



INNOVATIONS FOR UNDERGROUND DRILLING

BY AUTONOMOUS TRANSPORT OF MATERIAL
AND ENERGY IN FLUID ENVIRONMENT

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Who we are ?



- Knowledge oriented SME
- Founded in 1994 in Bratislava, Slovakia
- Innovative SME with several areas of expertise
- Team of senior researchers with long academic background and R&D experience

Ivan Kočíš, PhD

- Education- PhD (1971), honor for tech achievements
- Experience-R&D director ITC, prime minister advisor
- Interdisciplinary innovations, alternative energy

What we do ?



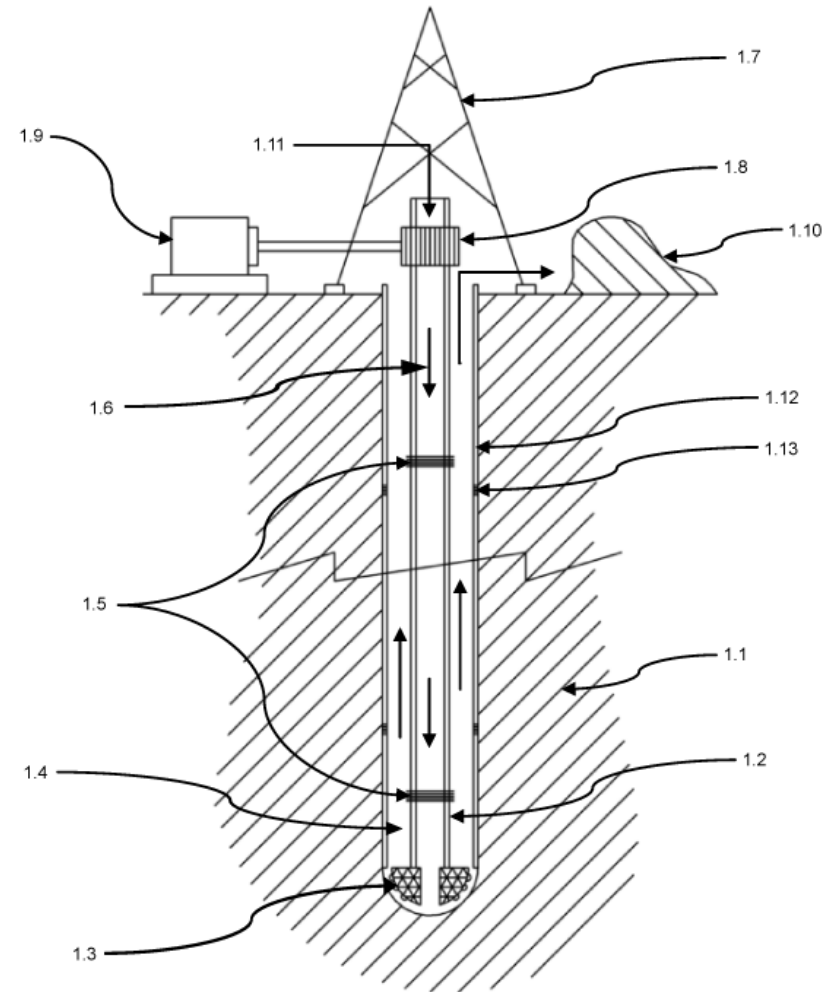
- Alternative energy concepts
- Geothermal energy innovations
- Specialized analyses and feasibility studies
- New solutions in ICT technologies

State of the Art in Drilling



Present drilling deficiencies:

- Exponential drilling costs
- Capacity of drills
- Depth limits



Existing Drilling Techniques



Rotary	Pellet	Laser
Spark	Turbine	Electron beam
Erosion	Plasma	Microwave
Explosive	Electric arc	Induction
Forced-Flame	High-Frequency	Ultrasonic
Jet-Piercing	Electric Heater	Chemical Reactions
Electric Disintegration	Nuclear	Terra-Jetter

Needs, Requirements, Demands



MIT Prof. Jefferson Tester defined the requirements:

- Reduce the exponential drilling costs (price/m)
- Neutrally buoyant drill string to greatly reduce rig size and capacity demands
- Vertical and directional drilling capability to total drilled depths > 20 km
- Under-reaming capability for creating subsurface infrastructures to at least 5 x base well diameter
- Built in hole stabilization with glassy liners and casing formed in place

What is the Smartrends Innovation ?



