Dec. 19, 1967 W. R. COTTON 3,358,781

SLOTTED PLASTIC WELL SCREEN WITH BACKWASH VALVE AND METHOD OF INSTALLATION

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Fig. 1

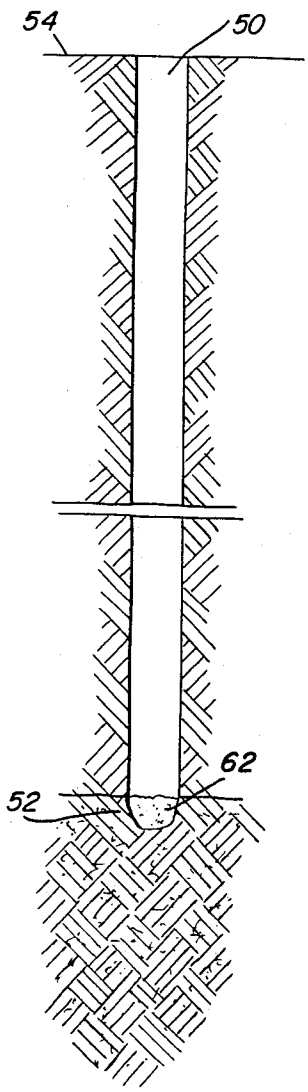


Fig. 2

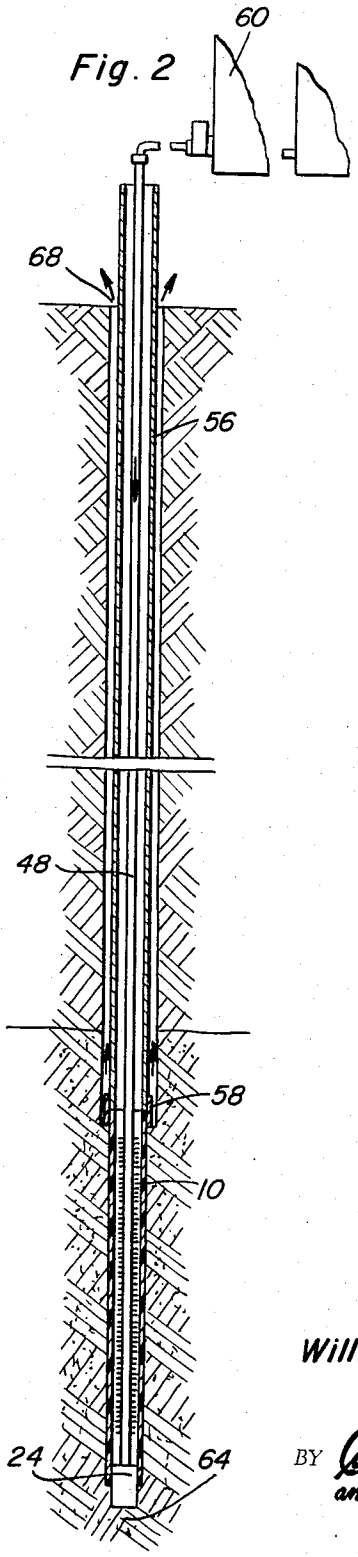
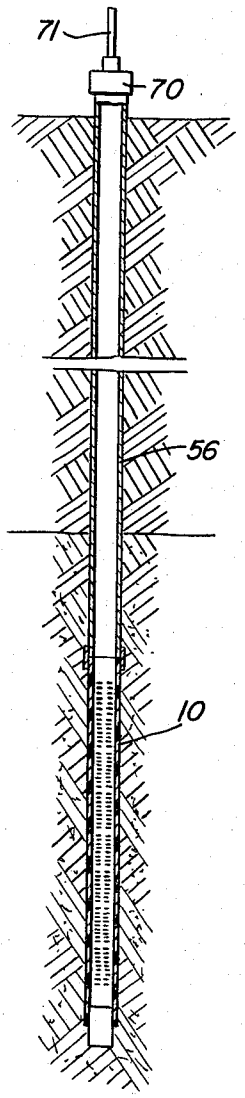


