

Chronic Total Occlusion (CTO) Treatment Device Project - DFM -

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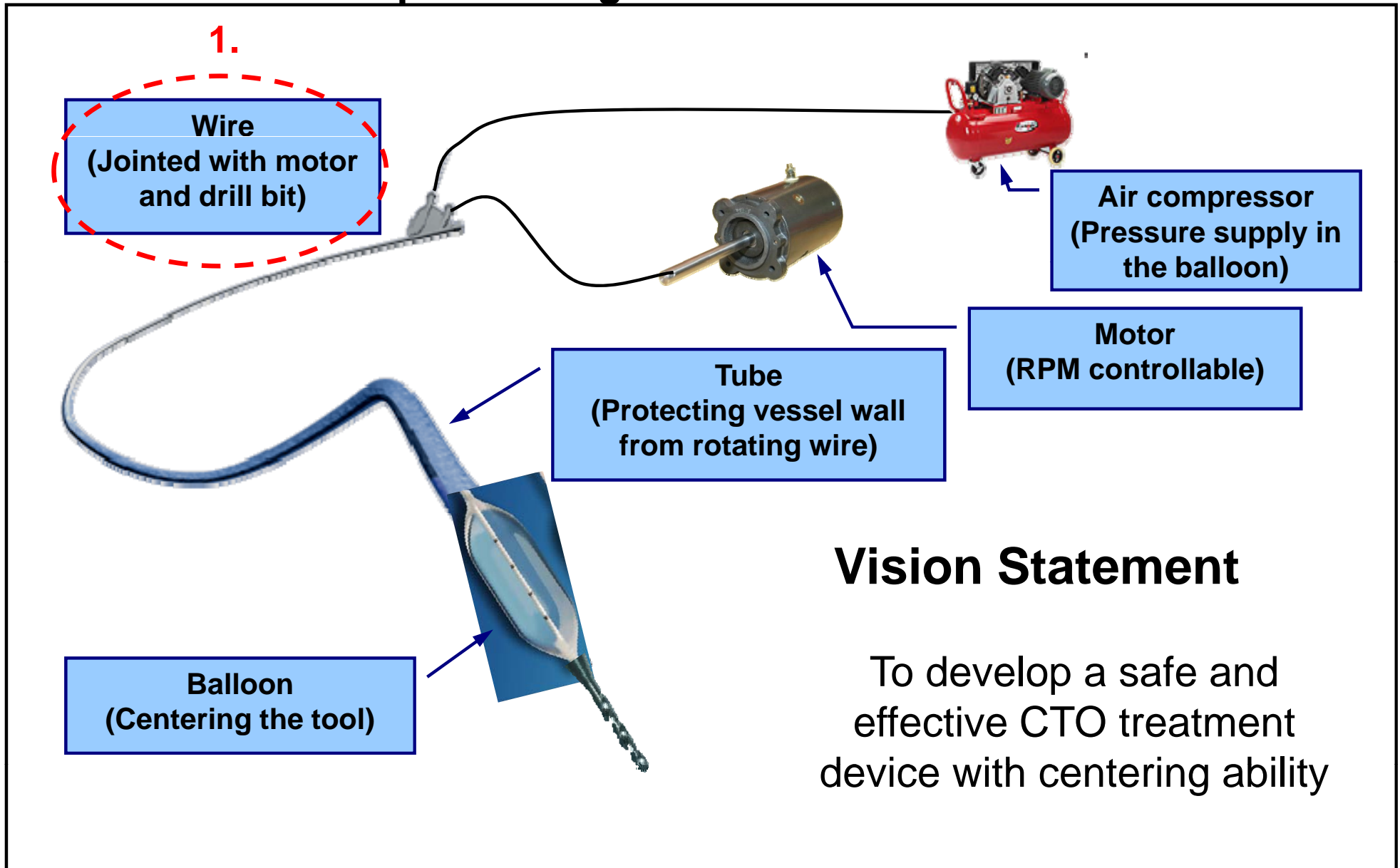
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Conceptual Design

