AN IMPROVED WELL PERFORATING APPARATUS

An improved well perforating apparatus comprising: a one or more rounded scallops in a perforating gun body of a perforating gun; said one or more rounded scallops comprising a cut away portion of said perforating gun body having a bore portion and a rim; and said rim comprising a bore angle between said bore portion and said perforating gun body.
WELL PERFORATING APPARATUS

[0001] This application is a nonprovisional application filed on Monday, Aug. 12, 2013 which is claiming the benefit of U.S. Provisional Patent Application No. 61/682,192 which was filed on Aug. 10, 2012.

BACKGROUND

[0002] This disclosure relates generally to an improved well perforating apparatus. None of the known inventions and patents, taken either singularly or in combination, is seen to describe the instant disclosure as claimed. Accordingly, an improved well perforating apparatus would be advantageous.

SUMMARY

[0003] Two embodiments of an improved well perforating apparatus are disclosed.

[0004] A first embodiment comprising: a one or more rounded scallops in a perforating gun body of a perforating gun; said one or more rounded scallops comprising a cut away portion of said perforating gun body having a bore portion and a rim; said rim comprising a bore angle between said bore portion and said perforating gun body; said bore angle comprises an angle of about forty-five degrees; said rim protects users of said perforating gun from harming themselves when handling said perforating gun; a burr is cut into said perforating gun body below said bore portion; said bore is cut into said perforating gun body with a cutter comprising a blade by rotating said blade at various depths into said perforating gun body; said blade comprises a rounded edge corresponding to a rounded cut at said bore portion; and said one or more rounded scallops are arranged on said perforating gun body in a helical pattern.

[0005] A second embodiment comprising: a one or more rounded scallops in a perforating gun body of a perforating gun; said one or more rounded scallops comprising a cut away portion of said perforating gun body having a bore portion and a rim; and said rim comprising a bore angle between said bore portion and said perforating gun body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIGS. 1A, 1B, 1C, 1D, and 1E illustrate a perspective overview and several elevated side views of a perforating gun, respectively.

[0007] FIG. 1F illustrates a perspective detailed overview of said scallop, with hidden lines exposed as dashed lines.

[0008] FIGS. 2A and 2B illustrate a lengthwise cross sectional overview of said perforating gun and a cross sectional side view of said scallop respectively.

[0009] FIGS. 2C, 2D, 2E, 2F and 2G illustrate a series of views of a cutaway portion from said perforating gun.

[0010] FIG. 2C illustrates lengthwise cross sectional overview of said perforating gun with said cutaway portion.

[0011] FIGS. 2D, 2F, 2E and 2G illustrate two perspective overviews, an elevated side view and an elevated front view of said cutaway portion, respectively.

[0012] FIGS. 2D, 2E, 2F and 2G further comprise dashed lines to assist in seeing the dimensions of said cutaway portion.

[0013] FIG. 3 illustrates a widthwise cross sectional overview of said perforating gun and said scallop.

[0014] FIGS. 4A, 4B, 4C, 4D, 4E, and 4F illustrate a perspective overview, several rotated side views, and a zoomed in perspective view of a perforating gun, respectively.

[0015] FIGS. 5A and 5B illustrate a lengthwise cross sectional overview of said perforating gun and a cross sectional side view of said scallop respectively.

[0016] FIG. 6 illustrates a widthwise cross sectional overview of said perforating gun and said scallop.

[0017] FIG. 7 illustrates a perspective overview of a cutter having a blade.

DETAILED DESCRIPTION

[0018] Described herein is an improved well perforating apparatus. The following description is presented to enable any person skilled in the art to make and use the invention as claimed and is provided in the context of the particular examples discussed below, variations of which will be readily apparent to those skilled in the art. In the interest of clarity, not all features of an actual implementation are described in this specification. It will be appreciated that in the development of any such actual implementation (as in any development project), design decisions must be made to achieve the designers’ specific goals (e.g., compliance with system- and business-related constraints), and that these goals will vary from one implementation to another. It will also be appreciated that such development effort might be complex and time-consuming, but would nevertheless be a routine undertaking for those of ordinary skill in the field of the appropriate art having the benefit of this disclosure. Accordingly, the claims appended hereto are not intended to be limited by the disclosed embodiments, but are to be accorded their widest scope consistent with the principles and features disclosed herein.

[0019] FIGS. 1A, 1B, 1C, 1D, and 1E illustrate a perspective overview and several elevated side views of a perforating gun 100, respectively. In one embodiment, said perforating gun 100 can comprise of one or more rounded scallops. In one embodiment, said one or more rounded scallops can comprise a scallop 102a, a scallop 102b, a scallop 102c, a scallop 102d, a scallop 102e, and a scallop 102f. In one embodiment, said one or more rounded scallops are positioned in a helical configuration along the length of said perforating gun 100. In one embodiment, more or less of said one or more rounded scallops may be used for said perforating gun 100.

