Sept. 7, 1926. 1,598,974

J. P. LAWLOR ET AL

CONCRETE WELL STRAINER

Filed May 6, 1925

Fig. 1

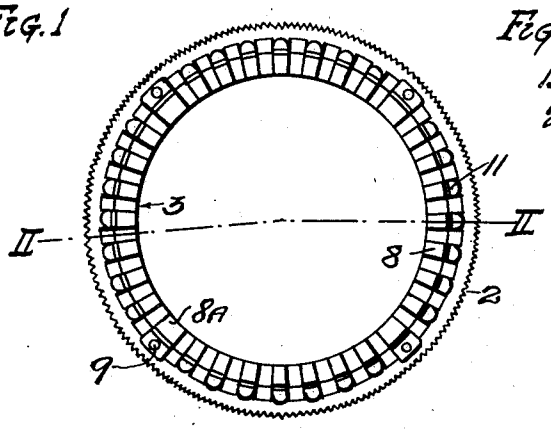


Fig. 5

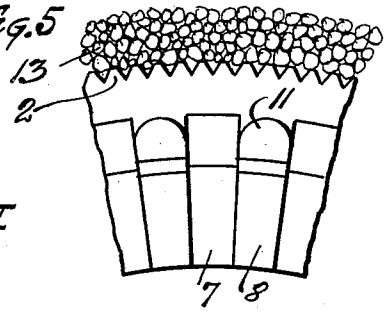


Fig. 2

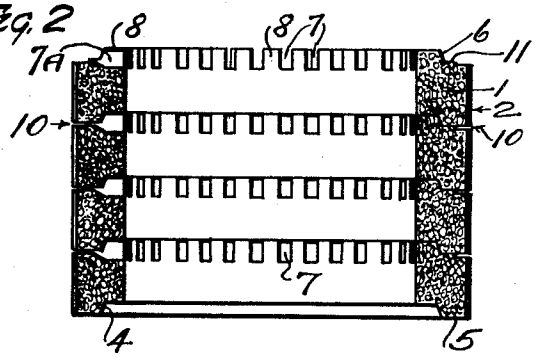


Fig. 4.

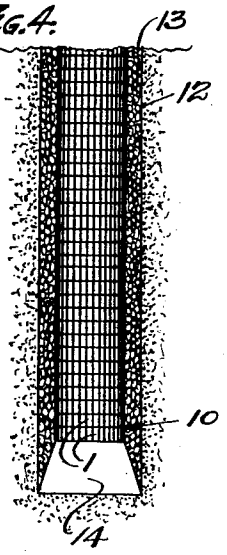
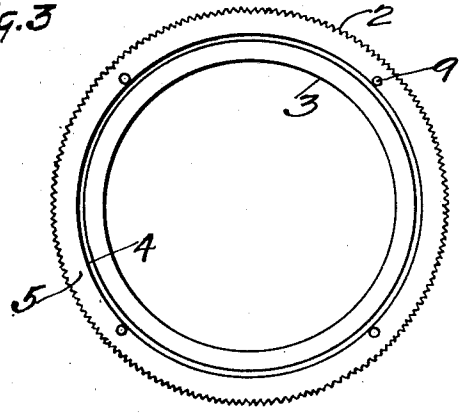


Fig. 3



INVENTORS
JOSEPH P. LAWLOR
JAMES I. SEAY.
By J. P. Weatherford
ATTORNEY.

Patented Sept. 7, 1926. 1,598,974

UNITED STATES PATENT OFFICE.

JOSEPH P. LAWLOR AND JAMES I. SEAY, OF MEMPHIS, TENNESSEE.

CONCRETE WELL STRAINER.

Application filed May 6, 1925. Serial No. 28,367.

This invention relates to a well strainer designed for use in deep or shallow wells, and to the well in which it is used.

It especially relates to a concrete construction in which a plurality of annular units are superimposed to form a strainer which is placed in a hole or well in the water bearing sand to permit the entrance of water into the well, therethrough, and at the same time exclude the entrance of sands and gravels as fully as possible.

There are at present concrete strainers of various design but each has certain points of weakness which will be eliminated in a strainer designed as described herein. In strainers as now made, or patented, the rings or sections, are held in place, one upon the other, by means of cables or rods. In such design the rings or sections are sometimes difficult to align vertically and may become distorted from a direct vertical position by uneven pressure of the sand and gravel surrounding same, or by other outside forces.

Another weakness in present designs is found in the small amount of supporting area between sections. In such design when a number of sections are placed one upon the other the compressive strength of the supporting surface is exceeded, thereby causing a crushing of the concrete or other material used to hold the sections or rings apart and defeating the purpose for which they are intended.

In the design shown herein the bearing surface between the sections or rings is greatly increased by providing bearing surface on both the upper and lower steps of the male and female joint.