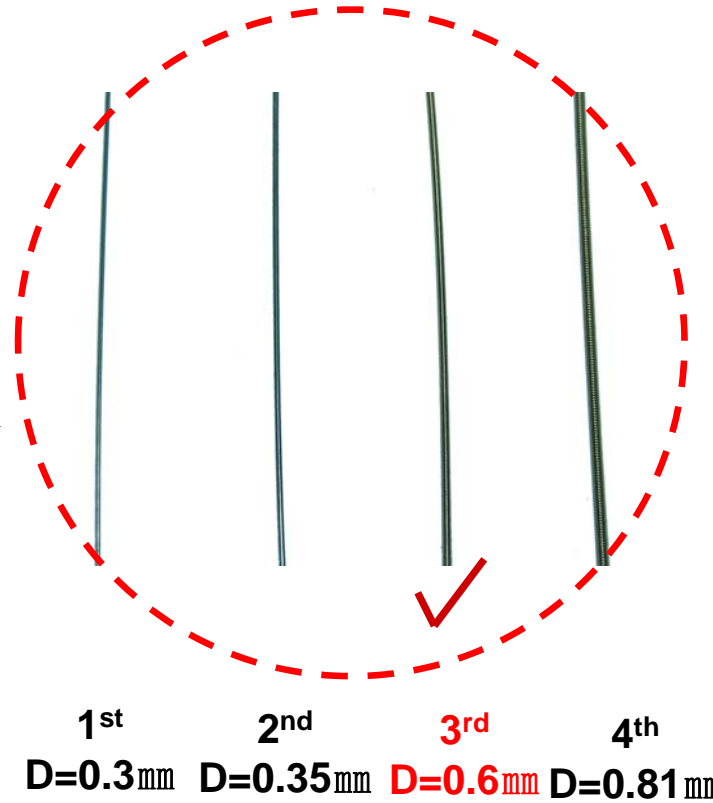
The Conceptual Design of CTO Treatment Device





Part Materials

- Wire



Guitar string is very strong and flexible.

1st and 2nd wires are plain steel,

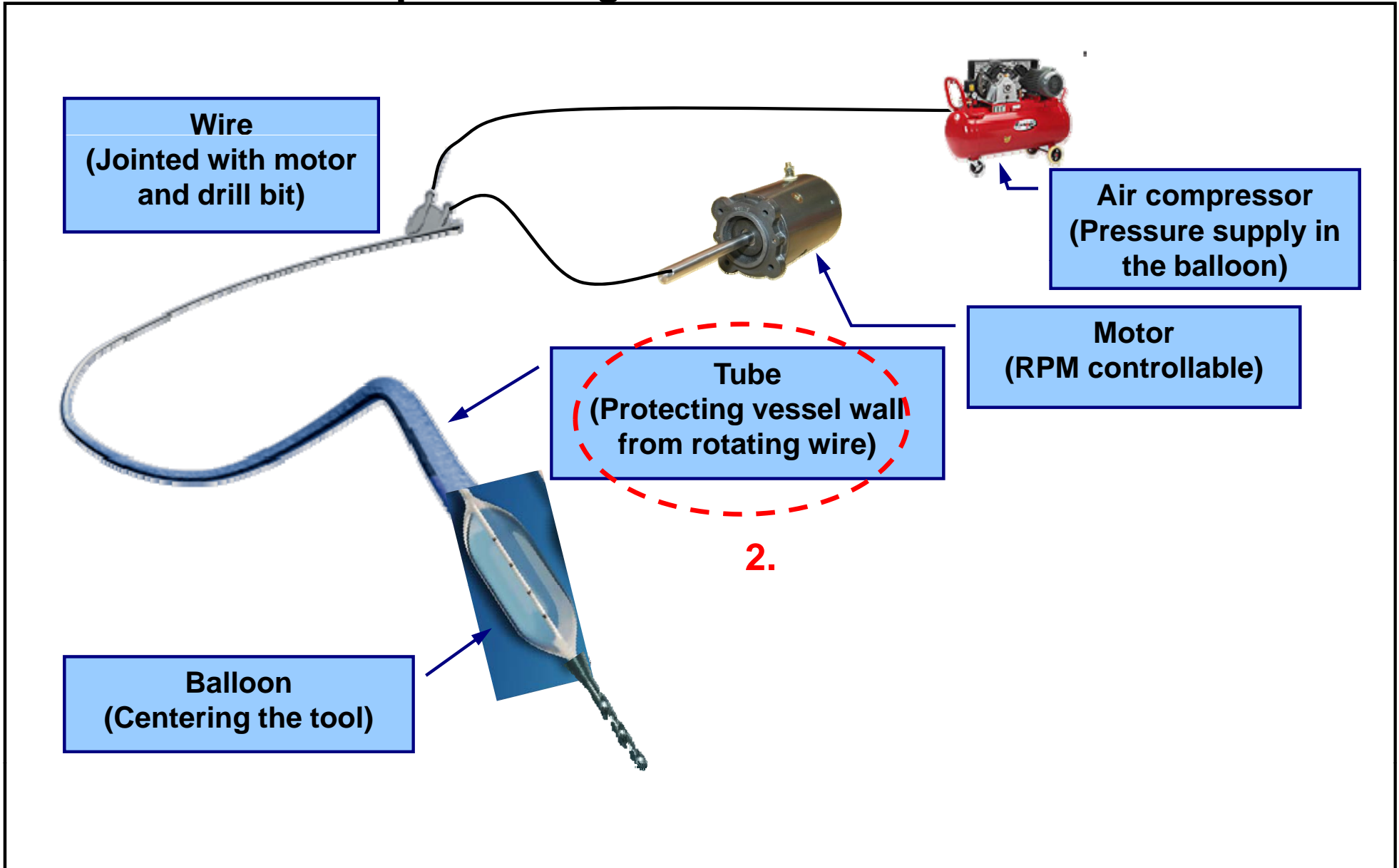
3rd and 4th wires are **bronze (copper + zinc) wound string.**