- Transport of energy to the drilling process
- Transport of disintegrated rock towards the surface
- No physical connection between ground and underground base station
- Solution suitable for any depth of drill hole
- Building of casing in hole parallel with drilling
- Energy-saving cutting and transport of mined rock – block cutting approach
- Speed of overall process

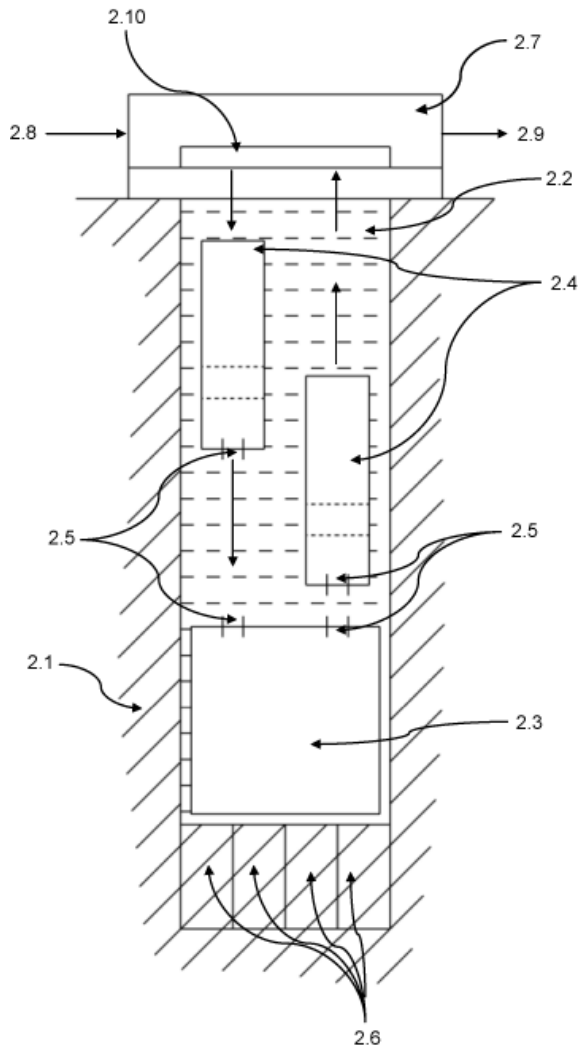
Advantage of Smartrends Solution



A radical innovative method that avoids
the inherent limitations of conventional rotary
drilling and material transport

