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(54) RESISTOR-BASED IGNITION SYSTEM FOR A CORE GUN

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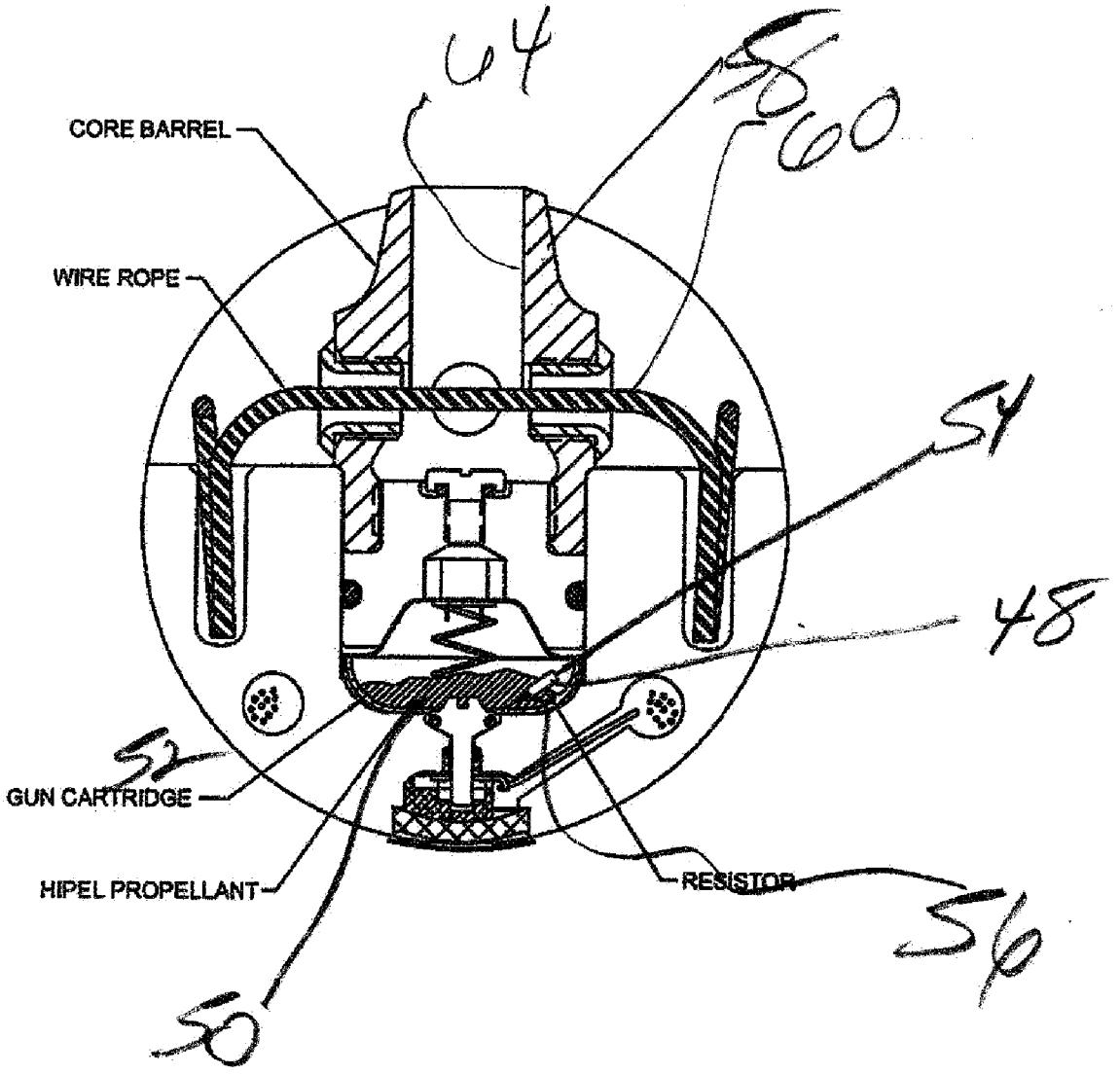
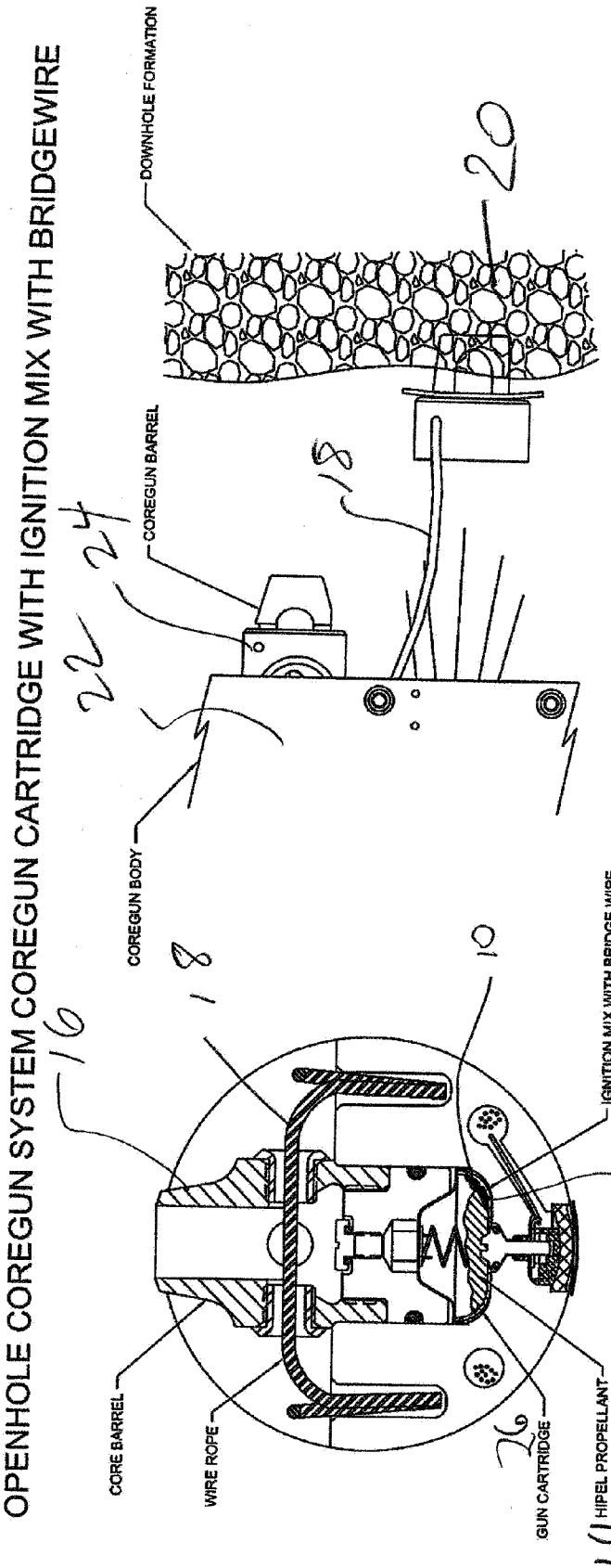
(57) **ABSTRACT**

