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Ortiz

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[54] **SEALING MEANS FOR DEEP-WELL**

[76] Inventor: **Carlos Mayer Ortiz,** Blas Pascal 135-1002, Mexico City, Mexico

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[51] **Int. Cl.** **E21b 43/00**

[58] **Field of Search** 166/68.5, 68, 127, 191, 166/106; 285/302

[56] **References Cited**

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Primary Examiner—James A. Leppink

Attorney, Agent, or Firm—Anthony A. O'Brien

[57] **ABSTRACT**

A sealing means to be employed to seal a wall section of a deep-well is disclosed. Said sealing means is formed by a seal carrier, solidary of the upper end of the pump; an outer sealing element carried by said carrier and covering this latter; O-ring means at said carrier; an elastic seal coupled to said outer sealing element; all of these constituting a lower end seal; and an upper end seal of resilient nature, and formed by the same elements as the lower one. Said sealing means are suitable to seal and isolate said wall section in order this to be used as the discharge conductor for said well.

7 Claims, 2 Drawing Figures

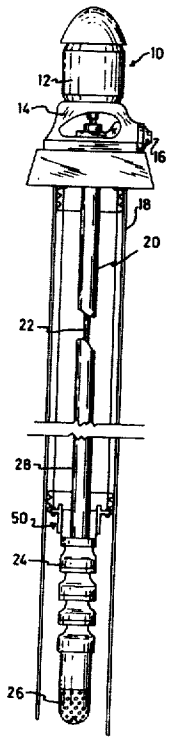


FIG. 2

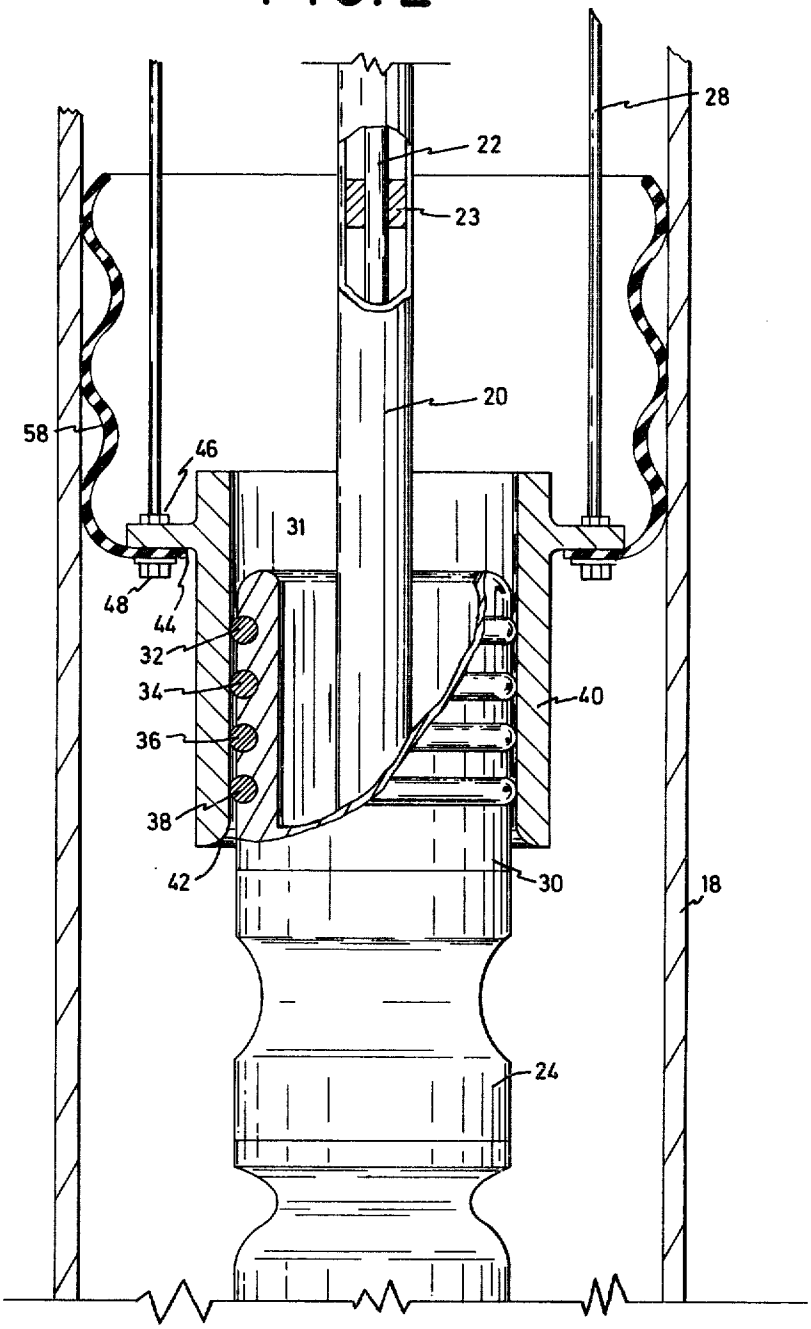
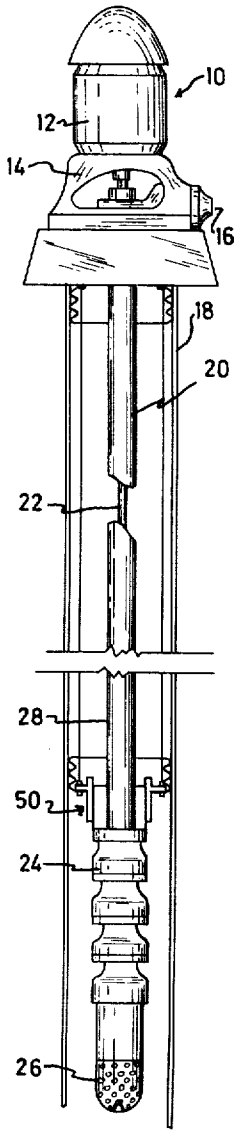