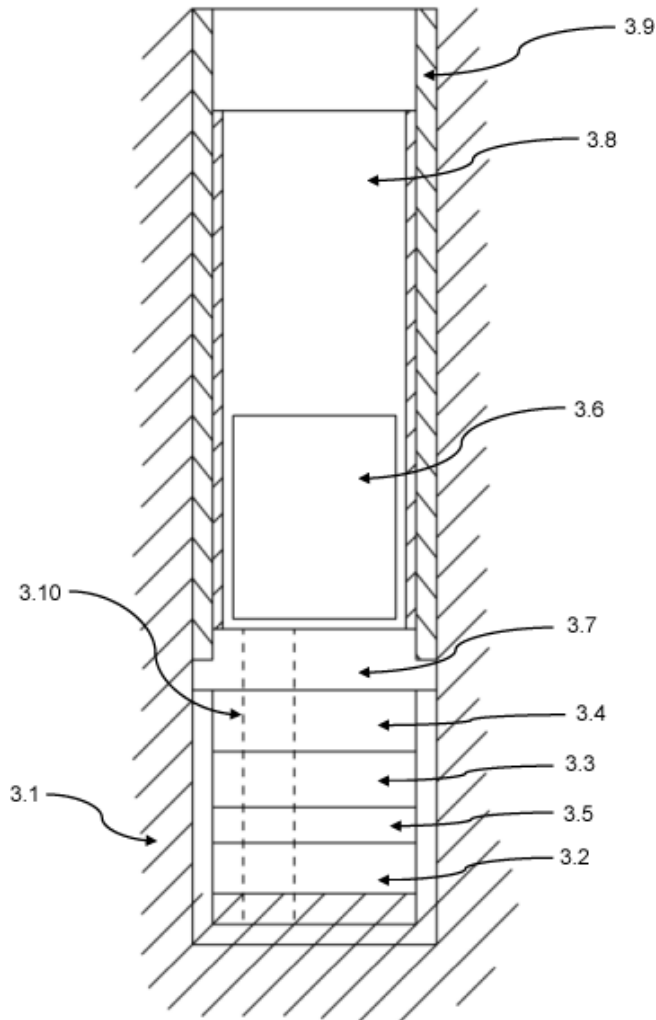
patented solution

Components of the Drilling System



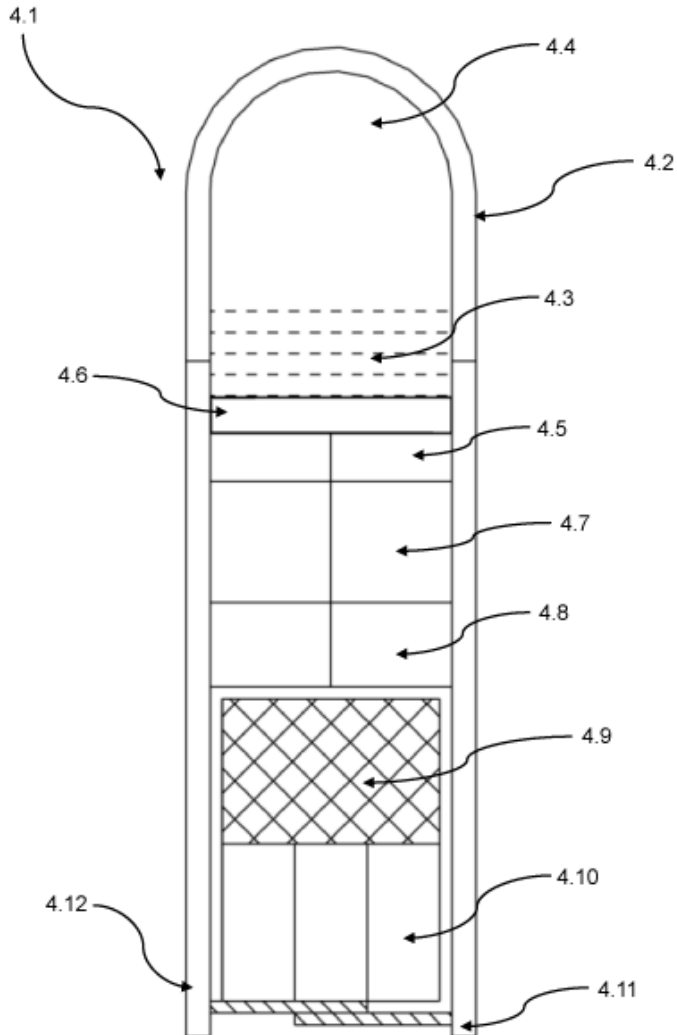
- Ground base station
- Transport unit
- Bore hole filled with fluid
- Underground base station

