Feb. 15, 1949. E. B. BARNES 2,461,512

FLOW BARREL

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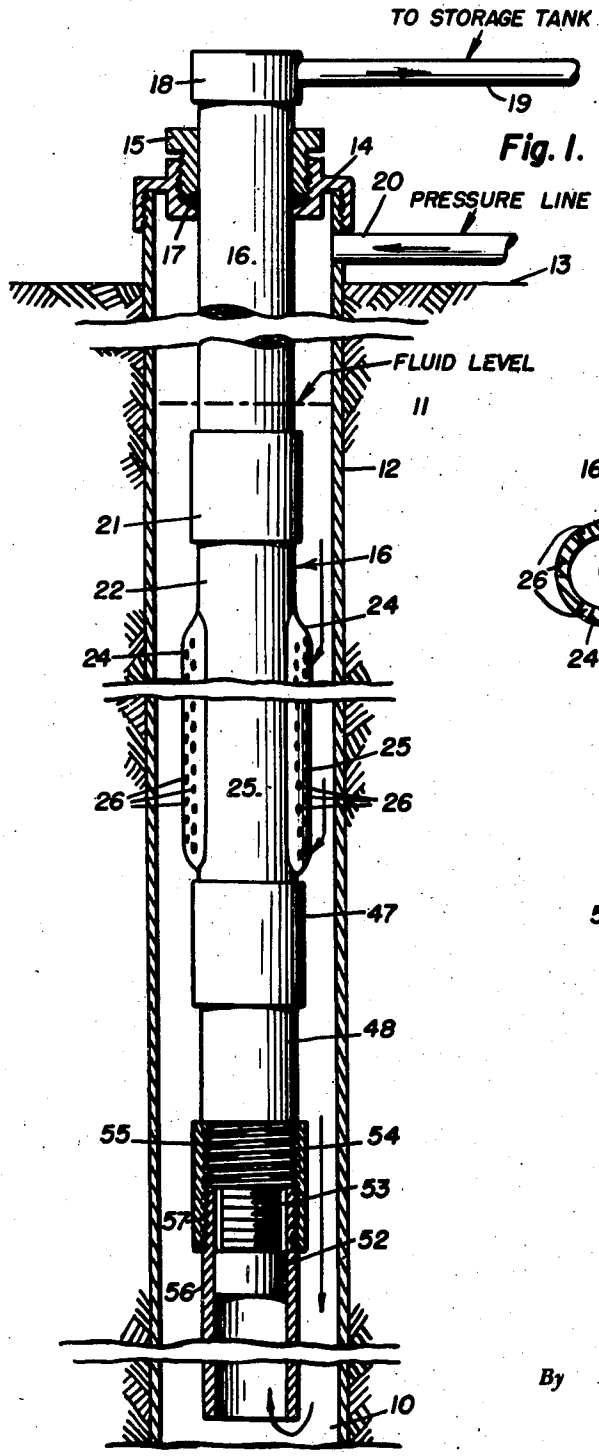


Fig. 1.

Fig. 6.

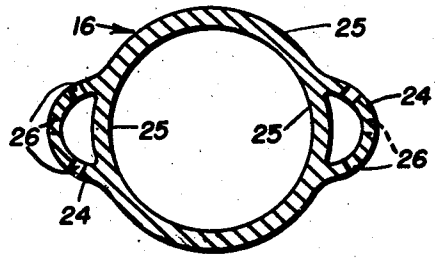
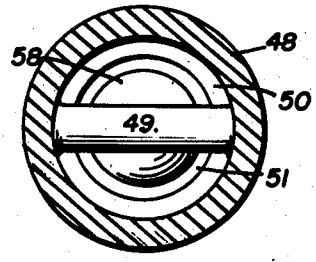


Fig. 7.



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FLOW BARREL

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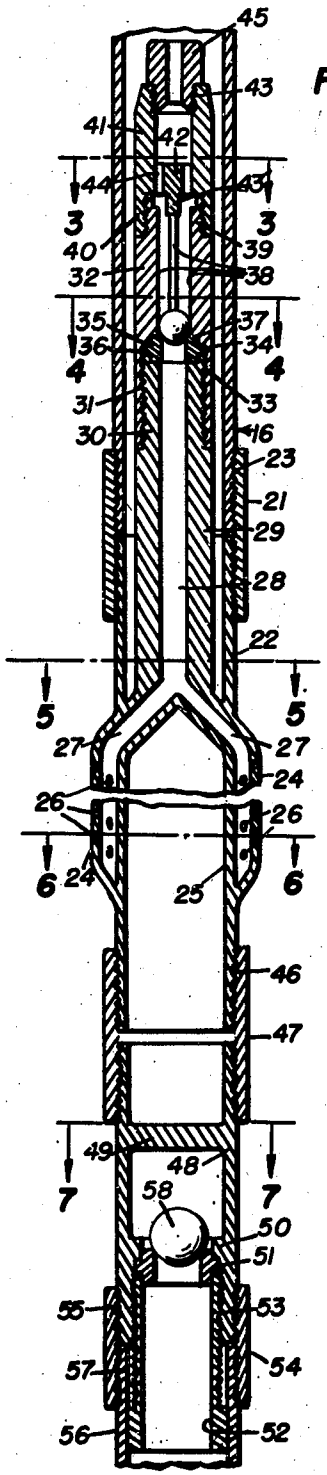


Fig. 2.

