July 13, 1948. G. F. TURECHEK 2,445,047

GUN PERFORATOR

Filed Jan. 22, 1940 2 Sheets-Sheet 1

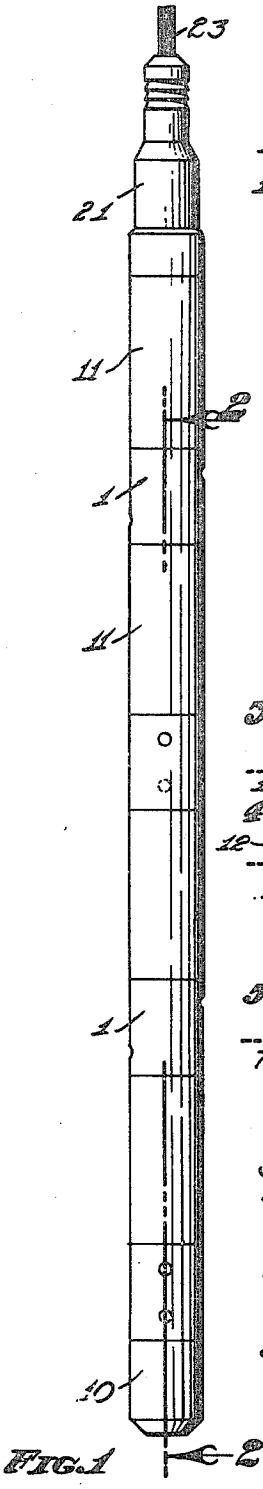


FIG. 1

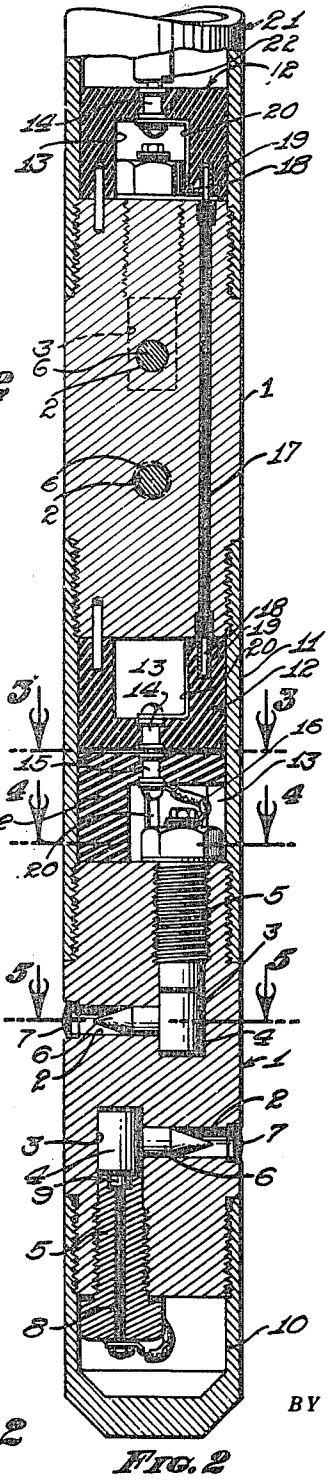


FIG. 2

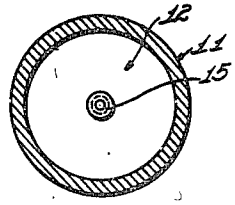


FIG. 3

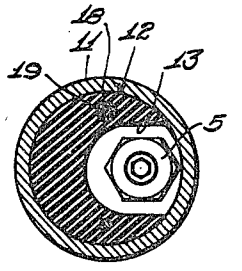


FIG. 4

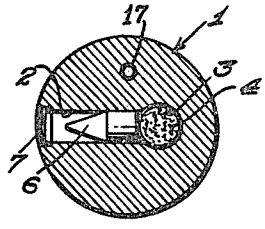


FIG. 5

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GUN PERFORATOR

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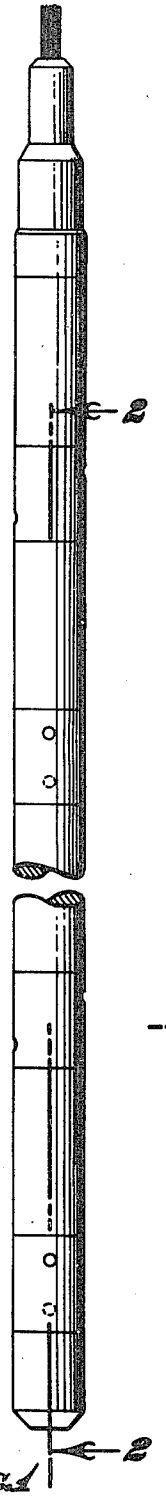