Selected part is 3rd string.



Conceptual Design

The Conceptual Design of CTO Treatment Device



Part Materials

▪ Tube



Outer tube : Infusion tube



external Diameter = 3.5 mm

internal Diameter = 2.6 mm

Infusion tube is not deformable at high pressure, but very flexible.



inner tube : covering of electric cable

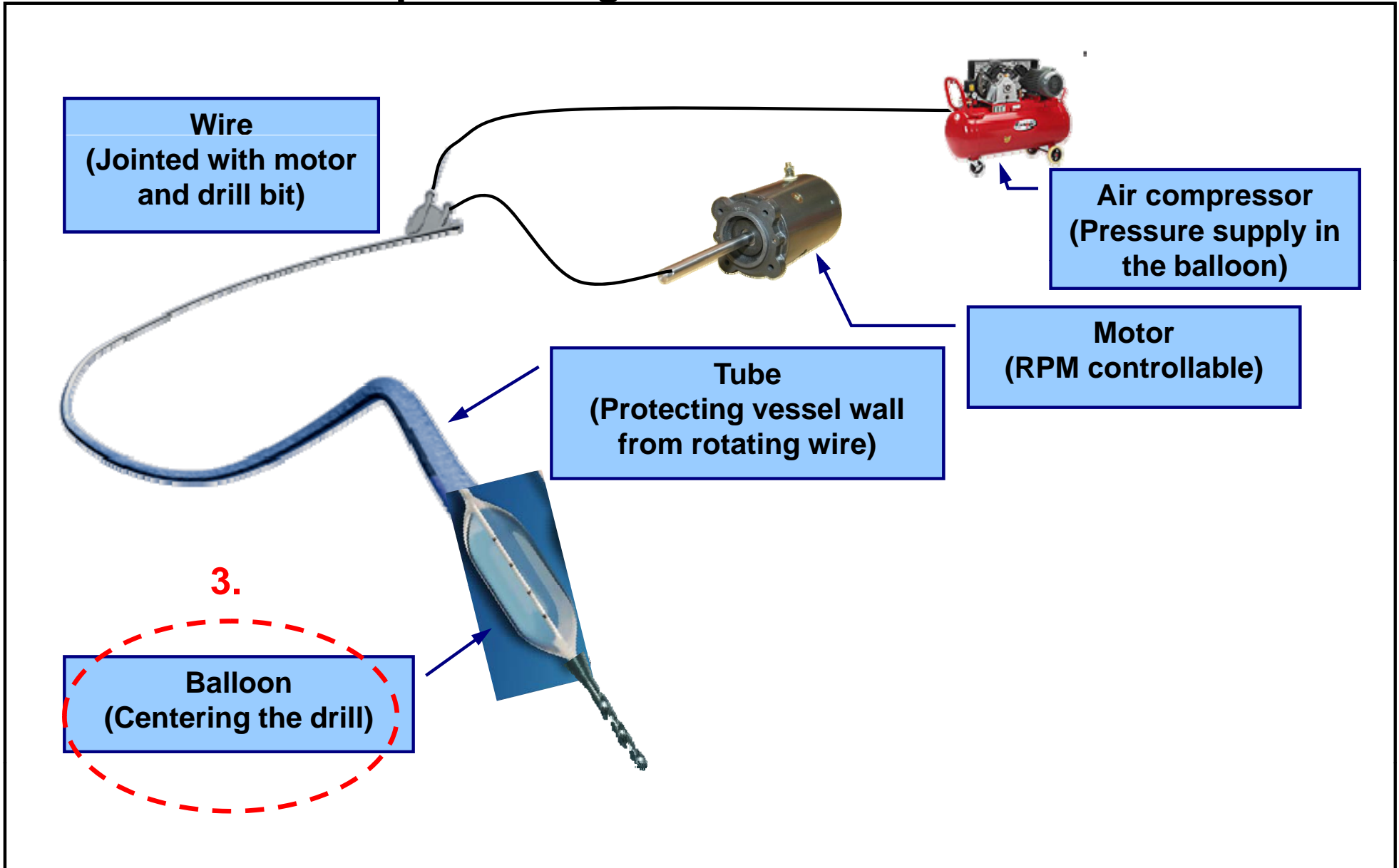
Infusion set is donated by the Korean Army medical office.

