Abstract: An EXTENDABLE FLUID TRANSPORT APPARATUS for conveyance of a fluid to a remote surface. A rigid fluid tube (300) receives fluid and is in fluid communication and interconnection with a flexible flex tube (400) which is in fluid communication and interconnection with a connection means proximal a telescoping tube (200) second end for conveyance of a fluid, including paint, to a distant surface. The telescoping tube (200) is slidably received into a casing (100). The flex tube is received through a casing slot (120) and a telescoping tube slot (240) into the telescoping tube.
EXTENDABLE FLUID TRANSPORT APPARATUS

Field of the Invention

[0001] This invention relates to an extendable apparatus which conveys a fluid. The invention more specifically relates to an apparatus for extendably conveying fluids under pressure from a source to a point of discharge. The invention more specifically relates to an extendable apparatus for application of paint to a distant surface.

Background of the Invention

[0002] Devices which convey a fluid and which are extendible are known in the prior art including Patent No. 6,889,920 to Nance et al; Patent No. 5,186,392 to Pleshek; Patent No. 6,976,644 to Troudt; Patent No. 6,811,100 to Bardinet et al; Patent No. 5,502,864 to Sorenson; Patent No. 4,652,024 to Krohn; Patent No. 5,598,598 to Sorenson; Patent No. 5,881,601 to Hammer; Patent No. 6,378,922 to Troudt; Patent No. 5,485,960 to Troudt; Patent Application US 2005/0045751 to Nance et al, and Patent Application No. US 2005/0029366 to Troudt. The patents referred to herein are provided herewith in an Information Disclosure Statement in accordance with 37 CFR 1.97.

Summary of the Invention

[0003] The extendable fluid transport apparatus (1) comprises a tubular easing (100)
having a casing slot (120) extending from the casing first end (105) or from proximal the casing first end (105) toward the casing second end. A telescoping tube (200) is received by the casing (100). At least one fixture connection means (220), for tube connection, is at the telescoping tube second end (210). Telescoping of the telescoping tube (200) fixed by interconnection means between the casing (100) and the telescoping tube (200).

[0004] A fluid tube (300) having fluid tube-casing connection means (330), for interconnection of the fluid tube (300) and the casing (100). A flex tube (400) is interconnected with the fluid tube (300) and with the telescoping tube (200).

[0005] The flex tube (400) is sized to be received and is received through the casing slot (120). Extending the telescoping (200) draws the flex tube (400) through the casing slot (120) thereby allowing communication of fluid from the fluid tube (300) to the telescoping tube (200) and the at least one fixture connection means (220) for interconnection with a fixture, such as a paint tip.

**Brief Description of the Drawings**

[0006] The foregoing and other features and advantages of the present invention will become more readily appreciated as the same become better understood by reference to the following detailed description of the preferred embodiment of the invention when taken in conjunction with the accompanying drawings, wherein:
[0007] Fig. 1 is a side elevation cutaway illustrating the extendable fluid transport apparatus (1) and showing the tubular casing (100), casing slot (120), casing axis (115), casing-tube interconnection means (130) for interconnection of the casing (100) and the telescoping tube (200), the telescoping tube (200) fixture connection means (220), telescoping tube-casing interconnection means (130), the fluid tube (300), fluid tube connection means (320) for interconnection with the flex tube (400), the flex tube (400) and flex tube connection means (420) for interconnection with the fluid tube (300).

[0008] Fig. 2 is a side elevation cutaway further illustrating a casing first end (105), a casing second end (110), a casing axis (115), the casing slot (120) extending from the casing first end (105) or from proximal the casing first end (105) toward the casing second end (110), the telescoping tube (200) in an extended position showing the tube first end (205) and tube second end (210), fixture connection means (220) at the tube second end (210), telescoping tube-casing interconnection means (230), for interconnection between the telescoping tube (200) and the casing (100), intermediate the tube first end (205) and the tube second end (210), a fluid tube first end (305) and a fluid tube second end (310), fluid tube-casing connection means (330), for interconnection between the fluid tube (300) and the flex tube (400), interconnecting the fluid tube (300) and the casing (100), the flex tube first end (405) and flex tube second end (410), the telescoping tube (200) which is received by the casing (100) and telescopes from the casing (100), the telescoping tube (200) fixed in at least one telescoping position by interaction between the casing-tube interconnection means (130) and the telescoping tube-casing interconnection means (230),
the fluid tube-casing connection means (330) interconnecting the tubular casing (100) and
the fluid tube (300), the flex tube first end (405) is interconnected with the fluid tube
second end (310), the flex tube (400) at the flex tube second end (410) received through the
casing slot (120), the flex tube second end (410) flex tube connection means (420) for
interconnection with the telescoping tube (200). Also seen is the telescoping tube slot
(240).

