Oct. 17, 1939. M. O. JOHNSTON 2,176,766

PRESSURE BOMB MOUNTING

Filed Nov. 20, 1936

Fig. 1.

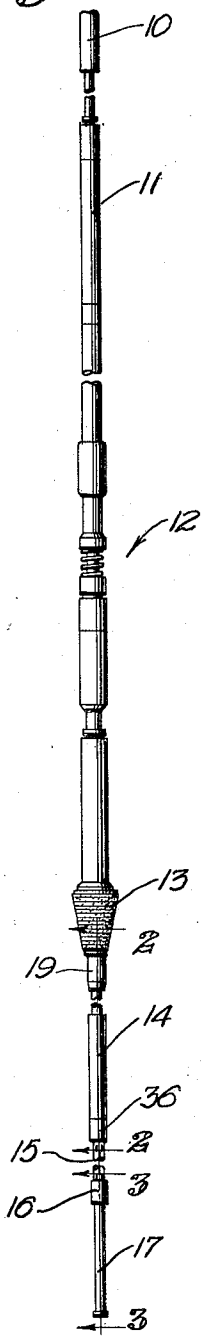


Fig. 2.

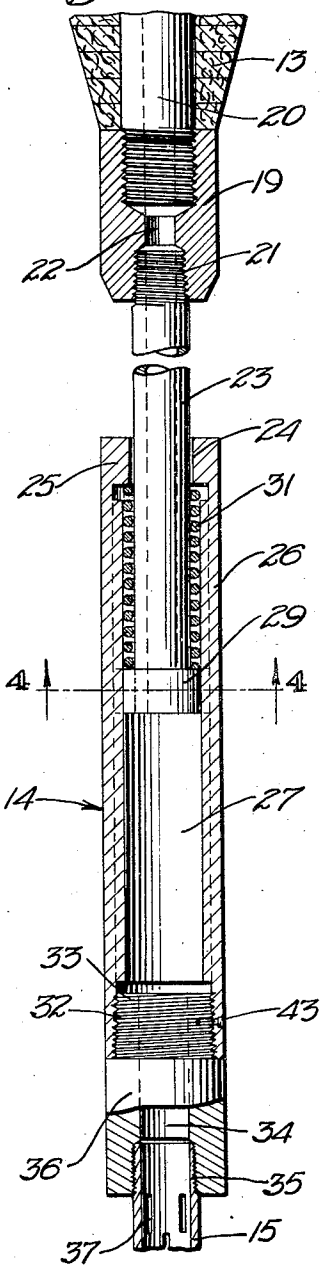


Fig. 3.

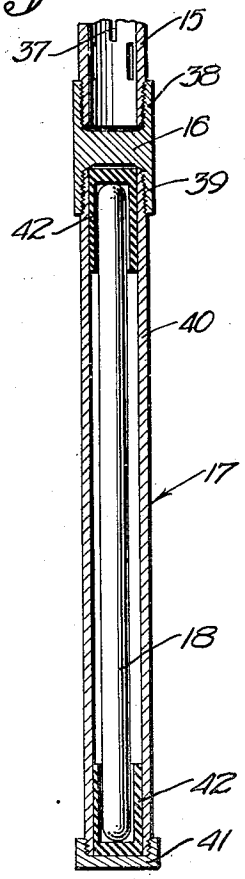
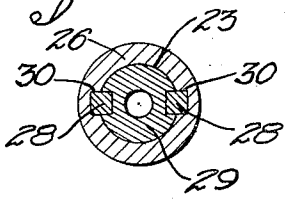


Fig. 4.



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PRESSURE BOMB MOUNTING

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2 Claims. (Cl. 166—1)

This invention relates to oil well equipment, and particularly pertains to a mounting for pressure bombs.