Fig. 3



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Fig. 4

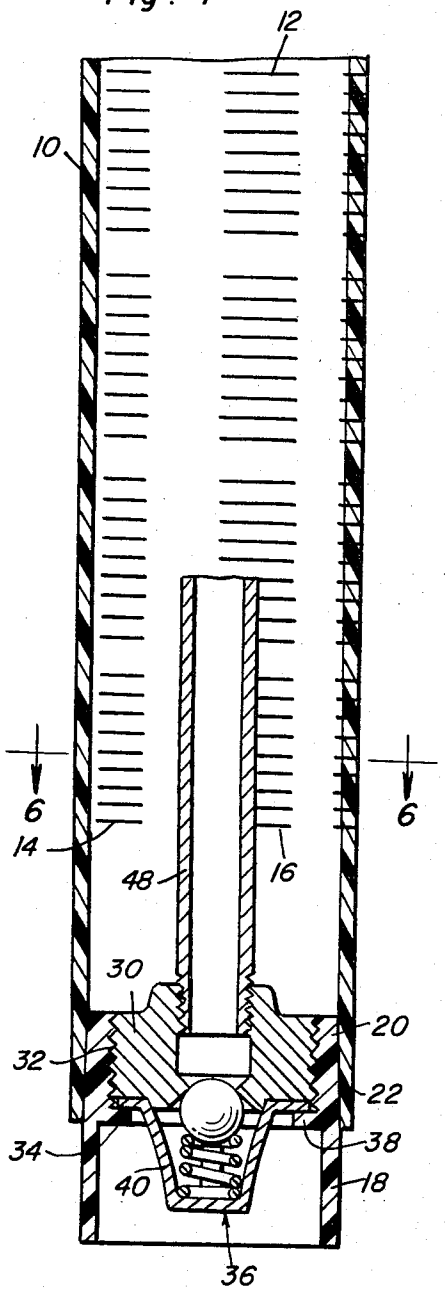


Fig. 5

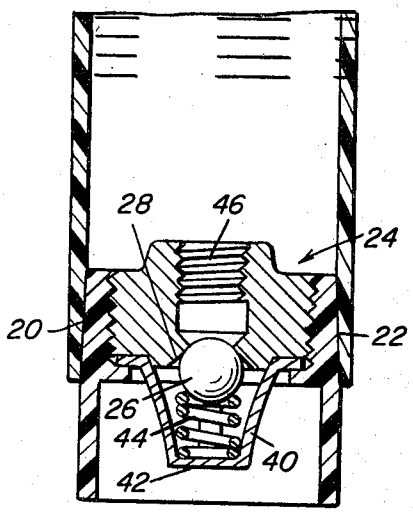
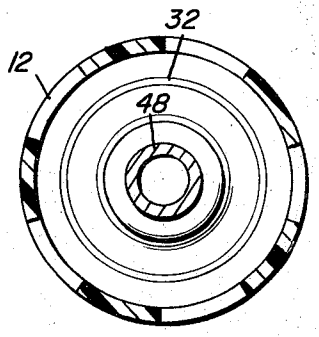


Fig. 6



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SLOTTED PLASTIC WELL SCREEN WITH BACKWASH VALVE AND METHOD OF INSTALLATION

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ABSTRACT OF THE DISCLOSURE

A well strainer and backwash valve in which the strainer is in the form of a pipe having circumferentially disposed slots therein which are arranged in longitudinal rows with each slot being in a plane perpendicular to the axis of the pipe. The backwash valve is attached to the strainer by employing an adapter screwthreadedly receiving an annular nut member. The nut member has a valve seat communicated with a threaded passageway for detachably receiving a wash line together with a spring-biased ball valve associated with the seat for forming a closure for the lower end of the strainer but enabling passage of fluid therethrough when the wash line is attached to the nut member and a fluid pressure is admitted through the wash line.

This invention relates to a well strainer in the form of a slotted pipe provided with a particular arrangement of slots together with a backwash valve which includes a threaded nut member threaded into an adapter in the lower end of the slotted pipe. The nut member includes a valve seat and a ball valve is associated with the valve seat and is provided with spring biasing means for retaining the ball valve against the valve seat.

