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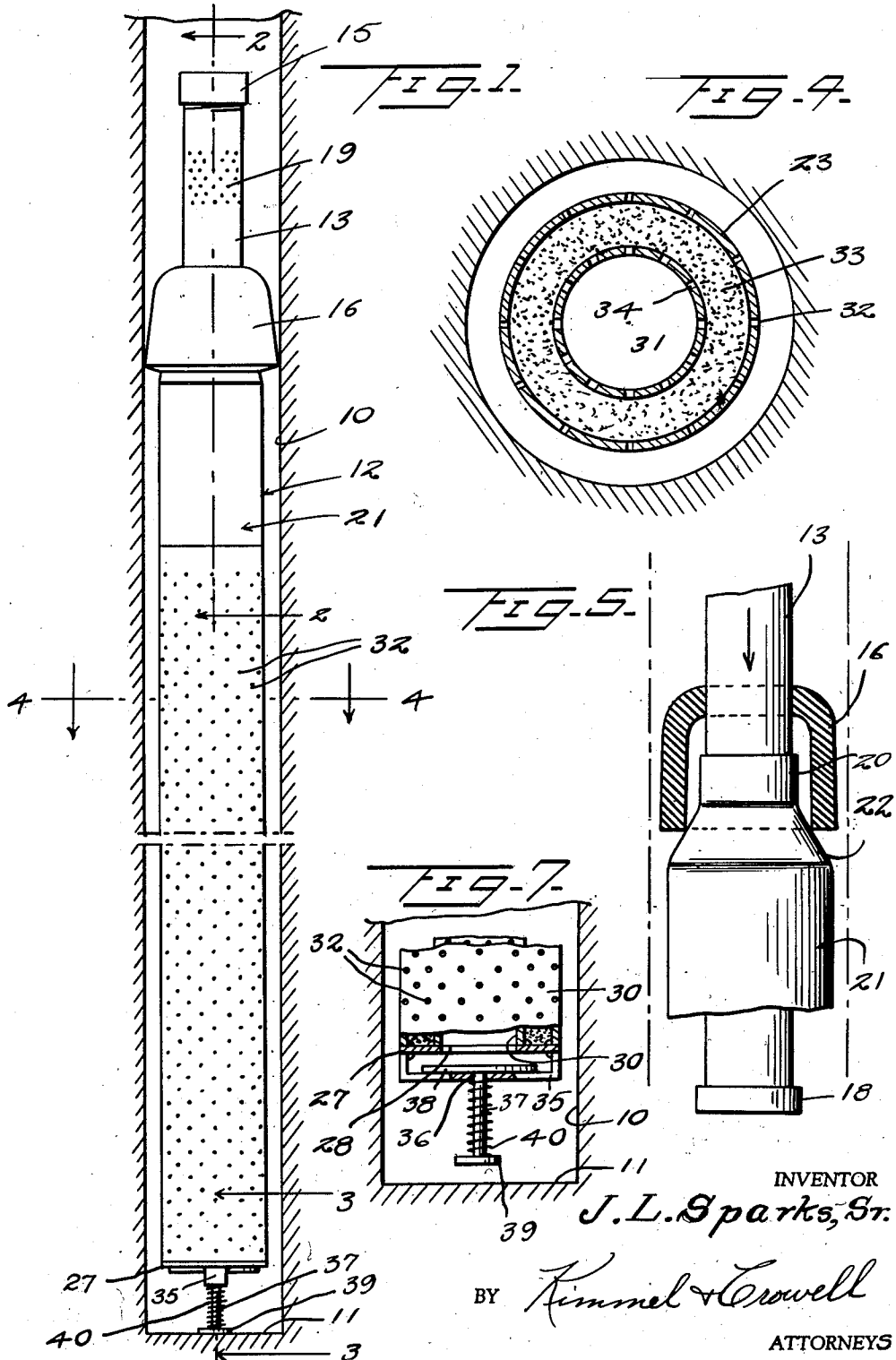
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FILTER LINER FOR OIL WELLS OR THE LIKE

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2 Sheets-Sheet 1



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2,806,537

FILTER LINER FOR OIL WELLS OR THE LIKE

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2 Claims. (Cl. 166—196)

This invention relates to a filter seal or liner for oil wells or the like, and has as its primary object the provision of an improved filter and seal or liner adapted for use with oil wells in shale sand to preclude shale sand and fluid from going up, around and above the filter without passing through it.