A core gun igniter assembly features a resistor under 50 ohms that is welded rather than soldered to a circuit. Upon energizing the circuit, the resistor creates the heat needed to directly set off the propellant to directly drive the core barrel into the surrounding formation to obtain the desired core sample. The use of a titanium powder ignition mix on a nichrome wire with its attendant safety risks is eliminated.





FIG#1a
PRIOR ART

FIG#1b
PRIOR ART

CASED HOLE CHEMICAL CUTTER SYSTEM USING E-12 IGNITER

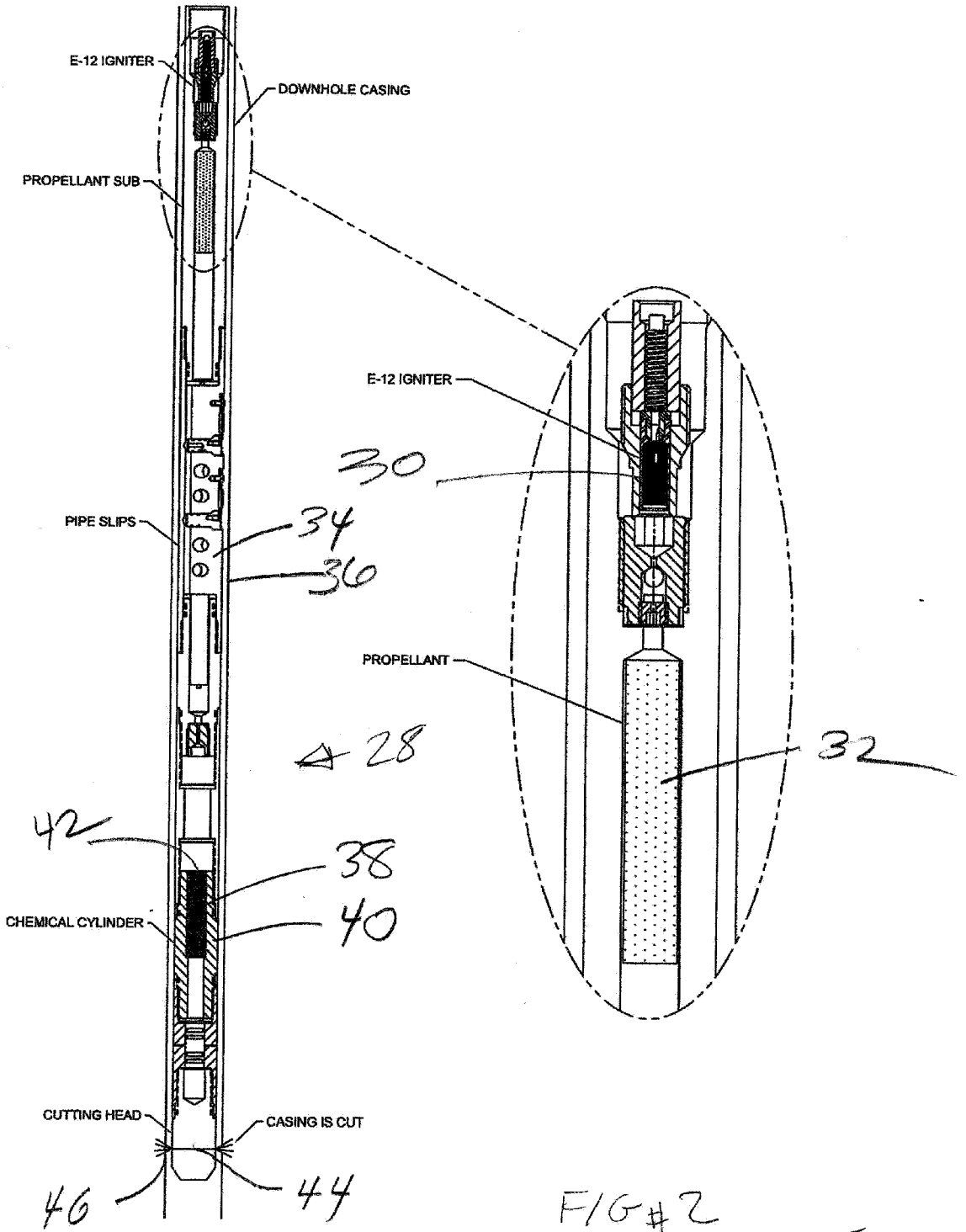
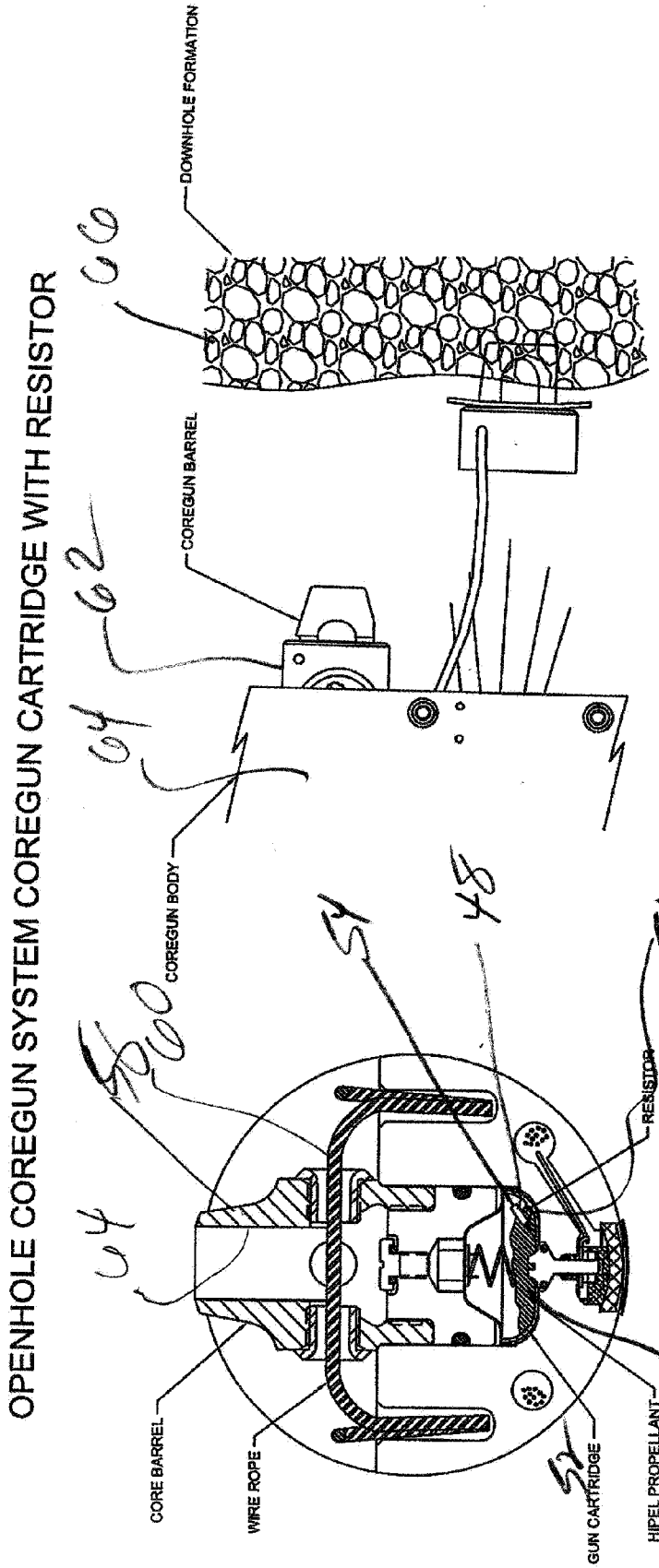