Underground Base Station

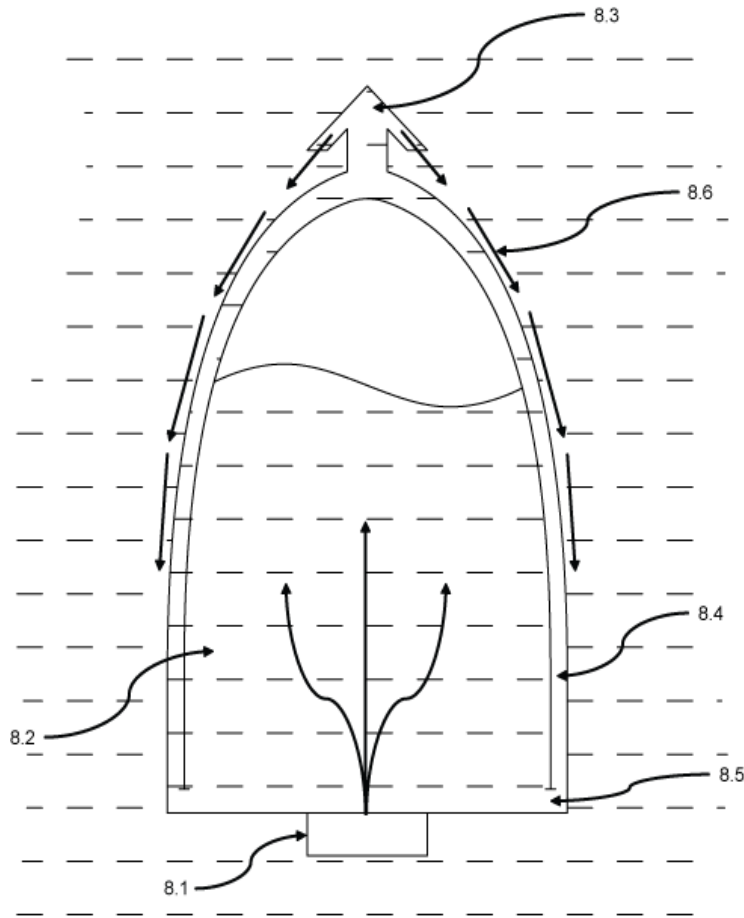


- Autonomous transport system
- Transport unit interface
- Overall control unit
- Casing production unit
- Motion control unit
- Energy source and storage
- Cutting, drilling

Transport Unit



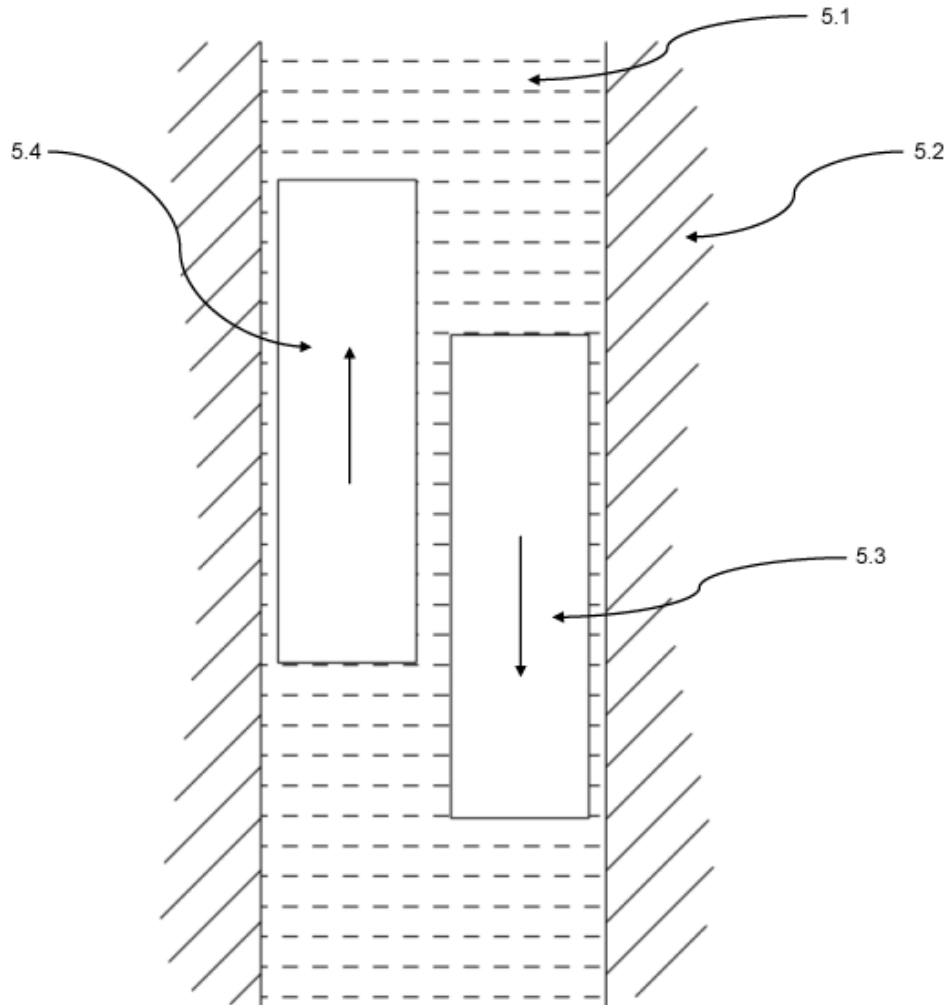
- Container for drilled rock
- Container for “fuel”
- Overall control unit
- Motion control unit
- Energy source
- Buoyancy principle
- Reactive, mechanical drive