[0009] Fig. 3 is a perspective view showing the flex tube (400) received through the
casing slot (120) and telescoping tube slot (240) and the offset between the fluid tube (300)
and the casing slot (120).

[0010] Fig. 4 is a perspective view showing the telescoping tube (200) in an extended
position with the flex tube (400) drawn into the casing (100).

[0011] Fig. 5 is a front elevation from Section 5-5 of Figure 1 illustrating the
approximately 155° to 175° angle Θ (125) relationship between the fluid tube (300), the
flex tube (400), the casing slot (120) and the telescoping tube slot (240). Also seen is the
casing-tube interconnection means (130) comprised in this illustration of a casing-tube
interconnection means hex aperture (135).

[0012] Fig. 5A is a perspective of the telescoping tube (200) showing the tube first end
(205) and illustrating the telescoping tube slot (240) which extends from the first end (205)
toward the second end (210) and which receives flex tube (400) into the telescoping tube (200).

[0013] Fig. 6 shows detail 7 illustrating the interconnection between the flex tube (400) and the telescoping tube (200).

[0014] Fig. 7 illustrates the relationship between the flex tube (400) and the telescoping tube (200). Seen is the telescoping tube interconnection means (235), for interconnection of the telescoping tube (200) and the flex tube (400) at the flex tube connection means (420), at the second end (210). Also illustrated is the interconnection between the telescoping tube interconnection means (235) with fixture connection means (220) at the second end (210). Tube interconnection means may be male-female threaded means, male-female quick release or snap fittings, ferrule fittings, compression fittings and other such interconnection means.

[0015] Fig. 7A illustrates the interconnection between the telescoping tube (200), the telescoping tube interconnection means (235) and flex tube connection means (420). Also illustrated is the interconnection between fixture connection means (220) and telescoping tube interconnection means (235).

[0016] Fig. 8 shows a ball detent (130) as the casing-tube interconnection means (130) with at least one telescoping tube-casing interconnection means (230) intermediate the tube.
first end (205) and the tube second end (210) shown here as at least one at least one detent (230) comprising an aperture or depression at the telescoping tube (200) sized to receive and the ball of ball detent (130).

[0017] Fig. 9 shows the flex tube (400) received into the casing slot (120) and telescoping tube slot (240). Additionally seen is the casing tube slot first end (122) illustrating the casing tube slot (120) as decreasing in width distal to the casing first end (105).

[0018] Fig. 10 illustrates the fluid tube (300) and casing (100) formed as an integral unit as with a molding process.

**Detailed Description**

[0019] Figures 1, 2, 3, 4, 6 and 9 illustrate the extendable fluid transport apparatus (1). A tubular casing (100) has a casing first end (105), a casing second end (110), a casing axis (115) and a casing slot (120). The casing (100) is, in the preferred embodiment, formed of a rigid tubular material including metals, composite materials, plastics and fiberglass. The casing axis (115) is centrally positioned from the casing first end (105) to the casing second end (110). The casing slot (120) extends from the casing first end (105) or, in the preferred embodiment, from proximal the casing first end (105), toward the casing second end (110). The casing slot (120) is generally parallel with the casing axis (115). Seen in Fig. 9 is the casing slot first end (122) illustrating the casing slot (120) as decreasing in width as the slot progresses from proximal the casing first end (105) toward the casing second end (110).
the preferred embodiment casing-tube interconnection means (130) is immovably fixed at
or proximal to the casing second end (110) or intermediate the casing first end (105) and
the casing second end (110) to effect an interconnection between the casing (100) and the
telelescoping tube (200). In the preferred embodiment the casing-tube interconnection
means (130) is a ball detent with the ball received into a tube-casing interconnection means
(230) illustrated in Fig. 7 and 8 as a detent (230), allowing the telescoping tube (200) to be
extended by increments as allowed by the ball-detent function. However, those of ordinary
skills in connection arts will appreciate that other structures to allow incremental extension
and retracting of a telescoping tube are equivalent including, for example, a ferrule which,
on rotation, will create a pressure fitting between the casing (100) and the telescoping tube
(200), thereby fixing the position or extension or retraction position of the telescoping tube
(200).