FIG #2
PRIOR ART


OPENHOLE COREGUN SYSTEM COREGUN CARTRIDGE WITH RESISTOR
DOWNHOLE FORMATION
COREGUN BARREL
COREGUN BODY
RESISTOR
CORE BARREL
WIRE ROPE
GUN CARTRIDGE
HIPEL PROPELLANT

FIG#3b

FIG#3a

RESISTOR-BASED IGNITION SYSTEM FOR A CORE GUN

FIELD OF THE INVENTION

[0001] The field of the invention is igniter systems for explosively operated subterranean tools and more particularly core guns.

BACKGROUND OF THE INVENTION

[0002] As shown in FIG. **1***a*, core gun cartridges have been manufactured for many years using Nichrome wire **10** coated with TK1 ignition mix **12** to ignite the main load of the propellant **14**. However there are several negatives and safety issues with the current system. TK1 mix **12** is hazardous to handle when dry and is sensitive to electrostatic discharge, friction and impact. The TK1 mix **12** is a fine titanium power which could be hazardous to handle in certain stages of manufacturing process. The manufacturing process of TK1 **12** is relatively a ill defined process and is left up to operator judgment to ensure a consistent product. Solder process sometimes fails do to cold solder joints.

[0003] FIG. **1***a* shows the core barrel **16** tethered with a wire rope **18**, a portion of which remains attached to the barrel **16** for retrieval after the barrel **16** is propelled into the formation **20**. The gun body **22** may also contain additional barrels such as **24** that can be independently fired.

[0004] The ignition mix **12** has in the past caused small fires and presented a personnel safety hazard when assembled into a cartridge **26**. Despite such risks core guns have been assembled with this dangerous ignition mix for many years.