Supercavitation principle for friction reduction

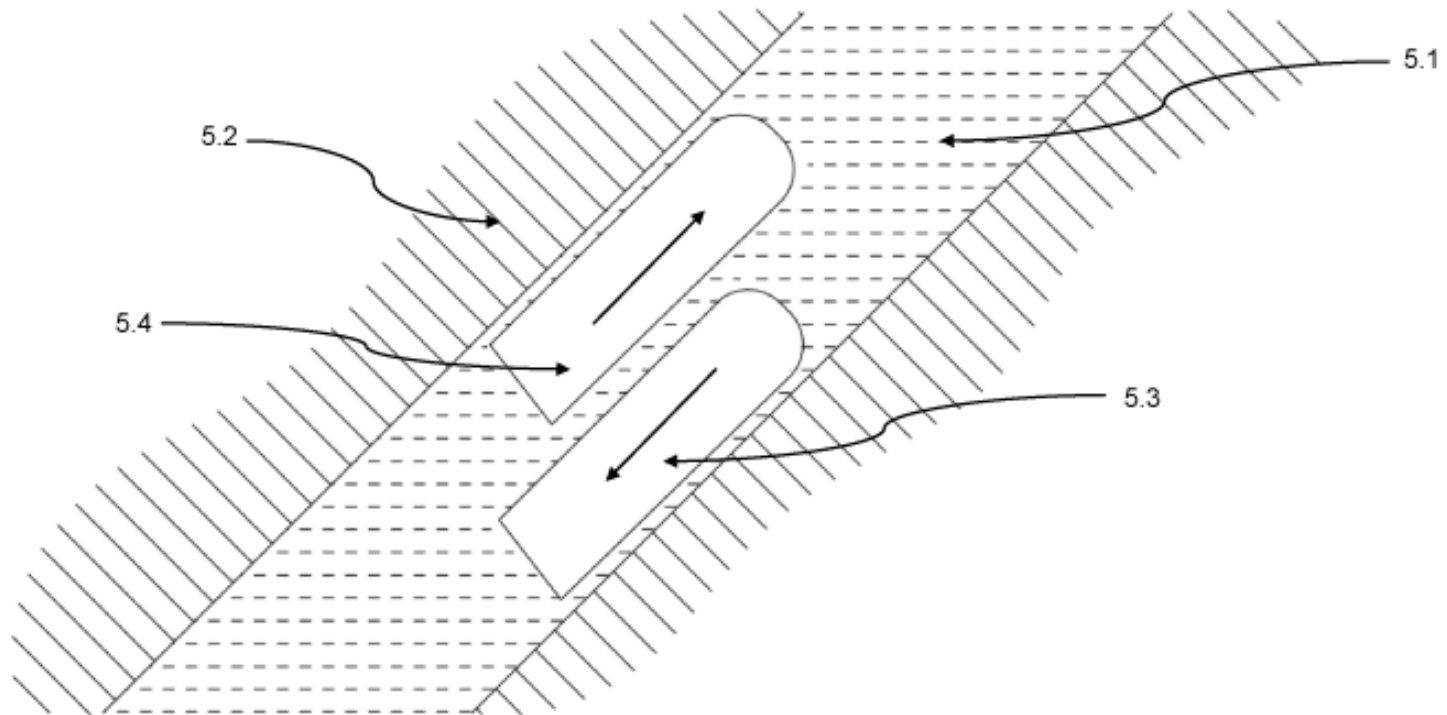
- Hot air flow
- Ventilated cavitation
- Air cushion
- Low friction
- Motion drive energy saving
- Reactive motion drive

Transport Techniques II.