FIG. 1

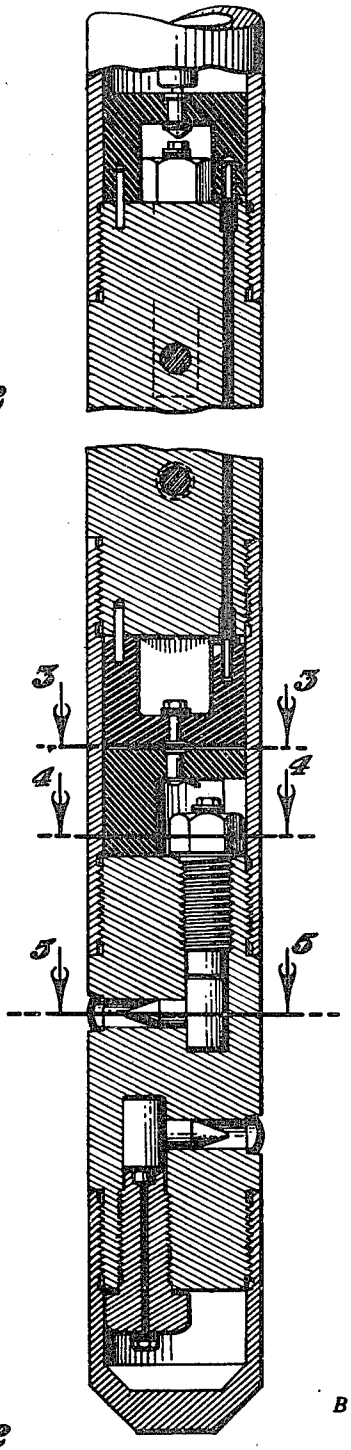


FIG. 2

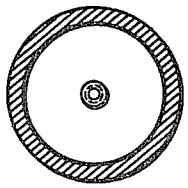


FIG. 3

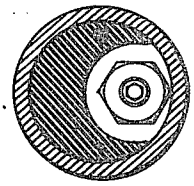


FIG. 4

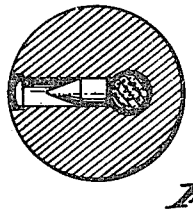


FIG. 5

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GUN PERFORATOR

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Application January 22, 1940, Serial No. 315,036

9 Claims. (Cl. 164—0.5)

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My invention relates to gun perforators, and among the objects of my invention are:

First, to provide a gun perforator in which the gun bores and powder chambers are incorporated integrally in a body member and access to the powder chamber is provided by axially positioned sealing plugs, the gun bores constituting the sole lateral or radial openings in the gun body;

Second, to provide a gun perforator which incorporates a series of dual gun units connected end to end; and

Third, to provide a gun perforator which incorporates a novel electrical connection between the several gun units wherein the electrical parts are entirely sealed from the surrounding well fluid.

With the above and other objects in view, as may appear hereinafter, reference is directed to the accompanying drawings, in which:

Figure 1 is an elevational view of my gun perforator;

Figure 2 is a fragmentary, longitudinal sectional view thereof, taken substantially through 2—2 of Figure 1; and

Figures 3, 4 and 5 are transverse sectional views thereof, taken through 3—3, 4—4 and 5—5, respectively, of Figure 2.

The gun perforator includes a plurality of gun bodies 1 in the form of relatively short cylindrical sections. Each gun body 1 is provided with a pair of diametrically disposed gun bores 2 positioned at equal distances, but near the midpoint of the gun body. Each gun bore is intersected at its inner end by an axially extending cartridge bore 3, the inner end of which receives a cartridge 4 and the outer end of which receives a screw-threaded plug 5. Each gun bore 2 receives a bullet 6, and the outer end thereof is closed by a fluid-seal disc 7.

The cartridges 4 are preferably of the electrically fired type. Each plug 5 is provided with a conductor 8 extending therethrough, terminating in a contact head 9 at its inner end.

The end portions of each gun body 1 are externally threaded. The end of the lowermost gun body is covered by a cap member 10 and the remaining ends of the gun bodies are connected by couplings 11. The confronting ends of the several gun bodies receive terminal blocks 12 formed of insulation material. The terminal blocks are cylindrical in form with recesses 13 provided therein to clear the outer ends of the plugs 5. The adjacent ends of the terminal blocks 12 are provided with axially centered terminals 14 and 15. These terminals are connected by leads 16 to the corresponding conductors 8 provided in the plugs 5.

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Each gun body is provided with a longitudinally extending bore which receives an insulated conductor 17 extending from one end to the other of the gun body. The outer ends of the conductor 17 terminate in contact pins 18 which coact with contact sockets 19 provided in the terminal blocks 12, and which are connected by leads 20 to the respective terminals 14 or 15 or, in the case of the lowermost gun unit, directly to the conductor 8.

The uppermost gun body is suitably connected to a cable head 21 having a terminal 22 therein. The cable head is secured to the lower end of a conductor cable 23 which both supports the gun and supplies electrical energy thereto.

The construction as herein illustrated is so arranged that the several gun units discharge simultaneously, although by substitution of electrical firing means such as shown in the Johnston Patent No. 2,048,451, issued July 21, 1936, the several gun units may be fired in sequence.