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FIG. 1


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SEALING MEANS FOR DEEP-WELL

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to deep-wells. More particularly it refers to a means for sealing a wall section of said well in order to avoid the need of a highly-costly discharge casing string.

2. The Prior Art

Recently a system has been developed by means of which the discharge casing string of a deep-well pump can be dispensed with, by providing for the sealing of a portion of the wall, so as this can be used as the discharge conduct for the well. The seals capable of being used in said application, must be provided with certain requirements, e.g. they must effectively isolate the wall portion of the well to be employed as the discharge casing, whereby they must be capable of establishing a firm and tight contact with said wall, irrespective of the unevenness or nonuniformities of said wall. Likewise, when using together with the upper portion of the pump, they must be perfectly tight, so as constitute really a seal against any leakage of fluid and, furthermore, must be capable of supporting the weight of the water column formed on said seal, and withstand the stress thus imparted without breaking or otherwise destroying the shape and condition of said seal.

CROSS-REFERENCE TO RELATED APPLICATION

This invention is partially related to the invention of the U.S. Pat. copending application Ser. No. 439,041 filed concurrently herewith in the name of the same inventor, and entitled "A System of Suppressing the Discharge Casing String in Deep-Well Vertical Pumps," the disclosure of which is incorporated herein by reference.

SUMMARY OF THE INVENTION

The instant invention deals with sealing means to be employed with the system of the above referred to U.S. application, as the top seal and the lower seal of the well, so as to isolate a wall section. Therefore, the invention provides sealing means and a supporting means therefor in order to reinforce said sealing means to provide for the maintaining of a good seal, even when the maximum weight of fluid is gravitating on said seal.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a sectional view of a deep-well pump, carrying the seal of this invention; and

FIG. **2** is a partially sectional view, magnified, showing the seal of this invention as employed in the pump depicted in FIG. **1.**

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In general, this invention provides, at the same time, a highly effective sealing means for the lower part of the string of a deep-well pump, and the sealing means for the top thereof, suitable to connect the fluid extracting conduct to the wall of the well, in a tight-way; a coupling system of said seal to said pump, and a coupling system of said seal to the wellhead, so as said seals can maintain the sealing capacity thereof irrespective of the stresses imposed thereon by the weight of the fluid column.

Thus, in FIG. **1** a pump **10** is shown consisting of a motor **12,** supported on the wellhead **14,** wherein there is also a discharge mouth **16,** in fluid-communication with the inside of the well. From said motor **12,** a tubing string projects consisting of a supporting sheath **20,** inside which there is a shaft **22** transmitting the power from motor **12** to a pump **24,** by means of which the fluid of the well will be suctioned at the suction end **26.** On the other side, the wellhead **14** is arranged to cover the wellhole, formed by a circular wall **18,** impermeable in a grade enough to be employed in lieu of the current discharge casing string.