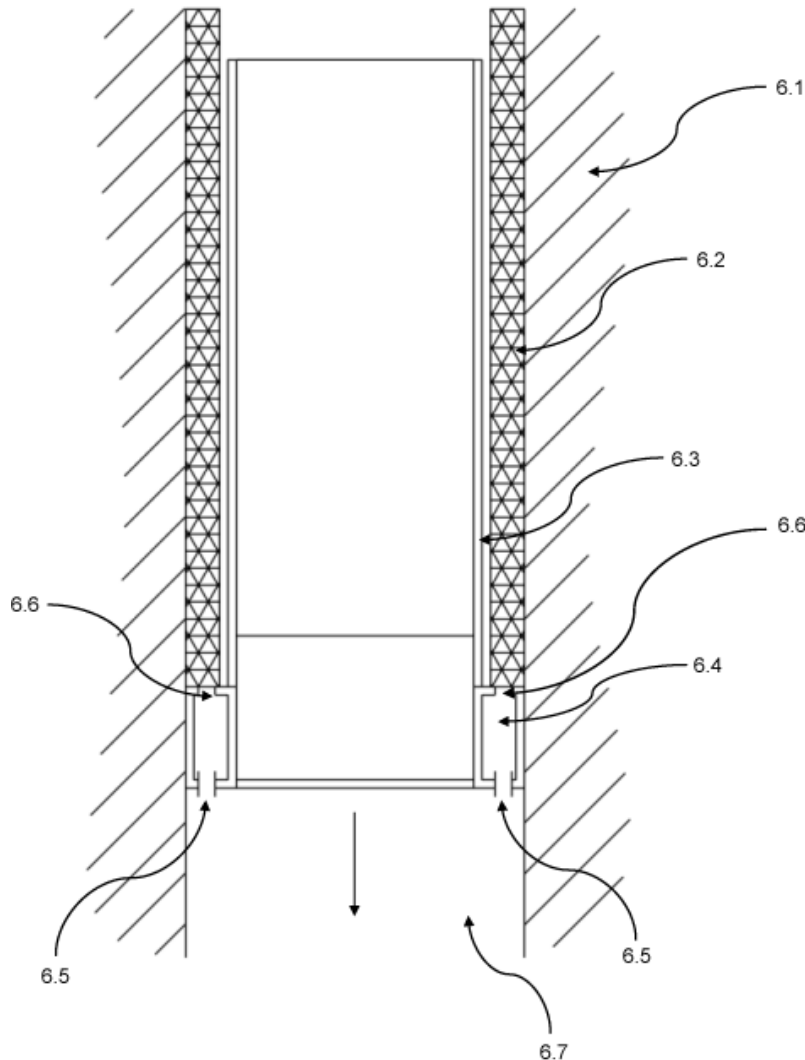


- More transport units
- Collision avoidance
- Traffic control

Transport Techniques III.



Continuous Casing Production



- Underground base station
- Crushed rock
- Binding material
- Reinforcing fibres
- Instant (quick) setting
- Continuous casing production
- Interface to transport unit
- Source substance supply

Social and Economical Impacts



- Long-term energy source
- Resolution of insufficient energy problem
- New industry segments
- Independence from fossil fuels in long term
- Undiscovered possibilities
- World socio-economical equilibrium
- Greenhouse effect avoidance

Next Steps



1. Feasibility study of partial problems
2. Proof of the concept project
 - Joining top experts in the field
 - Building financially strong consortium (industry, FP7)
 - Pilot project
 - Production in several application areas

Application Areas



- Geothermal power plants
- Oil wells
- Sarcophagus (used dangerous material)
- Well
- Mining

**Thank you for your
attention**

**I am looking forward
for future cooperation**

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