Another common weakness is found in the failure to so design the strainer as to permit, as far as possible, a straight line of flow of water from the water bearing sands through the strainer into the well. This feature is of paramount importance because after the strainer has been placed in position in the well it is advisable, if not absolutely necessary, to wash out and agitate the sands so as to increase the flow of water into the well. This is usually accomplished by alternately applying pressure and suction, to the water inside of the well, thereby setting up a surging action and causing the water to pass in and out through the strainer and the sands or gravel surrounding same. If the water passing in and out through the strainer is required to flow through various turns and passages, as is the condition with strainers now in use, before entering the water bearing sands upon which it is to act, its force and effectiveness upon the water bearing sand itself is greatly decreased and it is difficult if not impossible to develop a well so that it will yield the maximum quantity of water. Furthermore, when the well has been completed and is being pumped constantly, indirect courses or passages through which the water must travel in going through the strainer causes a loss in head by added friction, thereby decreasing the capacity of the well.

In the strainer herein-after described, there is a direct path of flow which is of advantage, first in permitting development of the well by pumping and surging to increase its capacity; and second, in decreasing the friction loss of water passing through the strainer itself, thereby increasing the quantity of flow.

Since the strainer openings cannot in such construction be close together, it is extremely important also that provision be made for vertical flow of the water along the casing in smooth and closely aligned passageways, as distinguished from strainers which have separated channelways which require tangential flow of the water to reach them before the vertical flow begins. In other words it is fully as desirable that water reaching the outer surface of the strainer between openings be provided with the most direct possible channel to such opening and that the direction of flow be diverted a minimum amount, and that for such diversion an unobstructed channel be provided which is not possible where channels are spaced apart with intermediate flat surfaces of considerable extent where flow is impeded not only by direction change from radial, to tangential, then to radial and then to vertical, but is also prevented from

making a direct tangential flow by the sand or gravel packing against the surface of the strainer.

With these facts before us, the objects of our invention, are

First, to provide means for aligning and centering the units or sections and preventing displacement of the sections with reference to each other;

Second, to provide a maximum of bearing surface between sections whereby crushing and destruction of the effectiveness of the strainer openings may not be caused by the weight of the superimposed sections;

Third, to provide as far as possible a straight line and direct path of flow between the exterior and interior of the strainer;

Fourth, to provide as far as possible for unobstructed vertical flow along the exterior of the strainer; and

Fifth, to generally improve the details of construction of such strainers.

We accomplish these objects, first, by employing a male and female joint, preferably with inclined surfaces, which will align the rings as they are being placed, center them directly one above the other, and hold them when in place against displacement.

Second, by making the male member of the joint slightly longer than the depth of the female member and additionally employing lugs on the contiguous portion of the male member to provide bearing surface between sections and separate them to provide openings between sections for inflow of water between sections.

Third, by providing contiguous, substantially V shaped, corrugations vertically disposed on the exterior surface of the sections, whereby the channels thus formed will be adjacent, and whereby the gravel and larger sand surrounding the strainer will bridge over the V shaped grooves and thereby create numerous vertical channels for the passage of the water to the openings or passageways leading inward between the sections, and as will be more fully hereinafter set out in the drawings, specification and claims. to which reference is now made.

In the drawings:

Fig. 1 is a plan view of the sections.

Fig. 2 is a section on the line II—II of Fig. 1 showing a number of sections in super-imposed relation.

Fig. 3 is a bottom view of the sections.

Fig. 4 is a section of the lower portion of a well with a number of strainer units in position in the well as they would appear when the well is finally completed.

Fig. 5 is an enlarged fragmentary plan of a portion of a section of one unit to show the detail of the vertical grooves and the gravel adjacent thereto.

Referring now to the drawings, in which the various parts are indicated by numerals. 1 is a strainer unit of concrete in the form of an annular ring having a vertically milled or corrugated exterior surface 2 and preferably a smooth cylindrical inner surface 3. The bottom of each of these units is undercut preferably along an inclined surface 4, leaving the outer portion an annular ring 5 projecting below the remaining portion of the bottom, and forming female portion of the joint. The top is complementary in form having the inner portion projecting upward to form the male portion of the joint, the outer surface 6 of this projection being so inclined that these units will nest one upon the other. The upwardly projecting portion of the top of the unit is channelled through along radial lines to form alternate channels 7 and projecting lugs 8. Preferably some of these lugs, such as the lug 8^A are of larger size than the remaining lugs and the unit at such lugs may be provided with vertical holes 9, either through the lug or adjacent thereto, through which cables or rods may be passed, should it be so desired. In forming these channels, it is preferred that they be cut below the general surface of the top of the unit as shown by the side view 7^A (Fig. 2), thus providing a downwardly inclined channel for the entering water. The height of the lugs 8 is greater than the height of the annular ring 5 so that a space 10 is left between the units at the outer edge thereof which space provides a communicating opening leading into the channels 7.

Extending radially beyond the lugs 8 are flat bosses 11 which have a height equal to the desired space 10 and provide additional bearing surface for the superimposed sections. These bosses may extend to the outer surface of the sections, but preferably extend only as shown so that the space 10 is an uninterrupted one extending entirely around the sections.