[0020] FIG. 1F illustrates a perspective detailed overview of said scallop 102a, with hidden lines exposed as dashed lines.

[0021] FIGS. 2A and 2B illustrate a lengthwise cross sectional overview of said perforating gun 100 and a cross sectional side view of said scallop 102a respectively. In one embodiment, said perforating gun 100 can comprise of a perforating gun body 200 and a lower portion 202. In one embodiment, said scallop 102a is drilled out of said perforating gun body 200. In one embodiment, said scallop 102a can comprise of a burr 204, a bore portion 206, a rim 207 and a bore angle 208. In one embodiment, said burr 204 is the cylindrical section of said scallop 102a. In one embodiment, said bore portion 206 is the upper portion of said scallop 102a. In one embodiment, said bore angle 208 is the angle at which said bore portion 206 extends from said burr 204. In one embodiment, said bore angle 208 can comprise of a multitude of angles ranging from 15 to 75 degrees although 45 degrees is preferred. In one embodiment, said one or more
rounded scallops of said perforating gun 100 can be substantially similar to said scallop 102a.

[0022] FIGS. 2C, 2D, 2E, 2F and 2G illustrate a series of views of a cutaway portion 220 from said perforating gun 100. FIG. 2C illustrates a cross sectional overview of said perforating gun 100 with said cutaway portion 220. FIGS. 2D, 2E, 2F and 2G illustrate two perspective views, an elevated side view and an elevated front view of said cutaway portion 220, respectively. FIGS. 2D, 2E, 2F and 2G further comprise dashed lines to assist in seeing the dimensions of said cutaway portion 220. In one embodiment, said cutaway portion 220 can comprise a portion of a pipe which has been removed to create said one or more rounded scallops. Accordingly, said cutaway portion 220 can be for illustrative purposes only, and said one or more rounded scallops can vary from the design shown herein and represented by removing said cutaway portion 220, as suggested. Nonetheless, said cutaway portion 220 can be helpful in describing a portion of said perforating gun body 200 to expose said one or more rounded scallops.

[0023] Said cutaway portion 220 can comprise an upper portion 222 and a lower portion 224. In one embodiment, said lower portion 224 can correspond with said burred 204 and said upper portion can correspond with said bore portion 206. In one embodiment, forming said one or more rounded scallops can comprise creating said upper portion 222 by scooping a portion of said perforating gun body 200 substantially in the form of said upper portion 222 and cutting a portion of said perforating gun body 200 in the form of said lower portion 224. In one embodiment, said one or more rounded scallops can penetrate a portion of said perforating gun body 200 but not cut all the way through said perforating gun body 200.

[0024] In the prior art, a typical scallop comprises drilling a substantially cylindrical cut into said perforating gun body 200 which leaves a cut approximating the form of said lower portion 224. Accordingly, said typical scallop (of the prior art) often has sharpened edges where said perforating gun body 200 met said typical scallop. Said sharpened edges were likely to injure users of said perforating gun 100. Accordingly, in one embodiment, by removing said upper portion 222 formed said perforating gun body 200, said bore portion 206 can protect users of said perforating gun 100 when handling said one or more rounded scallops.

[0025] FIG. 3 illustrates a cross sectional overview of said perforating gun 100 and said scallop 102a. In one embodiment, said one or more rounded scallops are positioned along outside wall 300 of said perforating gun body 200. In one embodiment, said one or more rounded scallops can be positioned in a helical configuration along the circumference of said outside wall 300 of said perforating gun body 200. In one embodiment, said one or more rounded scallops may be arranged in a different configuration as necessary. In one embodiment, the center of said one or more rounded scallops are perpendicular to said inside wall 302 of said perforating gun body 200. In one embodiment, said bore portion 206 makes a smooth transition to said outside wall 300 and can reduce injury when handling said perforating gun 100.

[0026] FIGS. 4A, 4B, 4C, 4D, 4E, and 4F illustrate a perspective overview, several rotated side views, and a zoomed in perspective view of a perforating gun 200, respectively. In one embodiment, said perforating gun 200 can comprise of one or more rounded scallops. In one embodiment, said one or more rounded scallops can comprise a scallop 402a, a scallop 402b, a scallop 402c, a scallop 402d, a scallop 402e, and a scallop 402f. In one embodiment, said one or more rounded scallops are positioned in a helical configuration along the length of said perforating gun 200. In one embodiment, more or less of said one or more rounded scallops may be used for said perforating gun 200. In one embodiment, said scallop 402a can be similar to said scallop 102a but lacking said burred 204. In one embodiment, said one or more rounded scallops of said perforating gun 200 can be substantially similar to said scallop 402a. In one embodiment, said perforating gun 200 can be substantially similar to said perforating gun 100 minus differences between said one or more sockets of said perforating gun 400 and said one or more sockets of said perforating gun 100.