An additional object of the invention is the provision in a device of this character, of a deformable seal at the upper end of the liner which may be inserted into the well in such a form as not to scrape against the sides thereof, but which may be readily expanded when the filter reaches the bottom of the well in a sealing relationship with the sides of the well.

An additional object of the invention is the provision of a device of this character having a valve means at its lower end which is opened during the lowering of the filter into the well to permit the ready passage of fluid through the filter in order not to obstruct the insertion of the filter therein, which valve is automatically closed when the device has reached the bottom of the well in order that no further fluid or foreign matter can pass above the seal without first passing through the filter.

An additional object of the invention is the provision of a cup-shaped seal, which will tend to resist any pressure exerted thereon from beneath, but which being of deformable material may be readily withdrawn from the well when desired.

Still other objects reside in the combination of elements, arrangement of parts, and features of construction, all as will be more fully pointed out hereinafter and described in the accompanying drawings wherein there is shown a preferred embodiment of this inventive concept.

In the drawings:

Figure 1 is a side elevational view of the device of the instant invention in operating position in a well, the latter being schematically designated in cross section.

Figure 2 is an enlarged sectional view taken substantially along the line 2—2 of Figure 1 as viewed in the direction indicated by the arrows.

Figure 3 is a fragmentary enlarged sectional view taken substantially along the line 3—3 of Figure 1 as viewed in the direction indicated by the arrows.

Figure 4 is an enlarged sectional view taken substantially along the line 4—4 of Figure 1 as viewed in the direction indicated by the arrows.

Figure 5 is a fragmentary side view, partially in elevation and partially in section, disclosing the position of the deformable seal during the insertion of the liner into the well.

Figure 6 is a sectional view similar to corresponding portions of Figure 2 disclosing the position of parts of the liner being withdrawn from the well.

Figure 7 is a fragmentary sectional view similar to Figure 3, but disclosing the valve mechanism in open position prior to contact with the bottom of the well.

Figure 8 is an enlarged sectional view taken through the filtering portion of the device.

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Similar reference characters refer to similar parts throughout the several views of the drawings.

Having reference now to the drawings in detail, there is generally indicated at 10 a well, including a well bottom 11, within which the device of the instant invention, generally indicated at 12, is adapted to be positioned. The device of the instant invention includes a nipple 13, having a threaded extremity 14, adapted for the threaded engagement with a collar 15 for the accommodation of a connected section of pipe or the like.

A cup-shaped deformable lead seal or liner 16 is fixedly secured about the exterior of nipple 13, in any desired manner, at a point a substantial distance above the lower end 17 of the nipple, which lower end is provided with a flange or collar 18.

A plurality of perforations 19 are provided in the upper portion of nipple 13 for purposes to be more fully described hereinafter. Nipple 13 extends in slidable relation through a restricted upper portion 20 of a tubular casing 21, the restricted portion flaring outwardly to provide tapered shoulders 22 merging into the outer wall 23 of the casing 21.

Positioned a distance below shoulders 22 in excess of the distance between seal 16 and flange or collar 18 is a flange 25, forming a central opening 26 of a diameter substantially equal to that of nipple 13.

A second flange 27 extends inwardly from the bottom of the outer wall 23 of the casing, and provides an opening 28 of a diameter corresponding to that of opening 26. An inner wall 30 extends between the inner periphery of flange 27 and the inner periphery of flange 25, and contains a plurality of apertures or perforations 31.

Exterior wall 23 is also provided, between flanges 25 and 27, with a series of perforations 32, perforations 31 of inner wall being larger in diameter than the perforations of outer wall. The space between inner wall 30 and outer wall 23 is filled with fine pea gravel 33 which forms an adequate filter for shale sand and the like. The perforations on the inner wall are made larger than the perforations 32 in order that any material passing into the filter may readily pass therefrom into the hollow interior of the filter and thence thus preclude clogging of the filter material.

