United States Patent [19]

Colburn

[11] **3,883,162**

[45] **May 13, 1975**

[54] **WELL SCREEN FITTING AND METHOD OF SEALING SAME TO A CASING**

[75] Inventor: **Edward N. Colburn**, Minneapolis, Minn.

[73] Assignee: **Universal Oil Products Company**, Des Plaines, Ill.

[22] Filed: **Mar. 18, 1974**

[21] Appl. No.: **452,483**

[52] **U.S. Cl.** ..... **285/111**; 166/231; 277/205; 277/212 C; 285/345

[51] **Int. Cl.** **F16l 17/00**

[58] **Field of Search** ..... 285/111, 110, 345, 231, 285/347; 277/212 C, 212 F, 205; 166/227, 231, 232

[56] **References Cited**

UNITED STATES PATENTS

2,998,065	8/1961	Hildebrandt	166/227 X
3,510,140	5/1970	Hermann	277/205
3,567,233	7/1968	Stephanich	277/205 X

FOREIGN PATENTS OR APPLICATIONS

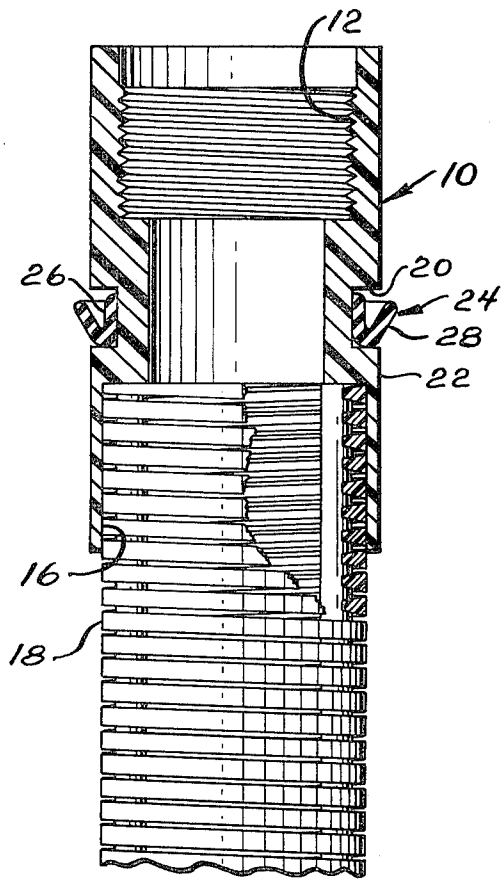
1,141,462	1/1969	United Kingdom	285/345
717,389	10/1954	United Kingdom	285/345

Primary Examiner—Thomas F. Callaghan
Attorney, Agent, or Firm—James R. Hoatson, Jr.; Barry L. Clark; William H. Page II

[57] **ABSTRACT**

Well screen fitting adapted to be placed in internal telescopic relation to a well casing is sealed relative to the casing by a short, cylindrical flexible rubber ring carried in an external annular groove in the fitting and having an upwardly and outwardly projecting integral skirt portion extending from its lower end. The skirt portion of the flexible ring is adapted to be doubled over on itself to effect a very firm seal with the inner wall of the well casing when the well casing is first slightly raised and then slightly lowered relative to the final position of the well screen and fitting. The fitting, well screen and casing are preferably all formed of plastic.