It is an object of this invention to force the well strainer and the well casing for the well down into the ground by forcing mud and water down through a backwash valve at the end of the well strainer and back up through the bored hole in which the casing and strainer reside thereby forcing sand and gravel out from the hole or bore. By removing such sand and gravel from the ground the well strainer together with the casing will work its way into the ground until the well strainer resides at a desired depth. For effecting this operation a new and novel backwash valve is employed whereby the backwash valve affixed to the well strainer is biased to a normal closed position which will prevent water or other liquids from washing back into the well strainer.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a profile view of the ground strata showing a hole bored to water producing sand;

FIGURE 2 is a profile view of the ground strata and showing a well casing and well screen or strainer coupled thereto inserted into the ground in a hole bored therefor, and showing a wash line in the well casing and screen, and connected to the well screen by a backwash valve;

FIGURE 3 is a profile view of the ground strata and showing the well casing and the well screen or strainer inserted into a well hole, and showing a pump line connection at the upper end of the well casing for pumping water from the well;

FIGURE 4 is a longitudinal sectional view of the well strainer of this invention showing the strainer partly broken away and showing a backwash valve connected to the lower end of said well strainer;

FIGURE 5 is a fragmentary sectional view of the well strainer and backwash valve of this invention and showing the wash line disconnected from the backwash valve; and

FIGURE 6 is a sectional view of the well strainer and wash line of this invention taken substantially along section line 6—6 of FIGURE 4 and showing a top view of the adapter and backwash valve.

A well strainer **10** best seen in FIGURE 4, is provided with slots cut across the circumference of the well strainer in a series of rows. The slots are indicated by reference numeral **12**. In FIGURE 4 two rows **14** and **16** are shown, each row being compiled of a series of columns of slots, and nine slots being provided in each column. The well strainer is made from plastic pipe and is intended to be used as a water well strainer. The length of the slots is such that not less than 60% nor no more than 75% of the circumference of the well strainer is slotted. The number of rows of slots will vary with the diameter of the pipe used. Accordingly, the following schedule is submitted to show the number of rows of slots to be used for a particular diameter pipe:

	Rows
Up to and including 2" dia.	3
Diameter, inches, inclusive, from—	
2 to 3	4
3 to 4	5
4 to 5	6
5 to 6	8
6 to 7	9
7 to 8	11
8 to 9	12
9 to 10	14

The gauge or thickness of the slots for any one strainer will be uniform through the strainer.

At the bottom of the well strainer an adapter **18** is pressed into the strainer **10**. The adapter **18** has a tapered outer surface **20** which is adapted to fit into a tapered inner surface **22** in the well strainer. The adapter **18** forms a part of a backwash valve **24** which is used in conjunction with the strainer of this invention to work the strainer down into the substrata. The backwash valve **24** comprises a chrome ball **26** which seats against a seat **28** provided on a nut member **30**. The nut member **30** has right hand threads on the outside thereof which are adapted to thread down into the threaded portion **32** of the adapter **18** to thereby retain the upper flange **34** of a cage member **36** on an inner peripheral flange **38** of the adapter **18** between the threaded nut member **30** and the inner peripheral flange **38**. The cage member **36** has a plurality of ribs **40** thereon which ribs are connected integrally to a centrally disposed base **42**. The base **42** of the cage **36** retains a coil spring **44** thereon. The coil spring **44** biases the chrome ball valve **26** upwardly against the seat **28** of the nut member **30**. The nut member **30** has a passageway through the center thereof for allowing fluid to flow down through the passageway and out past the ball valve **26** and seat **28** of the backwash valve to the outside of the strainer **10**. Left hand threads **46** are provided in this axial passageway to receive a wash line **48** which may be threaded into these threads. The left hand threads **46** are provided in the nut member so that when the wash line **48** is threaded thereinto or threaded out from the nut member the right hand threaded connection between the adapter **18** and the nut **30** will not be disturbed.

FIGURE 6 shows the spacing of the rows of slots around the circumference of the well strainer, and in this illustration five such rows of well slots are indicated.

