Oct. 31, 1939. E. P. HALLIBURTON 2,177,886

APPARATUS FOR REMOVING DEVICES FROM WELLS

Filed May 19, 1939

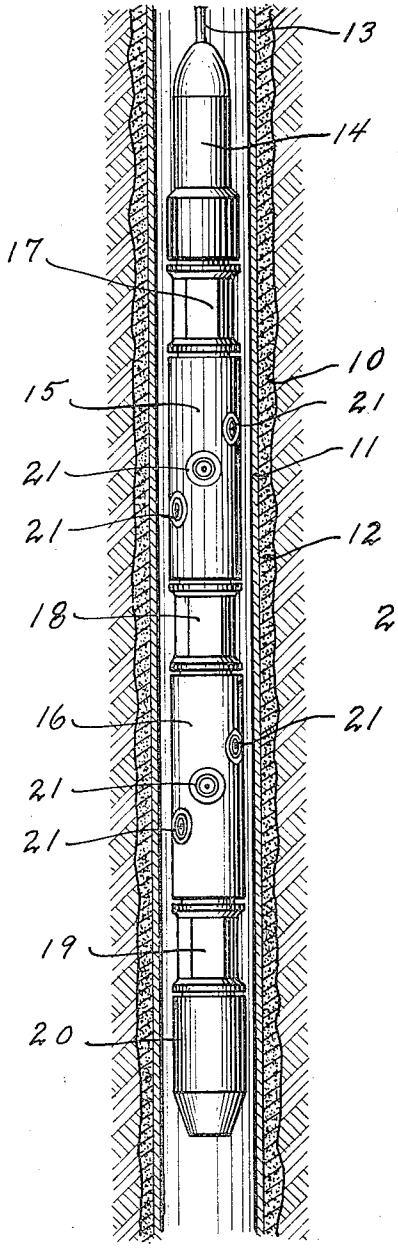


Fig. 1.

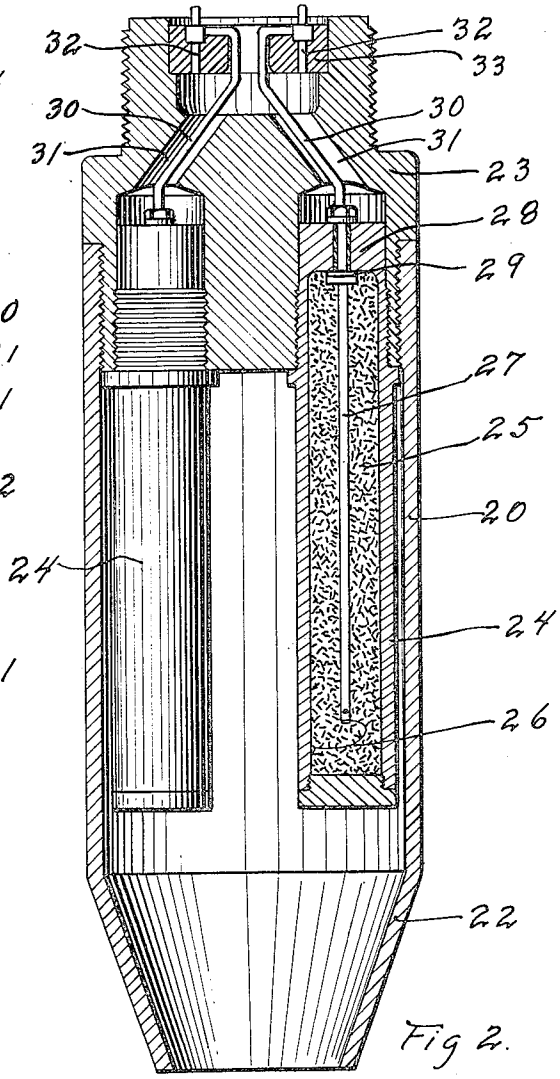


Fig 2.

INVENTOR.
Erle P. Halliburton
BY Earl Babcock.
ATTORNEYS.

