

June 8, 1954

J. L. AUSTIN

2,680,406

EXPLOSIVE CONTAINER FOR GUN PERFORATORS

Filed March 14, 1949

FIG. 1.

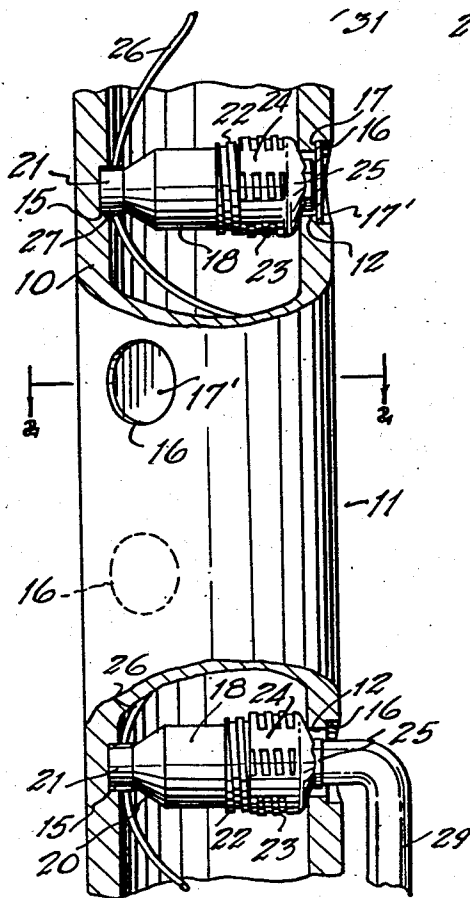


FIG. 2.

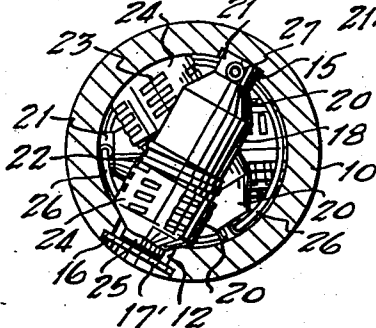


FIG. 3.

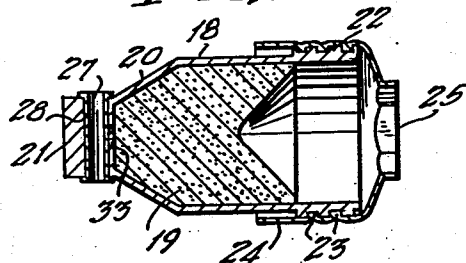


FIG. 5.

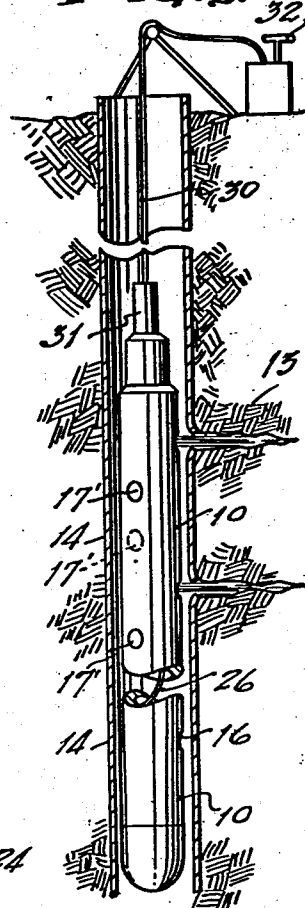
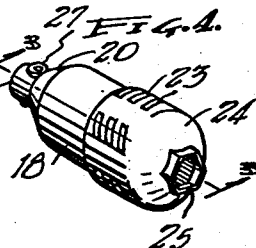


FIG. 4.



JOHN L. AUSTIN
INVENTOR.

BY Cecil L. Pross

ATTORNEY

UNITED STATES PATENT OFFICE

2,680,406

EXPLOSIVE CONTAINER FOR GUN PERFORATORS

John Leslie Austin, Fort Worth, Tex., assignor
to Jet-Guns Co., Inc., Fort Worth, Tex., a corporation of Texas

Application March 14, 1949, Serial No. 81,371

3 Claims. (Cl. 102—20)

1

This invention relates to gun perforators of the type in which are employed shaped charges for perforating oil well casing and producing formations, and it has for its primary object the provision of a specially designed container for encasing the charges and affording an arrangement for expediting the loading of the gun and providing a positive alignment of the charges therein preparatory to positioning the same in a well casing, thus affording an effective as well as economical device for such operations.

A prime object of the invention resides in the provision of a simple and inexpensive unitary container for shaped charges which can readily be installed in the gun barrel by suitable handling tools, such as tongs, and positively secured opposite each port against displacement or disalignment, and thus prevent damage to the gun as well as to expedite the loading operations.

An important object of the invention is that of providing an expendable container for the explosive which is capable of being extended along its axis after being properly located in the gun, to rigidly secure the same in operative position by the use of a suitable tool inserted through the port opposite which the charge is located, each unit being inserted successively and secured progressively along the barrel.

Broadly, the invention contemplates the provision of a novel container for the now conventional type of hollow or shaped charges whereby a gun can be utilized many times without damage and in this manner minimize the cost of such perforating operations and at once provide a more effective apparatus for performing the same.

While the foregoing objects are paramount, other and lesser objects will become manifest as the description proceeds taken in connection with the appended drawings wherein:

Figure 1 is a fragmentary elevational view of a perforating gun, portions of which are shown cut away illustrating the invention installed therein.