In making surveys of oil wells and the like it has now become established practice to ascertain the pressure of the gases and fluids which are native to the formation being penetrated in drilling. This is usually done by the use of a device known in the industry as a pressure bomb which is a structure sensitive to pressure and which carries a time clock and recording means so that a graph giving pressure readings at progressive depths may be obtained by lowering the device into the well. In some instances these pressure recording instruments are used in conjunction with well packers and with formation testing tools which are lowered into the well on a drill string. It often occurs that due to conditions in the well the formation caves so that the instrument may become lodged in the well and sometimes lost. In order to guard against this accidental occurrence a well jar is often carried in the string of pipe at a point above the tools and instruments being used, and for the purpose of jarring the instrument or the packer loose to permit recovery of all of the members lowered into the well. It will be recognized that the action of a well jar upon the delicate cage and clock of the pressure bomb may damage the parts thereof so that the structure would be rendered inoperative and necessitate expensive repairs. It is the principal object of the present invention therefore to provide a mounting for a pressure bomb which will protect it from the violent action of a well jar and which furthermore has the additional advantage of providing means for readily disconnecting the pressure bomb in case it becomes fastened in the drilled hole so that the superposed parts of the drill string structure may be withdrawn and so that subsequently the pressure bomb can be "washed over" and thereafter engaged by a fishing tool by which it may be recovered.

The present invention contemplates the provision of a mounting for pressure bombs having means embodied therein for permitting relative movement between the bomb and the parts from which it is suspended, and thus isolating the bomb from shock and vibration set up therein.

The invention is illustrated by way of example in the accompanying drawing in which:

Figure 1 is a view showing the assembly of well tools with which the present invention is connected.

Fig. 2 is an enlarged view in central vertical section as seen on the line 2—2 of Fig. 1, showing the pressure bomb mounting.

Fig. 3 is an enlarged view in central vertical section as seen on the line 3—3 of Fig. 1, indicating the pressure bomb assembly.

Fig. 4 is an enlarged view in transverse section through the pressure bomb mounting as seen on the line 4—4 of Fig. 2, showing the positive rotational engagement between parts of the pressure bomb mounting.

Referring more particularly to the drawing, 10 indicates a drill string which is lowered into a well, and which is here shown as fitted with a set of well jars generally indicated at 11. Mounted below the jars is a formation tester 12 shown equipped with a rathole packer 13. Below the rathole packer is secured a pressure bomb mounting 14 which carries at its lower end a perforated anchor pipe 15. Secured to the anchor pipe by a coupling 16 is a tubular sleeve 17 within which a pressure bomb 18 is mounted. Referring particularly to Fig. 2 of the drawing it will be seen that the rathole packer 13 is fitted with a bottom nut 19 which is threaded on to a central tubular packing mandrel 20. At the lower end of the bottom nut 19 is a threaded bore 21, the threads of which are here indicated as righthand threads for a purpose to be hereinafter described. A fluid passageway 22 is formed through the nut 19. Threaded into the opening 21 is a tubular mandrel 23 which extends through an opening 24 in the end wall 25 of a sleeve 26. A central cylindrical passageway 27 is formed lengthwise of the sleeve and has formed on its face and extending longitudinally thereof keys 28. The lower end of the mandrel 23 is formed with a head 29 carrying keyways 30 within which are seated the keys 28 along which the head 29 moves longitudinally. The length of the mandrel 23 is such as to cause a space to occur between the head 29 and the end wall 25 so that a helical shock absorbing spring 31 may be interposed between the lower face of the end wall 25 and a shoulder on the head 29. The lower end of the sleeve 26 is formed with a threaded counterbore having a lefthand thread indicated at 32. This thread receives the threaded portion 33 of the coupling 36. A central fluid passageway 34 extends through the coupling 36 and a threaded counterbore 35 at its lower end which carries a righthand thread. The upper threaded end of the anchor pipe 15 extends into this counterbore and is there fastened. The anchor pipe may be of any desired length and is formed with the usual perforations 37 which will permit fluid to

flow into the pipe, and thence upwardly into and through the testing tool to the drill string. Mounted upon the lower end of the perforated anchor pipe 15 is the coupling collar 16, the opposite ends of which are threaded. The upper threaded portion 38 receives the threaded end of the anchor pipe. The lower threaded portion 39 receives a tubular housing 40 for the pressure bomb unit 18. The lower end of the tubular housing is closed by a thimble 41. Mounted within the opposite ends of the tubular housing are rubber thimbles 42 which fit over the opposite ends of the pressure bomb 18 and resiliently support the same. Attention is directed to the fact that the coupling 36 is provided with a shear pin 43 which extends through the wall of the sleeve 26 and engages the threaded portion 33 of the coupling to normally prevent its rotation.