Three-way connector is donated by 강남고려병원.



Conceptual Design

The Conceptual Design of CTO Treatment Device



Part Materials

- **Balloon & adhesives**



Natural rubber tube



Adhesive agent : contraction tube (by heat)



Diameter = 4 mm

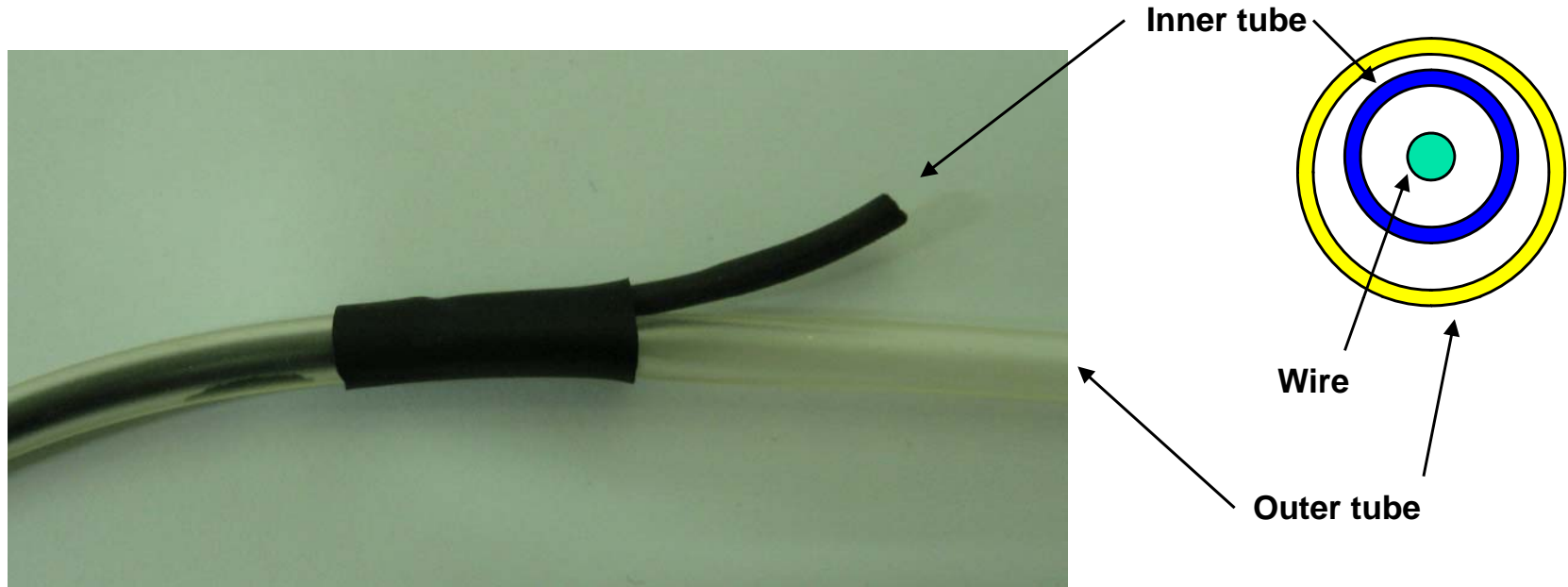
Natural rubber tube is used for a cloth diaper and an injection of ringer's solution.

Contraction tube is usually used for insulation.

Natural rubber tube is donated by the Korean Army medical office.

Fabrication

▪ Tube fabrication



1. Make a hole at outer tube.
2. Insert inner tube in the outer tube through the hole.
3. Seal the intersection of the tubes with contraction tube.

