

Nov. 3, 1936.

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2,059,488

ELECTRICAL CONTACT DEVICE

Filed Dec. 24, 1934

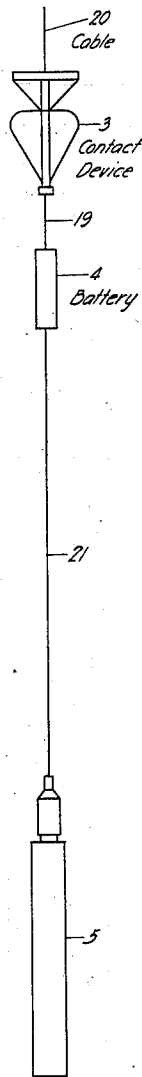


FIG. I

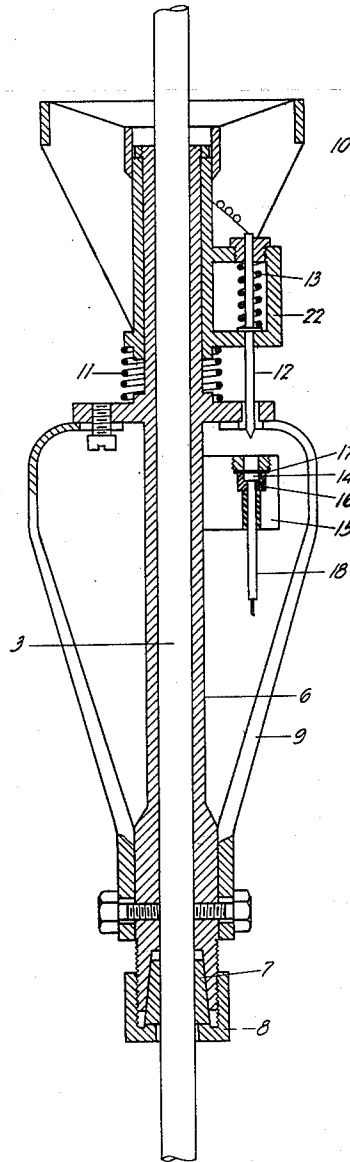


FIG. II

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UNITED STATES PATENT OFFICE

2,059,488

ELECTRICAL CONTACT DEVICE

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Application December 24, 1934, Serial No. 759,040
In Rumania December 29, 1932

4 Claims. (Cl. 102-4)

This invention pertains to methods of igniting explosive charges in bore-holes, and is more particularly concerned with an electrical contact device to be operated in conjunction with oil-well casing perforators using projectiles, such as are the subject of my co-pending applications Serial Nos. 656,607 and 736,473.

It has been customary up to now to ignite such charges either from the surface of the earth, or by means of time contacts lowered into the well.

The first method requires the use of long electrical conductors, and is therefore costly and unsafe, since the insulation of the conductor cannot long resist the corroding action of the oil and the hard conditions of wear and tear in deep wells, the resulting short circuits frequently causing undesired ignitions of the charge. On the other hand, when time contacts are used, the moment of ignition must always be exactly determined in advance, and a premature ignition may occur in case of any trouble or delay in lowering the perforator or other apparatus.

The purpose of this invention is to avoid these difficulties by providing for the ignition circuit a contact device carried on the suspending cable at a relatively short distance from the perforator, which contact may be closed at any desired moment by means of a weight, or go-devil, dropped into the bore-hole.

The operation of this device will be understood from the following description and drawing, wherein Fig. 1 diagrammatically shows the arrangement of the different pieces of apparatus used in perforating an oil-well casing, and Fig. 2 gives a vertical cross-sectional view of the electrical contact device proper.

Referring to Fig. 1, a cable 20 supports a contact device 3 and an electrical battery 4, which is provided with a cover making it impervious to the pressure and the corroding action of the well fluid. The battery is located at a short distance 19 below the contact device while still farther down, a well-casing perforator 5 is attached to the cable. The current in the circuit passes through an insulated wire from battery 4 to a detonating cap in the perforator 5, from there through the suspending cable to the contact device 3, where it is interrupted, and then farther through an insulated wire back to battery 4.

Referring to Fig. 2, the contact device 3 consists of a tubular body 6 which is firmly clamped to the suspending cable by means of a wedge 7 and a screw cap 8. Guides or springs 9 keep the body of the device centered in the bore-hole.

The contact head 10 is arranged to move longitudinally over the tubular body 6, and is held in its uppermost position by a spring or other compressible means 11. Mounted sidewise on the contact head 10 is a frame 22 supporting a contact pin 12, which is pressed to its lowermost position by a spring 13.

Opposite the contact pin 12 is a contact 14, held by a lateral projection 15 attached to the tubular body 6. Contact 14 is insulated from the body of the device by a dielectric bushing 16, and is protected from the outside by a frangible plastic disc 17. Contact 14 is connected with the battery by means of the insulated wire 18, while contact pin 12 is electrically connected to the body of the device.

The complete arrangement of parts shown on Fig. 1 and consisting of a casing perforator, an electrical battery, and a contact device is lowered into the bore-hole on a cable. When the casing perforator reaches the desired depth, as calculated by the length of the cable paid out, a weight is allowed to fall into the bore-hole, preferably by sliding along the suspension cable. The weight presses down the contact head 10, the pin 12 perforates the rubber disc 17 and closes the circuit formed by contact 14, the insulated wire 18, the battery 4, another insulated wire alongside of the portion 21 of the suspending cable, the detonating cap in the perforator 5, the suspending cable, and the pin 12.

I claim as my invention:

1. An electrical contact device for a projectile well-casing perforator suspended by a cable, comprising a tubular body clamped to the cable, a lateral projection on the tubular body carrying an insulated contact, a contact head sliding over the tubular body, a contact pin mounted on the contact head, a yielding means holding the contact head in its uppermost position, said means being compressible and allowing the contact pin to close with the insulated contact when a weight dropped into the well strikes the contact head.

2. In the device of claim 1, a frangible disc protecting the insulated contact, said disc being breakable by the contact pin when the contact head moves down against the action of the yielding compressible means.

3. In the device of claim 1, a plurality of spring guides around the tubular body of the contact device.

4. In combination with a projectile well-casing perforator suspended by a cable in a bore-hole, an electrical circuit comprising a detonator in the

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forator, a battery above the perforator, and a contact device above the battery, said device comprising a tubular body clamped to the cable, contact head slidably mounted on the tubular body and held in its uppermost position by yieldable means, a pair of contacts mounted respectively on the tubular body and on the slidable

head, said contacts closing the circuit when the contact head is depressed against the action of the yieldable means by the impact of a weight slidably dropped along the cable into the bore-hole.

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