21) International Application Number:
PCT/IB2017/050171
- (22) International Filing Date:
12 January 2017 (12.01.2017)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
62/277,766 12 January 2016 (12.01.2016) US
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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,

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(54) Title: HAND-WOUND TOURNIQUET

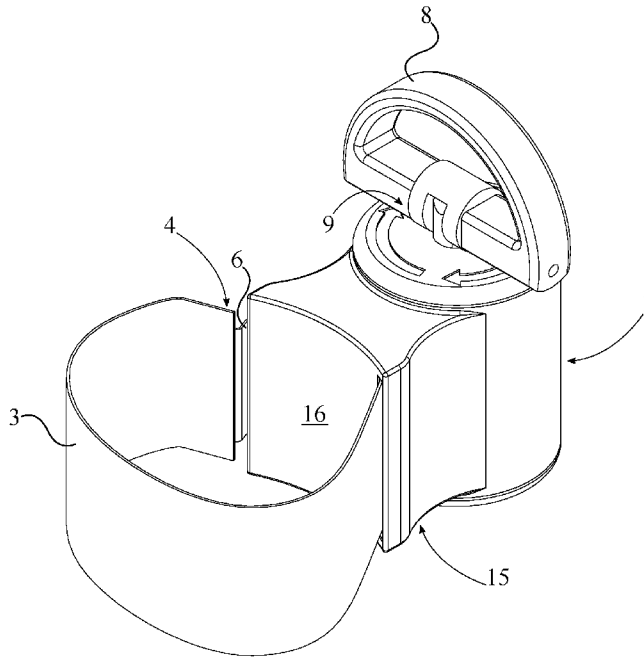


FIG. 1

(57) Abstract: A hand-wound tourniquet is an apparatus that stops blood flow of an injured appendage as quickly as possible and with minimal effort. The apparatus applies constant pressure against the limb without any manual input. The apparatus includes a housing, a strap, a hook, a reeling shaft, a handle, and a cam-locking mechanism. The reeling shaft traverses into the housing and is rotatably and slidably mounted to the housing. The handle is positioned external to the housing and is torsionally connected to the reeling shaft. The strap traverses into the housing. The cam-locking mechanism is operatively integrated into the torsional connection between the reeling shaft and the handle, wherein the longitudinal motion of the reeling shaft is used to actuate the cam-locking mechanism in order to prevent the rotation of the reeling shaft. The apparatus preferably includes a mount that accommodates the curvature of a limb.

WO 2017/122155 A1

SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, — *before the expiration of the time limit for amending the
GW, KM, ML, MR, NE, SN, TD, TG). claims and to be republished in the event of receipt of
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Published:

— *with international search report (Art. 21(3))*

Hand-Wound Tourniquet

The current application is a Patent Cooperation Treaty (PCT) application and
5 claims priority to U.S. provisional application serial number 62/277,766 filed on January
12, 2016.

FIELD OF THE INVENTION

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The present invention generally relates to the medical apparatus. More
specifically, the present invention is a hand-wound tourniquet that quickly deploys strap
and requires minimal effort to both tighten the strap and maintain the pressure of the
strap.

15

BACKGROUND OF THE INVENTION

Use of tourniquets have been controversial over the years due to the correlation
20 between the user of tourniquets and amputation and nerve damage. In recent years,
however, the popularity of tourniquets has increased. Over the past fourteen years, the
wars in Afghanistan and Iraq have been particularly demanding on the limbs of young
soldiers. The survival rates of these young soldiers have been greatly increased as a result
of better control of the loss of blood and the faster arrival of the injured soldiers to a
25 surgical center within the hour.

The tourniquets used to save lives today utilize a concept that dates back
centuries. The tourniquets of today utilizes a piece of material with a stick. The stick is
then inserted under the material and turned to tighten. The military and first responders
use this concept but with a nylon strap and a plastic twist rod to tighten the strap. Even
30 with this improvement, which applies more pressure on the injured limb, tourniquets still
require skill to properly mount and force to tighten.

Therefore, an objective of the present invention is to tighten a nylon strap while lessening the amount of time and effort to wrap around an injured limb. The present invention is manually tightened to the proper tension in order to shut the flow of blood and may be locked so that the necessary pressure is applied to the injured limb without
5 any additional input.

BRIEF DESCRIPTION OF THE DRAWINGS

- 10 FIG. 1 is a front perspective view of the preferred embodiment of the present invention, wherein the handle is in an upright orientation and the cam-locking mechanism is unlocked.
- FIG. 2 is a front perspective view of the preferred embodiment of the present invention, wherein the handle is in a prone orientation and the cam-locking mechanism is locked.
- 15 FIG. 3 is a rear perspective view of the preferred embodiment of the present invention, wherein the handle is in an upright orientation and the cam-locking mechanism is unlocked.
- FIG. 4 is a front perspective view of the present invention without the housing.
- FIG. 5 is a front perspective exploded view exploded view of the preferred embodiment
20 of the present invention without the strap and the hook.
- FIG. 6 is a bottom exploded view of the preferred embodiment of the present invention without the strap and the hook
- FIG. 7 is a front perspective view of an embodiment of the present invention, wherein the padding is fixed to the mount.
- 25 FIG. 8 is a front perspective view of an embodiment of the present invention without the strap and the hook, wherein the slot traverses through the housing.

DETAILED DESCRIPTION OF THE INVENTION

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All illustrations of the drawings are for the purpose of describing selected versions of the present invention and are not intended to limit the scope of the present invention.

The present invention is a medical apparatus that quickly stops the blood flow of an appendage with minimal effort by a user. The present invention applies the necessary amount of pressure to an engaged, injured limb for a continuous period of time without a user having to continuously apply force upon the present invention. The present invention better mounts onto an injured limb, facilitating the wrapping of the apparatus around the limb. As illustrated in FIG. 1, FIG. 5, and FIG. 6, the present invention comprises a housing 1, a strap 3, a hook 6, a reeling shaft 7, a handle 8, and a cam-locking mechanism 9. The housing 1 stores the strap 3, upholds the reeling shaft 7 and handle 8, and positions the cam-locking mechanism 9. The strap 3 wraps around a limb, adjacent the injury along the limb, and applies pressure upon the limb. The strap 3 comprises a first strap end 4 and a second strap end 5. The first strap end 4 allows the hook 6 to move externally about the housing 1, and the second strap end 5, as shown in FIG. 4, attaches the strap 3 to the reeling shaft 7. The hook 6 connects the second strap end 5 to the housing 1 so that the strap 3 loops around an injured limb. The reeling shaft 7 extends and retracts the strap 3 upon the engagement of the handle 8. The cam-locking mechanism 9 prevents the strap 3 from extending and retracting about the reeling shaft 7, thereby applying constant pressure against the injured limb as needed.

