July 20, 1943. H. C. BEENE ET AL 2,324,814

TEST DEVICE FOR OIL WELLS

Filed Sept. 3, 1940

Fig. 1.

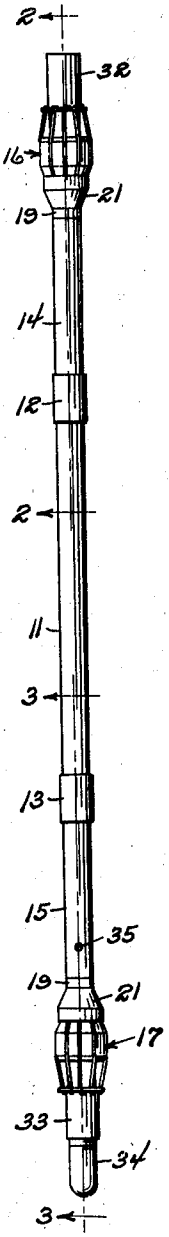


Fig. 2.

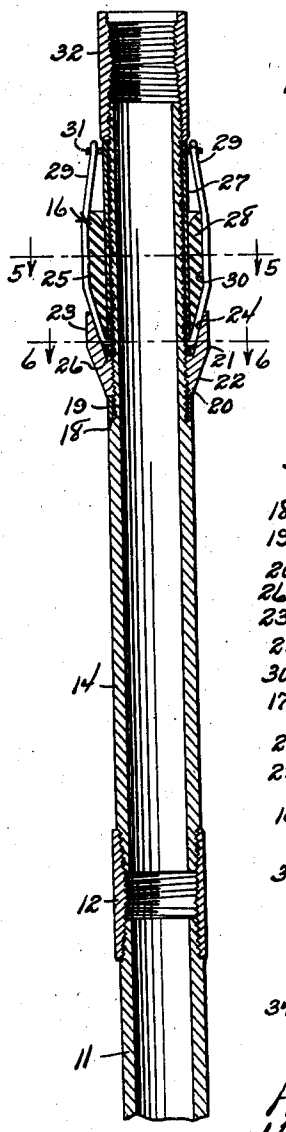


Fig. 3.

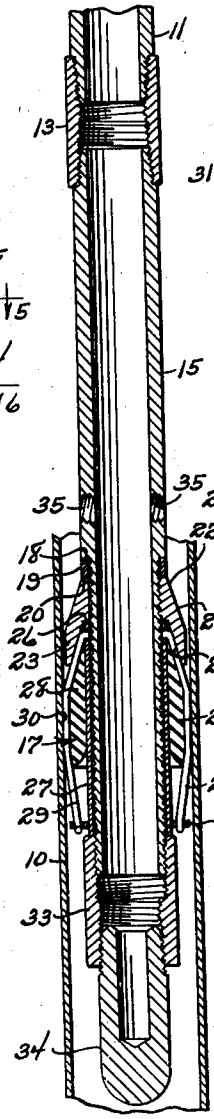


Fig. 4.

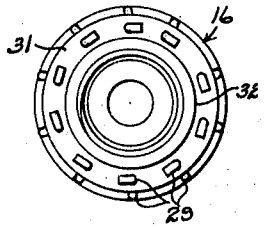


Fig. 5.

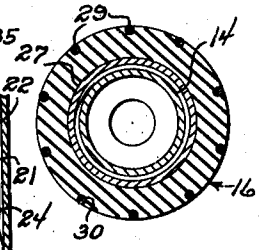
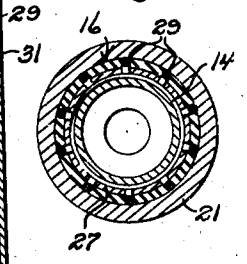


Fig. 6.



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TEST DEVICE FOR OIL WELLS

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Application September 3, 1940, Serial No. 355,246

1 Claim. (Cl. 166—11)

Our invention relates broadly to new and useful improvements in test equipment for oil wells and more particularly to a device for locating the point or points along a perforated well casing at which water or other impurities are entering the well.

An important object of our invention is to provide a test device of the above-mentioned character which may be easily and expeditiously used in a conventional oil well construction and which will permit the operator to ascertain at which points the impurities are flowing into the well.

Another object of our invention is to provide a testing device of the above-mentioned character which is uniquely constructed of a relatively soft metal whereby the same may be easily cut into pieces and removed from the well in the event that it becomes immovably lodged within the casing and which includes provision for permitting the pump attached thereto to be removed upon the occurrence of the above-named contingency.

