Oct. 28, 1924. 1,513,228

F. E. CROTTO

EXPANSION WELL WASHER

Original Filed Jan. 3, 1922

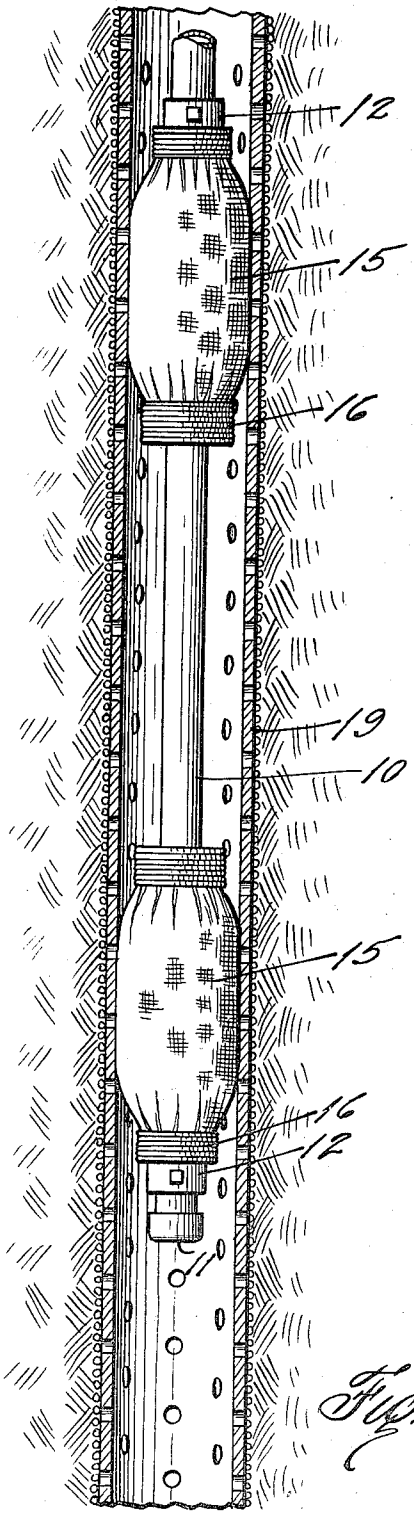


Fig. 1.

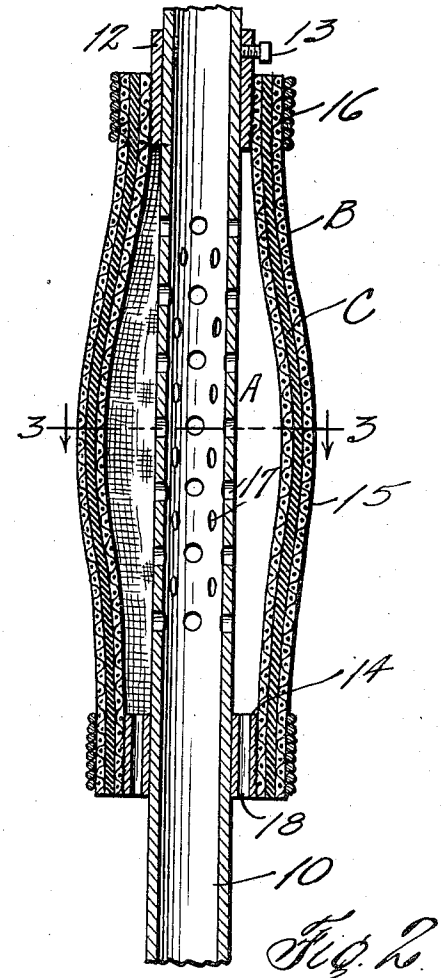


Fig. 2.

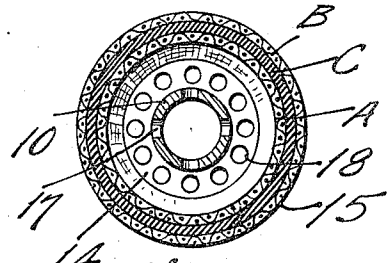


Fig. 3.