Fabrication

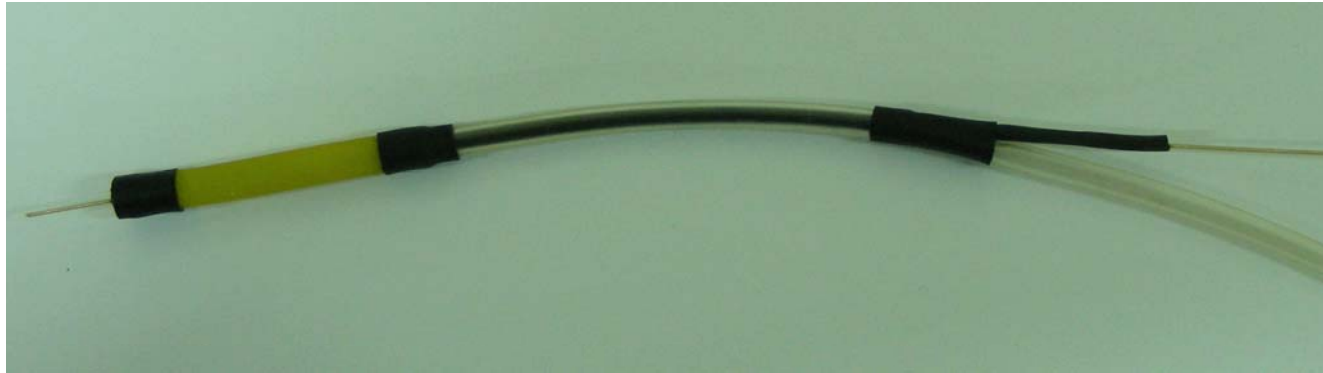
- **Balloon fabrication**



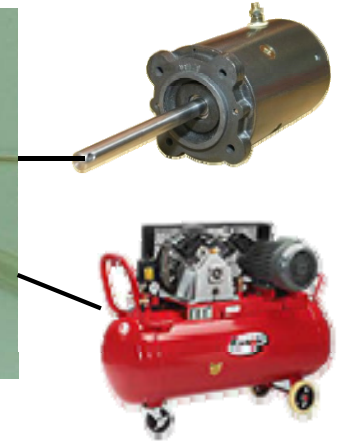
- 1. Natural rubber tube is inserted on inner and outer tube.**
- 2. Each end of natural rubber tube is attached to the inner and outer tube and both ends are sealed with contraction tube.**

Fabrication

- **Balloon fabrication & Operation**



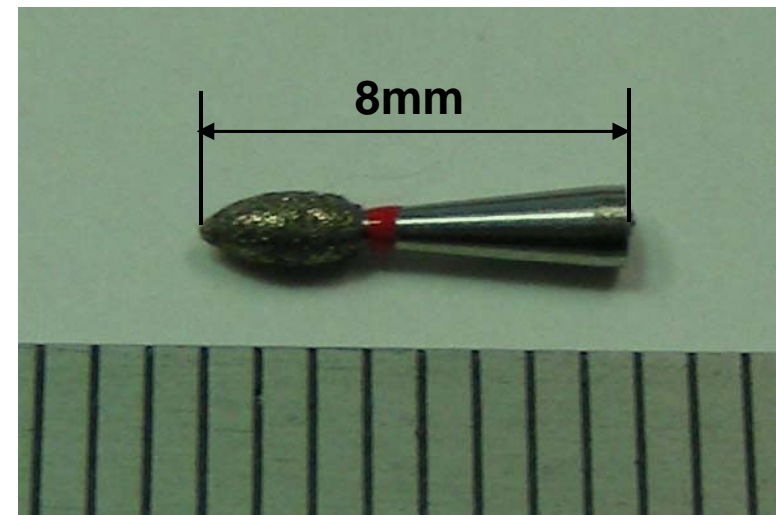
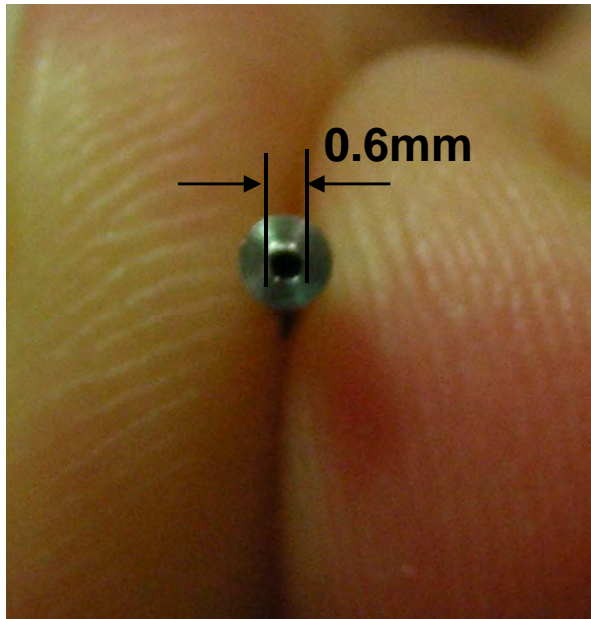
The wire is inserted in the inner tube.