[0005] FIG. **2** represents a cased hole chemical cutter where an igniter **30** comprises a 30 ohm resister that when fed current gets sufficiently hot to ignite the propellant **32** which in turn sets the slips **34** against the casing to be cut below **36**. The pressure generated by the propellant **32** also drives out the chemical **38** from a cylinder **40** by breaking the rupture disc **42** and forcing the chemical **38** out nozzles **44** to create the cut **46**. This tool has been used with the above described ignition system for many years.

[0006] Yet despite the existence of the chemical cutter of FIG. **2** the core guns that have been in use for years have featured the use of the ignition mix **12** and its associated hazards.

[0007] The present invention removes the ignition mix and replaces the nichrome wire **10** with the ignition mix **12** combination with a precision resistor preferably under 50 ohms in the core gun to remove the stated disadvantages in the context of a core gun where the core is directly driven by the ignited propellant into the surrounding formation. Those skilled in the art will further appreciate these and other aspects of the invention from a review of the detailed description of the preferred embodiment and the associated drawing while appreciating that the full scope of the invention is to be found in the appended claims.

SUMMARY OF THE INVENTION

[0008] A core gun igniter assembly features a resistor under 50 ohms that is welded rather than soldered to a circuit. Upon energizing the circuit, the resistor creates the heat needed to directly set off the propellant to directly drive the core barrel into the surrounding formation to obtain the desired core sample. The use of a titanium powder ignition mix on a nichrome wire with its attendant safety risks is eliminated.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIGS. **1***a* and **1***b* represent a prior art core gun in the run in and shot positions respectively where the gun is set off with an ignition mix coated nichrome wire;

[0010] FIG. **2** is a chemical cutter used to cut and remove casing that is triggered with a resistor that gets hot to ignite the propellant to then push out a chemical through nozzles to cut the tubular.

[0011] FIGS. **3***a* and **3***b* are the core gun of the present invention shown in the run in and the fired conditions.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0012] FIG. **3***a* shows a resistor **48** that when energized creates heat to burn the propellant **50** in the cartridge **52**. The resistor is preferably under 50 ohms and is secured at opposed ends with welds **54** and **56**. The barrel **58** is secured by the tether **60** that operates in the same manner as in FIG. **1***a*. Additional barrels such as **62** can be used in the core gun body **64**. The core sample of the formation **66** is captured in the passage **64**.

[0013] Those skilled in the art will appreciate that the elimination of the nichrome wire coated with the ignition mix that had been in persistent use in the past for years for core guns posed safety issues that caused fires and threatened personal injury for the assembly workers. The soldering process for attaching the wire also created reliability issues with the possibility that the barrel would not be propelled into the formation.

[0014] Now the core gun with a welded resistor of preferably under 50 ohms to set off the propellant to launch the barrel, the assembly safety issues are eliminated as are the reliability issues with the soldering using the welded connections. The preferred resistance is under 25 ohms. The design meets API safety standard API RP 67 IME SLP-20.

[0015] The above description is illustrative of the preferred embodiment and many modifications may be made by those skilled in the art without departing from the invention whose scope is to be determined from the literal and equivalent scope of the claims below:

We claim:

1. A core gun for subterranean use, comprising:

a housing;

at least one barrel mounted to said housing for selective launching from said housing;

a propellant ignitable by a selectively energized resistor for selective launching of said barrel into a surrounding formation to collect a core sample therein.

2. The gun of claim **1**, wherein:

said resistor has welded connections.

3. The gun of claim **1**, wherein:

said resistor is less than 50 ohms.

4. The gun of claim **1**, wherein:

said resistor and propellant are mounted in a cartridge in said housing.

5. The gun of claim **1**, wherein:

said at least one barrel comprises a plurality of barrels each selectively launched.

6. The gun of claim **1**, wherein:

said barrel is tethered to said housing for retrieval after launch.

7. The gun of claim **2**, wherein:

said resistor is less than 50 ohms.

8. The gun of claim **7**, wherein:
said resistor and propellant are mounted in a cartridge in said housing.
9. The gun of claim **8**, wherein:
said at least one barrel comprises a plurality of barrels each selectively launched.
10. The gun of claim **9**, wherein:
said barrel is tethered to said housing for retrieval after launch.

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