1 Claim, 7 Drawing Figures



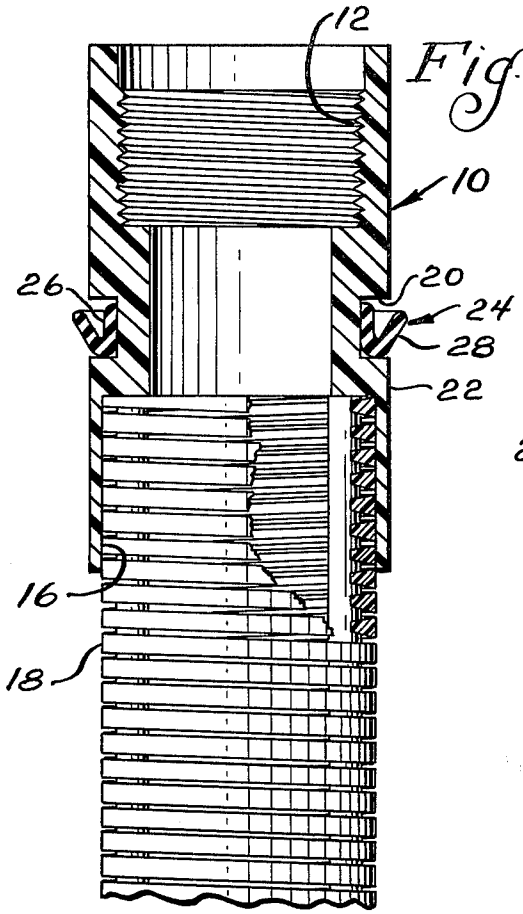


Fig. 1

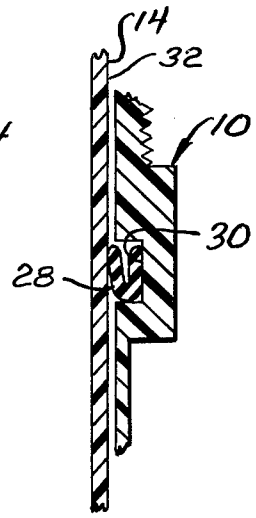


Fig. 6

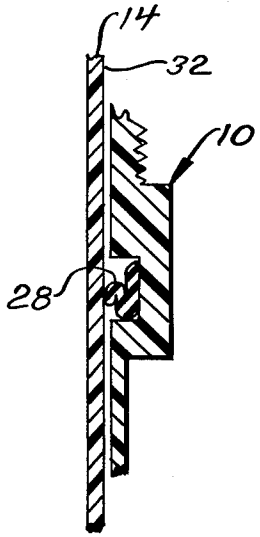


Fig. 7

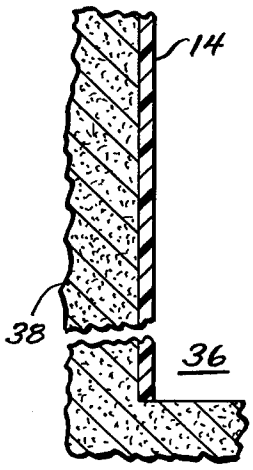


Fig. 2

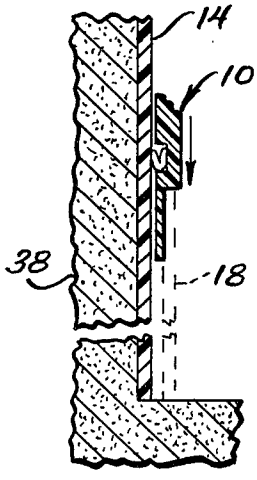


Fig. 3

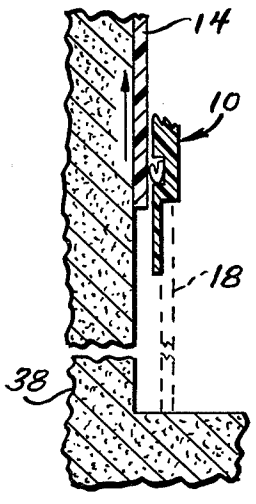


Fig. 4

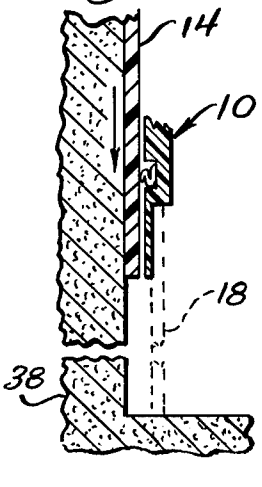


Fig. 5

WELL SCREEN FITTING AND METHOD OF SEALING SAME TO A CASING

BACKGROUND OF THE INVENTION

This invention relates to telescope-sized well screens which are designed to be set in place in wells by lowering the screen through the well casing. To permit the well screen to be moved through the casing and to accommodate manufacturing tolerances, the screen and its upper fitting are preferably smaller in outside diameter than the inner diameter of the casing. The resulting annular space between the fitting and casing is preferably sealed to prevent particulate material such as sand from being drawn into the casing when the material is larger in size than the well screen openings. The sealing is usually accomplished by a lead packer or by a self-sealing packer. The lead packer includes an annular ring of lead at the top of the screen fitting which is swaged outwardly against the casing by a tapered swage block dropped down the casing. The self-sealing packer utilizes a rubber ring molded and vulcanized to a metal well screen fitting. Although the self-sealing packer does not require any installation tools it does provide a rather limited sealing range since the rubber must move along the entire length of the casing while in its compressed state and should be compressed a minimal amount to avoid being damaged by the inside of the casing. The molding and vulcanizing operation required to attach the rubber ring makes this type of seal quite expensive. Furthermore, a seal is not always desirable, making it necessary that fittings be made available both with and without the molded-on sealing ring.

SUMMARY OF THE INVENTION

It is among the objects of the present invention to provide a well screen sealing structure which is effective for its purpose, simple to install, low in cost, and capable of accomodating a range of variations in spacings between a casing and a well screen fitting.