Fig. 3.

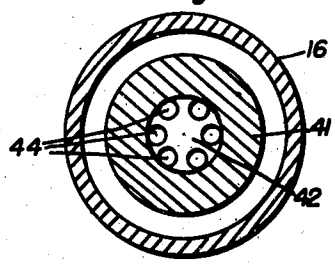


Fig. 4.

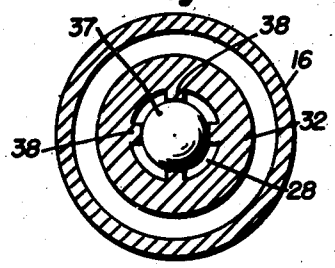
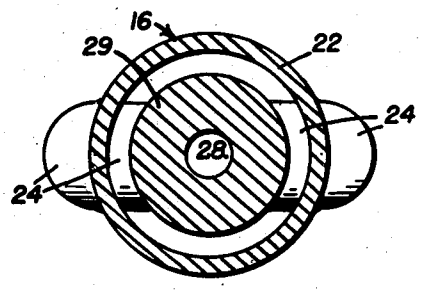


Fig. 5.



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FLOW BARREL

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2 Claims. (Cl. 103—232)

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This invention relates to a flow barrel for the production of fluids from a well, such as the production of petroleum or crude oil products from oil wells, although the invention is applicable to the production of any fluid from any well.

The principal object of the invention is to provide a device which is designed to cause an atomizing or agitating effect upon the fluid, with the lifting qualities of gas or air causing the production to flow from the well and permitting air or gas under pressure to be supplied for forcing the fluid from the well, either in the well itself, or from other wells having such pressure or from an external source as by means of a compressor at the surface where the gas or air may be introduced into the hole, so as to produce pressure by either natural pressure from gas in the hole or from an external source, such as a compressor at the surface, or from other wells, where gas may be introduced into the hole from such source to cause flow of the fluid or oil more quickly and to increase production in a shorter space of time.

Another object of the invention is to provide a flow barrel which is adapted to be hung in the well hole somewhere below the fluid level in the hole and the bottom of the well with tubing to the surface, and also with tubing hanging below the flow barrel to near the bottom of the well, so that pressure will be produced by either natural pressure from gas in the hole or by a compressor at the surface, where gas may be introduced into the hole from other wells having pressure or otherwise.

Another object of the invention is to provide a flow barrel, incorporated as a part of the well tubing, and by which the gas or air is forced under pressure to produce an atomizing or agitating effect and also to lift the fluid, either oil or otherwise, by reason of the lifting qualities of the gas or air pressure causing the production to flow from the well, said pressure supply being connected to the casing head at the surface of the well so as to flow or be forced into the space between the casing outside of the tubing and the tubing, or from the bottom of the well itself, in which event it will enter the same area and cause the atomizing or agitating and lifting effect described, so as to bring the oil or other fluid to the surface quickly and efficiently with increased production, especially with wells, having insufficient pressure within the well hole, to cause flow and production thereby facilitating production and flow in such wells.

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Another object of the invention is to provide a novel flow barrel construction having perforated areas outside of the well tubing, and along the outside of the flow barrel, through which the fluid or oil is forced under pressure while producing an atomizing or agitating and lifting effect under gas or air pressure produced within the well or supplied thereto at the casing head between the tubing and the outside casing, so as to enter the flow barrel through the perforations along the outside of the flow barrel, leaving the bottom of the tubing below the flow barrel freely open to allow oil or other fluid to flow freely up to the flow barrel where the gas or air pressure will pick it up and carry it to the surface, while providing means to prevent any return of backward flow of the fluid.

Other objects and advantages reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the acompanying drawings forming part hereof, wherein like numerals refer to like parts throughout, and in which:

Figure 1 is an elevation of the flow barrel installed in a well casing, for supplying gas or air pressure to facilitate production and flow of the oil or other fluide from the bottom of the well.

Figure 2 is a sectional view of the flow barrel removed from the casing.

Figures 3, 4, 5, 6 and 7 are sectional views taken on the section lines 3—3, 4—4, 5—5, 6—6, and 7—7 of Figure 2 and enlarged with respect thereto.

