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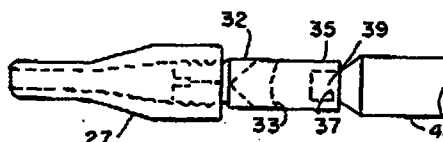
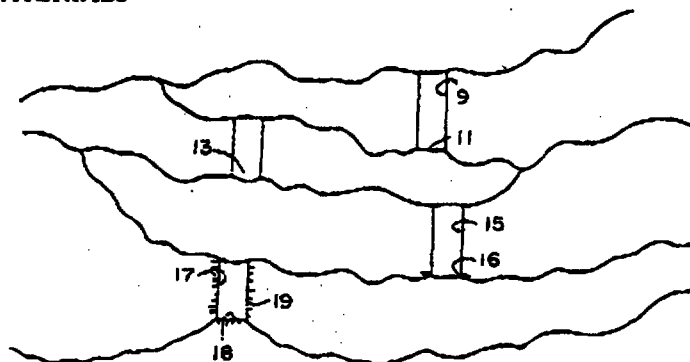
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THIS SHEET HAS BEEN
REPLACED

(54) Title: **CONTROLLED FRACTURE METHOD AND APPARATUS FOR BREAKING HARD COMPACT ROCK AND CONCRETE MATERIALS**



This Sheet Has Been Replaced



(57) Abstract

Hard compact materials, such as rock, concrete, et cetera, are broken by igniting an appropriately designed explosive or propellant charge (101) carried in a special charge-containing device (27) with a short barrel (25) which is inserted and sealed into a pre-drilled hole (9) of particular geometry. Holes (9) are percussively drilled with microfractures (19) in and around hole bottoms (13) to provide fracture initiation sites at the hole bottom (13) so as to provide preferred fracture initiation roughly parallel to a free surface of material being excavated. The propellant charge (101) may be placed and ignited within a charge-containing device (27) which includes a short barrel (25) inserted into the holes (9) drilled into the material to be broken. The barrel (25) of this device (27) may be further sealed into the holes (9) by a helical shim (21) or by having a slight shoulder (53) on the barrel pressed against a slight step (49) on the hole wall (43).