According to the teachings of the above identified application, a top sealing means (not shown) is provided, so as to reduce the opening of the wellhole, at the top end thereof, to just an opening corresponding to the size of the passing conduct located at the wellhead (not shown) and in direct communication with the discharge mouth **16,** in order said pumped fluid from the well goes through that only exit through said conduct and mouth. Likewise, a lower end is provided, identified generally by numeral **50,** and arranged to limit by the lower end, the wall of the well in a point corresponding to the uppermost edge of said pump **24,** all in a manner most clearly shown in FIG. **2.**

Referring to FIG. **2,** a pump **24** is supported from a string formed by said sheath **20** carrying internally a shaft **22** supported thereinto by bearing **23.** The upper end of said pump **24** is provided with a seal-carrier **30,** solidary and firmly connected to said pump **24,** and arranged to carry a plurality of seals of the O-ring type **32, 34, 36** and **38,** carried in suitable slots in the exterior of said seal carrier **30.** The upper end **31** of said carrier is rounded in order to make easy the introduction of said carrier within the outer seal or outer sealing device **40.**

Said outer seal **40,** shown in the preferred embodiment as a cylindrical seal, can be contacted with the exterior of said carrier **30,** by means of said plurality of O-rings **32–38** and is provided with the lower end thereof **42** internally rounded, in order to make easy also the coupling with said portion. At a certain distance from the upper end, said cylindrical seal **40** has an outer peripheral land **44,** extending diametrically outwardly.

Said land **44** is provided with suitable holes so as to allow the pass therethrough of a threaded lower end of a corresponding plurality of supports, e.g., cables, rods or beams, identified by numeral **28,** affixed in place by means of nuts and counternuts **46, 48,** and thereby the cylindrical seal **40** is supported on said supporting means. Said supports **28,** as shown in FIG. **1,** run until the wellhead **14,** wherein they are fastened by suitable means, in order that said seal **40** remains pending from said wellhead.

Said land **44** also serves as a coupling means between a peripheral resilient seal **58,** disposed to be coupled sealingly to said land **44,** and fastened by means of a counternut **48** to the respective support, in order to further straighten the coupling thereof. The material from which said seal **58** is made, the shape of which has been shown as a preferred embodiment is outwardly flared, with a sinus shape, must be resilient enough to bear firmly against the wall **18** but, at the same time, must have enough strength to support the weight of the fluid column formed during the pumping of the fluid from the bottom of the well, above the cylindrical seal **40,** to

the discharge mouth **16** (FIG. **1**). As will be easily understood, the degree of said bearing of the seal **58** against the wall **18** will increase as a response to the weight of the fluid supported as a column above said seal; and this fact will increase the sealing action.

Therefore, on the one side, said O-ring seals **32–38** make a tight joint between said cylindrical seal **40** and said carrier **30**; and on the other side, said elastic seal **58** makes a tight joint between said platform **44** and said wall **18.** Furthermore, said supports **28** prevent said seal assembly from coming out of place when supported by said cylindrical seal and, therefore, with the resilient seal connected to said land, by said supports from the wellhead, as above discussed.

Although the invention has been described with reference to a pump of the so-called water-or oil-lubricated deep-well pumps, it can be understood that this invention also can be applied to other types of pumps, such as those of the underwater electric motor type, whrein, due to its different construction, makes necessary slight modifications in order to apply this invention to said systems; but the modifications and changes are well within the spirit and scope of the invention.

It will be obvious that changes and modifications can be made relating the above discussed; therefore, any of the herein pointed out must be considered not as limitative but as illustrative only, since the only limits are those imposed by the true spirit of the annexed claims.

What is claimed is:

1. In a sealing means for a wall of a deep-well, a well head, a pump device having an upper end, the sealing means being suitable to connect the wall in a tight manner to the upper end of the pump device, a supporting string supporting the pump device;

a seal carrier means solidarily coupled to the upper end of said pump device and in fluid-flow relationship with the interior thereof;

an outer sealing device arranged to cover said carrier means;

a plurality of O-ring seals carried by said carrier means;

said O-rings being disposed to make a tight joint between said carrier means and said outer sealing device;

an elastic sealing device coupled to said outer sealing device, being disposed to extend from the latter toward the wall of the well, and uniting in a tight manner said outer sealing device and said wall; and

elastic sealing means located at the uppermost point of the well; whereby a section of the wall interposed between said elastic sealing means and the wellhead is isolated from the bottom of the well and disposed to be employed as a discharge casing.

2. Sealing means according to claim **1,** wherein said outer sealing device is a cylindrical rigid seal.

3. Sealing means according to claim **1,** wherein said outer sealing device is formed with an outer peripheral land, extending normal to said sealing device; and with said elastic sealing device being connected thereto.

4. Sealing means according to claim **1,** wherein said elastic sealing device comprises a plurality of flared resilient seals.

5. Sealing means according to claim **1,** wherein support means are provided supporting said outer sealing device independently from said pump device and said seal carrier means.

6. Sealing means according to claim **5,** wherein said outer sealing device is a cylindrical seal; said support means are constituted by a plurality of rods connected to said cylindrical seal.

7. Sealing means according to claim **6,** wherein said cylindrical seal includes a land; the coupling of said support means is effected through holes provided at the land of said cylindrical seal, and by the use of suitable fastening elements.

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