The overall configuration of the aforementioned components allows a user to attach the present invention onto a user's injured limb and stop further blood loss from the injury. The reeling shaft 7 traverses into the housing 1 so that the strap 3 is stored within the housing 1, as shown in the exploded views of FIG. 5 and FIG. 6. Furthermore, the reeling shaft 7 is rotatably and slidably mounted to the housing 1. The rotation of the reeling shaft 7 allows the strap 3 to wind and unwind into the housing 1. The sliding of the reeling shaft 7 corresponds to the locking and unlocking of the cam-locking mechanism 9. The locking and unlocking of the cam-locking mechanism 9 allows for and prevents the rotation of the reeling shaft 7 within the housing 1, respectively. The handle 8 is positioned external to the housing 1 and is torsionally connected to the reeling shaft 7 so that the user may grasp onto the handle 8 and maneuver the reeling shaft 7 via the

handle **8**. This arrangement allows the user to extend the length of the strap **3** outside of the housing **1** and retract the strap **3** into the housing **1**. More specifically, as the strap **3** traverses into the housing **1**, the first strap end **4** is positioned external to the housing **1**, and the second strap end **5** is positioned within the housing **1**. The hook **6** is fixed onto the first strap end **4**, and the second strap end **5** is fixed to the reeling shaft **7**. The arrangement allows the hook **6** to clip onto the housing **1** in order to create a loop with the strap **3**, while the strap **3** remains connected to the reeling shaft **7**. The user engages the cam-locking mechanism **9** via the handle **8** in order to secure the length of the strap **3** outside of the housing **1**. More specifically, the cam-locking mechanism **9** is operatively integrated into the torsional connection between the reeling shaft **7** and the handle **8**, wherein longitudinal motion of the reeling shaft **7** is used to actuate the cam-locking mechanism **9** in order to prevent the rotation of the reeling shaft **7**.

In order to prevent the length of the strap **3** from changing, the cam-locking mechanism **9** comprises a stopping plate **10** and a roller **11**, illustrated in FIG. **5** and FIG. **6**. The stopping plate **10** locks and unlocks the rotation of the reeling shaft **7** within the housing **1**. The roller **11** connects the cam-locking mechanism **9** and the handle **8**. In order for the roller **11** to engage with the handle **8**, the roller **11** is positioned external to the housing **1** and tangentially contacts the housing **1**, which allows the roller **11** to roll against the housing **1**. Furthermore, an off-center axle **12** of the roller **11** is rotatably connected to the reeling shaft **7**, and the handle **8** is torsionally connected to the roller **11**. This configuration allows the handle **8** to rotate the roller **11** and consequently allows the off-center axle **12** to convert the rotational motion of the roller **11** into linear motion with the reeling shaft **7**. In an alternate embodiment of the present invention, a pin is positioned along the off-center axle **12** and allows for the rotatable connection between the handle **8** and the roller **11**. The stopping plate **10** is positioned within the housing **1** so that the stopping plate **10** comes into contact with the housing **1**. More specifically, an engageable portion **2** of the housing **1** is positioned adjacent to the stopping plate **10**, allowing for the engagement of the stopping plate **10** and the housing **1**. The stopping plate **10** is axially fixed along the reeling shaft **7** so that the stopping plate **10** rotates simultaneously with the reeling shaft **7**. In the preferred embodiment of the present invention, a hole traverses through the center of the stopping plate **10**, and a block is

axially fixed along the reeling shaft **7**. The hole of the stopping plate **10** is a square-like hole, which allows the block to be fitted within the hole of stopping plate **10**. An external tooth lock washer is laterally fixed along the reeling shaft **7** so that the external tooth lock washer prevents the stopping plate **10** from slipping past the block. The external tooth
5 lock washer is positioned adjacent the block and within the hole of the stopping plate **10** such that the inner rim of the external tooth lock washer surrounds the reeling shaft **7** and the teeth of the external tooth lock washer presses against the stopping plate **10**. Upon the engagement of the stopping plate **10** and the engageable portion **2**, both the reeling shaft **7** and the stopping plate **10** stop rotating.

10 In the preferred embodiment of the present invention, the cam-locking mechanism **9** further comprises a first set of locking teeth **13** and a second set of locking teeth **14**. The first set of locking teeth **13**, as shown in FIG. **5**, lock and unlock the rotation of the reeling shaft **7** and, consequently, the handle **8**. The first set of locking teeth **13** is connected onto the stopping plate **10** and is radially positioned around the reeling shaft **7**.
15 This arrangement accommodates the torsional movement of the stopping plate **10** about the reeling shaft **7**. The second set of locking teeth **14** engages with the first set of locking teeth **13** and secures orientation of the stopping plate **10** about the reeling shaft **7**. The second set of locking teeth **14** is positioned within the housing **1** and connected onto the engageable portion **2** of the housing **1**, as shown in FIG. **6**. Moreover, the second set of
20 locking teeth **14** is radially positioned around the reeling shaft **7** so that the second set of locking teeth **14** accommodates the torsional movement of the stopping plate **10** and the first set of locking teeth **13**. The stopping plate **10** presses against the engageable portion **2** of the housing **1**, wherein the stopping plate **10** and the engageable portion **2** of the housing **1** are arranged in a locked configuration. In the locked configuration, the length
25 of the strap **3** is fixed. In order to extend or retract the strap **3**, the user raises the handle **8**. The user twists the handle **8** in an upright orientation with respect to the housing **1** until the user achieves the desired length and pressure of the strap **3** about an engaged, injured limb. The user flips the handle **8** about the roller **11** so that the handle **8** is in a prone orientation with respect to the housing **1**, and the first set of locking teeth **13** and the
30 second set of locking teeth **14** engage each other and consequently are in a locked configuration with each other.