- 1. Outer tube is connected to the air or water compressor.**
 - 2. Wire is connected to rotating equipment.**
- (This movie shows you blow in and blow out operations of balloon)**

Fabrication

- Drill fabrication

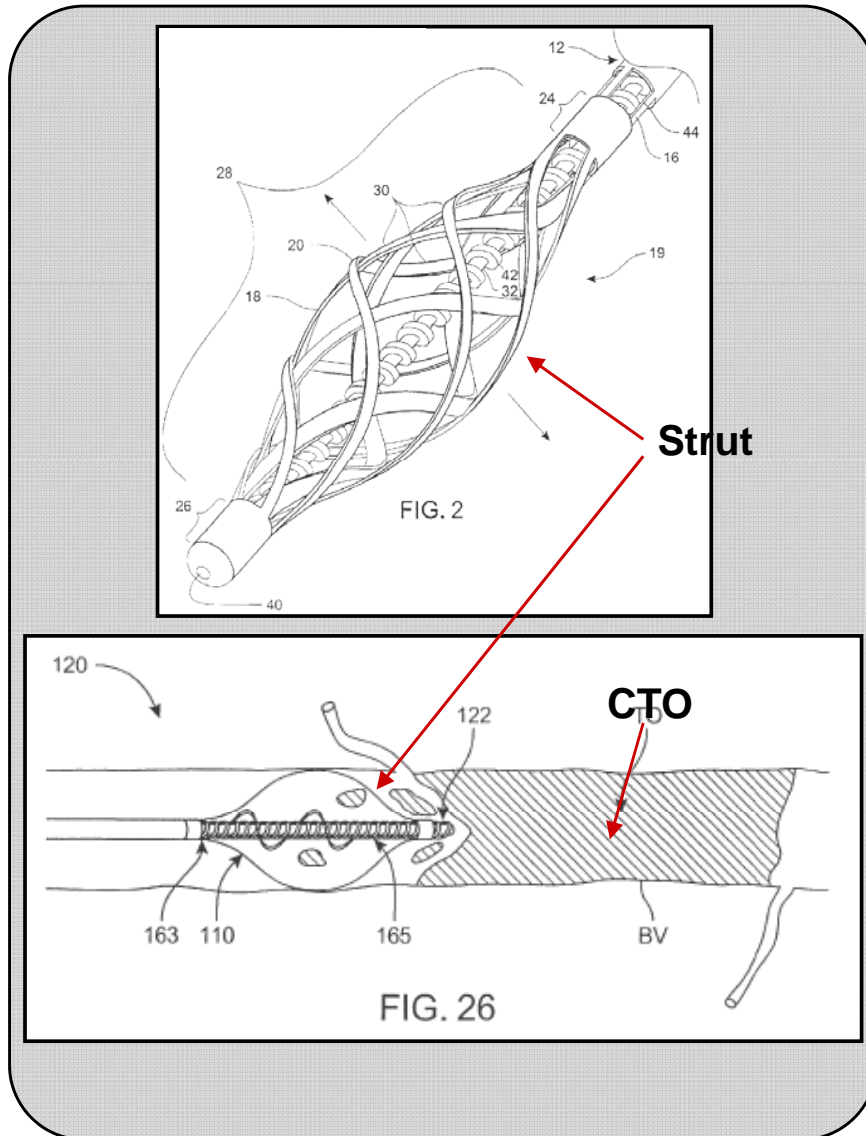


1. The hole of the burr is drilled in 0.6mm diameter by EDM (Electric Discharge Machining).
2. The drilled burr is cut in 8mm.

Patents About CTO Treatment (1)