These and other objects are achieved by the sealing structure of the present invention wherein an elongated plastic well screen fitting has a circumferential groove in its outer surface, female pipe threads in its upper end and a shouldered recess in its lower end. The recess is adapted to receive a plastic well screen which may be welded or cemented in place. The upper threads are adapted to receive a length of pipe which is used to lower the well screen into a well casing installed in the ground. Generally, the pipe is unthreaded from the fitting and removed from the casing after the screen is installed. When it is necessary to seal the fitting to the casing, a molded neoprene sealing ring is expanded over one end of the fitting and snapped into the groove. The sealing ring is somewhat V-shaped in cross-section and has an inner wall which is cylindrical and an outer wall integrally joined to the inner wall at its bottom. The outer wall projects in skirt-like fashion in a radially outwardly and upward direction. The thickness of each wall is greater than one third and less than one half of the distance between the inner wall of the casing and the inner wall of the groove. Thus, the outer wall is not compressed in thickness as the fitting and well screen are assembled into the casing. However, once the well screen reaches the bottom of the hole, the casing is lifted to a point about 1 inch above its desired final position and is then lowered 1 inch. This last movement causes the upper outer edge of the outer wall or skirt portion to be frictionally engaged by the casing wall and rolled over and compressed upon itself to form a tight seal.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a sectional view of the improved well screen fitting and sealing ring taken in an axial plane;

FIGS. **2–5** are a series of fragmentary sectional views which show the method by which the well casing is placed in a hole and the well screen fitting of FIG. **1** assembled into sealing relation with it; and

FIGS. **6** and **7** are enlarged fragmentary views of the structure shown in FIGS. **3** and **5.**

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, the plastic well screen fitting **10** is shown as having female threads **12** at its upper end for receiving a length of pipe (not shown) by which it is lowered into a well casing **14** (FIG. **3**). The lower end of the fitting **10** has a recessed opening **16** into which a plastic well screen **18** may be cemented or otherwise attached. A peripheral groove **20** formed in the side wall **22** of the fitting **10** is adapted to receive a resilient ring member **24.** The ring **24** has a cylindrical inner wall **26** and a skirt-like outer wall **28** joined to it at its lower end. The combined thickness of the two walls **26,28** is between about 70–80% of the distance between the inner wall **30** of the groove **20** and the inner wall **32** of the casing **14** so that when the outer wall **28** is rolled over as shown in FIG. **7,** all of the walls will be compressed. In actual operation, the ring **24,** which may be molded of neoprene, for example, is stretched over the outer surface **22** of fitting **10** and snapped into groove **20** so that skirt-like outer wall **28** extends outwardly and upwardly as shown in FIG. **1.** Assuming that a well casing **14** has been driven into a hole **36** in the ground **38** as shown in FIG. **2,** the fitting **10** is dropped down inside the casing (FIG. **3**) until the screen **18** contacts the bottom of the hole **36** or reaches its desired depth. The casing **14** is then lifted as shown in FIG. **4** until it approaches the seal **24,** after which it is lowered (FIG. **5**) to frictionally engage the outer skirt portion **28** and cause it to roll over into its sealing position shown in FIGS. **5** and **7.** In an actual embodiment that proved satisfactory, the radius of the inner wall of a nominal 2 inch casing **14** was 1.034 in., the depth of groove **20** was **0.150** in. and the space between the casing **14** and fitting wall **22** was 0.049 in., resulting in a total space of 0.209 in. between the inner wall of the casing and the bottom wall **30** of the groove **20.** A neoprene rubber sealing ring **24** having each of its walls **26,28** of a thickness of 0.080 in. and an axial length of 0.375 in. was found to provide effective sealing when rolled over as shown in FIGS. **5** and **7.**

I claim as my invention:

1. In combination, a well casing and a well screen fitting for sealing a well screen to the interior surface of said well casing through which it is moved to its final position, said well screen fitting comprising an elongated cylindrical body member having a recess in one end for receiving a well screen, a circumferential groove in the wall of the body at a position spaced axially from said recess, a generally V-shaped flexible sealing ring having a base portion and inner and outer wall portions extending upwardly from said base portion, said sealing ring being positioned along its entire axial

extent in said groove with said base portion located at the end of the groove closest to the recess, the inner wall portion of the ring having its inner surface in tight engagement with the inner wall of the groove throughout the length thereof and the outer wall portion of the ring being formed so as to extend outwardly in a skirt-like fashion relative to the outer surface of the fitting, the combined wall thickness of said inner and outer wall portions being between **70-80%** of the radial distance between the inner wall of the circumferential groove and the inner wall of the well casing, the outer wall portion of the ring being of sufficient resiliency and axial extent that it will fold over on itself and be compressed when the fitting and sealing ring are moved a short distance in said well casing in the direction opposite to that used for installing the fitting into the casing.

* * * * *