The manner of inserting the well screen to its desired depth in the substratum is best described with reference

to FIGURES 1 through 3. In FIGURE 1 a hole 50 has been bored through the substratum down into water producing sand 52 by using conventional well drilling rig and procedure. After the hole 50 has been so bored below the ground surface 54 to the water producing sand, the drilling bit and the drilling apparatus are removed from the hole and the well casing 56 coupled to the well strainer 10 by the coupling sleeve 58 is lowered into the hole. The well strainer 10 has the backwash valve 24 rigidly attached thereto as is indicated in FIGURE 2. The backwash valve 24 has the water line, or wash line 48 attached thereto. The entire assembly comprising the casing 56, well strainer 10, backwash valve 24 and water line 48 are inserted into the bored hole, with the backwash valve resting on the bottom of the bored hole 50. After the entire arrangement has been placed in the hole, mud and water is forced down through the wash line 48 from a mud source indicated by the tank 60 or may be pumped from a mud pit by conventional pumping means. The mud and water is forced down through the line 48 and out through the backwash valve 26 into the bottom 64 of the hole in which the backwash valve and the well strainer rests. The mud and water so forced through the backwash valve will flow back up through the drilled hole 50 along the outside of the well strainer and the well casing and out through the top of the hole as indicated at 68. The mud so forced from the hole will carry sand and gravel with it and force the sand and gravel out from the bored hole at 68, thereby working the well strainer down deeper into the substrata. It is to be observed that the well strainer is worked deeper into the substrata by both the effect of the sand and gravel being removed and forced along the outside of the casing and outwardly from the hole, and by the mud and water washing sand and gravel from the hole and opening the hole further into the ground to allow the strainer and casing to drop down. The slots 12 in the well strainer will normally be clogged shut by the effect of the mud and sand forcing its way along the outside of the well strainer. Since the wash line and the casing are both filled with water, this weight will serve to keep the casing from lifting. Furthermore, to sink the well casing one of the workmen normally rides the casing down. This will serve to force the casing into the drilled hole faster.

In this invention the well casing as well as the well strainer is preferably made from commercial plastic pipe. The adapter 18 is preferably made from plastic, and the backwash valve 24 is preferably made from brass or a similar metal which is a poor catalyst so that there is nothing for the minerals in the water to react with. The wash line 48 used in initially driving the plastic screen or strainer to its desired depth is made from metal however, the wash line is not retained in the well and does not form a part of the well once the well is put into operation.

After the well strainer and well casing have been driven to the desired depth fresh clear water is then pumped down the wash line, and this clear water will clean the casing and clear the screen. After the screen has been cleaned the wash line may be removed from the backwash valve by unscrewing the wash line therefrom. The threaded arrangement between the wash line and backwash valve is the opposite of the threaded arrangement between the backwash valve nut 30 and the adapter 18 so that when the wash line is unscrewed from the backwash valve the nut member 30 having the valve seat 28 thereon will not be unscrewed from its adapter 18. The wash line after being unthreaded from the backwash valve is first raised three to six inches from the backwash valve and clear water is again pumped down the disconnected wash line to force the muddy water out of the inside of the casing. Thereafter the wash line is removed from the casing, and the well is completed by placing a normal pumping arrangement on the well casing as is indicated at 70 in FIGURE 3. The drop line 71, as well as the coupling connecting the pump to the casing are made from commercial plastic, which further retards any electrolytic process.

The well so completed will operate as a normal well, however, the advantages of the plastic casing and plastic screen of this invention over a normal driven well are numerous. The chrome ball 26 of the backwash valve 24 will normally seat against the nut member 30 by the action of the coil spring 44 biasing the chrome ball 26 into seating engagement with the seat 28. This will serve to keep sand and other foreign matter out of the well strainer and out of the well casing during normal operation of the pump. In the event the strainer is to be cleaned however the backwash valve may be used by reinserting the wash line down into the backwash valve into threaded engagement with the threads 46 of the backwash valve.

Water will strain into the casing through the well screen 10 so that the water may readily be pumped from the well casing by a pump at the top of the casing.

