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APPARATUS FOR PERFORATING WELL CASINGS

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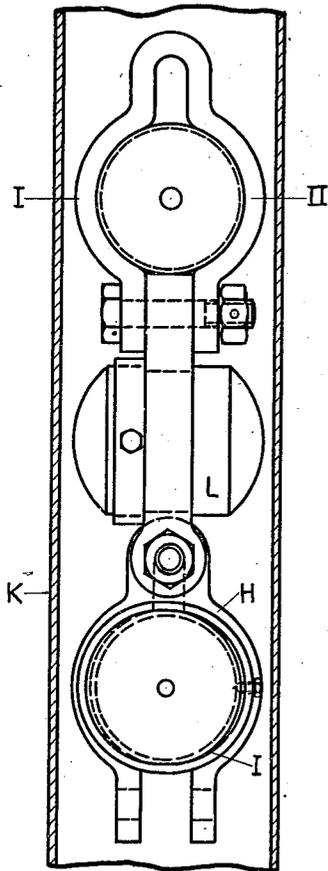


FIG. 3

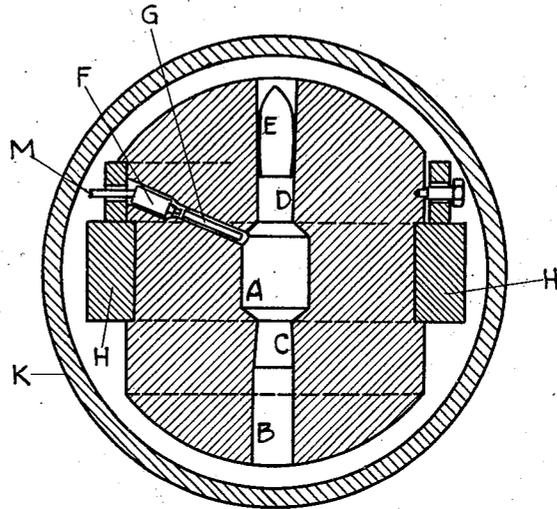


FIG. 1

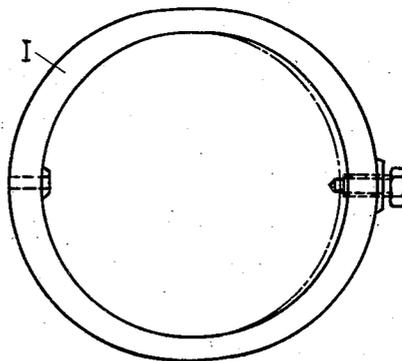


FIG. 2

Inventor: Gottfried Prikel

By his Attorney:

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APPARATUS FOR PERFORATING WELL CASINGS

Gottfried Prikel, Bucharest, Rumania, assignor to Shell Development Company, San Francisco, Calif.

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7 Claims. (Cl. 81—188)

In order to perforate oil well casing at certain depths, which operation proves to be necessary whenever, by accident or intentionally, an oil layer has been passed and shut off, there are, besides various mechanical devices, some apparatuses which make use of projectiles fired by an explosive charge.

These apparatuses have various drawbacks, which are avoided in the apparatus which constitutes the subject of the present invention.

Up to now it has proved to be very difficult to adapt the apparatuses to use under high pressure, such high pressure being, in fact, required in perforating in order to avoid sand heavings and collapsed casings. Furthermore the said apparatuses, in their present known form, constituting real fire arms are subject to recoil, which besides causing possible damage to the casing means an important loss of the explosive's energy.

In the apparatus described below these drawbacks are obviated.

The enclosed drawing, Fig. 1, shows a section of the perforator.

The body L is diametrically perforated and its middle part provided with a chamber A, into which the powder is loaded. On both sides of the cavity A there are two cylindrical-trunconical channels C—B. The stoppers D are introduced into the trunconical portions C, which stoppers are made of a semi-plastic material, similar to the material packing is made of, whereas into the cylindrical portions B, there are introduced projectiles E, which are made of steel or some other similar material. A detonator G (e. g. an electrical detonator) is placed into the sideway channel and is held down by a stopper F, made of packing material. This stopper is held by a ring I (vide details in Fig. 2), which is perforated in order to allow the electric cable M to pass through, and is secured by means of a bolt. By means of the collar H, sustaining the body L, a series of similar perforators can be connected and thus form a chain of a certain length, as shown in Figure 3, where the perforators are arranged in such a way as to obtain two series of perforations having their axes within two vertical planes perpendicular to each other. By turning the lugs of the collars to a certain angle the perforations can be made to lie according to any other arrangement. In Figure 3 K indicates the casing to be perforated.

The construction of the perforator allows of operating with the highest pressure, since the

greater the external pressure will be, the more strongly the stoppers D and F will be pressed into their borings. On the other hand the recoiling of body L is neutralized, since the two projectiles E of the same material are simultaneously thrown in quite opposite directions. The immediate result of such an arrangement is the reduction of the charge to one third, which charge involves the greatest expenditure with such perforators.

What I claim is:

1. Casing perforator using as perforating elements projectiles fired by an explosive charge, comprising a body member with an explosive-containing chamber communicating with a cylindrical-trunconical boring for each projectile, the trunconical part of each boring having its wider opening directed outwardly and receiving a stopper of semi-plastic material, which by external pressure is forced into its place.

2. Casing perforator using, as perforating elements, projectiles fired by and explosive charge comprising a body member with a boring for each projectile, an explosive charge containing chamber, and a detonator introduced from the outside of the body member to the said chamber through a boring, the said boring being stopped by a semi-plastic stopper introduced from the outside and forced into its place by external pressure, said stopper being held in place by a ring which surrounds the body member and is pressed against said opening of the boring.

3. Casing perforators using as perforating elements projectiles fired simultaneously by an explosive charge, comprising a body member with co-axial and diametrically opposed borings for each projectile communicating with a common charge containing chamber, said borings being of a cylindrical-trunconical shape and each receiving in the trunconical part, which has its wider opening directed outwardly a stopper of a semi-plastic material which is forced into its place by external pressure.

4. A chain-like series of pivotally connected well casing perforators substantially as disclosed in claim 1.

5. A chain-like series of well casing perforators substantially as described in claim 1 and pivotally held together by lugs and collars attached to the perforators.

6. Casing perforator using as perforating elements projectiles fired by an explosive charge, comprising a body member with an explosive-containing chamber communicating with a cylindrical-trunconical boring for each projectile,

the trunconical part of each boring having its wider opening directed outwardly and receiving a stopper of semi-plastic material.

5 7. Casing perforator using as perforating elements projectiles fired by an explosive charge comprising a body member with a boring for each projectile, an explosive-containing chamber,

and a detonator introduced from the outside of the body member to the said chamber through a boring, said boring being stopped by a semi-plastic stopper held in place by a ring which surrounds the body member and is pressed 5 against said opening of the boring.

GOTTFRIED PRIKEL.