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GAS PORT COUPLING

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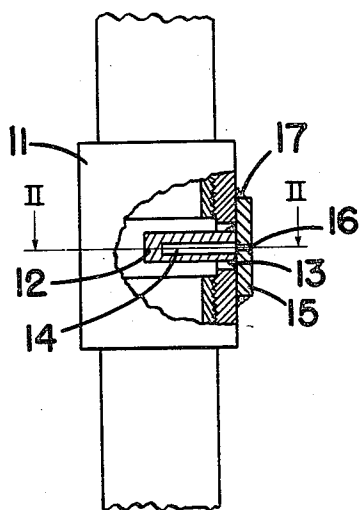


FIG. 1.

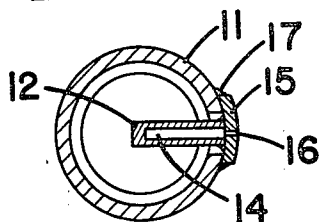


FIG. 2.

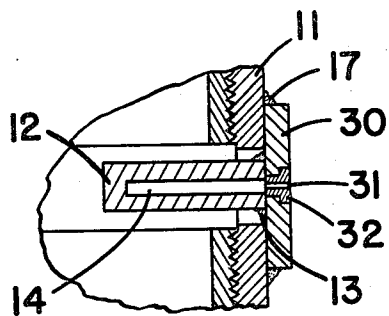


FIG. 3.

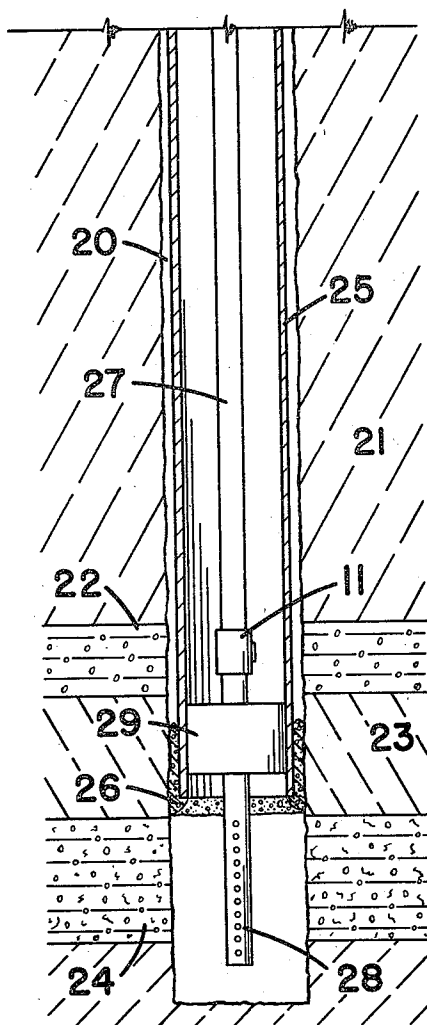


FIG. 4.

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GAS PORT COUPLING

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2 Claims. (Cl. 166—1)

The present invention is directed to a coupling for use in the flow string of a well.

An object of the present invention is to produce a means which will enable an orifice to be installed in the tubing in a well without necessitating the removal of the tubing from the well.

A further object is to provide a means to be arranged in the flow string of a well which will provide an orifice in a tubing upon suitable manipulation from the surface of the earth.

Other objects and advantages of the present invention may be seen from a reading of the following specification taken in conjunction with the drawing in which

Fig. 1 is a view, partly in cross section, of a modification of the present invention;

Fig. 2 is a view taken along the line II—II of Fig. 1;

Fig. 3 is a cross sectional view of another modification of the present invention; and

Fig. 4 is a view showing the device in position in the flow tubing in a well.