[0020] Seen in Figures 1, 2, 3, 4, 6 and 9 is a telescoping tube (200) which is sized to be
received by and into the casing (100) at the casing first end (105) or the casing second end
(110). In the preferred embodiment the telescoping tube is composed of a rigid tubular
material including metals, composite materials, plastics and fiberglass. A person of
ordinary skills in tube arts will appreciate that other materials will be equivalent. In the
preferred embodiment the telescoping tube (200) has a hexagonal cross section which is
received through a hexagonal shaped casing second end (110) comprising, in the preferred
embodiment, an interior of the casing-tube interconnection means (130) shown in Fig.
5 as a casing-tube interconnection means hex aperture (135). A person of ordinary skills in
the tubing arts will recognize that other interrelation connections will exist to fix the
telescoping tube (200) from rotation relative to the casing (100). The telescoping tube
(200) has a tube first end (205) and a tube second end (210) and at least one fixture
connection means (220) at the tube second end (210). Fixtures may include paint tip-
guards and paint tips for application of pressurized painting. As the complement to the
preferred embodiment means of fixing the extension of the telescoping tube (200) and the
casing-tube interconnection means (130) when formed of a ball detent, there is at least one
telelescoping tube-casing interconnection means (230) intermediate the tube first end (205)
and the tube second end (210). In the preferred embodiment the tube-casing
interconnection means (230), at the telescoping tube (200) is at least one detent (230)
comprising an aperture or depression sized to immovably receive the ball of ball detent
(230) until such time that the spring pressure on the ball is relieved allowing the
telelescoping tube (200) to be extended or retracted.

[0021] Also seen in Figures 1 through 4, 6 and 9 is a fluid tube (300) having a fluid tube
first end (305) and a fluid tube second end (310). Fluid tube-casing connection means
(330) interconnects the fluid tube (300) and the casing (100). In the preferred embodiment
the fluid tube-casing connection means (330) is composed of bracket means and, in the
preferred embodiment there will be at least one fluid tube-casing connection bracket (330)
interconnecting the fluid tube (300) at the fluid tube first end (305) at or proximal to the
casing first end (105) and at least one fluid tube-casing connection bracket (330)
interconnecting the fluid tube second end (310) to the casing (100) intermediate the casing
first end (105) and the casing second end (110). A person of ordinary skills in the tubing and manufacturing arts will appreciate that the fluid tube (300) and the casing (100) maybe formed as an integral unit without need for bracket means.

[0022] When interconnected with the casing (100) the fluid tube (300) is positioned generally parallel with the casing axis (115). The fluid tube (300) has fluid tube connection means (320) at the fluid tube first end (305) and the fluid tube second end (310). In a preferred embodiment the fluid tube connection means (320) at the fluid tube first end (305) will interconnect with an airless paint gun, in which circumstance the fluid tube connection means (320) may present a female threaded connector.

[0023] As will be appreciated by those of ordinary skills in the tubing arts, tubing connection means, for interconnection of the several tubular structures in this invention, will include male-female threaded means, male-female quick release or snap fittings, ferrule fittings, compression fittings and other connection means known to those of ordinary skills in the tubing interconnection arts. These described connection means will be primary tube connection means, in the preferred embodiment, for interconnection between the fluid tube (300) and flex tube (400) and between the flex tube (400) and the telescoping tube (200) of the present invention. Tube connection means between the fluid tube 300, the flex tube (400) and between the flex tube (400) and the telescoping tube (200) and between the telescoping tube (200) and the fixture connection means (220) may be male-female threaded means, male-female quick release or snap fittings, ferrule fittings,
compression fittings and other such interconnection means.

[0024] Seen in Figures 1 through 4, 5, 5A, 6, 7 and 9 is a flex tube (400) having a flex tube first end (405) and a flex tube second end (410) having flex tube connection means (420) at the flex tube first end (405) and at the flex tube second end (410). In the preferred embodiment the flex tube (400) is generally 5' in length allowing the telescoping tube (200) to be extended while maintaining fluid connectedness from the fluid tube first end (305) via the flex tube (400) to the telescoping tube second end (210).