Patented Oct. 31, 1939 2,177,886

UNITED STATES PATENT OFFICE

2,177,886

APPARATUS FOR REMOVING DEVICES FROM WELLS

Erle P. Halliburton, Los Angeles, Calif., assignor to Halliburton Oil Well Cementing Company, Duncan, Okla.

Application May 19, 1939, Serial No. 274,499

6 Claims. (Cl. 166—1)

This invention relates to apparatus for removing devices such as gun perforators from oil wells or the like, and more particularly to an arrangement operating in response to an explosive charge which will jar a device stuck in a well so as to cause it to become loose.

In the making of wells such as oil or gas wells, it is common practice to lower various kinds of tools into the well, such as formation testers, gun perforators, etc., for the purpose of performing certain operations therein. These devices may be lowered on drill pipe or by means of a cable or other known means. Where the wells are drilled by the rotary method, they contain mud, and the mud and sediment or cuttings in the mud often settle around the device or tool which has been lowered into the well and cause it to be stuck herein. Various types of jars have been devised for aiding in removing stuck drill pipe or tools which have become lodged in the well, but even though the jar may impart a tremendous impact to the stuck device they do not always dislodge it.

It is an object of the present invention to devise a novel apparatus for aiding in the removal of devices which have become stuck in an oil well, in which an explosive charge is employed to transmit a large force to the device so as to tend to dislodge it.

It is another object of the invention to devise an arrangement particularly suited for use with a gun perforator of the type commonly employed for perforating casing in a well and in which an explosive charge is fired electrically to dislodge the gun perforator in the event that it has become stuck in the well.

Other objects and advantages reside in certain novel features of the arrangement and construction of parts, as will be apparent from the following description taken in connection with the accompanying drawing, in which:

Fig. 1 is a vertical cross-sectional view of an oil well showing the gun perforator constructed in accordance with the principles of the present invention located therein.

Fig. 2 is an enlarged vertical cross-sectional view of the lower portion of the gun perforator shown in Fig. 1.

Referring to the drawing in detail, it will be seen that an oil well is illustrated in Fig. 1 as consisting of a hole 10 within which a casing 11 is placed, the casing being cemented as illustrated at 12. A gun perforator may be lowered into the well by means of a cable 13, the gun perforator consisting of a carriage made up of sections of pipe as illustrated at 14, 15 and 16, these portions being connected by coupling members 17 and 18, and the lower section of pipe 16 carrying a coupling member 19 to which a special member 20, which forms the essential feature of the present invention, is connected. The gun carriage members 15 and 16 may be of the usual type, each containing a number of gun barrels indicated at 21, these being preferably spirally disposed within the carriage members 15 and 16. Any number of gun carriage members may be employed, although only two are shown in the drawing, and each may contain as many guns as may be desired. An example of a gun perforator apparatus of this type is found in the British patent to Delamare Maze, No. 287,839, complete accepted February 26, 1929, and need not be further described here.

It is well known to those skilled in the art that gun perforators of the type shown in Fig. 1 may be fired electrically, this also being disclosed in the British patent to Delamare Maze, mentioned above. The particular arrangement illustrated and described herein is adapted for use with an electrically fired gun perforator but it will be obvious to those skilled in the art that the device can be used with any tool in a well other than a gun perforator and that the explosive charge therein can be fired by any known means for firing the same. As illustrated, the member 20 is connected to the lower end of the gun perforating tool. As particularly shown in Fig. 2, the member 20 is hollow and is tapered inwardly at its lower end, while its upper end is provided with internal screw threads so that it may be connected to a coupling member 23 which is also provided with threads so that it may be connected to the member 19 shown in Fig. 1.

Screw threaded into the bottom of the coupling member 23 are one or more explosive cartridges 24, two being shown in the drawing. Each of these cartridges may contain a quantity of powder 25 and a fuse 26 adapted to ignite the same. The fuse may be carried on a rod 27 which passes through the upper end 28 of the cartridge, being insulated therefrom as illustrated at 29. Insulated wires 30 may be connected to the heads of the rods 27, these wires passing through passage ways 31 in the coupling member 23 and making connection to contact members 32 carried in an insulating block 33 in the upper portion of the coupling member 23. Any convenient form of electrical socket may be employed to make connection with the contacts 32, the elec-

trical coupling being made within the sealed portion of the gun perforator assembly.

