Sept. 21, 1937. W. W. LEE 2,093,764

WELL POINT

Filed March 1, 1937

Fig. 1.

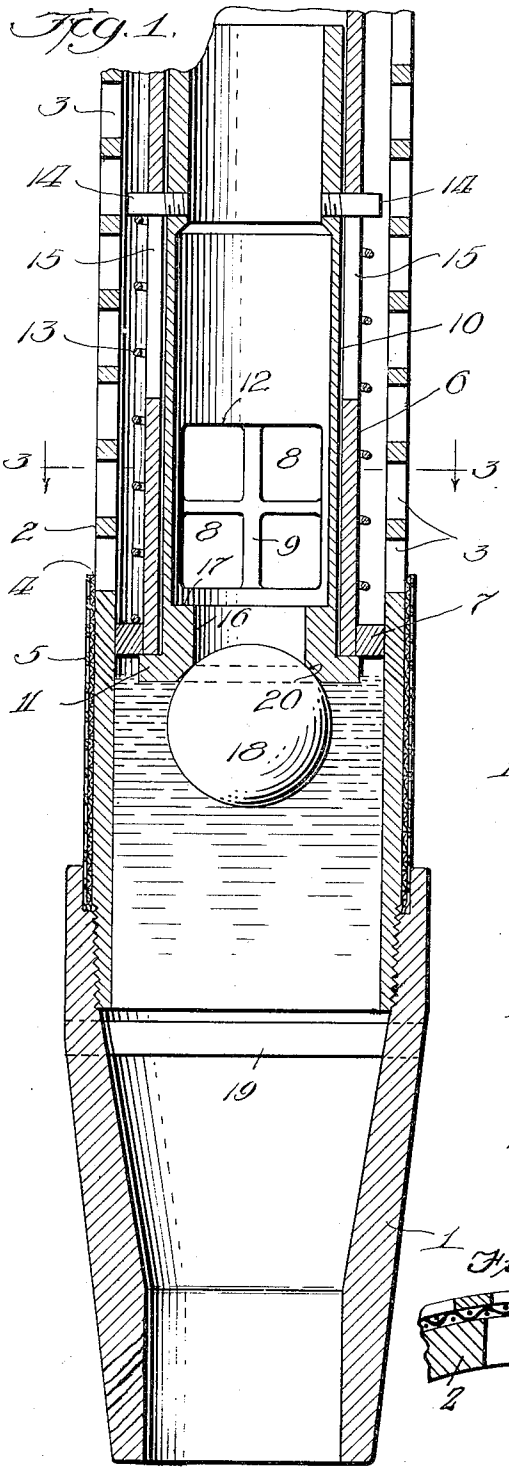


Fig. 2.

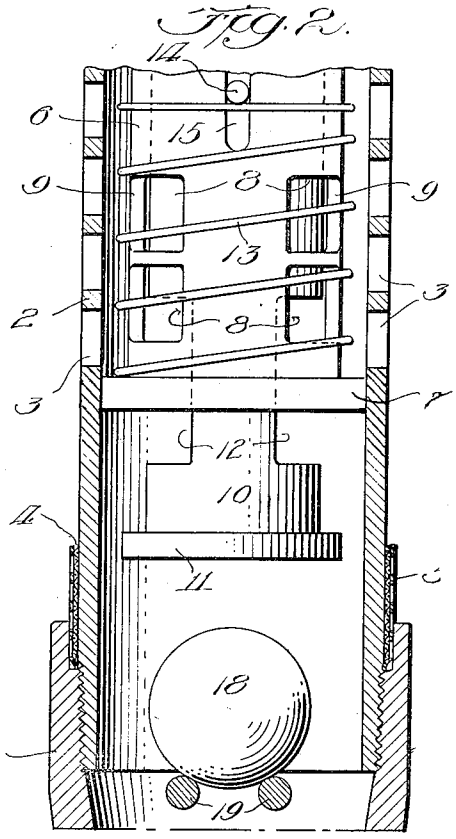


Fig. 3.

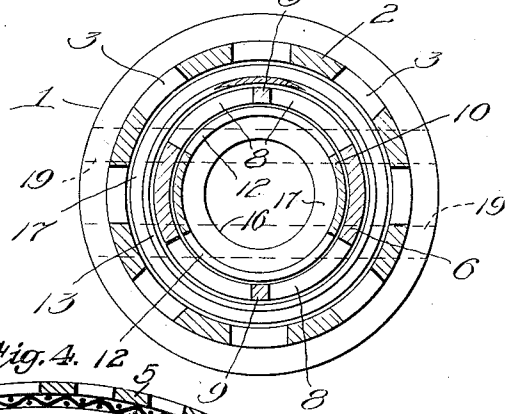
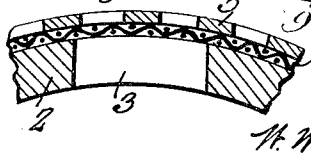


Fig. 4.



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Patented Sept. 21, 1937 2,093,764

UNITED STATES PATENT OFFICE

2,093,764

WELL POINT

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Application March 1, 1937, Serial No. 128,321

4 Claims. (Cl. 166—5)

The present invention relates to well points of the type that may be caused to penetrate soil to any desired depth by clearing away the soil in advance of the same hydraulically, by means of jets discharged from the points; and it has for its object to improve the construction and operation of such devices, with respect to both the driving of the points into the soil and the subsequent drainage of water from the soil through the points.

The various features of novelty whereby my invention is characterized will hereinafter be pointed out with particularity in the claims; but, for a full understanding of my invention and of its objects and advantages, reference may be had to the following detailed description taken in connection with the accompanying drawing, wherein:

Figures 1 and 2 are longitudinal sections through a device embodying the present invention, showing the lower end of a point with the valve means in different working positions; Fig. 3 is a section on line 3—3 of Fig. 1; and Fig. 4 is a transverse section on a still larger scale through the wall of the shell or body member of the well point.