[0025] The telescoping tube (200) is received by the casing (100) at the casing first end (105) or the casing second end (110). There is at least one fixture connection means (220) at or proximal the tube second end (210). The telescoping tube (200) is fixed in at least one telescoping position by interaction between the casing-tube interconnection means (130), including a ball detent or ferrule, and the telescoping tube-casing interconnection means (230) comprised of a detent; the casing-tube interconnection means (130) being a ball detent; the tube-casing interconnection means (230) being at least one detent aperture (230) in the telescoping tube (200). In the preferred embodiment the telescoping tube (200) has a hex cross-section as seen in Fig. 5. The telescoping tube (200) from the tube first end (205) extending toward the tube second end (210) has a telescoping tube slot (240), seen in Fig. 5 and Fig. 5A, which receives the flex tube (400) into the telescoping tube (200). The casing slot (120) is aligned with the telescoping tube slot (240) to receive the flex tube (400) into the telescoping tube (200).
[0026] The fluid tube-casing connection means (330) rigidly interconnects the tubular casing (100) and the fluid tube (300). When the fluid tube-casing connection means (330) is bracket means there is at least one bracket interconnection between the fluid tube first end (305) and the casing (100) proximal the tubular casing first end (105) and at least one bracket interconnection between the fluid tube second end (310) and the casing (100) intermediate the casing first end (105) and the casing second end (110).

[0027] The flex tube (400) at the flex tube first end (405) is interconnected with the fluid tube second end (310) by connection of the flex tube first end (410) flex tube connection means (420) and the fluid tube connection means (320) at the fluid tube second end (310). The flex tube (400) at the flex tube second end (410) is sized to be received and is received through the casing slot (120) and the telescoping tube slot (240). The flex tube second end (410) flex tube connection means (420) interconnects with the telescoping tube (200) at or proximal the telescoping tube second end (215) tube connection means (220) or at the telescoping tube first end (205) or intermediate the telescoping tube first end (205) and the telescoping tube second end (210). It will be recognized by a person of ordinary skills in tubing arts that tube connection means (220) may extend from the telescoping tube second end (210) toward the telescoping tube first end (205) where interconnection may be made between the flex tube (400) and the telescoping tube (200). In the preferred embodiment the fluid tube (300) and flex tube (400) are high pressure tubing suitable for the application of fluids under pressure. Applications available includes but is not limited to the application of paint.
[0028] The fluid tube (300) is positioned, as seen in Fig. 5, relative to the casing axis (115) and relative to the casing slot (120) and the telescoping tube slot (240) at an obtuse angle $\theta$ (125). The angle, in the preferred embodiment is generally 155° to 175°. This relationship will lessen the drag between the flex tube (400) and the casing (100) as the telescoping tube (200) is extended and retracted.

[0029] While a preferred embodiment of the present invention has been shown and described, it will be apparent to those skilled in the art that many changes and modifications may be made without departing from the invention in its broader aspects. The appended claims are therefore intended to cover all such changes and modifications as fall within the true spirit and scope of the invention.
I CLAIM: 1. An extendable fluid transport apparatus (1) comprising:

   a. a tubular casing (100) having a casing first end (105), a casing second end (110),

   a casing axis (115) and a casing slot (120); the casing axis (115) centrally positioned from

   the casing first end (105) to the casing second end (110); the casing slot (120) extending

   from the casing first end (105) or from proximal the casing first end (105) toward the

   casing second end (110) generally parallel with the casing axis (115); the casing slot (120)

   having a casing slot first end (122) proximal the casing first end (105); the casing slot (120)

   decreasing in width from proximal the casing slot first end (122) toward the casing second

   end (110); casing-tube interconnection means (130) at or proximal to the casing second

   end (110) or intermediate the casing first end (105) and the casing second end (110); a

   casing-tube interconnection means hex aperture (135) at or proximal the casing second end

   (HO);

   b. a telescoping tube (200) sized to be received by the casing (100) at the casing

   first end (105) or the casing second end (110); the telescoping tube (200) has a tube first

   end (205) and a tube second end (210); fixture connection means (220) at the tube second

   end (210); telescoping tube-casing interconnection means (230) intermediate the tube first

   end (205) and the tube second end (210); the telescoping tube (200) having a hexagonal

   cross-section; the telescoping tube (200) is received, substantially parallel with the casing

   axis (115), by the casing-tube interconnection means hex aperture (135) thereby securing

   the telescoping tube (200) from rotation;

   c. a fluid tube (300) having a fluid tube first end (305) and a fluid tube second end