In order to fasten the present invention onto an injured limb in a quicker fashion, a mount **15** surrounds and directly presses upon the injured limb of the user. The mount **15** further comprises an appendage-bracing portion **16** and hook-clasping portion **17**, as shown in FIG. **1** and FIG. **3**. The appendage-bracing portion **16** surrounds a portion of an injured limb, and the hook-clasping portion **17** secures the hook **6** to the mount **15**. The user preferably engages the hook **6** with the hook-clasping portion **17** before the tightening or loosening of the strap **3** about the injured limb. In order to directly press the mount **15** upon the injured limb, the housing **1** is connected adjacent to the mount **15**. More specifically, the appendage-bracing portion **16** is positioned opposite to the housing **1**. The strap **3** traverses out of the mount **15**, adjacent to the appendage-bracing portion **16** so that the position of the injured limb against the appendage-bracing portion **16** is maintained while the strap **3** is tightened and loosened. In order for the first strap end **4** to loop around the entirety of the injured limb that presses against the appendage-bracing portion **16**, the hook-clasping portion **17** is positioned adjacent to the appendage-bracing portion **16**, opposite to the strap **3**. In the preferred embodiment of the present invention, the hook-clasping portion **17** is a hole, wherein a cross-section of the hole is a barb shape. The hole traverses into the mount **15**, parallel to the reeling shaft **7**, so that the hook **6** engages to the barb shape. In an alternate embodiment, the hole traverses through the mount **15** so that the hook **6** may slide into the hole from either side. This arrangement prevents the strap **3** from twisting and consequently applying inconsistent pressure about the injured limb. In an alternate embodiment of the present invention, the hook-clasping portion **17** is a hole, wherein a cross-section of the hole is a circular shape, and the hook **6** is engaged to the circular shape. In various embodiments of the present invention, the cross-section of the hole may be a variety of shapes that accommodate the hook **6**, however the parallel arrangement between the hole and the reeling shaft **7** needs to be preserved by the present invention.

In the preferred embodiment of the present invention, the mount **15** further comprises a padding **18**. The padding **18** lessens the impact of the injured limb against the appendage-bracing portion **16**, so that the limb does not bruise or get injured any further, while still maintaining the pressure applied by the strap **3**. The padding **18** is attached to the appendage-bracing portion **16**, positioned opposite the housing **1**, and

traverses across the appendage-bracing portion **16**. This arrangement, shown in FIG. 7, cushions the user's injured limb against the entirety of the appendage-bracing portion **16**.

In an alternate embodiment of the present invention, a slot **19** accommodates the both the strap **3** and hook **6**. As shown in FIG. 8, the slot **19** traverses into the housing **1**, similar to that of the hook-clasping portion **17** of the mount **15**. However, in this alternate embodiment, the strap **3** is positioned through the slot **19** and the hook **6** engages to the slot **19**. More specifically, the strap **3** presses against a lateral edge of the slot **19** as the strap **3** exits the slot **19**, and the hook **6** latches onto the opposite lateral edge of the slot **19** as the strap **3** loops around an injured limb. In this embodiment, the housing **1** is not connected adjacent to the mount **15** as the slot **19** is the point of exit so that the strap **3** may fully encompass the injured limb and more pressure may be applied.

Although the invention has been explained in relation to its preferred embodiment, it is to be understood that many other possible modifications and variations can be made without departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

1. A hand-wound tourniquet comprises:

a housing;

a strap;

5 a hook;

a reeling shaft;

a handle;

a cam-locking mechanism;

the strap comprises a first strap end and a second strap end;

10 the reeling shaft traversing into the housing;

the reeling shaft being rotatably and slidably mounted to the housing;

the handle being positioned external to the housing;

the handle being torsionally connected to the reeling shaft;

the strap traversing into the housing;

15 the first strap end being positioned external to the housing;

the hook being fixed onto the first strap end;

the second strap end being positioned within the housing;

the second strap end being fixed to the reeling shaft; and

20 the cam-locking mechanism being operatively integrated into the torsional connection between the reeling shaft and the handle, wherein longitudinal motion of the reeling shaft is used to actuate the cam-locking mechanism in order to prevent rotation of the reeling shaft.

2. The hand-wound tourniquet as claimed in claim 1 comprises:

25 the cam-locking mechanism comprises a stopping plate and a roller;

the roller being positioned external to the housing;

the roller tangentially contacting the housing;

an off-center axle of the roller being rotatably connected to the reeling

shaft;

30 the handle being torsionally connected to the roller;

the stopping plate being positioned within the housing;

the stopping plate being axially fixed along the reeling shaft; and
an engageable portion of the housing being positioned adjacent to the
stopping plate.

5 3. The hand-wound tourniquet as claimed in claim 2 comprises:
 the cam-locking mechanism further comprises a first set of locking teeth;
 the first set of locking teeth being connected onto the stopping plate; and
 the first set of locking teeth being radially positioned around the reeling
 shaft.

10

4. The hand-wound tourniquet as claimed in claim 2 comprises:
 the cam-locking mechanism further comprises a second set of locking
 teeth;
 the second set of locking teeth being positioned within the housing;
15 the second set of locking teeth being connected onto the engageable
 portion of the housing; and
 the second set of locking teeth being radially positioned around of the
 reeling shaft.

20 5. The hand-wound tourniquet as claimed in claim 2 comprises:
 wherein the stopping plate and the engageable portion of the housing is
 arranged in a locked configuration; and
 the stopping plate being pressed against the engageable portion of the
 housing.

25

6. The hand-wound tourniquet as claimed in claim 1 comprises:
 a mount;
 the mount comprises an appendage-bracing portion and a hook-clasping
 portion;
30 the housing being connected adjacent to the mount;
 the appendage-bracing portion being positioned opposite to the housing;

the strap traversing out of the mount, adjacent to the appendage-bracing portion; and

the hook-clasping portion being positioned adjacent to the appendage-bracing portion, opposite to the strap.