Still another object of our invention is to provide a test device for oil wells that is simple in construction to promote inexpensive manufacture thereof and that is efficient and efficacious in the performance of its duties.

Other objects and advantages of our invention will be apparent during the course of the following description.

In the drawing, forming a part of this specification, and wherein like numerals are employed to designate like parts throughout the same,

Figure 1 is a side elevation of a test device embodying our invention,

Figure 2 is a fragmentary longitudinal sectional view taken on the line 2—2 of Figure 1,

Figure 3 is a fragmentary longitudinal sectional view taken on the line 3—3 of Figure 1,

Figure 4 is an end elevation of our device,

Figure 5 is a transverse sectional view taken on the line 5—5 of Figure 2, and

Figure 6 is a transverse sectional view taken on the line 6—6 of Figure 2.

In the accompanying drawing, wherein for the purpose of illustration, is shown a preferred embodiment of our invention, the numeral 10 designates a section of an oil well casing adapted to receive our testing device. Our device is adapted to be lowered through the well casing to the portion thereof extending through the oil bearing strata or to points in the casing where it is desired to test for impurities entering the casing through leaks or fractures therein.

Our testing device includes a middle pipe section 11 of a length equal to the length of casing which it is desired to test. The opposite ends of the pipe screw-threadedly receive the couplings 12 and 13 and relatively short pipe sections 14 and 15 are connected to the couplings 12 and 13, respectively, in axial alignment with the section 11. The free ends of the pipes 14 and 15 are exteriorly-screw-threaded and the packing elements 16 and 17 are carried thereby to effectively seal the section of well casing to be tested.

The packing elements are identical in their construction and are identically associated with their respective pipe sections. A detailed description of but one will, therefore, be given.

As hereinabove described the free ends of the short pipe sections are screw-threaded, which screw-threaded portion is connected to the non-screw-threaded portion thereof by an annular shoulder 18. An internally screw-threaded collar 19 having a wall of lesser thickness than the wall of the pipe is fitted to the male threads of the pipe to bring the same in abutting engagement with the shoulder 18. The outer peripheral surface of the collar when thus seated is flush with the outer peripheral surface of the pipe and the edge 20 thereof forms a flat, smooth surface against which the abutting end of the thimble 21 may seat.

The abutting end of the thimble is of the same diameter as the collar and pipe; however, from the lower end thereof the thimble is outwardly divergent, as at 22, which tapered portion terminates in a cylindrical upper portion 23 of substantially greater diameter than the pipe. The thimble is internally screw-threaded in a manner whereby it may be threadedly rotated about the pipe and into abutting engagement with the collar. When thus disposed the internal annular groove 24 of the thimble forming annular seats which opens through the outer end thereof and receives the cup 25.

The lower end of the cup is beveled to properly seat against the flared wall of the groove 24 which flared wall terminates at its inner end in an annular shoulder or seat 26 which lies in a plane extending at right angles to the axis of the pipe. The cup includes a metallic sleeve 27 which carries a substantially larger sleeve 28 of rubber, or the like. The internal diameter of the metallic sleeve 27 is slightly larger than the screw-threaded end of the pipe whereby the cup may be easily slidably moved relative to the threaded portion. The rods 29 support and reinforce the rubber sleeve 28, a plurality of the rods being spaced circumferentially around the sleeve 28 and each being received within a longitudinal groove 30 extending the full length of the sleeve. The manner in which the rods are received by the grooves 30 positions the same substantially flush with the peripheral surface of the sleeve in a manner whereby the sleeve may be slidable along the inner surface of the casing 10 but whereby the outer surface of the sleeve may have a sealed engagement with the casing. The lower ends of the rods are turned inwardly and extend through the rubber sleeve and into the metallic sleeve 27.

The upper ends of the rods are bent at right angles and received within registering openings in the ring 31 loosely enclosing the upper ends of the metallic sleeve. The rubber sleeve 28 is of greater diameter than the thimble whereby insertion of the device into the casing will cause the rubber sleeve to have a snug fitting peripheral engagement with the casing.

Both of the packing elements 16 and 17 are securely held in proper association with their respective pipe sections by the couplings 32 and 33. Threading of the coupling onto the ends of the pipe section will move the same into engagement with the metallic sleeves 27 to force the remote end thereof into pressed engagement with the annular seat 26 of the thimble to effect a tight pressed engagement therebetween.