[0027] FIGS. 5A and 5B illustrate a cross sectional overview of said perforating gun 200 and a cross sectional view of said scallop 402a. In one embodiment, said perforating gun 200 can comprise of a gun body 500 and a lower portion 502. In one embodiment, said scallop 402a is drilled out of said gun body 500. In one embodiment, said scallop 402a is comprised of a bore portion 504 and a rim 506. In one embodiment, said bore portion 504 can be similar in dimensions to said bore portion 206 and maintain said bore angle 208. In one embodiment, said one or more rounded scallops of said perforating gun 200 can be substantially similar to said scallop 402a.

[0028] FIG. 6 illustrates a cross sectional overview of said perforating gun 400 and a cross sectional overview of said perforating gun 200 and said scallop 402a. In one embodiment, said one or more rounded scallops are positioned along outside wall 600 of said perforating gun body 500. In one embodiment, said one or more rounded scallops can be positioned in a helical configuration along the circumference of said outside wall 600 of said perforating gun body 500. In one embodiment, said one or more rounded scallops may be arranged in a different configuration as necessary. In one embodiment, the center of said one or more rounded scallops are perpendicular to inside wall 602 of said perforating gun body 500. In one embodiment, said bore portion 504 makes a smooth transition to said outside wall 600 and can reduce injury when handling said perforating gun 500.

[0029] FIG. 7 illustrates a perspective overview of a cutter 700 having a blade 702. In one embodiment, said blade 702 comprises a rounded edge 704. In one embodiment, said 700 can be used to cut a portion of said one or more rounded scallops. For example, in one embodiment, said 700 can cut said upper portion 222 of said perforating gun 100 or said bore portion 504 of said perforating gun 400. In one embodiment, said cutter 700 can be used by rotating said blade 702 on said perforating gun body 200 and/or said gun body 500 at varying depths relative to a thickness of said guns, as would be obvious to one of ordinary skill in the art.

[0030] Various changes in the details of the illustrative operational methods are possible without departing from the scope of the following claims. Some embodiments may combine the activities described herein as being separate steps. Similarly, one or more of the described steps may be omitted, depending upon the specific operational environment the method is being implemented in. It is to be understood that the above description is intended to be illustrative, and not restrictive. For example, the above-described embodiments may be used in combination with each other. Many other embodiments will be apparent to those of skill in the art upon reviewing the above description. The scope of the invention should, therefore, be determined with reference to the
appended claims, along with the full scope of equivalents to which such claims are entitled. In the appended claims, the terms “including” and “in which” are used as the plain-English equivalents of the respective terms “comprising” and “wherein.”

1. An improved well perforating apparatus comprising:
   a one or more rounded scallops in a perforating gun body of a perforating gun;
   said one or more rounded scallops comprising a cut away portion of said perforating gun body having a bore portion and a rim;
   said rim comprising a bore angle between said bore portion and said perforating gun body;
   said bore angle comprises an angle of about forty-five degrees;
   said rim protects users of said perforating gun from harming themselves when handling said perforating gun;
   a burr is cut into said perforating gun body below said bore portion;
   said bore is cut into said perforating gun body with a cutter comprising a blade by rotating said blade at various depths into said perforating gun body;
   said blade comprises a rounded edge corresponding to a rounded cut at said bore portion; and
   said one or more rounded scallops are arranged on said perforating gun body in a helical pattern.

2. An improved well perforating apparatus comprising:
   a one or more rounded scallops in a perforating gun body of a perforating gun;
   said one or more rounded scallops comprising a cut away portion of said perforating gun body having a bore portion and a rim; and
   said rim comprising a bore angle between said bore portion and said perforating gun body.

3. The improved well perforating apparatus of claim 2 wherein:
   said bore angle comprises an angle between fifteen degrees and seventy-five degrees.

4. The improved well perforating apparatus of claim 2 wherein:
   said bore angle comprises an angle of about forty-five degrees.

5. The improved well perforating apparatus of claim 2 wherein:
   said rim protects users of said perforating gun from harming themselves when handling said perforating gun.

6. The improved well perforating apparatus of claim 2 further comprising a burr.

7. The improved well perforating apparatus of claim 6 wherein said burr is cut into said perforating gun body below said bore portion.

8. The improved well perforating apparatus of claim 2 wherein:
   said bore is cut into said perforating gun body with a cutter comprising a blade by rotating said blade at various depths into said perforating gun body.

9. The improved well perforating apparatus of claim 8 wherein:
   said blade comprises a rounded edge corresponding to a rounded cut at said bore portion.

10. The improved well perforating apparatus of claim 2 wherein said one or more rounded scallops are arranged on said perforating gun body in a helical pattern.

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