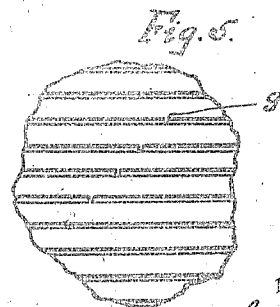
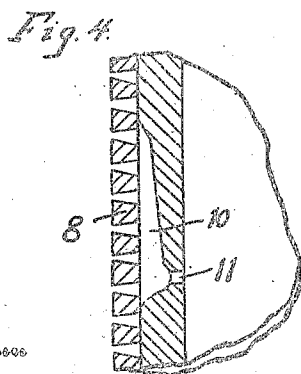
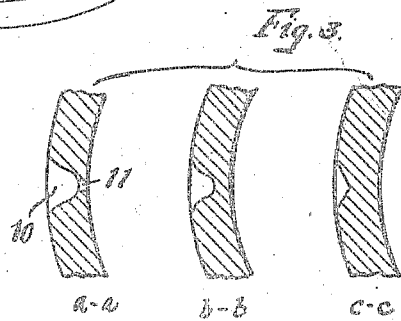
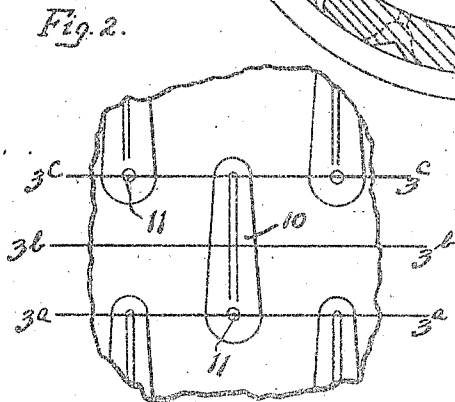
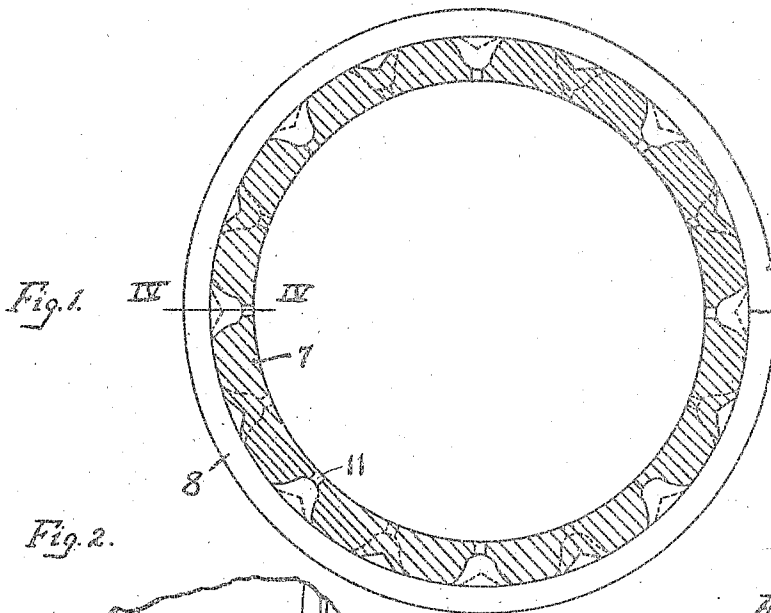


1,273,236.

Patented July 23, 1918.



Witnesses

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UNITED STATES PATENT OFFICE.

MAHLON E. LAYNE, OF HOUSTON, TEXAS.

WELL-SCREEN.

1,273,236.

Specification of Letters Patent.

Patented July 23, 1918.

Application filed October 23, 1916. Serial No. 127,054.

To all whom it may concern:

Be it known that I, MAHLON E. LAYNE, a citizen of the United States, residing at Houston, in the county of Harris and State of Texas, have invented certain new and useful Improvements in Well-Screens, of which the following is a specification.

This invention relates to a well screen for oil or water wells and the like, and it has for one of its primary objects the provision of a well screen in which a maximum screening area is obtained without weakening the frame which supports the screening elements. Another object of my invention is to provide a screen which has a maximum gathering area; that is to say, in which there are no dead spaces. Still another object of the invention is the arrangement of the gathering area in such manner as to distribute the wearing effect of the inflowing liquid over a greater area and to cut down the velocity of the liquid flow adjacent points of entrance into the interior of the frame, whereby the life of the screen is lengthened. My invention also contemplates the disposition of the gathering compartments so as to result in the least possible weakening of the frame; the disposition of the gathering compartments in such manner as to provide a maximum supporting area for the screening wire helix, thereby insuring evenness in the spacing of the helix; and the disposition and formation of the gathering compartments in such manner as to minimize the damaging effect of a breakage in the screening wire. My invention also has for an object the provision of a screen in which the gathering compartments are self cleaning.

The foregoing, together with such other objects as may hereinafter appear or are incident to my invention, I attain by means of a construction which I have illustrated in preferred form in the accompanying drawings, in which—

Figure 1 is a cross section through a well screen embodying my improvements; Fig. 2 is a side elevation of a portion of the screen supporting frame, showing one of the gathering compartments; Fig. 3 is a group of three sectional views taken respectively on the lines 3^a—3^a, 3^b—3^b, and 3^c—3^c, of Fig. 2 to illustrate the configuration of the gathering compartments; Fig. 4 is a sectional view taken on the line IV—IV of Fig. 1; and Fig. 5 is a side elevation of a small portion of the screen illustrating the manner in

which the coils of the helix of screening wire are spaced.

In the drawings, I have exaggerated the relative proportions of the parts for purposes of illustration.