In Fig. 4 the lower end of a well with the strainer therein is shown. The hole or well 12 is larger than the outer diameter of the strainer sections therein and the space therebetween is filled with gravel 13 which acts to hold the surrounding sand away from the strainer.

In Fig. 5 the relation of the gravel 13 to the V shaped grooves of the corrugated surface 2 is shown. In this view, the size of the gravel is shown much smaller in relation to the grooves than is normally the case, yet the bridging action by which the grooves are left uninterrupted is clearly shown. 14 is a supporting shoe preferably of metal on which the bottom strainer unit rests. These grooves are shown V shaped, but it will be readily understood that while we prefer to so make them, they are not necessarily of such shape but may be any form

of corrugations, preferably closely aligned or contiguous, so that no tangential flow will be required. While they should be vertical, deviations from true vertical lines may be permitted if desired.

In use the superposed units or sections are placed in the well each resting on and supported by the next lower unit, the outer portions being spaced apart by the bosses 11 and the lugs 8 as before described. The strainer is then surrounded with gravel and such work of increasing flow is done as may be desired.

We have confined this description to units made of concrete but we wish it distinctly understood that other materials such for instance as clap products, may be used if it be so desired.

Having now fully described our invention, what we claim and desire to secure by Letters Patent in the United States is:—

1. As a strainer unit for a well, an annular member, having a female end, and a complementary male end having the projecting portion of slightly greater depth than said female portion, said projecting portion being divided into alternate lugs and channels and projecting bosses on said male end of thickness equal to the difference in depth of said male and female portions extending radially outward from the base of said lugs toward but not to the outer edge of said member.

2. As a strainer unit for a well, an annular member, having a female end, and a complementary male end having the projecting portion of slightly greater depth than said female portion, said projecting portion being divided into alternate lugs and channels, and vertically disposed contiguous corrugations, on the outer surface of said member, extending inward from said surface a less distance than to said lugs, whereby the engaging surfaces of said lugs are left intact.

3. As a strainer unit for a well, an annular member, having a female end, and a complementary male end having the projecting portion of slightly greater depth than said female portion, said projecting portion being divided into alternate lugs and channels, projecting bosses on said male end of thickness equal to the difference in depth of said male and female portions, extending radially outward from the base of said lugs, toward but not to the outer edge of said member, and vertically disposed contiguous corrugations, on the outer surface of said member, extending inward from said surface a less distance than to said bosses, whereby the supporting surfaces of said bosses are left intact.

4. As a strainer unit for a well, an annular member, having a female end, and a complementary male end having the projecting portion of slightly greater depth than said female portion, said projecting portion being divided into alternate lugs and channels, and projecting bosses on said male end of thickness equal to the difference in depth of said male and female portions extending radially outward from the base of said lugs.

5. A concrete well strainer comprising a plurality of superposed annular units, each unit having a male and female end, the female end of one section engaging with the male end of the adjacent section, the projecting member of said male end being of slightly greater length than the depth of said female end and being divided into alternate lugs and channels, whereby the outer surface of adjacent sections will be spaced apart and channelways be provided inward from the openings thus formed; said units having vertically disposed V shaped corrugations on the outer surface thereof, extending inward from said surface a less distance than to said lugs, whereby the engaging surfaces of said lugs are left intact.

6. A concrete well strainer comprising a plurality of superposed annular units, each unit having a male and female end, the female end of one section engaging with the male end of the adjacent section, the projecting member of said male end being of slightly greater length than the depth of said female end and being divided into alternate lugs and channels, whereby the outer surface of adjacent sections will be spaced apart and channelways be provided inward from the openings thus formed, and projecting bosses on said male end of thickness equal to the difference in depth of said male and female portions, extending radially outward from the base of said lugs toward but not to the outer edge of said unit; said units having vertically disposed contiguous V shaped grooves on the outer surface thereof, extending inward from said surface a less distance than to said bosses.

7. A well strainer comprising a plurality of superposed annular units, each having a male and a female end, the female end of one unit being engaged by the male end of the adjacent unit, the male end of each unit being divided into alternate lugs and channels, and the outer faces of said lugs, and the inner face of each female end, being bevelled correspondingly, whereby each of said units is self-centered, due to engagement of one of said beveled faces, upon its ends being joined with a co-acting end of another unit.

8. A well strainer comprising a plurality of superposed annular units, each having a male and a female end, the female end of one unit being engaged by the male end of the adjacent unit, the projecting portion of the male end of each unit being of slightly

greater depth than the complementary female portion, and being divided into alternate lugs and channels, with projecting bosses of thickness equal to the difference in depth of said male and female portions, the outer faces of said lugs, and the inner surface of each female end, being bevelled correspondingly, whereby each of said units is self-centered, due to engagement of said beveled faces, upon one of its ends being joined with a co-acting end of another unit.

In testimony whereof we have hereunto set our names.

JOSEPH P. LAWLOR.
JAMES I. SEAY.