Extending beneath the flange 27 is a U-shaped bracket 35 provided with a centrally disposed aperture 36 through which extends the stem 37 of a valve 38. The lower end of stem 37 is provided with a head 39, and a coil spring 40 extending between the outer side of bracket 35 and head 39 serves normally to hold the valve 38 in open position away from the aperture 28. The valve is adapted to be closed in a manner to be more fully pointed out hereinafter.

The interior of casing 21 carries an internal ring 41 adjacent the upper extremity of shoulder 22.

From the foregoing the operation of the device should now be readily understandable. When it is desired to insert the filter into the well by pressure as indicated by the arrow in Fig. 5 the parts are in the position shown in Figures 5 and 7, with valve 38 open and with deformable seal 16, substantially cylindrical in exterior configuration, and resting lightly on an intermediate part of tapered shoulder 22. When the device is in this position fluid passes freely through the interior tubular opening between flanges 25 and 27 and interior wall 30 out through nipple 13.

When the head 39 of valve stem 37 strikes the bottom 11 of the well, valve 38 is closed and moved to the position disclosed in Figure 3, thus effectively closing the aperture 28. Simultaneously the nipple 13 slides downwardly to assume the position disclosed in Figure 2. Shoulder 22 then effects a camming action on lead seal 16 to expand the same shown in Figure 2 where its edges bite into the

wall of well 10 to form an effective seal, precluding the passage of fluid upwardly about the exterior or outer wall 23.

Thus when suction is applied through the nipple 13, or fluid extruded through internal pressure in the well such fluid must pass through the apertures 32, the filtering material 33 and the apertures 31 in order to pass upwardly through nipple 13 to the surface.

The apertures 19 in nipple 13 above seal 16 serve to permit withdrawal, upon application of suction, of fluid above the seal 16.

When it is desired to withdraw the device from the well, withdrawal pressure, indicated by the arrow in Fig. 6, exerted upon nipple 13 will cause the parts to assume the position shown, whereupon the seal 16, no longer engaging the shoulder 22, may be readily compressed by the walls of the well 10 to permit easy withdrawal. Engagement of ring 18 with ring 41 will also effect ready withdrawal of the casing 21.

From the foregoing it will not be seen that there is herein provided a device which accomplishes all the objects of this invention, which serves as an effective sealing filter, and provides many advantages of great practical utility and commercial importance.

As many embodiments may be made of this inventive concept and as many modifications may be made in the embodiment hereinbefore shown and described, it is to be understood that all matter herein is to be interpreted merely as illustrative and not in a limiting sense.

What is claimed is:

1. In a filter liner for wells, a tubular nipple, a deformable cup-shaped seal having a central opening with said nipple extending therethrough and fixedly secured therein, an enlarged tubular casing slidably mounted on and communicating with said nipple below said seal and depending from said nipple, a ring secured to said nipple at the lower end thereof for retaining said casing on said nipple, a tapered shoulder at the upper end of said casing for expanding said seal to sealing position upon downward movement of said seal with respect to said shoulder when said filter liner engages the bottom of the well, said

casing including for a portion of its length perforated inner and outer walls, top and bottom flanges connecting said walls, gravel filtering material between said walls, said bottom flange forming an apertured bottom wall, a valve supported below said bottom wall adjacent the aperture therein, a valve stem extending below said casing, and spring means on said stem biasing said valve to open position, the abutment of said stem against the bottom of said well closing said valve against the aperture in said bottom wall.

2. A filter liner for wells comprising a tubular nipple having a threaded upper extremity, a deformable inverted cup-shaped seal having a central opening through which extends said nipple in fixed relation thereto, an enlarged tubular casing slidably mounted on and communicating with said nipple and extending therebelow, a tapered shoulder on the upper end of said casing for expanding said seal to sealing position upon downward movement of said seal with respect to said shoulder, a collar on the lower end of said nipple for retaining said casing thereon, inner and outer perforated walls arranged in concentric relation at the lower portion of said casing, upper and lower flange members connecting the upper and lower ends of said inner and outer perforated walls, gravel filter means between said inner and outer perforated walls, said lower flange member forming an apertured bottom wall on said casing, a valve mounted below said bottom wall and having a downwardly extending valve stem, and spring means normally biasing said valve to an open position.

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