J. E. McAVOY.

METHOD OF SHOOTING OIL WELLS.

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1,248,689. Patented Dec. 4, 1917.

Fig. 1

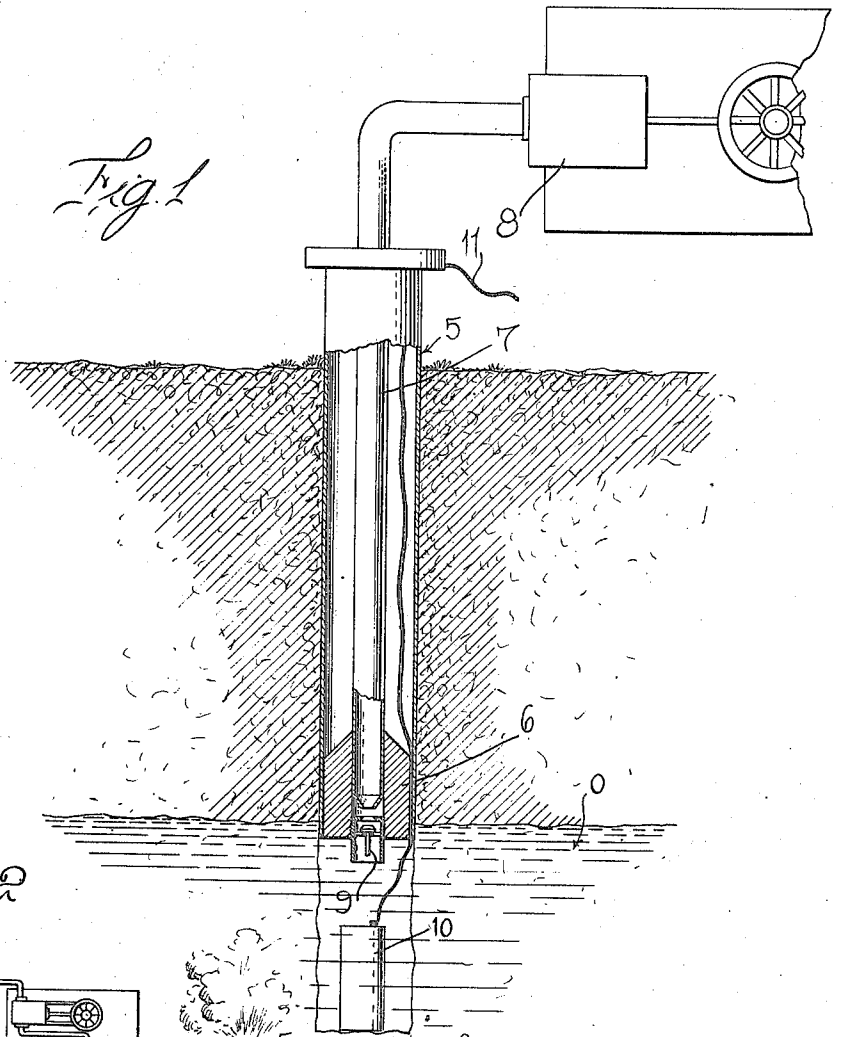

Fig. 2

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METHOD OF SHOOTING OIL-WELLS.

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Application filed June 13, 1917. Serial No. 174,615.

To all whom it may concern:

Be it known that I, JAMES E. McAVOY, a citizen of the United States, residing at Foxburg, in the county of Clarion and State of Pennsylvania, have invented certain new and useful Improvements in Methods of Shooting Oil-Wells, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to an improved method of shooting oil wells, and has for its primary object to secure a free flow of oil or gas from the well by a simple, inexpensive, and expeditious operation.

It is a more particular object of the invention to provide a method for the above purpose, embodying the retention under high pressure of a compressed air and gas in the oil bearing strata of rock and the explosion thereof, whereby the rock is broken up and the oil released.

And it is another object of the invention to provide a method as above characterized, which may be advantageously employed in the field of abandoned wells, the shooting of one well releasing the oil from the oil bearing sand and rock by the expansion of the gases so that the oil will collect in the adjacent abandoned wells.

With the above and other objects in view, the invention consists in the several successive steps comprising my improved method which will be hereinafter fully described and subsequently set forth in the appended claims, reference being had to the accompanying drawing, wherein—

Figure 1 is a vertical sectional view through an oil well, illustrating my improved method; and

Fig. 2 is a sectional diagrammatic view illustrating the manner of employing the method in connection with a series of adjacent abandoned wells.