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UNITED STATES PATENT OFFICE.

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EXPANSION WELL WASHER.

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To all whom it may concern:

Be it known that I, FRANK E. CROTTO, a citizen of the United States, residing at Tulsa, in the county of Tulsa and State of Oklahoma, have invented certain new and useful Improvements in Expansion Well Washers, of which the following is a specification.

This invention relates to new and useful improvements in expansion well washers.

The object of the invention is to provide a well washer particularly adapted for washing well screens and involving a pair of expansible packers for packing off a section of the screen therebetween, for the purpose of cleansing the same.

A particular feature of the invention resides in the formation of each packer in a detachable unit which may be removed as a unit from the washer pipe and either repaired or replaced as desired. Another feature resides in the provision of an elastic impervious liner or sleeve arranged within the usual fabric packer sleeve, thus precluding the passage of fluid thru the packer sleeve and assuring a more rapid and uniform expansion. Another aim of the invention is to positively assure the expansion of the packer sleeves before the cleaning fluid is discharged into the casing or screen for cleaning the same and it is particularly sought to accomplish this result by first discharging the fluid into the sleeve and then discharging it from the sleeve, provision being made for supplying the fluid to the sleeve in greater quantity or volume than it is discharged therefrom.

A construction designed to carry out the invention will be hereinafter described together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawings, in which an example of the invention is shown and wherein:

Fig. 1 is a vertical sectional view of a well screen showing a well washer in elevation constructed in accordance with my invention and disposed in said screen with its packers expanded,

Fig. 2 is an enlarged vertical sectional view of one of the packers and a portion of the washer pipe, said packer being unexpanded, and

Fig. 3 is a cross-sectional view on the line 3—3 of Fig. 2.

In the drawing the numeral 10 designates a washer pipe or a tube which may be suitably connected with the fluid supply pipe by which it is supported in the well, as is usual in this art. The lower end of the pipe 10 is closed by any suitable means as a cap 11. On the pipe 10 I dispose two packer units and as each is a duplicate of the other, description of one will explain both.

A short metal sleeve 12 is fitted snugly on the pipe 10 and is held against longitudinal displacement by a set screw 13 or any suitable fastening. A metal collar 14 is mounted to slide on the pipe 10 at a point removed from the sleeve. A flexible packer sleeve 15 has its ends secured to the sleeve 12 and collar 14, a portion of said sleeve projecting beyond the end of the sleeve 15.

The construction of the packer sleeve 15 permits of considerable variation. I have illustrated a sleeve composed of an inner liner or layer A and an outer covering or jacket B, both of which are composed of a flexible material such as canvas, leather or other light material. Between the liner and the jacket I interpose an intermediate layer or member C, composed of rubber or other impervious elastic material.

The parts A, B and C are suitably shaped and have their ends gathered together so as to provide a fullness of material intermediate said ends, for the purpose of expansion. I prefer to fasten the ends of the sleeve 15 on the sleeve 12 and collar 14 by wrapping the same tightly with wire 16 which may be soldered, but it is to be understood that any other suitable fastening may be employed. A sleeve constructed with the member C will more readily expand and if the jacket is injured or torn, said sleeve will still be impervious unless it is punctured. It will be seen that by loosening the set screw 13 the entire sleeve may be slid from the pipe 10 and either replaced or a new sleeve quickly substituted. This adds to the life of the washer as well as its efficiency and convenience.

The pipe 10 is perforated only between the sleeve 12 and the collar 14, within the sleeve 15 by means of apertures 17 or other openings. The collar 14 is provided with longitudinal ports 18 located between the pipe 10 and the liner A. In order that the sleeve 15 may be adequately expanded the combined area of the perforations 17 is greater than the combined cross sectional

area of the ports 18, thereby causing the cleaning fluid from the pipe 10 to flow into the sleeve 15 in greater quantity or volume than it is discharged thru the ports 18. By this arrangement the sleeve 15 will be expanded against the inner wall of the screen 19 and so held during the washing operation.