In operation of the present invention the various instrumentalities required are assembled as shown by way of example in Fig. 1. It is to be understood that other combinations of tools and instruments might be used and that in any event it is desired to mount the pressure bomb in a manner to protect it from damaging shock or vibration. When the device is lowered into the well with the rathole packer 13 the packer is seated on the usual shoulder at the bottom of the main well bore and at the top of the rathole. The nut 19, the pressure bomb mounting 14, the perforated nipple 16, and the pressure bomb unit extend down into the reduced bore of the rathole. When the valves of the testing tool are opened fluid may freely flow through the perforations 37 in the anchor pipe 15 and then upwardly through the opening 34 in the coupling 36 through the central passageway 27 of the sleeve 26, and then through the central opening of the tubular mandrel 23 through the passageway 22 into the packer mandrel 20 and on upwardly through the various other tools to the drill string. If the formation should cave in around the portion of the structure extending into the rathole or around the various tools thereabove, it will be necessary to release the jars 11 and produce a jarring action in an attempt to loosen the lodged tools. This jarring action will produce violent longitudinal movement of the members below the jar, and if the motion is in an upwardly direction as is usual there will be a jerk imparted to the tubular mandrel 23. This will act to compress the spring 31 and will damp the blow which would otherwise be delivered to the pressure bomb mounting 14. Movement of the jar in the opposite direction would cause the mandrel 23 to telescope into the space 27 without affecting the pressure bomb mounting. It will thus be seen that under such circumstances the pressure bomb mounting will protect the pressure bomb from these jarring blows. In some instances it will not be possible to loosen the lodged pressure bomb and its mounting, and then it will be necessary to unfasten the pressure bomb mounting from the drill string and the supporting members thereabove. Since the normal rotation of the drill string would be in a righthand direction and would tend to tighten all of the righthand threads at the various joints it is evident that the lefthand thread 32 at the bottom of the sleeve 26 might be unscrewed. In order to guard against this the shear pin 43 has been provided and will temporarily hold the threaded joint pin, the coupling 36, and the sleeve 26 against relative rotation which would unscrew the parts. In an emergency, however, when it is necessary to leave the pressure bomb in the hole for a subsequent fishing operation the drill string is rotated until it shears the pin 43 and thus the sleeve 26 may be rotated with relation to the coupling 36 to unscrew the sleeve from the coupling and to permit the sleeve and the various members thereabove to be withdrawn from the well leaving the pressure bomb and the anchor pipe in the hole with the coupling 36. The drill string is then withdrawn and the members left in the hole may be washed over so that a fishing tool can be lowered in the well to grasp the coupling 36 and to pull the pressure bomb from its lodged position.

It will thus be seen that by the use of the structure here disclosed a pressure bomb will be normally protected from the jarring action of a set of well jars and that in the event this action is not sufficient to dislodge the pressure bomb the pressure bomb may thereafter be recovered by a fishing operation.

While I have shown the preferred form of my invention, as now known to me, it will be understood that various changes might be made in the combination, construction, and arrangement of parts, by those skilled in the art, without departing from the spirit of the invention as claimed.

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

1. In combination, a drill string or the like, a well jar carried thereby and threaded thereto, a member carried by the well jar and threaded thereto with a thread of opposite direction from the first named thread, and shear means temporarily holding said opposite thread against rotation.

2. A device of the character described comprising a tubular sleeve, an end wall at the upper end of said tubular sleeve having a central opening therethrough, a mandrel extending through said opening of the end wall, an enlarged portion formed on one end of said mandrel conforming to the central bore of the tubular sleeve, key ways formed on the face of the central bore of said tubular sleeve, keys formed on said enlarged portion of the mandrel to slidably hold the mandrel within the tubular sleeve, spring means interposed between the end of the tubular sleeve and the shoulder formed by the enlarged portion of said mandrel whereby said mandrel will be freely movable in one direction and will be cushioned when moved in the opposite direction, and connecting means formed on the opposite end of said mandrel and the other end of said tubular sleeve.

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