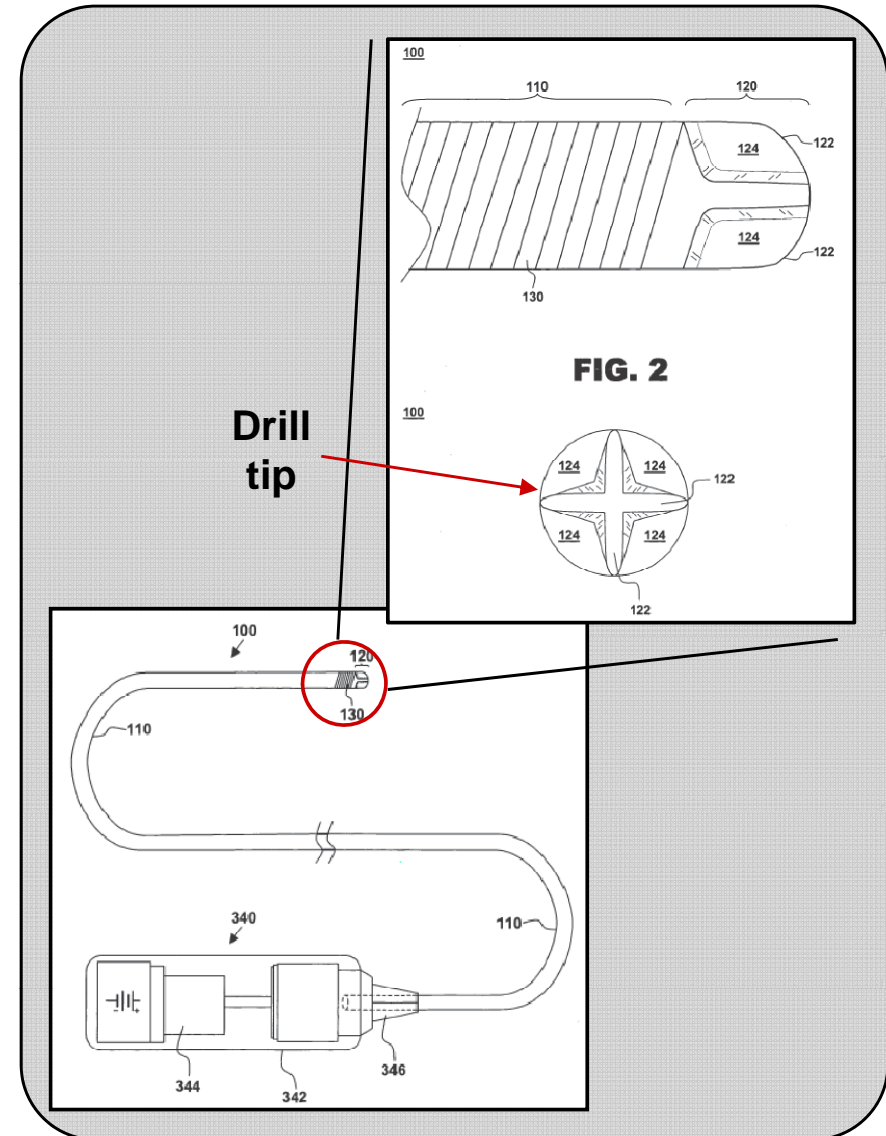
- Evans et al. (2001)

- Using flexible struts



- Noone (2005)