Figure 2 is a transverse cross-sectional view through the gun barrel, on lines 2—2 of Figure 1, showing the spiral arrangement of the ports and the invention installed in each.

Figure 3 is a longitudinal sectional view on lines 3—3 of Figure 4 of one of the casing units, containing a shaped or hollow charge, and illustrating the cup threaded thereon.

Figure 4 is a perspective illustration of a container embodying the invention, showing the polygonal flange formed with the cup for rotating the same, and

2

Figure 5 illustrates a typical installation of a perforating gun in a well casing, shown in longitudinal section, and illustrating the operation of the unitary charges.

It has been stated that the instant invention is primarily concerned with the provision of a unitary container for the explosive charge by which the same can be inserted into a gun specially designed for such loading, and embracing features of construction rendering it durable and capable of repeated use since it can be reloaded after each shot.

The tubular barrel 10 of the gun 11 has a plurality of ports 12 spaced longitudinally and circumferentially thereof in a spiral arrangement, as shown in Figure 2. The ports 12 are preferably arranged about the barrel 10 on spacings of 120 degrees so that the charges can be directed radially into the well formation 13 through the well casing 14, as shown in Figure 5. Opposite each port 12 is formed a circular recess 15 in the inner wall of the barrel 10. Each port 12 has an annular recess 16 formed therearound defining a shoulder 17 against which a disk 17' is pressed to provide a fluid-tight seal.

A cylindrical container 18 houses the shaped charge 19, as illustrated in Figure 3, and has a conical portion 20 formed on its closed end. A circular pin 21 is formed axially of the conical portion 20 and is adapted to engage the recesses 15 in the barrel 10 when the unit is installed. The opposite or open end of the container 18 has threads 22 formed thereon to receive the spiral arrangement of internal bosses 23 in the skirt portion of a cup 24 which provides a closure for the container 18 and a means for rigidly securing the same in its operative position in the barrel 10.

The cup 24 has a polygonal flange 25 thereon, which has a lesser diameter than the cup 24 and is capable of projecting into the ports 12, in the manner shown in Figures 1 and 2, when the assembly is installed in the gun 11. In loading the gun, therefore, the units are prepared for installation by threading the cups 24 on the container 18. Each unit is arranged on a detonating fuse 26 which is passed through a sleeve 27 arranged through a bore 28 extending transversely through each of the pins 21.

By manipulating the units with suitable tongs, or other device, each can be inserted in the barrel 10 and located opposite its respective port 12 by placing the pin 21 in the recess 15 and holding the assembly while a wrench 29 is inserted through the port 12 into the socket defined by the flange 25 of the cup 24 to rotate the latter

3

and thread the same outwardly against the wall of the barrel 10, in the manner shown in Figure 1. Thus the unit can be rigidly supported in the gun by longitudinally expanding the same so that it has a bearing at each end. The unit can be removed, if desired, by threading the cup 24 inwardly. The disk 17' is inserted into the annular recess 16, after the unit is installed, to exclude well fluids.

The gun 11 is suspended in the well by a coaxial cable 30 which is attached to a rope socket 31, or other device, on the upper end of the gun 11, and the detonating fuse 25 is connected to the cable 30 through a detonating train. The cable 30 is connected to a blasting device 32 at the earth's surface. The charges are detonated simultaneously through the fuse 25 which is arranged in intimate relationship with each charge through a small port 33 providing a communication between the bore 28 and the interior of the container 18, as apparent in Figure 3.

Manifestly, the invention may be modified, from time to time, by persons skilled in the art without departing from the spirit and intent of the invention or the scope of the appended claims.

What is claimed is:

1. In a perforating gun for oil well casing in combination, a cylindrical barrel having a plurality of ports spaced spirally therealong, a recess formed in said barrel opposite each of said ports, a container for a shaped charge adapted to be supported in said barrel and transversely thereof opposite each of said ports, a portion of each container having a pin formed thereon engageable with said recesses, a cap on each container opposite said pin and rotatably threaded thereon, and a polygonal flange on said cap extended into the ports opposite said recesses.

2. In a unitary charge container for oil casing perforating guns, in combination with a cylindrical barrel having a series of spaced ports arranged

4

spirally therealong and a recess formed internally of said barrel opposite each port, a tubular container adapted to be arranged in said barrel opposite each of said ports, each said container having an axial portion extending into one of said recesses to partially support said container transversely of said barrel, a cup threadedly arranged on each said container opposite said axial portion thereof formed with means for extending same into the ports opposite the said recesses when threaded outwardly to rigidly fix each said container in alignment with its respective port.

3. In a perforating gun for oil well casing, in combination with a tubular barrel having a plurality of spirally arranged ports spaced therealong, an explosive unit arranged in each port, each of said units comprising a container having a closed conical end and an open end and containing a shaped charge facing said open end, a cup threadedly attached to the open end of each of said containers capable of extending said units longitudinally transversely of said barrel and projecting into each of said ports, a recess arranged in said barrel opposite each port adapted to receive the closed conical end of each container, and means formed with each cup providing means for threading the same longitudinally of its said container to extend said cup into said ports.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,169,671	Walker	Aug. 15, 1939
2,266,345	Turechek	Dec. 16, 1941
2,281,870	Cole	May 5, 1942
2,399,211	Davis	Apr. 30, 1946
2,415,814	Davis	Feb. 18, 1947
2,419,841	Lampel et al.	Apr. 29, 1947
2,494,256	Muskat et al.	Jan. 10, 1950