

(No Model.)

2 Sheets—Sheet 1.

S. W. TITUS.
TUBE WELL.

No. 602,547.

Patented Apr. 19, 1898.

Fig. 1.

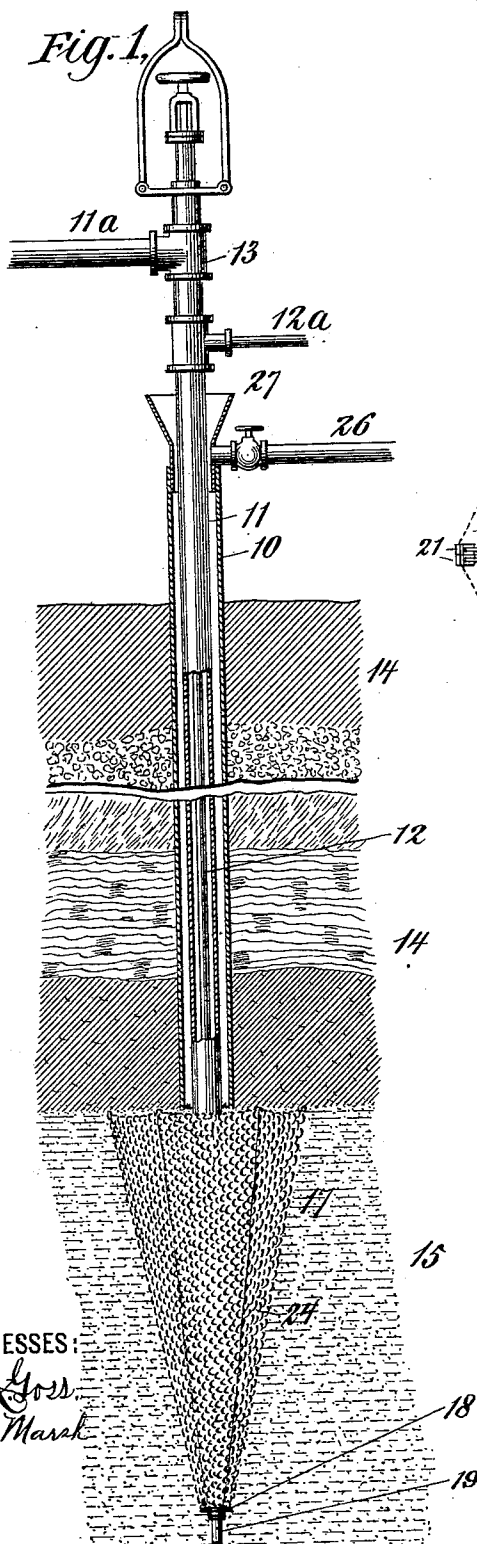


Fig. 4.

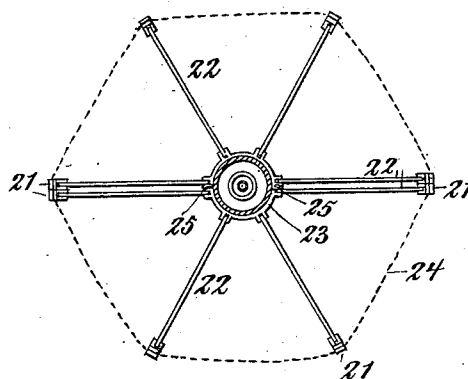


Fig. 5.

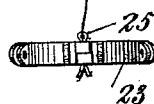
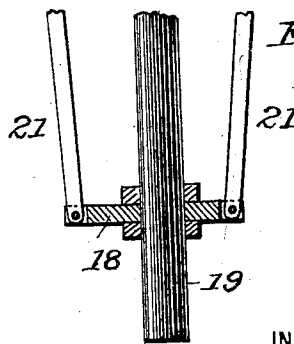


Fig. 6.



WITNESSES:

Harry Goss.
Harry Marsh.