   (310); fluid tube-casing connection means (330) interconnects the fluid tube (300) and the
casing (100); fluid tube connection means (320) at the fluid tube first end (305) and the
fluid tube second end (310); the fluid tube (300) positioned parallel with the casing axis
(115); fluid tube-casing connection means (330) comprised of at least one fluid tube
bracket (330) or in the alternative the fluid tube (300) and the casing (100) formed of an
integral structure;

   d. a flex tube (400) having a flex tube first end (405) and a flex tube second end
(410); flex tube connection means (420) at the flex tube first end (405) and at the flex tube
second end (410);

   e. the telescoping tube (200) is received by the casing (100) at the casing first end
(105) or the casing second end (110); at least one fixture connection means (220) at or
proximal the tube second end (210); the telescoping tube (200) fixed in at least one
telescoping position by interaction between the casing-tube interconnection means (130)
and the telescoping tube-casing interconnection means (230); the casing-tube
interconnection means (130) being a ball detent; the tube-casing interconnection means
(230) being at least one detent aperture or depression in the telescoping tube (200); the
telescoping tube (200) having a hexagonal cross-section; a telescoping tube slot (240) from
the telescoping first end (205) toward the telescoping second end (210) aligned with the
casing slot (120) to receive the flex tube (400) into the telescoping tube (200);

   f. the fluid tube-casing connection means (330) rigidly interconnects the tubular
casing (100) and the fluid tube (300); when the fluid tube-casing connection means (330) is
bracket means at least one bracket interconnection between the fluid tube first end (305)
and the casing (100) proximal the tubular casing first end (105) and at least one bracket
interconnection between the fluid tube second end (310) and the casing (100) intermediate
the casing first end (105) and the casing second end (110);

g. the flex tube (400) at the flex tube first end (405) is interconnected in fluid
communication with the fluid tube second end (310) by connection of the flex tube
connection means (420) and the fluid tube connection means (320); the flex tube (400) at
the flex tube second end (410) is sized to be received and is received through the casing
slot (120) and the telescoping tube slot (240); flex tube connection means (420) at the flex
tube second end (410) is in fluid communication and interconnected with the telescoping
tube (200) at the telescoping tube second end (210) via the telescoping tube
interconnection means (235); the fixture connection means (220) is in fluid communication
with the telescoping tube interconnection means (235) distal to the telescoping tube second
end (210); connection means between the fluid tube 300, the flex tube (400) and between
the flex tube (400) and the telescoping tube interconnection means (235) and between the
telescoping tube interconnection means (235) and the fixture connection means (220) may
be male-female threaded means, male-female quick release or snap fittings, ferrule fittings,
compression fittings and other such interconnection means.

2. An extendable fluid transport apparatus (1) comprising:

   a. a tubular casing (100) having a casing slot (120);

   b. a telescoping tube (200) sized to be received into the tubular casing (100) and is
received into the casing (100); the telescoping tube (200) extends from and retracts into the
casing (100);
c. a fluid tube (300); fluid tube-casing connection means (330) rigidly interconnects
the fluid tube (300) and the casing (100);

d. a flex tube (400) is flexible and has flex tube connection means (420) which is
interconnected at the flex tube first end (405), for fluid transport, with the fluid tube (300)
fluid tube connection means (320) at the fluid tube second end (310);

e. the telescoping tube (200) is interconnected, in fluid communication, with
telescoping tube interconnection means (235) proximal or at the telescoping tube second
end (210); fixture connection means (220) is rigidly affixed at the telescoping tube
interconnection means (235) distal from the telescoping tube second end (210); the flex
tube (400) extends through the casing slot (120) and into the telescoping tube (200) with
tube interconnection between the flex tube connection means (420), at the flex tube second
end (410), and telescoping interconnection means (235) for fluid transport and fluid
conductivity from the fluid tube (300) through the flex tube (400) to the fixture connection
means (220).

3. The extendable fluid transport apparatus of claim 2 further comprising:

a. the casing (100) has a casing first end (105), a casing second end (110), a casing
axis (115); the casing slot (120) formed in the casing (100) from or proximal to the casing
first end (105) toward the casing second end (110);

b. the telescoping tube (200) is received at the casing first end (105) or the casing
second end (110); the telescoping tube (200) has a tube first end (205) and a tube second
end (210); the telescoping tube first end (205) is proximal the casing first end (105) when
the telescoping tube (200) is retracted into the casing (100); a telescoping tube slot (240) extending from the telescoping tube first end (205) toward the telescoping tube second end (210) aligned with the casing slot (120) to receive the flex tube (400) into the telescoping tube (200);

c. the fluid tube (300) has a fluid tube first end (305) and a fluid tube second end (310); the fluid tube (300) has fluid tube connection means (320) at the fluid tube first end (305) and the fluid tube second end (310);