Referring to the drawings in detail, in which like reference characters designate corresponding parts throughout the several views, 10 designates a well hole for the production of any fluid, such as crude oil or water, in which the fluid level is indicated at 11, within the well casing 12. The fluid level may be oil level, water level, or otherwise, and frequently there is water mixed with oil and there may be other fluids as well, the purpose being to make the invention general in its application for all wells, irrespective of the fluid to be produced or lifted from the well hole, which as usual, may extend several hundred or several thousand feet below the ground surface indicated at 13, where the casing 12 is provided with the usual or any preferred form of casing head 14, but shown threaded thereto, with an intermediate packing gland 15 between the same and the well tubing indicated at 16, with an interposed packing 17, above which the well tubing 16 extends and may be provided with a

head 18 from which a conduit or pipe 19 may extend through a storage tank or otherwise. While fluid pressure such as gas or air may be provided in the bottom of the well, where there is not sufficient pressure, that is natural pressure from the gas in the hole, pressure may be supplied from an external source by means of a compressor at the surface, or by natural pressure at the surface from gas introduced in the hole from other wells having pressure, through the medium of a pressure line 20 or otherwise, to the well casing 12 above the surface of the well, below which the tubing 16 extends to the bottom of the well and below the flow barrel constituting the principal feature of novelty of the present invention.

As shown, the tubing 16 is coupled as indicated at 21 to the flow barrel proper 22, the lower end of the upper portion of the tubing 16 and the upper end of the barrel 22 being externally threaded as indicated at 23 for taking the internally threaded coupling 21, as more particularly shown in Figure 2 of the drawings.

The flow barrel 22 includes one or more, and shown as two diametrically disposed perforated areas or longitudinal external channel projections 24 projecting outwardly from the tubular portion 25 of the flow barrel, for considerable length and provided with a plurality of relatively fine perforations 26 located in rows in staggered relation lengthwise thereof, through which the air or gas, fluid pressure is adapted to enter the barrel from the space between the tubing 16 and the well casing 12, as produced from the natural pressure from gas in the hole, or by a compressor at the surface, where gas may be introduced into the hole from other wells having pressure. It is of course well-known that some wells have excess pressure, or that said pressure may be below that required to produce necessary flow of oil or other fluid from the well, and give the production required. It is in such instances, where the pressure may be introduced into the well hole internally of the casing and externally of the tubing 16, in order to secure the required or desired production, so as to raise the efficiency of the production and insure proper flow of the fluid, either water, oil or otherwise from the well hole. Also, frequently, water is mixed with oil and there may be other fluids in the well hole, so that the present device is capable of general application for production of different fluids to insure proper flow thereof from the well hole, the tubing extending below the flow barrel to any desired depth, which may be several hundred or several thousand feet below the flow barrel in the well, so as to be lifted and by suction created by the pressure in addition to the commingling of the particles of atomized or agitated effect of the air or gas pressure within the fluid, assisting in the upward flow and production of the flow from the well, whether oil, water or otherwise.

The flow barrel assembly includes, in addition to the perforated longitudinal projections, extensions or channels 24, closed except by the perforations 26 on the outside, and which are imperforate at the inner tubular portion 25, converging inwardly extending oppositely inclined channels or passages 27 at the top, extending into a central tubular passage 28 in the manner of a V inverted, or a Y inverted from the merging passages 27 with a thickened tubular portion 29 of reduced diameter or size spaced from the surrounding tubing 16 and having an externally threaded reduced portion 30 at the top receiving an internally threaded portion 31 of reduced thickness formed at the lower end of a tubular ball cage 32, the coacting upper and lower ends of the portions 30 and 32 respectively forming shoulders are bored to provide seats 33 and 34 for an annular ball seat 35 having an intermediate annular rib 36 with reduced ends, seated in the stepped shoulders 33 and 34 and thereby retained in position when the parts 30 and 32 are coupled at the threaded connection 31 so that a ball check valve 37 operating in the portion 32 within the longitudinal webs or ribs 38 in the ball cage 32 and shown as four in number equidistantly spaced around the same, will close the passage 28 at the seat 35 whereby the gas, air or vapor under pressure may pass upwardly therethrough, but effectively prevent backflow or backpressure therethrough.

