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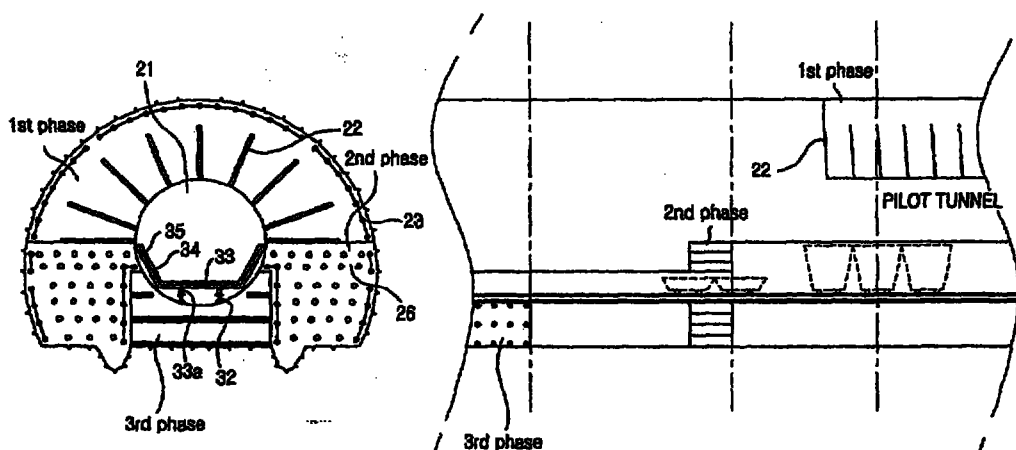
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(54) Title: THREE DIMENSIONAL MULTI-PHASE TUNNELING METHOD AND EQUIPMENTS THEREOF



(57) Abstract: A three dimensional multi-phase tunneling method and equipments thereof, make it possible that a drilling and blast-ing process can be carried out simultaneously during excavating a pilot tunnel by means of tunnel boring machine (TBM), thereby is capable of reducing the period and the cost of excavation. The three dimensional multi-phase tunneling method includes the steps of drilling an oblique charge hole on an upper half section in a pilot tunnel being excavated by a tunnel boring machine (TBM) and drilling an outermost charge hole to a predetermined length in a tunneling direction (longitudinal direction) at an outermost tunneling section during excavating the pilot tunnel, and charging and blasting the upper half section, wherein the oblique charge hole is turned at a predetermined angle from a transverse direction to a longitudinal direction, and charging and blasting the lower half section except the central portion apart by a predetermined distance from the tunnel face after drilling a longitudinal hole.

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