Referring in detail to the drawing, 5 designates the well casing which is arranged in the bored well in the usual manner, the lower end of said casing terminating contiguous to the oil bearing strata of rock and sand, indicated at 0. In carrying out my improved method, the well hole below the tube or casing 5 is tightly closed by means of a suitable packing indicated at 6, such packing being of such construction that it has a normal tendency to expand in an outward direction and exert a tight frictional bearing pressure against the walls of the well hole. The packing 6 has a central bore to receive the lower end of a sectional pipe 7 which is connected to a cylinder 8, in which air and gas are compressed. The amount of gas supplied to the pipe 7 is determined by the approximate amount of gas contained in the oil bearing rock. This rock frequently contains large pockets of oil gas and the supply of compressed gas through the pipe 7 is in inverse ratio to the quantity of such natural gas which may be found by investigation to exist in the oil bearing strata of rock.

Below the pipe 7, the bore of the packing 6 is provided with a valve 9 which is closed by pressure in the well below said packing.

A cylinder or other container, indicated at 10, containing dynamite, nitroglycerin, or other high explosive, is arranged in the well below the packing 6, said container being provided with a suitable spark forming device to which the current supply wires, indicated at 11, are connected. While I have found it desirable to use a container 10 for the explosive, it is to be understood that the explosive may be loosely placed in the bottom of the well hole, the lower ends of the current supply wires being connected directly to a stick of dynamite. The particular method to be employed will be determined largely by the peculiar nature of the oil bearing rock.

In the operation of my improved method, the explosive is arranged in the well below the tube 5, and the packing 6 carrying the valve 9 is then arranged in place. The lower end of the pipe 7 is engaged in the packing bore and compressed air and gas is supplied through said pipe to the well. As the pressure increases, it enters the crevices in the adjacent oil bearing rock and expands, releasing the gases which collect in the well around the explosive container 10. When the desired pressure has been attained, a suitable switch is closed and the dynamite or nitroglycerin is exploded. The surrounding gas is likewise exploded and acts with tremendous force by expansion in all directions to break up the oil bearing rock or sand and release the oil contained therein. The explosion, of course, also drives the packing 6 upwardly out of the well casing, it being understood that the pipe 7 is removed before the charge is exploded. The oil which is thus released will flow into the well bore below the casing 5 and such flow is facili-

tated by means of a suitable vacuum pump, and the oil collecting in the bottom of the well hole is then withdrawn in the usual manner. In the use of the pump, a suitable packing similar to that above referred to, is again arranged in the lower end of the well tube around the pipe.

In Fig. 2 of the drawing, I have illustrated a series of abandoned oil wells. In such cases, one of the wells is shot in the manner above explained, so that the oil entrained in the oil bearing rock or sand between this well and the nearest adjacent wells will flow into the latter wells, from which it may be recovered. Each of the abandoned wells is shot in like manner so that substantially all of the oil contained in the surrounding oil bearing rock may be recovered.

From the foregoing description, taken in connection with the accompanying drawing, the several steps of my improved method and the manner of practising the same, will be clearly and fully understood. It will be appreciated that by means of my invention, the oil may be recovered in a simple and expeditious manner and with practically no waste. By the creation of a high pressure in the well, whereby the oil rock adjacent the well is broken up and such gases as may be contained therein released, the force of the explosion will be relatively great with the use of a comparatively small amount of dynamite or nitroglycerin. Thus, it is apparent that the improved method can be practised at very small cost. As the several steps of the method are very simple, they may be carried out with a minimum of manual labor. In the use of the method as shown in Fig. 2, after shooting the well, the artificial pressure may be continued so as to thoroughly liberate all of the oil by completely breaking up the rock and sand, and directing the oil into the adjacent wells.

While I have herein disclosed the manner of practising my improved method which I have found to be most advantageous in actual use, it is nevertheless to be understood that the same is susceptible of certain modifications and I, therefore, reserve the privilege of resorting to all such legitimate changes as may be fairly embodied within the spirit and scope of the invention as claimed.

Having thus fully described my invention, what I desire to claim and secure by Letters Patent is:

1. The herein described method of shooting oil wells which consists in closing the lower end of the well hole against pressure and supplying compressed gas to the well below the tube, and then exploding a charge in the body of compressed gas.

2. The herein described method of shooting oil wells which consists in closing the lower end of the well hole contiguous to the oil bearing strata of rock, then supplying compressed air to the well below the closed end of the tube to enter the crevices of the surrounding oil bearing rock and break up the same to release the gases therefrom, and finally exploding a charge within the compressed body of air and gas.

3. The herein described method of shooting oil wells which consists in closing the lower end of the well hole above the oil bearing strata of rock, then supplying compressed air and gas to the well below the tube until a sufficient pressure is obtained to break up the surrounding oil bearing rock and release the gases contained therein, and finally igniting a charge of explosive in the body of compressed air and gas.

4. The herein described method of recovering oil and gas from abandoned wells, which consists in arranging an explosive charge in the bottom of the well, then confining a highly compressed body of gas within the bottom of the well, and finally exploding the charge to break up the surrounding oil bearing rock and release the oil and gas contained therein.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

JAMES E. McAVOY.

Witnesses:
GEO. HUBER,
WILLIAM E. EVANS.