The ball cage 32 has a reduced externally threaded upper end portion 39 engaged by the internally threaded enlarged bore portion 40 of a tubular ball stop 41 having a central stop or baffle wall 42, engaging an internal projection of corresponding portent 43 extending from one of the longitudinal ribs 38 at the upper end of the cage 32, so as to form a stop to limit the movement of the ball valve 37 to an unseated position and preventing displacement thereof. Around the wall or baffle 42, which is in the form of an internal transverse wall or partition, a plurality of longitudinal openings 44 are provided through which the air, gas or vapor entering between the barrel 25 at the passages 27 and passage 28, may escape upwardly upon unseating the ball valve 37, after entering through the holes or perforations 26 between the barrel or tubing and the casing 12, and into the bore of the stop 41 from the cage 32, where it may issue from the reduced bore of a nozzle 45 of reduced diametcr having an externally threaded reduced lower portion 43 threaded in a correspondingly sized bore of the stop 41 at the upper end of the latter into the fluid channel between the tubing 26 and the flow barrel or nozzle, so as to cause an atomizing or agitating effect with the lifting qualities of the gas, air or vapor for causing the flow of production of fluid, either water, oil or otherwise, from the well. As before stated, this pressure may be produced internally in the well hole, by natural pressure from gas in the hole or by a compressor at the surface where gas may be introduced in the hole from other wells having such pressure or otherwise. At the casing head, the fluid, the flow or production of which is thereby facilitated, to lift the oil or other fluid from the well, will be connected at the casing head at the surface of the well, to the flow line such as indicated at 19, to a storage tank or otherwise.

As shown, the lower end of the tubing, that is of the portion 25, is externally threaded as indicated at 46 to take an internally threaded coupling 47 on the externally threaded upper end portion of a ball cage 48 having a diametrical stop member or spider 49 intermediately of the length thereof and its lower portion formed with an internal annular rib 50 designed to take a ball seat 51 corresponding to the seat 35 by reason of the shoulders or seats provided in the cage 48 beneath the rib 50 and at the externally threaded upper end of a tubular lock ring or nut 52 threaded as at 53 in the enlarged bore of the lower end of the cage 48 against the annular intermediate shoulder of the ball seat 51. A coupling 54 internally threaded to engage the externally threaded portion 55 at the lower end

of the ball cage 48, provides means for coupling an extension tubing 56 having an exteriorly threaded portion 57 engaged with the internal threads of the lower end of the coupling 54 as at 57, so that the tubing may be extended below the flow barrel any desired distance, such as several hundred feet or several thousand feet, to the bottom of the well below the fluid level of the oil or water in the well hole, and within the casing 12, as clearly shown in Figure 1 of the drawings. In other words, the device or tool itself will hang somewhere below the fluid level in the hole and the bottom of the hole, with the tube extending to the surface and also with the tubing hanging below the tool or flow barrel to near the bottom of the well, so that the gas, air or vapor pressure in the hole will force the fluid therein to be produced or caused to flow to the surface, through the perforations 26 and up through the passages 27 into the passage 28 and escape with the fluid at the top to cause an atomizing or agitating effect together with the lifting qualities of the air or gas pressure causing the production to flow from the well, either in connection with water, oil or other production. Obviously, any number of perforated areas or channels may be provided, so that the gas or air pressure may effectively pass to the same and up into the tube past the check valve or ball 37, which upon closing, downwardly will prevent backflow or back-pressure in the passage 28. The device will act in the manner stated whether the gas or air will flow or be forced into the space between the casing outside of the tubing and the tubing or else will come from the well, in which event it will enter the same area passing through the perforations and the passages 27 into the common passage 28 in the flow barrel, in addition to outside and along the flow barrel before passing through the Y-connection past the ball valve into the open tubing to mix with the oil or water enroute, causing the atomizing or agitating of pressure and bringing the oil or other fluid to the surface. For this purpose, a ball check valve 58 cooperates with the seat 51 so that the fluid entering the tubing at the bottom, will pass through the same upon unseating of the check valve 58 and held from displacement by the diametrical stop 49, upward in the tubing and flow valve to flow freely to the top thereof, where the gas or air pressure will pick it up and carry it to the surface. Each ball valve will prevent any return or backward flow of the fluid or air or gas under pressure irrespective of the nature of the fluid in the well, thereby adapting the device generally to production of any fluid from any well, such as oil, water or otherwise.

While in the foregoing there has been shown and described the preferred embodiment of this invention it is to be understood that minor changes in the details of construction, combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as claimed.

I claim:

1. A flow barrel for wells comprising a tubular body threaded at its ends for interposition between sections of well tubing and provided with a pair of longitudinal hollow external perforated projections affording elongated fluid entrance pockets therein, an inverted Y-shaped element providing a pair of upwardly converging tubular members communicating at their lower ends through the body with the upper ends of said pockets, and a single tubular member spaced from and disposed axially of and within the body, said single tubular member projecting above the body and communicating at its lower end with the upper ends of said converging tubular members.

2. The construction defined in claim 1, in combination with a ball seat, a tubular ball cage securing said ball seat on the upper end of said single tubular member, a ball in said cage above the seat, a tubular ball stop secured on the upper end of said cage and having a central depending stop member for said ball, and a nozzle secured on the upper end of said ball stop and having a bore of reduced size compared to the passages through the tubular members, the ball cage and the ball stop.

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