d. the flex tube (400) has a flex tube first end (405) and a flex tube second end (410); the flex tube (400) has flex tube connection means (420) at the flex tube first end (405) and at the flex tube second end (410);

e. the telescoping tube (200) has at least one fixture connection means (220) at or proximal the tube second end (210); said fixture connection means (220) conveys a fluid;

f. the fluid tube-casing connection means (330) rigidly interconnects the tubular casing (100) and the fluid tube (300) or the fluid tube (300) and the casing (100) are integrally formed;

g. the flex tube (400) at the flex tube first end (405) is interconnected with the fluid tube second end (310) by connection of the flex tube first end (410) flex tube connection means (420) and the fluid tube connection means (320) at the fluid tube second end (310); the flex tube (400) at the flex tube second end (410) is sized to be received and is received through the casing slot (120); the flex tube second end (410) flex tube connection means (420) interconnects with the telescoping tube (200) at the tube first end (205) tube connection means (220).
4. The extendable fluid transport apparatus of claim 3 further comprising:
   a. the casing axis (115) is centrally positioned from the casing first end (105) to the
casing second end (110); the casing slot (120) is generally parallel with the casing axis
(115); casing-tube interconnection means (130) at or proximal to the casing second end
(110) or intermediate the casing first end (105) and the casing second end (HO);
   b. the fluid tube (300) is positioned generally parallel with the casing axis (115);
fluid tube-casing connection means (330) between the fluid tube (300) and the casing (100)
is by integral construction or comprised of at least one fluid tube bracket (330) immovably
fixing the fluid tube (300) to the casing (100);
   c. the telescoping tube (200) is secured from rotation and secured within the casing
(100) by casing-tube interconnection means (130); the telescoping tube (200) is releasably
fixed in at least one extended telescoping position by interaction between the casing-tube
interconnection means (130) and the telescoping tube-casing interconnection means (230).

5. The extendable fluid transport apparatus of claim 4 further comprising:
   a. the casing-tube interconnection means (130) being a ball detent or ferrule; the
tube-casing interconnection means (230) being at least one detent aperture (230) in the
telescoping tube (200) intermediate the tube first end (205) and the tube second end (210);
   b. the telescoping tube (200) has a hexagonal cross-section; the casing-tube
interconnection means (130) at an inside, receives the telescoping tube (200) and has a
hexagonal aperture (135) to receive and secure the telescoping tube (200) from rotation;
   c. when the fluid tube-casing connection means (330) is bracket means at least one
bracket interconnection between the fluid tube first end (305) and the casing (100)
proximal the casing first end (105) and at least one bracket interconnection between the
fluid tube second end (310) and the casing (100) intermediate the casing first end (105) and
the casing second end (110).
6. The extendable fluid transport apparatus of claim 5 further comprising:
   a. the fluid tube (300) is positioned relative to the casing axis (115) and relative to
      the casing slot (120) and telescoping tube slot (240) at a casing slot-fluid tube angle \( \Theta \)
      (125).

7. The extendable fluid transport apparatus of claim 6 further comprising:
   a. the casing slot-fluid tube angle \( \Theta \) (125) is generally between 155° to 175°.

8. The extendable fluid transport apparatus of claim 7 further comprising:
   a. the casing slot (120) has a casing slot first end (122) proximal the casing first end
      (105); the casing slot (120) width at and proximal the casing slot first end (122) is greater
      proximal the casing first end (105) and diminishes toward the casing second end (110).
INTERNATIONAL SEARCH REPORT

International application No PCT/US2008/066176

A CLASSIFICATION OF SUBJECT MATTER
IPC(8) - B05C 21/00 (2008.04)
USPC - 222/464 5

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)
IPC(8) - B05C 21/00 (2008 04)
USPC - 222/174, 464 5, 523, 239/165,176, 281, 532, 285/302, 401/170

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)
PatBase

C DOCUMENTS CONSIDERED TO BE RELEVANT

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<tr>
<th>Category*</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No</th>
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<td>DE 38 04 889 A1 (STROBL) 31 August 1989 (31 08 1989) entire document</td>
<td>1-8</td>
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<td>Y</td>
<td>US 1,357,564 A (HUGHES) 02 November 1920 (02 11 1920) entire document</td>
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<td>Y</td>
<td>US 1,516,226 A (WIXOM) 18 November 1924 (18 11 1924) entire document</td>
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Date of the actual completion of the international search
23 September 2008

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