INVENTOR

Silas W. Titus

BY

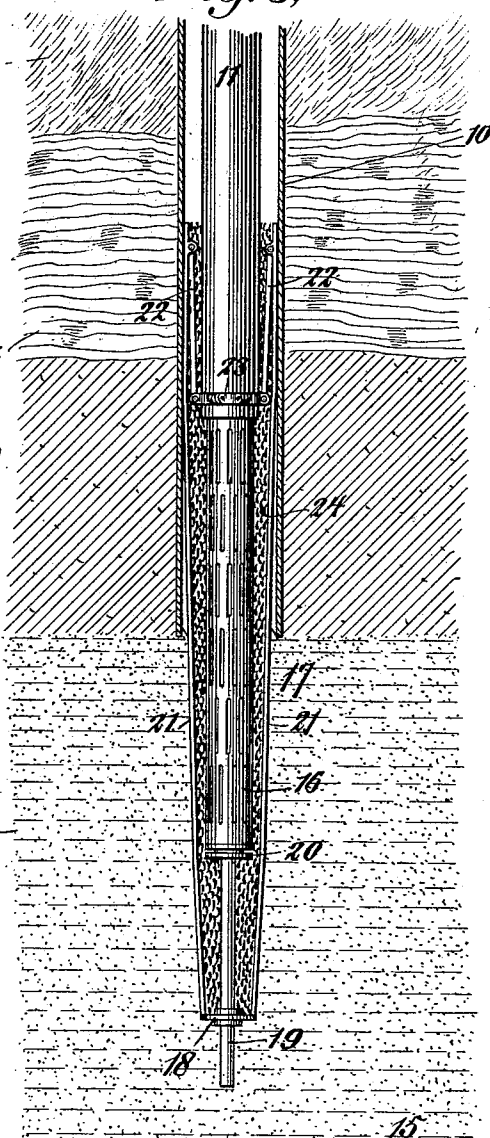
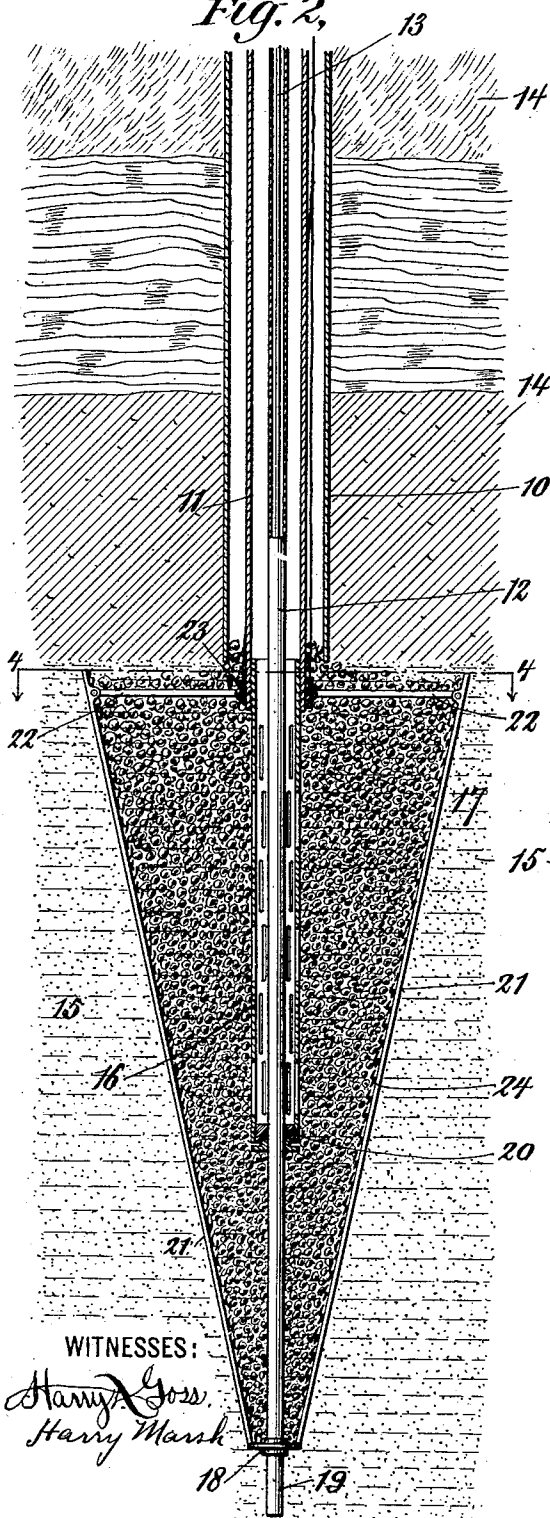
Howard Maymott
ATTORNEY

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Fig. 2,

Fig. 3,



WITNESSES:

Harry Goss,
Harry Marsh

INVENTOR

Silas W. Titus

BY

Howard Maybrook
HIS ATTORNEY

UNITED STATES PATENT OFFICE.

SILAS WRIGHT TITUS, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE
PNEUMATIC ENGINEERING COMPANY, OF NEW YORK, N. Y.

TUBE-WELL.

SPECIFICATION forming part of Letters Patent No. 602,547, dated April 19, 1898.

Application filed July 31, 1897. Serial No. 646,581. (No model.)