A plug 34 is fitted into the extending end of the coupling 33 to effectively prevent fluid entering the casing below the packing element 17 from having access to the pipe sections 11, 14 or 15. Diametrically opposed openings 35 in the pipe section 15 will, however, permit fluid entering between the packing elements 16 and 17 to have access into the internal bore of the pipe sections.

All of the screw-threaded connections joining the respective elements are right hand with the exception of the portion of the coupling 32 which extends beyond the pipe section 14. This extending portion of the coupling is provided with a left hand female thread which is adapted to receive the threaded male connection of a pump.

In operation, a section of pipe 11 of a length suitable to the particular characteristics of the casing to be tested is fitted to the couplings 12 and 13. The entire device as a unit is then connected to a pump if the well is a "pumping well" or a well which has been "placed on the pumps." As hereinbefore described, the pump is connected to the coupling 32 and suitable pipe line connected to the pump for lowering the device into the well casing. The peripheral surface of the cups 25 will slidably engage the inner surface of the casing and the inherently resilient and formative nature of the rubber sleeve will permit the same to readily accommodate itself to the casing. These particular and unique characteristics of the sleeve will also cause the same to have a sealed but sliding contact with the casing. The device is lowered as far as the section of the casing to be tested at which point it is temporarily suspended until the test can be made. Obviously, the section of the casing extending between the packing elements 16 and 17 will be isolated from the remaining sections of the casing by the sealed engagement of the sleeves 28 of the packing elements therewith and fluid flowing through the casing may have access into the internal bore of the pipe sections through the inlet ports 35. The plug 34 will prevent such fluid from flowing out of the pipe sections and the pump disposed thereabove will force the fluid to the surface where it may be examined or tested for impurities.

After the sample has been taken from a particular section of the casing the device may be moved slightly longitudinally of the casing to obtain a sample from another section thereof. It may thus be seen that successive operations of this nature will permit the operator to test any selected portion or portions of the casing and to obtain accurate samples of the fluid flowing through any particular section. Obviously, if the well to be tested is a flowing well it will not be necessary to connect a pump with the coupling 32 inasmuch as the fluid which enters the pipe sections will flow to the surface of its own accord.

It sometimes happens that the packing elements will freeze or otherwise become immovably lodged within the casing. Upon the occurrence of this contingency the pump may be readily disconnected from this device by reason of the left hand threads which connect the same thereto. It is preferred that all of the metallic parts of the device be formed of a relatively soft metal which may be drilled into essentially small pieces if it becomes necessary to cut the device loose. After the pump has been removed a drill is lowered through the casing and the testing device cut into pieces. The fragments of the device may then be removed or permitted to fall to the lowermost end of the casing, as desired. Generally speaking, however, the device may be removed from the casing in the same manner in which it was inserted. When the line to which it is attached is pulled upwardly the device will be pulled upwardly therewith and removed from the casing. The rods 29 which surround the sleeves will prevent the sleeves from being torn during the insertion or removal of the device into or from the casing and will serve to some extent as runners to facilitate this operation.

It is to be understood that the form of our invention, herewith shown and described, is to be taken as a preferred example of the same and that various changes in the size, shape and arrangement of parts may be resorted to without departing from the spirit of our invention, or scope of the appended claim.

Having thus described our invention, we claim:

A test device for oil wells comprising a section of tubing having inlet ports therein intermediate its length, a thimble carried by the section adjacent each end thereof, each of the said thimbles having an annular seat lying in a plane extending transversely of the axis of the section and a flared annular skirt portion extending beyond the annular seat and in circumferentially spaced relation with the section, metallic sleeves carried by the end portions of the tubular section extending from the thimbles, said sleeves extending into the thimbles and abuttingly engaging the annular seats, resilient essentially formative packing elements fixedly carried by the sleeves and having tapered end portions adapted to snugly seat within the skirt portions of the thimbles, rings loosely fitting the portion of the sleeves extending beyond the packing elements, a plurality of circumferentially spaced longitudinally extending rods arranged to surround the packing elements, the outer ends of the rods being securely attached to the said rings and the inner ends thereof being inturned to extend through the relatively soft packing elements and into openings in the said metallic sleeves, and collars screw threadedly carried by the portion of the tubing extending beyond the sleeves and abuttingly engaging the outer ends of the sleeves to securely hold all of the parts in mutually pressed relation.

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