With this arrangement, it will be seen that the casing of each cartridge **24** is grounded on the gun perforator assembly which is placed within the mud in the hole so that one side of each fuse **26** is grounded. Upon electrical current passing through the wires **30** from some source such as a battery at the surface of the ground, the powder in the cartridges **24** will be ignited and cause them to explode. The cartridges **24** may be exploded simultaneously or in sequence as desired, and the arrangement within the gun perforating assembly may be such that none of the cartridges **24** are ignited until after all of the guns **21** have been discharged. On the other hand, it will be obvious to those skilled in the art that a suitable arrangement may be provided by which the electrical circuits to the cartridges **24** may be independent of that to the guns **21** so that the cartridges **24** can be fired at any time should the gun perforator become stuck in the well.

Upon the firing of the cartridges **24**, an explosive force will tend to move the member **20** and hence the gun perforator assembly upwardly with a tremendous impact, this being due to the fact that the member **20** is open at the bottom so as to direct the entire force of the explosion downwardly against the mud within the well. The reaction or recoil of the explosion being equal to this downwardly directed force, it will be apparent that the gun perforator assembly will be dislodged from whatever is holding it stuck in the well. The amount of force or pressure exerted by the dislodging means may, of course, be varied by the number of cartridges and may be caused to deliver one quick dislodging blow, as in the event all the cartridges are fired simultaneously, or a number of lesser blows in quick succession as would be the case if a number of cartridges **24** were fired in sequence. The amount of impact or shock may further be controlled by the placing of either fast burning or slow burning powder within the cartridges **24**.

It will thus be seen that the hollow member **20** with the cartridges therein constitutes a gun pointed downwardly, whereas the guns carried by the members **15** and **16** are pointed laterally so that the bullets carried thereby perforate the casing. The downwardly pointed gun **20**, when fired, imparts an impact or recoil to the entire gun perforating assembly or gun carriage which tends to release the same no matter how or where it may be struck in the well.

While only one embodiment of the invention has been shown and described herein, it is obvious that various changes may be made without departing from the spirit of the invention o the scope of the annexed claims.

I claim:

1. Apparatus adapted to be lowered into a wel including an arrangement for releasing the sam in the event it becomes stuck or lodged in th well, said arrangement including explosiv means, means for directing the force of the ex plosion of said explosive means downwardl and means for firing said explosive means.

2. Apparatus adapted to be lowered into a wel including an arrangement for releasing the sam in the event it becomes stuck or lodged in th well, said arrangement including a hollow member mounted on the bottom of said apparatus said hollow member being open at the bottom, ar explosive cartridge mounted in said hollow member and means for firing said explosive cartridge to impart an upward shock to said apparatus.

3. Apparatus adapted to be lowered into a well including an arrangement for releasing the same in the event it becomes stuck or lodged in the well, said arrangement including a hollow member mounted on the bottom of said apparatus, said hollow member being open at the bottom, a plurality of explosive cartridges mounted in said hollow member and means for firing said explosive cartridges to impart one or more upward shocks to said apparatus.

4. Apparatus adapted to be lowered into a well including an arrangement for releasing the same in the event it becomes stuck or lodged in the well, said arrangement including an explosive cartridge mounted thereon, means for directing the force of the explosion of said cartridge downwardly when the same is fired to impart an upward reaction or recoil to said apparatus to dislodge the same and means for firing said explosive cartridge.

5. Apparatus adapted to be lowered into a well including an arrangement for releasing the same in the event it becomes stuck or lodged in the well, said arrangement including explosive means located below said apparatus and means for firing said explosive means, whereby an upward force will be imparted to said apparatus when said explosive means is fired.

6. In a gum perforator for perforating casing in a well, the combination with a gun carriage member containing one or more guns adapted to perforate the casing, of a gun pointed downwardly so as not to perforate the casing, said downwardly pointing gun being adapted, when fired, to impart an impact or recoil to the gun carriage tending to release the same when stuck or lodged in the well, and means for firing said guns.

ERLE P. HALLIBURTON.