To all whom it may concern:

Be it known that I, SILAS WRIGHT TITUS, a citizen of the United States of America, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Tube-Wells, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to improvements in the construction and development of tube or pipe wells after the said tube or pipe has been placed in position either by driving or boring or by any usual or well-known means; and my invention consists in means whereby gravel or other suitable pervious filtering material may be introduced into the space around the suction end of the tube and retained in such position. A permanent artificial filtering-bed in the water-bearing stratum around the suction-pipe is thus formed.

It is well known to those experienced in the art of well-sinking that water is frequently encountered in a stratum of such fine gravel or sand that the water will not flow quickly enough to form a constant supply for the well. This is due of course to the imperviousness of the stratum and the necessarily-limited size of the strainer, also to the fact that the sand itself will pack hard against the strainer and tend to clog the same. In carrying out my invention I propose to replace a quantity of the fine gravel or sand with a corresponding quantity of coarse gravel or stone and to provide means for retaining the said coarse gravel or stone in its proper position around the strainer or suction foot-piece of the well-tube. By this means I form an artificial bed of pervious material of such extent that the water percolating into it on all sides will flow to the strainer and from thence may be forced up the well-tube by any well-known or desired means in such volume as to render a uniform and constant supply. In providing a means for retaining the said filtering-bed and preventing it from gradually disseminating in the water-bearing stratum I cause to be passed down the well-tube a collapsible funnel-shaped or outwardly-flaring holder, which for purposes of this description, owing to its

similarity in shape, I term an "umbrella." Such umbrella is adapted to be passed through the well-tube, before the gravel is introduced, in a closed condition and opened upon its reaching a point below the end of the said tube. The umbrella may consist of any suitable material that will retain the filtering material—such, for instance, as a woven-link chain—and the said filtering material being fed down the tube into the said umbrella will thereby be retained from displacement and dissemination.

My invention consists of certain further details of construction and operation, to be more clearly hereinafter set forth.

The object of my invention is to utilize economically and commercially water-bearing strata of but slightly-pervious material and cause same to yield in a well a constant and uniform flow of water of sufficient volume for practical purposes.

I will now proceed to describe my invention more particularly with reference to the accompanying drawings, and then point out the novel features in claims.

Figure 1 is a central vertical section of a tube-well with inlet and outlets, air-pipes, valves, &c., of substantially the form patented to me August 18, 1896, and having in position the suction surrounded by an artificial filter-bed and an umbrella inclosing and retaining same. Fig. 2 is a detail, on a larger scale, of the lower end of the tube-well, the suction, the filter-bed, and the umbrella, all in position for use. Fig. 3 is a detail, on same scale as Fig. 2, showing the method of inserting the umbrella. Fig. 4 is a section on the line 4-4 of Fig. 2. Fig. 5 is a detail. Fig. 6 is an enlarged detail view, partly in section, of the lower end of the expansible shield-frame.

Similar reference characters denote corresponding parts in all the figures.

10 designates the well-tube; 11, the discharge-tube; 12, the air-pipe, and 13 the valve-rod. 12^a is the compressed-air inlet; 11^a, the discharge-outlet.

The form of well I have shown is of the form patented to me August 18, 1896, No. 566,102; but I do not intend to be limited to

this form of well in connection with this my present application, as same is applicable to wells of other description.

14 14 designate non-water-bearing strata superposed upon a water-bearing stratum 15. The stratum 15 is supposed to consist of very fine gravel or wet sand. The tube 10 is bored or driven in any suitable manner through the strata 14 14 until the stratum 15 is reached. 10 The discharge-tube 11, which has fitted to it the air-pipe 12 and its appurtenances, and also the suction or strainer foot-piece 16, as is usual, would ordinarily now be inserted. Before such insertion, however, a collapsible 15 umbrella or shield is attached in such a manner that it may be inserted therewith.

17 designates the collapsible shield or umbrella in its entirety.

18 is a collar rigidly secured to an extension 19 of the air-pipe 12. Such extension passes through the end of the strainer, which may be provided with a stuffing-box 20.

21 21 are a series of ribs pivotally connected to the collar 18 at their lower ends, and at 25 their upper ends connected by links 22 22 to a collar 23. The collar 23 is suitably attached to the end of the discharge-pipe, as shown, and is preferably made in two halves.

As more clearly shown in Fig. 4, the umbrella is provided with eight ribs. There may of course be more or less. These ribs are arranged in fours, the end ribs of each series being close together, and each series is attached by the links 22 to one-half of the collar 23. These links may be flexible or rigid, 35 as desired. The umbrella is covered with some suitable material 24, such as woven-link chain, the said covering being made in two parts, each part being secured to one series of ribs. The end ribs coming together 40 makes this in effect one continuous covering. The two halves of the collar are secured together by pins 25 25, to which may be attached a wire passing up between the discharge-tube 45 and the well-tube to the mouth thereof.