Various changes and alternate arrangements may be made within the scope of the appended claims, in which it is my intention to claim all novelty inherent in the invention as broadly as the prior art permits.

I claim:

1. In a gun perforator: a gun body having a pair of oppositely directed gun bores intersecting its side walls, and axially oppositely directed cartridge bores intersecting the inner ends of said gun bores and the axial extremities of said gun body; bullets for said gun bores; cartridges for said cartridge bores; and sealing means closing said cartridge bores.

2. In a gun perforator: a plurality of gun bodies; coupling members joining said gun bodies end to end; each of said gun bodies having a pair of oppositely directed gun bores intersecting its side walls, and axially oppositely directed cartridge bores intersecting the inner ends of said gun bores and the axial extremities of said gun body; bullets for said gun bores; cartridges for said cartridge bores; sealing means closing said cartridge bores; said sealing means being covered by said coupling members.

3. In a gun perforator: a plurality of gun bodies, each gun body having a pair of laterally extending, diametrically opposed but axially offset gun bores and individual cartridge chambers each intersecting one of said gun bores and extending in axially opposite directions to the axial extremities of said gun body; a conductor plug and an

electrically responsive cartridge for each cartridge bore; a bullet for each gun bore; hollow couplings connecting said gun bodies end to end and covering said plugs; separable contact blocks in said couplings electrically connected with said cartridges through said conductor plugs; and conductors extending through said gun bodies to the several terminal blocks.

4. In a gun perforator: a gun body having a pair of laterally and diametrically oppositely directed gun bores offset axially from each other and occupying the major portion of the gun body diameter and an individual cartridge chamber extending from each end of each gun body toward each other parallel to but offset from the axis of said gun body and from each other and intersecting the inner end of a corresponding gun bore; bullets for said gun bores; cartridges for said cartridge chambers; and an explosive-resistant plug closing said cartridge chambers.

5. A gun perforator for wells, comprising: a series of gun units, each gun having a pair of laterally directed gun bores and a pair of axially directed cartridge bores, the outer ends of the cartridge bores intersecting the ends of said gun units, and a conductor bore offset from the axis of the gun unit and extending from end to end; bullets for said gun bores; electrically responsive cartridges for said cartridge bores; a conductor in said conductor bore; connector sleeves joining said gun units; and a pair of terminal blocks in each sleeve associated with the confronting ends of gun units joined by said sleeve, each terminal block having axially offset contact means coacting with a conductor in the corresponding gun unit and an axially centered contact element electrically connected with said contact means and coacting with the contact element of the other terminal block.

6. In a gun perforator: a gun body having a pair of laterally directed gun bores intersecting its side walls and a pair of axially oppositely directed cartridge bores, the first of said cartridge bores intersecting the inner end of the first of said gun bores and extending to one axial extremity of said gun body and the second of said cartridge bores intersecting the inner end of the second of said gun bores and extending to the opposite axial extremity of said gun body; bullets for said gun bores; cartridges for said cartridge bores; and sealing means closing said cartridge bores.

7. In a gun perforator: a plurality of gun bodies; coupling members joining said gun bodies end to end; each of said gun bodies having a pair of laterally directed gun bores intersecting its side walls and a pair of axially oppositely directed cartridge bores, the first of said cartridge bores

intersecting the inner end of the first of said gun bores and extending to one axial extremity of said gun body and the second of said cartridge bores intersecting the inner end of the second of said gun bores and extending to the opposite axial extremity of said gun body; bullets for said gun bores; cartridges for said cartridge bores; sealing means closing said cartridge bores; said sealing means being covered by said coupling members.

8. In a gun perforator: a plurality of gun bodies, each gun body having a pair of laterally extending, axially offset gun bores and individual cartridge chambers each intersecting one of said gun bores and extending in axially opposite directions to the axial extremities of said gun body; a conductor plug and an electrically responsive cartridge for each cartridge bore; a bullet for each gun bore; hollow couplings connecting said gun bodies end to end and covering said plugs; separable contacts in said couplings electrically connected with said cartridges through said conductor plugs; and conductors extending through said gun bodies to the several terminal blocks.

9. A gun perforator for wells comprising: a series of gun units, each gun unit having a pair of laterally directed gun bores, a pair of axially directed cartridge bores, the outer end of the cartridge bores intersecting the ends of said gun units, a separate conductor bore offset from the axis of the gun units and extending from end to end thereof, a conductor extending through said conductor bore, a contact element at each end of said gun body and insulated therefrom and connected to an end of said conductor; connector sleeves joining said gun units end to end, said contact elements of confronting ends of gun units thus joined end to end being positioned to contact one another to form a continuous electrical circuit through said joined gun units; and conductor means electrically connected to said contact elements and extending into said cartridge bores, adapted to ignite electrically responsive cartridges in said bores.

GEORGE F. TURECHEK.

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