5

7. The hand-wound tourniquet as claimed in claim 6 comprises:

the hook-clasping portion being a hole, wherein a cross-section of the hole is a barb shape;

the hole traversing into the mount, parallel to the reeling shaft; and

10

the hook being engaged to the barb shape.

8. The hand-wound tourniquet as claimed in claim 6 comprises:

the hook-clasping portion being a hole, wherein a cross-section of the hole is a circular shape;

15

the hole traversing into the mount, parallel to the reeling shaft; and

the hook being engaged to the circular shape.

9. The hand-wound tourniquet as claimed in claim 6 comprises:

the mount further comprises a padding;

20

the padding being attached onto the appendage-bracing portion; and

the padding being positioned across the appendage-bracing portion.

10. The hand-wound tourniquet as claimed in claim 1 comprises:

a slot;

25

the slot traversing into the housing; and

the strap being positioned through the slot.

11. The hand-wound tourniquet as claimed in claim 8 comprises:

the hook being engaged to the slot.

30

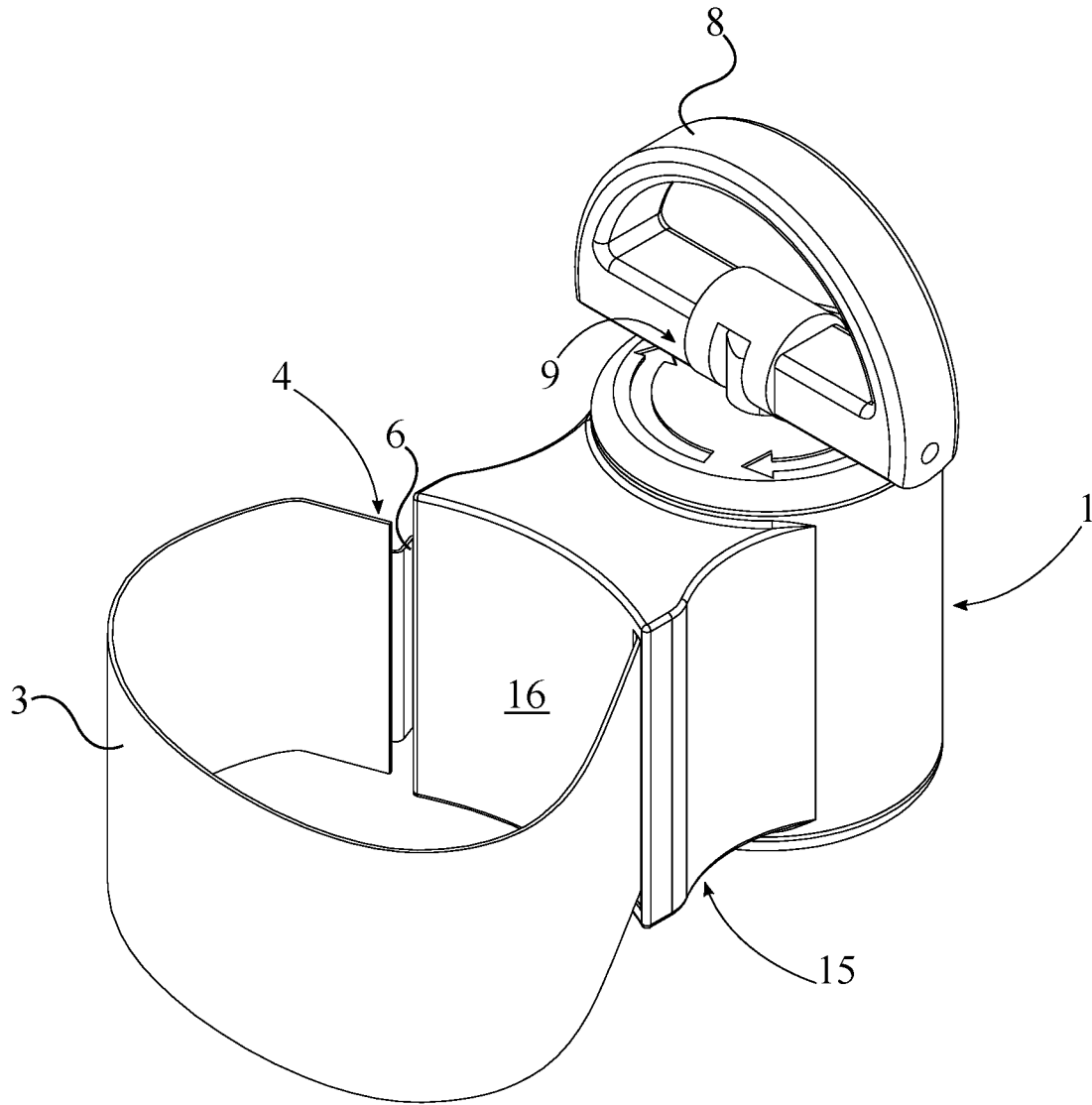


FIG. 1

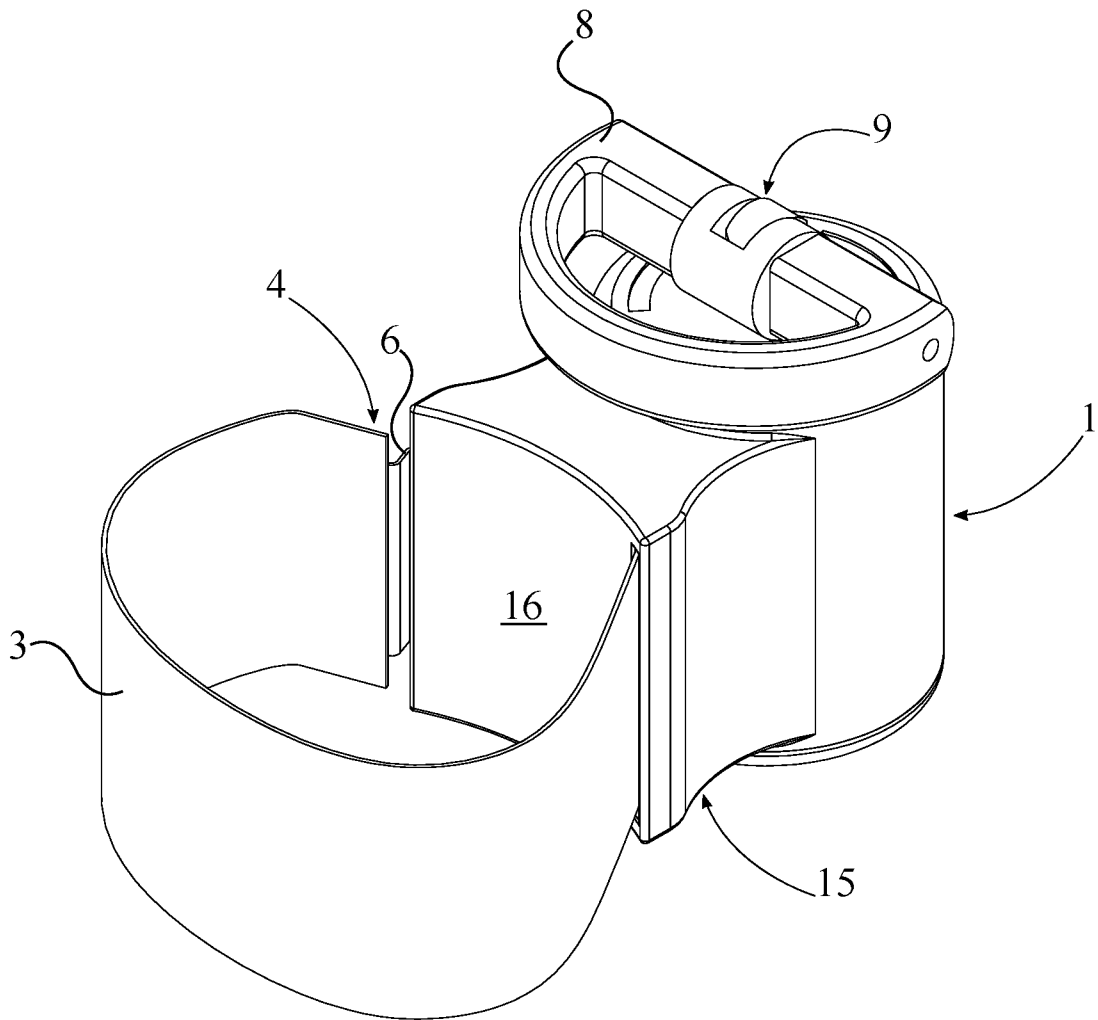


FIG. 2

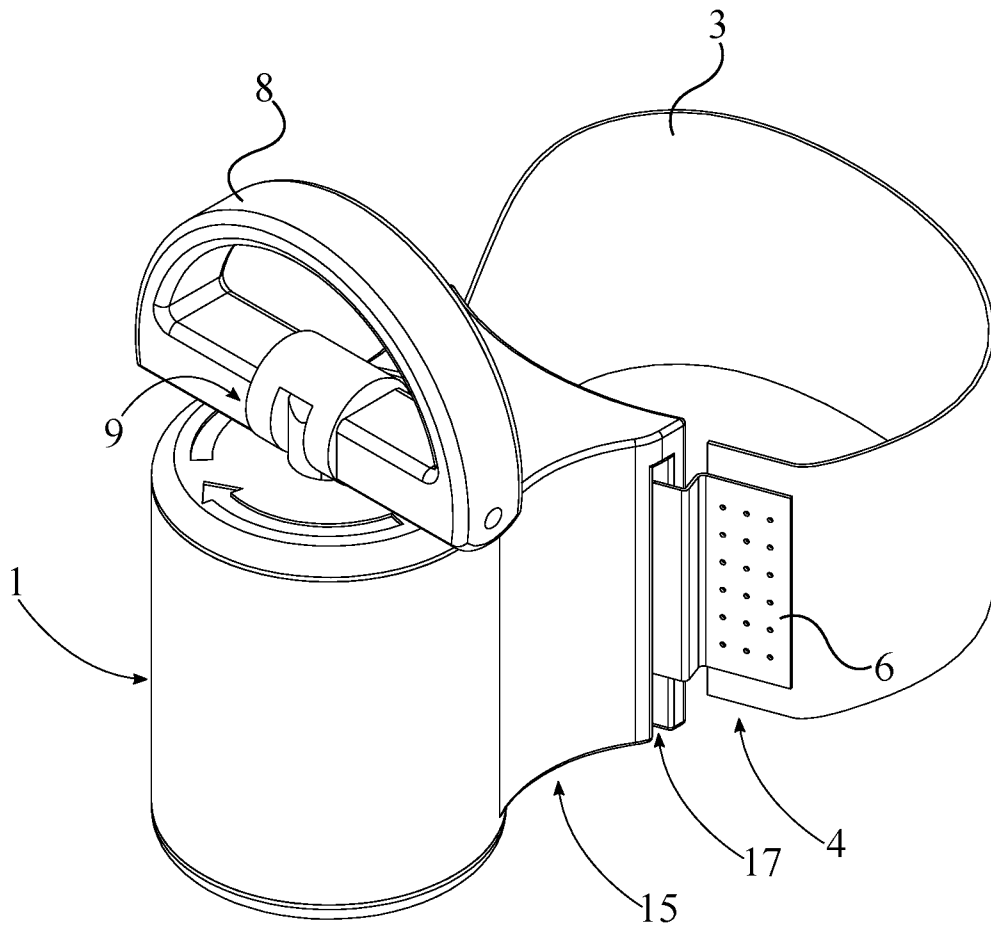


FIG. 3

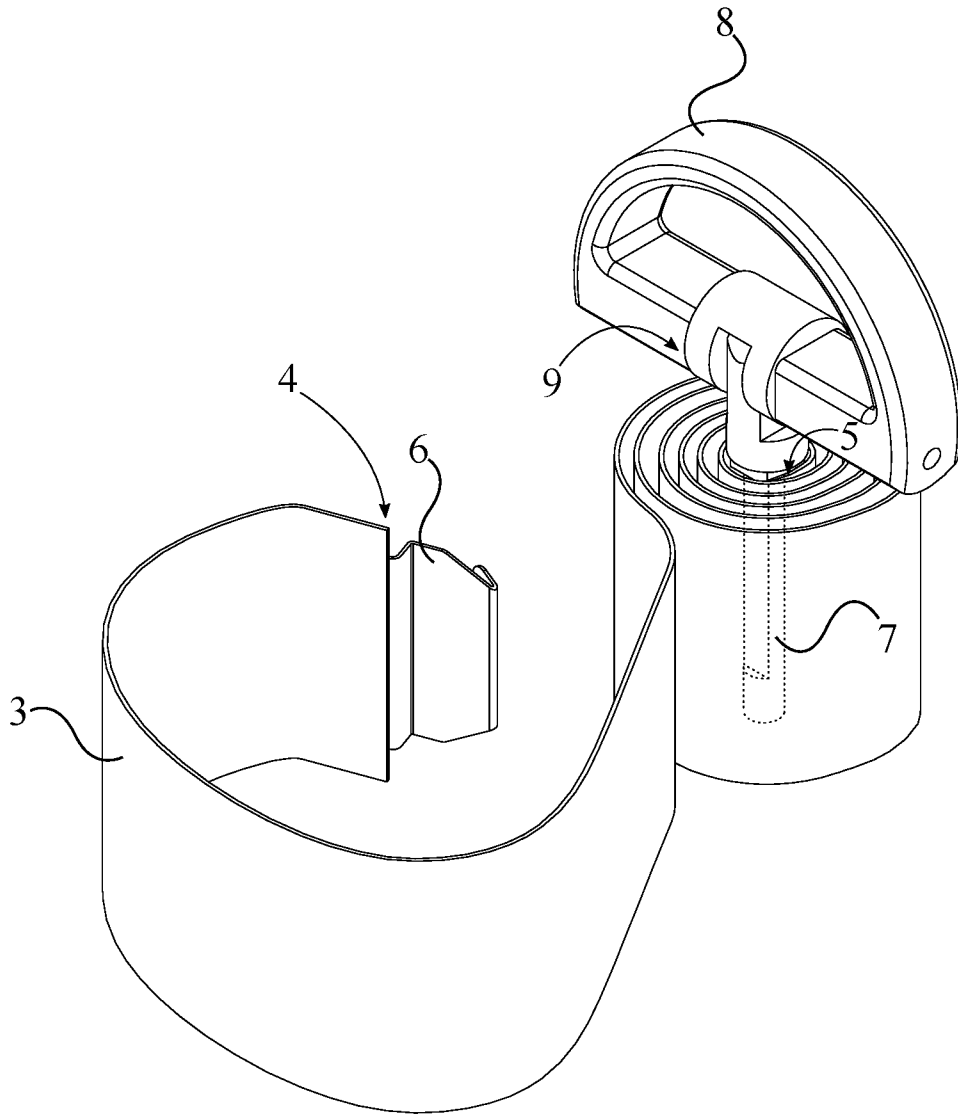


FIG. 4

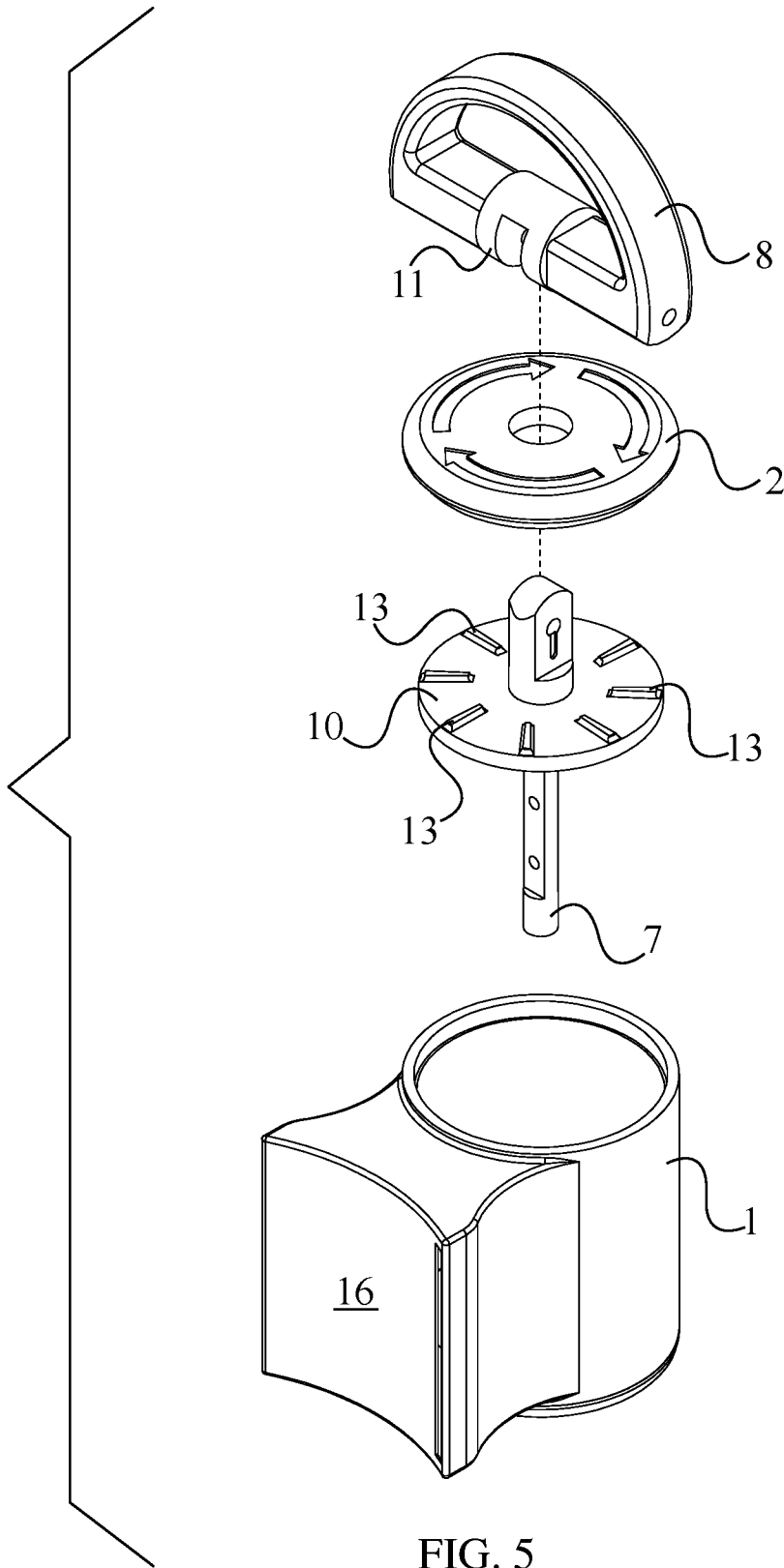


FIG. 5

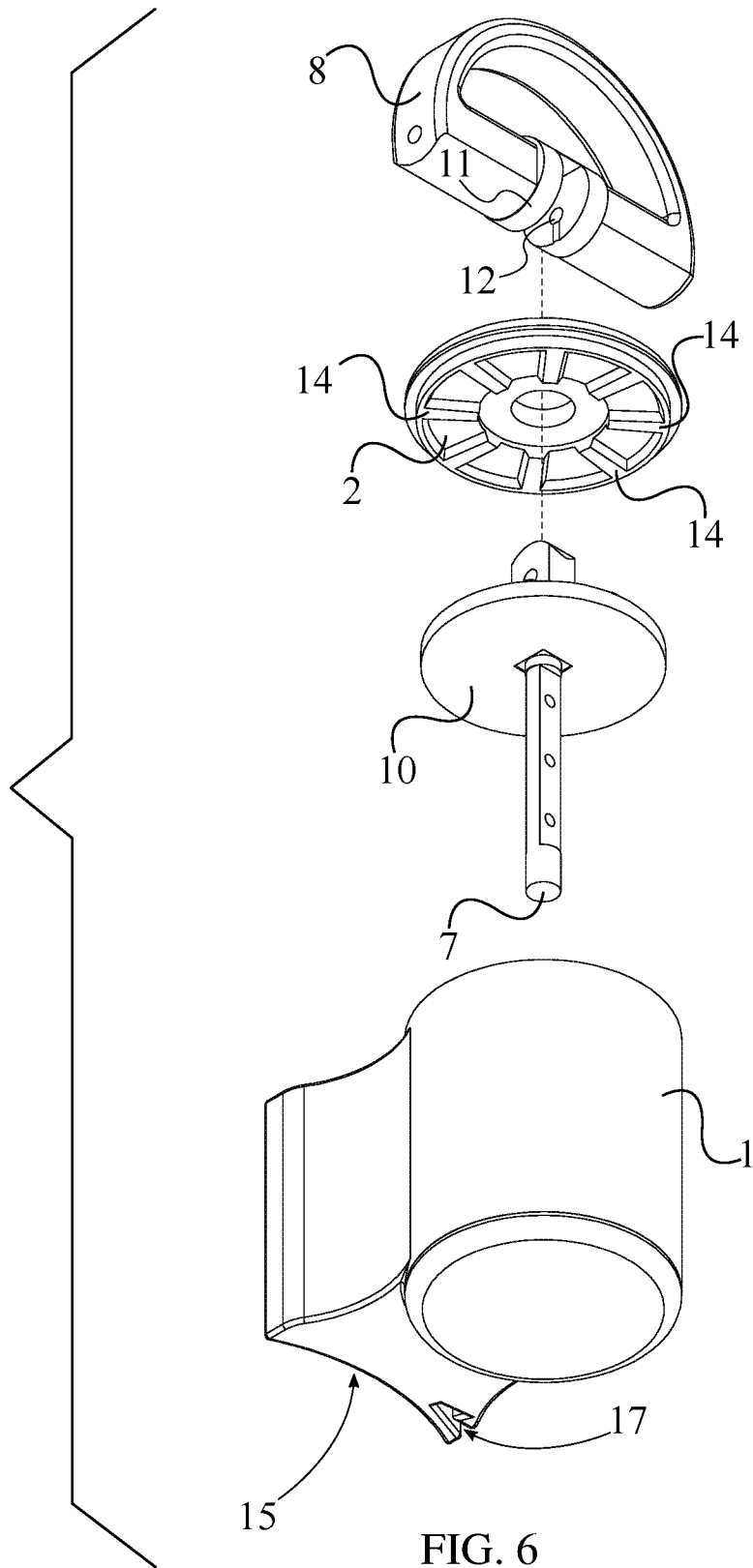


FIG. 6

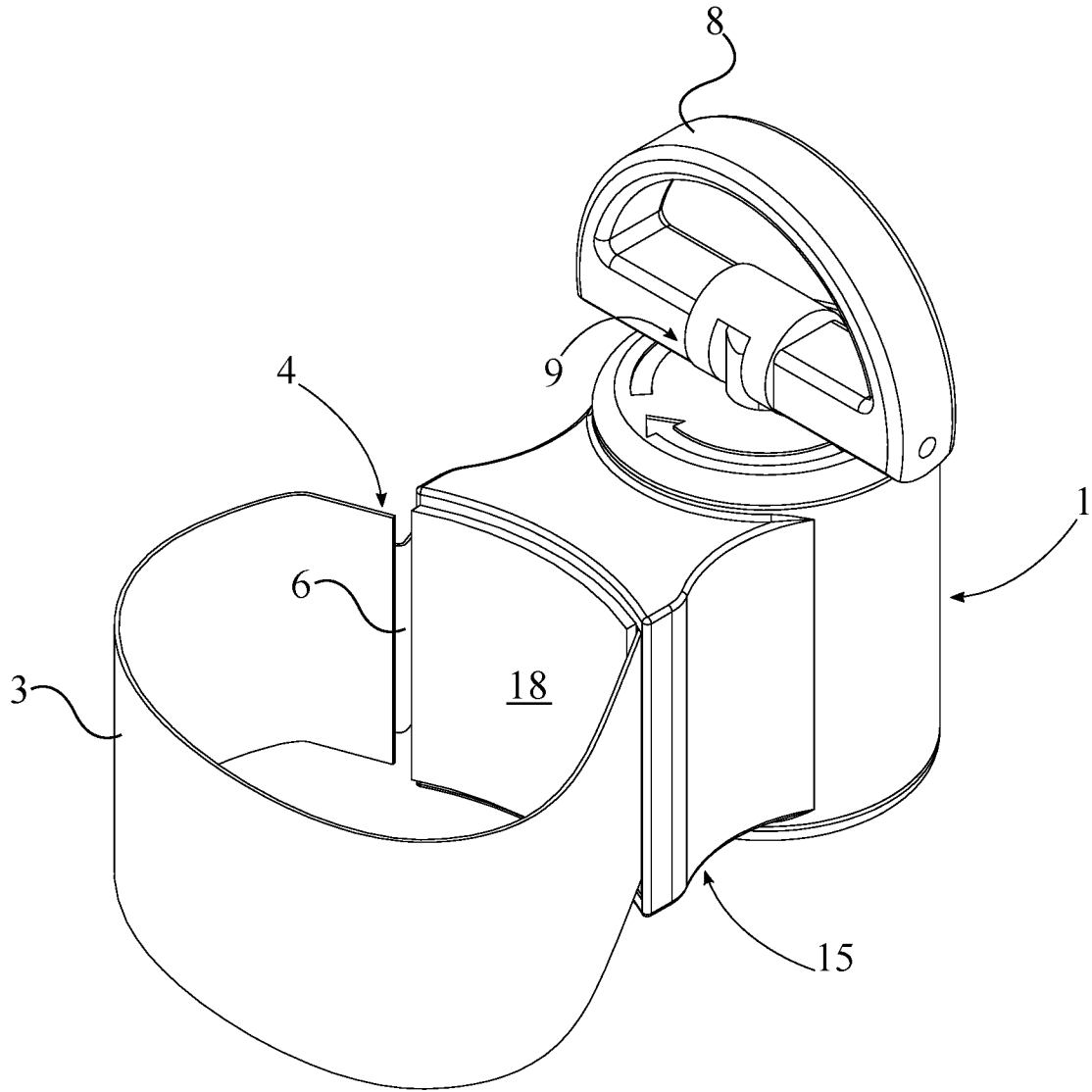


FIG. 7

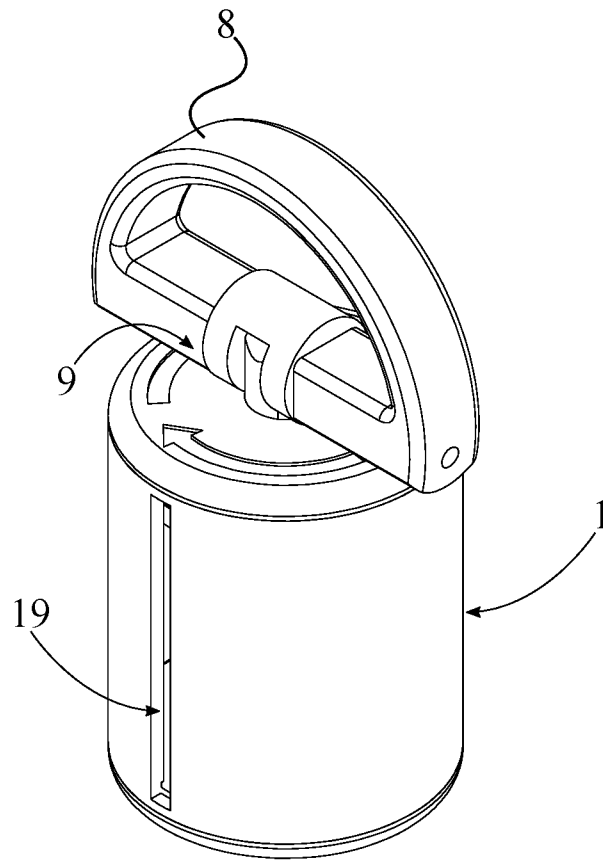


FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IB 2017/050171

A. CLASSIFICATION OF SUBJECT MATTER		
<i>A61B 17/132 (2006.01)</i>		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED		
Minimum documentation searched (classification system followed by classification symbols)		
A61B 17/00, 17/132, 17/135		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
PatSearch, esp@cenet, USPTO, Google		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2005/0113866 A1 (THOMAS J. HEINZ et al.) 26.05.2005, abstract, paragraphs [0007]-[0008], [0010]-[0011], [0021], [0027], [0029]-[0034], [0038]-[0039], [0042]-[0048], [0050], claims 1-7, 9-11, 20-24, 26, 29, fig. 1-7, 9, 13	1
Y		2-11
Y	US 2015/0018941 A1 (ST. JUDE MEDICAL, CARDIOLOGY DIVISION, INC.) 15.01.2015, abstract, paragraphs [0215]-[0216], [0218], fig. 67-68	2-11
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C. <input type="checkbox"/> See patent family annex.		
*	Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family
"A"	document defining the general state of the art which is not considered to be of particular relevance	
"E"	earlier document but published on or after the international filing date	
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"O"	document referring to an oral disclosure, use, exhibition or other means	
"P"	document published prior to the international filing date but later than the priority date claimed	
Date of the actual completion of the international search		Date of mailing of the international search report
05 May 2017 (05.05.2017)		01 June 2017 (01.06.2017)
Name and mailing address of the ISA/RU: Federal Institute of Industrial Property, Berezhkovskaya nab., 30-1, Moscow, G-59, GSP-3, Russia, 125993 Facsimile No: (8-495) 531-63-18, (8-499) 243-33-37		Authorized officer E. Nosova Telephone No. 8 (495)-531-64-81

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB 2017/050171

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2015/095333 A1 (STANDARD BARIATRICS, INC.) 25.06.2015, paragraphs [0016], [0040]-[0043], [00190]-[00195], [00197]-[00200], [00214]-[00216], [00228], [00231]-[00237], fig. 14, 15A, 15B, 18, 18A, 19, 20A, 20B, 25, 31, 32A, 32B	2-5