Referring now specifically to the drawing, a coupling 11 is provided with a hole in the median portion thereof, and arranged within the hole so that it extends laterally with respect to the axis of the coupling is a pin 12 which is constructed of a frangible material, such as cast iron. The pin is attached to the coupling by suitable means, such as welding 13, which seals the end of the pin to the coupling in a fluid-tight manner. A passage 14 is drilled into the pin, the passage beginning at the face of the part of the pin attached to the coupling and extending longitudinally inwardly, but terminating before the end of the pin is reached. Arranged to cover the base of the pin is a plate 15, the plate being provided with a small hole 16 of a size to be determined by the volume of gas desired, the hole being centered over the passage 14 of the pin. Plate 15 is constructed of a shock resistant material, such as steel, and is attached to the coupling 11 by a suitable means, for example, welding 17, in order to provide a fluid-tight seal.

As another modification of the present invention the plate covering the base of the frangible pin may be provided with a hard metal insert. Such an insert is illustrated by Fig. 3. As indicated in this figure, a plate 30 is provided with small passage 31, and centered about the outer opening of this passage is a hard metal insert 32. The insert resists abrasive conditions which otherwise might rapidly enlarge the opening through the plate.

An application of the device to a producing

well is illustrated in Fig. 4. In this figure, a bore hole 20 penetrates a superimposed stratum 21, gas producing zone 22, impermeable zone 23, and oil producing formation 24. The hole is provided with the usual casing 25 sealed at its lower end with cement plug 26. Within the casing is arranged tubing 27 having arranged at its lower end a perforated nipple or screen 28 with a packer 29 arranged above the perforated nipple to seal the oil producing zone from the gas producing zone. Arranged above the packer in the gas producing zone is collar 11 having arranged therein a frangible pin, as previously described.

The well may be allowed to produce from the oil producing formation in the usual manner. Under some occasions, however, it will be found that there is not sufficient gas dissolved in the oil produced. Under such circumstances, it will be desirable to have an orifice in the tubing at the gas producing zone to enable gas to flow from the gas producing zone into the tubing. This additional gas will reduce the specific gravity of the oil in the tubing and allow greater production from the oil producing formation. Under such conditions, a weight on a line may be run down the tubing. If the weight strikes pin 12 with sufficient force, it will shear off the end thereof and expose passage 14 so that gas may flow from the gas producing zone to the interior of the tubing.

While specific materials for constructing the device have been disclosed herein, it will be apparent that the device is not limited to the use of such materials. What is desired is a relatively easily frangible pin projecting within the tubing and provided with a passage, the end of the passage being protected by a shock-resisting material provided with a small orifice so that, when a portion or all of the frangible pin is destroyed, the flow of fluid into the well will be controlled by the small orifice. It is therefore not my intention to be bound by the specific modification disclosed, but to claim my invention broadly.

I claim:

1. Means suitable for arrangement in a producing string comprising, in combination, a section of conduit, a frangible member secured to the wall of said conduit in a fluid-tight manner and extending inwardly, a second member of relatively shock-resistant material secured to the exterior of said conduit in a fluid-tight manner to entirely cover said frangible member, a relatively small orifice in said second member, a passage of larger size in said frangible member, said passage being arranged with one end in

communication with said orifice and extending a substantial distance in said member, but without fluid communication with the interior of said conduit, and abrasion-resisting means arranged on the exterior of said shock-resisting member adjacent said orifice.

2. Apparatus for producing a well comprising, in combination, a string of tubing, perforations in the lower end of said tubing for allowing the flow of fluid therein, a coupling arranged above said perforations constructed of relatively shock-resistant material having a hole in the wall thereof, a relatively frangible member secured in

said hole and projecting inwardly, a relatively shock-resistant member secured on the exterior of said coupling to cover the end of said frangible member, an orifice of relatively small area in said shock-resistant member, erosion resisting means arranged on said shock resistant member adjacent said orifice and a passage in said frangible member in communication with the exterior through said orifice, but without communication to the interior of the casing, said frangible member being arranged to be sheared by a weight passed down said tubing.

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