The invention relates in general to that type of well screen in which a helix of screening wire is wound upon a perforated supporting frame. Heretofore where the supporting frame is composed of well tubing or piping, it has been customary to form the perforations in the tubing, which perforations were of relatively large diameter and were counter-sunk, the increasing size of the perforations being necessitated in order to secure a maximum efficiency. This form of construction, however, weakens the strength of the supporting frame, increases the velocity of the liquids flowing through the slits between the wires at some points into the interior of the tubing, subjecting the screening wire at such points to excessive erosive or wearing action, which shortens the life of the screening elements. In addition, in such construction, in the event of breakage of the screening wire opposite a perforation, there resulted a relatively large exposed portion permitting the entrance of unscreened liquid. As previously indicated, one of the objects of my present invention is the provision of a screen in which a maximum screening area, and a maximum gathering area are obtained, in a structure having none of the foregoing disadvantages.

Referring now to the drawings, it will be seen that I have shown a supporting frame or tubing 7 upon the exterior of which is wound a helix of screening wire 8, such wire being of a truncated pyramidal shape in cross section, the small end of the wire being adjacent the tube to provide a groove or circulation chamber increasing in width. The coils of the helix of wire are spaced apart, for example, by means of the burs 9 which are struck up on the edges of the wire (see Fig. 5). Formed in any preferred manner in the outer face of the tube 7 are a plurality of gathering compartments 10 which are arranged longitudinally of the tube and in staggered relation, which gathering compartments increase in depth and in width from the top to the bottom, and are in general form an angular trough. Adjacent the bottom of each compartment, preferably at the deepest portion thereof, a hole 11 is

punched or drilled to provide communication with the interior of the tube, these holes being considerably smaller in diameter than the counter-sunk perforations previously described.

Disposing the gathering compartments longitudinally of the tube, results in the least possible weakening thereof; and by arranging them in staggered relation so as to overlap at the ends, a maximum gathering area is provided inasmuch as each annular circulating chamber or channel of the helix communicates with one or more of the gathering compartments, and the increase in depth and width of the compartments permits of the gathering of a maximum quantity of liquid and insures a flow from each of the circulating channels with which it communicates. Stated in other words, each gathering compartment receives or draws its supply from a number of slits and channels substantially uniformly instead of from one or two located immediately adjacent the inlet openings 11, this being insured by making the size of the opening 11 of a compartment somewhat less than the total area of the circulating channels communicating with the compartment. The location of the openings 11 in the lower portion of the gathering compartments makes the gathering compartments self cleaning, thereby preventing clogging.

A further advantage of this construction is that the wearing effect of the inflowing liquid is distributed over a wider area. This result is obtained by the form of the gathering compartments and also by reason of the fact that I so proportion the size of the openings 11 to the total area of the circulating channels which communicate with a gathering compartment that the flow is somewhat retarded, the effect of which is to break up the cyclonic action of the pressure on the exterior of the screen and to cut down the velocity of the inflowing liquid and extend the area from which the supply for each compartment is drawn, thus reducing and distributing the cutting effect on the screening wire. At the same time, however, because of the relatively small size of the outlet openings 11, they may be provided in greater number so as to secure a maximum discharge area into the tube, and this without weakening the tube. The total volume of inflowing liquid is therefore large, but is delivered through a large number of inflow points. The disposition of the gathering compartments is also such that a maximum supporting area is provided for the coils of the helix, thus insuring evenness in spacing, this advantage being obtained because I am enabled to utilize by my improved arrangement, gathering compartments of relatively small width.

It will also be noted that in the event of

breakage of the screening wire opposite a gathering compartment, because of the relatively small size of the outlet openings 11, the foreign matter which is carried into the compartments will rapidly clog and stop up the outlet opening, thus minimizing the damaging effect of a breakage on the efficiency of the screen.

I claim:

1. A well screen comprising in combination a supporting frame and a helix of screening wire thereon providing circulating channels, said frame having in its face a plurality of gathering compartments, each communicating with a number of circulating channels and having a discharge outlet of less capacity than the capacity of the channels communicating with the compartment.

2. A well screen comprising in combination a supporting frame and a helix of screening wire thereon providing circulating channels, said frame having in its face a plurality of gathering compartments, each of varying width and depth, and each communicating with a number of circulating channels and having a discharge outlet, the compartments being widest and deepest adjacent said outlets.

3. A well screen comprising in combination a supporting frame and a helix of screening wire thereon providing circulating channels, said frame having in its face a plurality of gathering compartments, each communicating with a number of circulating channels and having a discharge outlet approximately at one end, the compartments increasing in width and depth from the opposite end.

4. A well screen comprising in combination a supporting frame and a helix of screening wire thereon providing circulating channels, said frame having in its face a plurality of gathering compartments, each communicating with a number of circulating channels and each increasing in depth and width from one end toward the other.

5. A well screen comprising in combination a supporting frame and a helix of screening wire thereon providing circulating channels, said frame having in its face a plurality of gathering compartments, each communicating with a number of circulating channels and each increasing in area from one end toward the other.

6. A well screen comprising in combination a supporting frame and a helix of screening wire thereon providing circulating channels, said frame having in its face a plurality of gathering compartments arranged longitudinally of the frame in staggered relation, each communicating with a number of circulating channels and having an outlet, the compartment increasing in width and depth toward said outlet.

7. A well screen comprising in combination a supporting frame and a helix of screening wire thereon providing circulating channels, said frame having in its face a
5 plurality of gathering compartments, each communicating with a number of circulating channels and having a discharge outlet of less capacity than the capacity of the chan-

nels communicating with the compartment and of less capacity than the compartment. 10

In testimony whereof I have hereunto signed my name.

MAHLON E. LAYNE.

Witnesses:

C. S. POWERS,
LLOYD F. LAYNE.