Fig. 3 shows the umbrella collapsed and being inserted into position through the well-tube. The ribs are arranged with their covering to close around the strainer in such a 50 way that the whole appliance may readily be passed through same, as shown.

If the links 22 22 be made of rigid material, the air-pipe 12 must be adjusted relatively lower with respect to the discharge-pipe, 55 which will permit of the straightening or closing of the ribs for the insertion of the same, and the readjustment afterward will cause the umbrella to open out, as shown in Fig. 2. Should, however, the links be of flexible material, this opening and closing can be effected 60 without any adjustment of the air-pipe relatively to the discharge-tube. When the umbrella has been duly inserted into place, the same may be partially opened by working 65 same up and down for a short space. This will also loosen the sand around same. Water will now be introduced into the annular space

between the discharge-pipe and the well-tube through the pipe 26. This water will wash out the sand around and within the strainer 70 and the same will be raised in the discharge-pipe, together with some water from the water-bearing stratum 15, by compressed air introduced down the air-pipe 12 and discharged through the discharge-outlet 11^a. Coarse 75 gravel or broken stone will now be introduced into the annular space between the discharge-pipe and the well-tube, a funnel 27 at the top of the well-tube being provided for this purpose. The gravel will pass down with 80 the water from the inlet 26 and fill the space within the umbrella not occupied by the strainer. The pressure of the gravel will tend to open the umbrella more and more, this being assisted, if necessary, by "working" the 85 umbrella, as before described, or by adjusting the air-pipe relatively to the discharge-tube. This operation is continued until the umbrella is entirely open and the space therein 90 filled with coarse gravel. A permanent artificial filter-bed has thus been provided around the strainer or suction end of the well with no possibility of unintentional displacement of same.

Should it be desired at any time to withdraw the umbrella or shield, the pins 25 25 95 may be removed by pulling upon the wire connected thereto and which passes to the mouth of the well. This will cause the collar 23 to come in halves, and upon pulling up the 100 air-pipe the umbrella may be turned inside out and removed in this way.

I have alluded to the shield 17 throughout this specification as an "umbrella" from the similarity in shape, as here shown, to this article; but I do not intend to confine myself 105 to this particular shape or even the herein-described construction. By the term "umbrella" I wish to include any shield or inclosure which is capable of being closed into such 110 shape that it can be passed down inside the well-tube and which when desired can be opened out for the purpose of holding and retaining an artificial filter-bed inserted therein. 115

What I claim is—

1. The improvement in the art of constructing tube-wells, which consists essentially in sinking a well-tube until the lower end thereof reaches a water-bearing stratum, then passing 120 down through the tube a collapsible expandible shield, and finally expanding and filling said shield with gravel or other permeable material in substitution of the sand or fine material entering the shield from the water-bearing stratum, substantially as set forth. 125

2. The improvement in the art of constructing tube-wells, which consists essentially in providing a permeable expandible shield in the water-stratum below the lower extremity 130 of the tubing, and then filling said shield with gravel or coarse material which takes the place of the sand in the water of such stratum, substantially as set forth.

3. The combination in a tube-well of an artificial filter-bed at the foot of said well, and a collapsible shield or umbrella, surrounding said artificial filter-bed substantially as specified.

4. A collapsible shield or umbrella adapted to be inserted through a well-tube to the foot thereof, the said shield being adapted to be opened when in position, and space inclosed thereby to be filled with gravel or coarse material constituting an artificial bed, substantially as specified.

5. A collapsible shield or umbrella adapted to be inserted through a well-tube to the foot thereof, the said shield being adapted to be opened when in position, and space inclosed thereby to be filled with gravel or coarse material constituting an artificial bed, and means whereby said shield may be emptied and withdrawn through the well-tube substantially as specified.

6. The combination in a tubular well of a well-tube, an interior tube, a collar carried by the interior tube at its lower end, a series of ribs pivoted to said collar, a flexible pervious

covering carried by the ribs, the said ribs and pervious covering being adapted to close up for the purpose of insertion through the well-tube, and to open when at the foot of the well substantially as and for the purpose set forth.

7. The combination in a tubular well of a well-tube, an interior discharge-tube, an air-tube within said discharge-tube, a collar attached to said air-tube, a series of ribs pivoted to said collar, a flexible pervious covering carried by the ribs, a collar carried by said discharge-tubes, and links pivoted to said collar and said ribs, whereby a longitudinal movement of the discharge-tube relatively to the air-tube will cause the ribs to open or close, substantially as specified.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 26th day of July, 1897.

SILAS WRIGHT TITUS.

Witnesses:

D. HOWARD HAYWOOD,
FREDERICK M. HITCHCOCK.