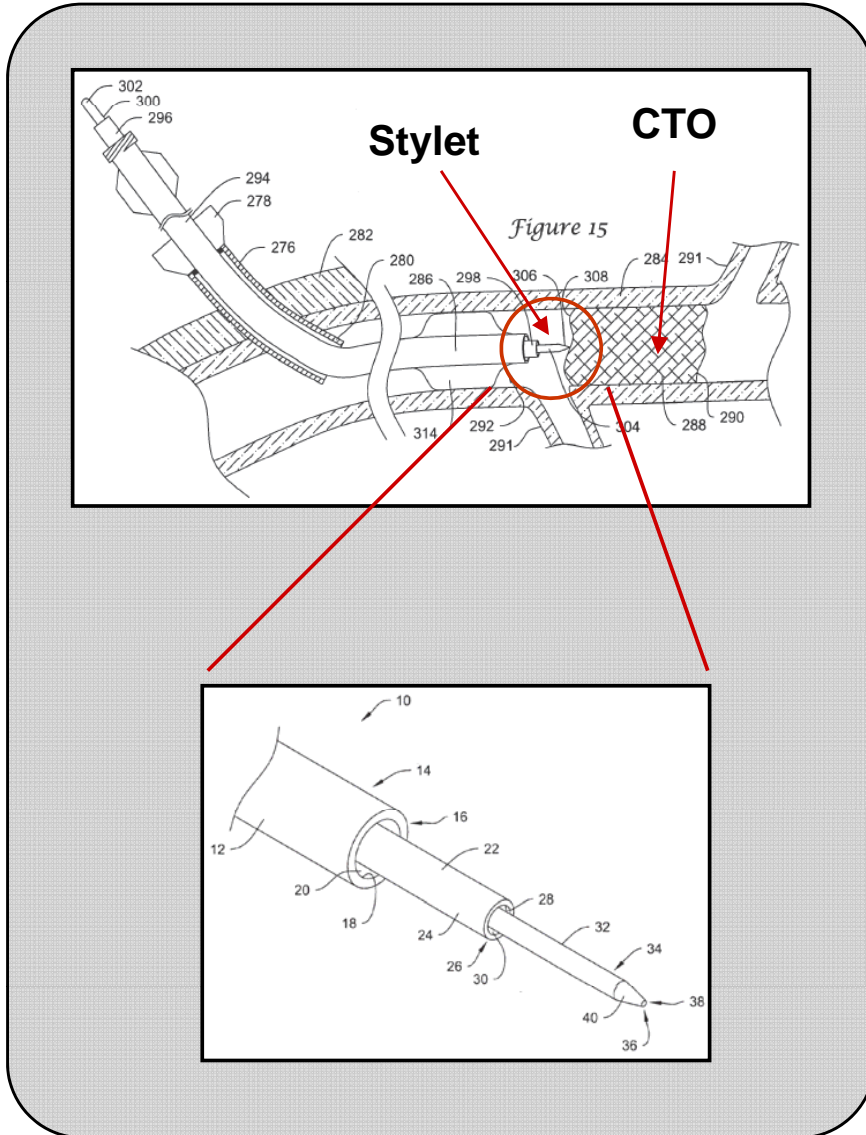
- Drill tip on the guide wire



Patents About CTO Treatment (2)

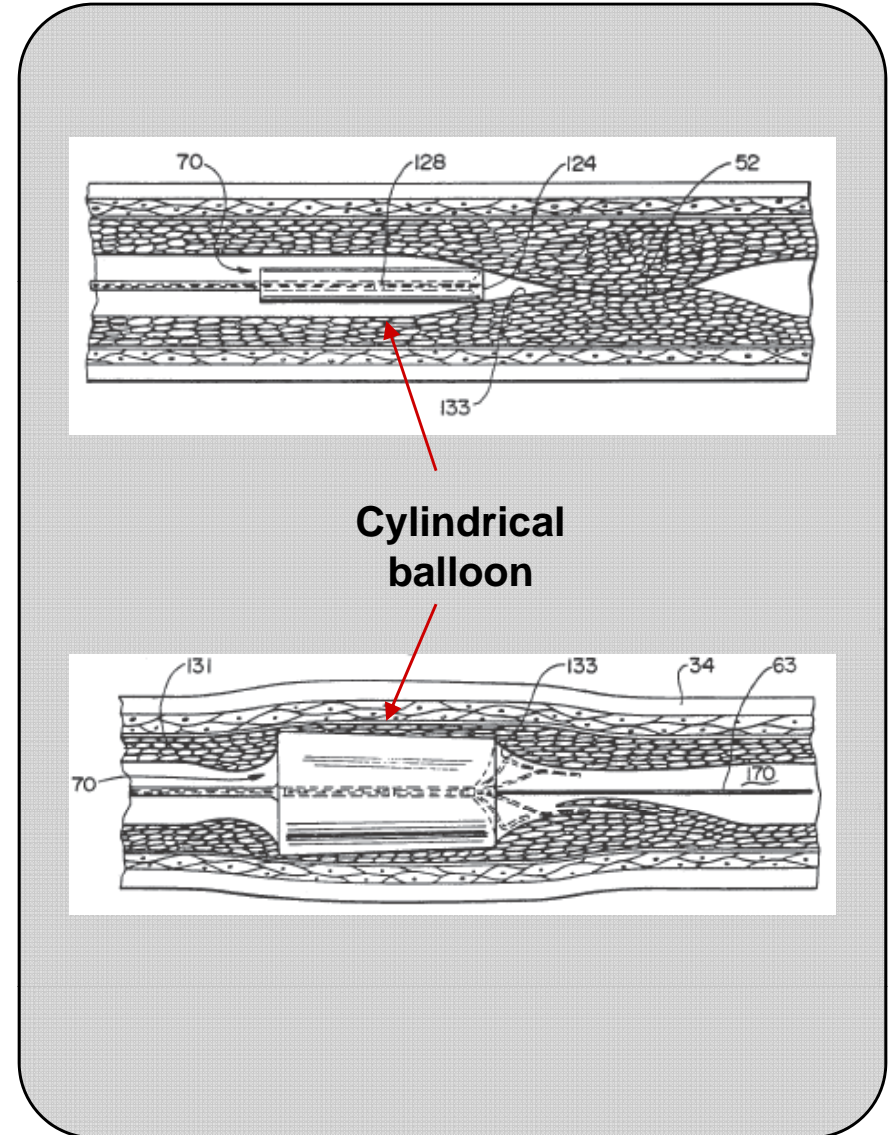
- **Jenson et al. (2006)**

- Using stylet to penetrate CTO



- **Myers (1993)**

- Enlarging with cylindrical balloon





Future works

- **Future works**
 - Improvement of Prototype
 - Realization
 - Mechanism : centering -> holding & cutting -> release (repetitive)
 - Test of prototype
 - Test of the prototype in the environment similar to blood vessel



Project Schedule



Project Schedule Table

Plans	Mar	Apr	May	Jun	Remarks
Basic Research					Functions of parts
Detail part design					Specifications
Developing components					Buying or manufacturing parts
Assembly & fabricating prototype					
Test					Final Presentation



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THANK YOU