In using the washer it is lowered into the screen 19 with the sleeve 15 unexpanded. When it has been brought to the proper position which may be established by measurement, the cleaning fluid is pumped into the pipe 10. The fluid escapes thru the perforations 17 into the sleeves 15 which are filled. As the fluid cannot escape thru the ports 18 as fast as it is introduced into the sleeves, said sleeves will be expanded so as to snugly engage the inner wall of the screen 19. The fluid which escapes thru the ports 18 will wash out that portion of the screen 19 located between the packer sleeves 15. The pressure of the fluid in the sleeves 15 will be constantly maintained and there will be no tendency for said sleeves to contract and permit the washing fluid to leak by the same during the washing operation. When the sleeves 15 are expanded the collars 14 will undergo a sliding movement on the pipe 10, but this will not interfere with the operation of the device in any way.

Various changes in the dimensions and construction as well as modifications may be made, without departing from the spirit of the invention, and within the scope of the appended claims.

What I claim is:

1. In an expansion well washer, a washer pipe, a flexible sleeve surrounding the pipe and having one end closed against the discharge of fluid therefrom, the opposite end of the sleeve having a fluid discharge outlet constantly open, the washer pipe being imperforate except within the flexible sleeve, the discharge of fluid from the constantly open outlet of the sleeve being less than the discharge of fluid from the pipe thru its perforations into the sleeve, whereby said sleeve is expanded.

2. In an expansion well washer, a washer pipe, a flexible sleeve removably mounted on said pipe and having one end fastened thereto and closed against the discharge of fluid from the sleeve, said washer pipe being perforated only within said sleeve, the opposite end of the sleeve having a restricted discharge outlet for retarding the passage of fluid from the sleeve and causing the latter to expand, said discharge outlet being constantly open.

3. In a well washer, a washer pipe, a flexible sleeve surrounding the pipe and composed of a plurality of layers, one of which is composed of impervious elastic material.

4. In an expansion well washer, a washer pipe, and a flexible packer sleeve surrounding the pipe and including an outer jacket of flexible material and an inner tubular member of impervious elastic material.

5. In an expansion well washer, a washer pipe, a flexible sleeve surrounding the pipe and having one end fastened thereto, and a collar slidable on the pipe and to which the other end of the sleeve is fastened, said collar having fluid discharge openings communicating with the interior of the sleeve, said pipe being perforated only within said sleeve.

6. In an expansion well washer, a washer pipe, a flexible sleeve surrounding the pipe and having one end fastened thereto, and a collar slidable on the pipe and to which the other end of the sleeve is fastened, said collar having fluid discharge openings communicating with the interior of the sleeve, said pipe being perforated only within said sleeve, the perforations of the pipe having a greater cross sectional area than the cross sectional area of the discharge openings of the collar and remaining uncovered during the operation of the washer, whereby said sleeve is expanded.

7. In an expansion well washer, a washer pipe, a removable metal sleeve fastened on the pipe, a flexible expansion sleeve composed of a plurality of flexible layers, one of which is impervious, one end of the flexible sleeve being fastened on the metal sleeve, a ring slidable on the pipe and to which the other end of the flexible sleeve is fastened, said ring having ports communicating with the flexible sleeve, said pipe being perforated only within said flexible sleeve.

8. In an expansionable well washer, a washer pipe, a pair of flexible expansion sleeves spaced apart on said pipe and each having its remote end with relation to the other sleeve detachably fastened on said pipe, perforated collars slidable on the pipe and to which the adjacent ends of the sleeves are fastened, the washer pipe being imperforated between and within said collars, said pipe being perforated within the flexible sleeves for supplying fluid to said sleeves in greater volume than it is discharged thru the collars.

In testimony whereof I affix my signature.

FRANK E. CROTTO.