Since there are no metal casings, couplings or screens there is nothing in the well of this invention for the minerals in the water to react with, and electrolytic processes which would normally take place in a metallic well casing will not be encountered. The slots in the well screen will not be coated by reaction between the minerals of the water as in normal wells and the loss of water from losing water pressure by the elimination of water seepage through the well screen is negligible. There is no reason for rust to show up in the water used from a well constructed in accordance with this invention and the maintenance required to keep the well in operation is extremely negligible.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention as claimed.

What is claimed as new is as follows:

1. A well strainer comprising in combination, an integral pipe having slots cut therein, said slots being cut in a series and being disposed circumferentially of the pipe and along a plane perpendicular to the axis of said pipe, and a backwash valve, said backwash valve comprising a threaded nut member, said backwash valve being connected to the bottom of said well strainer, said threaded nut member having threads on the outer circumference thereof, and wherein said backward valve includes an annular adapter having threads on the inner periphery thereof whereby said threaded nut member may be threaded into said adapter, said adapter having an inner flange thereon disposed adjacent to the threaded inner periphery, a cage means disposed between said inner flange and said threaded nut member, a seat means on said threaded nut member, a ball valve means retained by said cage means for seating against said seat means, and biasing means retained by said cage means for biasing said ball valve means against the seat means on said nut member.

2. The combination as defined in claim 1 wherein said nut member includes an axial passageway extending therethrough with the seat means for the ball valve means being disposed at the lower end thereof, the upper end of said passageway being internally threaded for detachable connection with a wash line insertable into the well strainer.

3. The combination as defined in claim 2 wherein said well strainer and adapter are constructed of plastic material, said cage means including a peripheral flange at the upper end thereof extending laterally outwardly received between the inner flange on the adapter and the lower end of the nut member.

4. A backwash valve for preventing liquid from washing back into a well strainer through said valve, said backwash valve comprising a tubular adapter, said tubu-

lar adapter being tapered along the outer periphery thereof for facilitating the insertion of said adapter into one end of the well strainer, a flange means and a thread engaging means on the inner periphery of the tubular adapter, a seat means having threads thereon for engaging said thread engaging means on said tubular adapter and a valve retaining means, said valve retaining means being retained between said inner periphery of the tubular member and said seat means, said seat means having an inner seat disposed along the longitudinal axis thereof, a ball valve in said valve retaining means, said ball valve normally being seated against the inner seat of said seat means by a biasing means in said valve retaining means.

5. A backwash valve comprising a ball valve, a nut member having an inner seat means defined by an inner peripheral flange in said nut member, internal and external threads on said nut member, a cage means having a plurality of ribs disposed from an outer flange and integrally connected to a flat base, and a tubular retaining means having an internal peripheral flange disposed adjacent to an internal thread engaging means, the outer flange of said cage means being retained between said nut member and said inner peripheral flange on said tubular retaining means to thereby retain said cage means in said tubular retaining means, and a biasing means retained in said cage means and disposed against said ball valve for urging said ball valve against the inner seat means of said nut member.

6. A backwash valve for use in a well strainer and adapter to detachably connect with a wash line inserted downwardly into the strainer, said backwash valve including an annular member adapted to be connected with the lower end of the well strainer, a nut member screwthreadedly engaged with the interior of the annular member, said nut member having an axial passageway therethrough with the upper end of the axial passageway being internally screwthreaded for detachable connection with

a wash line, the lower end of said axial passageway having a valve seat formed in the lower end of the nut member, a ball valve member engaged with the valve seat, spring means associated with the ball valve member for biasing the ball valve member into engagement with the valve seat, cage means engaged with the spring means for retaining the spring means and ball valve member in axial alignment with the passageway to resiliently retain the ball valve member against the valve seat and to enable movement of the ball valve member away from the valve seat for passage of fluid through the passageway when a wash line is engaged with the nut member and fluid pressure exerted against the top of the ball valve member, said cage means including a peripheral flange supportingly engaging said annular member and being locked in supporting engagement with the annular member by the nut member.

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