The outer or shell portion of the device, including the soil piercing head and the strainer, may be of any usual or suitable construction. In the arrangement shown, the head 1 is a tubular sleeve contracted somewhat at one end and having a heavy pipe 2 screwed into the other end. The pipe 2 is filled with holes 3. Around the pipe 2 is a wire mesh layer 4 which, in turn, is covered with a perforated shell 5 of thin perforated sheet metal. A tube or conduit 6, smaller in diameter than the interior of the pipe 2 extends downwardly into the latter and terminates at a point removed some distance from the upper end of the head. The tube 6 has an external annular flange 7 at the extreme lower end which centers this end of the tube within the pipe. The tube has at least one opening or window through the side thereof near the extreme lower end. In the arrangement shown, there are two such windows 8 diametrically opposed to each other, each window being divided into four sections by a cross-like unmutilated portion 9 of the wall of the tube. Within the tube and having a sliding fit therein is a long sleeve 10, the lower end of which has an external annular flange 11 which is adapted to engage with the bottom edge of the tube to limit the upward movement of the sleeve. The sleeve has therein two large windows 12 disposed diametrically opposite each other; these windows being of such a size and shape, and being so located, that when the sleeve is in its uppermost position, these windows register with those in the surrounding tube, as shown in full lines in Fig. 1. At this time, water that has entered the space in the strainer around the tube, may be drawn in through the registering windows or openings in the tube or sleeve, when the upper end of the tube is connected to a vacuum pump or other suction creating device in the usual way. The sleeve is normally held raised by a compression spring 13 which surrounds the tube and rests at its lower end on top of the flange 7. The sleeve 10 is provided with a cross bar 14 extending diametrically through the same at a point that lies above the windows in all positions of the sleeve. This cross bar projects laterally from the sleeve 10, through longitudinal slots 15 in the wall of the tube; the projecting ends of the bar resting on top of the spring. The parts are assembled with the spring having an initial compression sufficient to hold the sleeve raised against the action of gravity. The limit of downward movement of the sleeve 10 is determined by the length of the slots 15, the downward movement being arrested whenever the cross bar reaches the lower ends of the slots.

The sleeve 10 has a thick internal annular flange 16 at its lower end which causes a restriction of the bore of the sleeve, thereby forming in the lower end of the sleeve a transverse annular shoulder 17 that faces in the upward direction. When fluid is pumped down into the point under pressure, the pressure of this fluid is exerted in a downward direction against the upper end of the sleeve 10 and also against the annular shoulder 17, forcing the sleeve down into the position shown in full lines in Fig. 2. The windows 12 have now travelled down past the lower edges of the windows or openings 8 in the tube, so that the latter windows or openings are covered up by solid portions of the sleeve 10. Consequently, when fluids are forced down through the tube, they travel downwardly through the head and emerge from the tip of the head in the form of a jet and do not escape laterally through the windows and the perforated walls of the strainer.

When water is to be drained from the soil, it is essential that it enter the point through the strainer and not up through the jetting passage I have therefore provided means for automatically closing the inlet into the lower end of the tube except during times when hydraulic dredging is being carried out. This I accomplish by providing the open lower end of the sleeve 10

with an upwardly seating check valve. The simplest form of valve is a ball 18, such as illustrated; this ball being made from wood or otherwise constructed so that it will float. The ball may lie loosely within the upper part of the head when the point is dry. In the arrangement shown, there are a pair of pins or rods 19 extending across the interior of the head, near the axis of the latter, and the valve, when free to do so, drops down and rests on these pins or rods which also serve to confine the valve so that it will not fall out. When there is no downward pressure in the tube, the ball will rise from the supporting pins or rods, if the water level within the point be high enough, until it comes to rest against the valve seat 20 in the under side of the flange 16 of the sleeve 10. If the valve should not seat itself perfectly, as soon as a partial vacuum is created in the tube 6, the suction of the water tending to flow up past the valve will cause the valve to become firmly seated. Therefore, when water is to be drained from the soil by a suction process, it can only enter the tube after having passed through the strainer, because the valve prevents any direct upflow through the jetting passage in the head. When suction ceases, if there be enough water in the device below the valve to hold it against its seat, the valve will remain closed until subjected to pressure from above. When fluids are forced down through the tube 6, the sleeve 10 is forced down, as shown in Fig. 2, and the valve cooperating with the lower end of the sleeve is forced away from its seat. Even should the valve fail to move down and open the lower end of the sleeve 10, the fluids under pressure could still be discharged through the windows or openings 12, the greater portions of which lie below the lower end of the tube 6 at times when the sleeve is in its lowermost position relatively to the tube.

While I have illustrated and described with particularity only a single preferred form of my invention, I do not desire to be limited to the exact structural details thus illustrated and described; but intend to cover all forms and arrangements which come within the definitions of my invention constituting the appended claims.

I claim:

1. In a device of the character described, a tubular strainer element having at the lower end a soil-piercing head provided with a jetting passage, a tube within and extending lengthwise through the strainer element into the vicinity of the head, said tube being open at and having a large side opening near the lower end, means including a sleeve slidable on said tube to close said opening when fluid is forced downwardly in the tube and to uncover the opening when the tube is employed as a suction device, and a valve cooperating with the open lower end of said sleeve to prevent water from being drawn up into the tube through the end thereof.

2. In a device of the character described, a tubular strainer element having at the lower end a soil-piercing head provided with a jetting passage, a tube within and extending lengthwise through the strainer element into the vicinity of the head, said tube being open at and having a large side opening near the lower end, means including a sleeve slidable on said tube to close said opening when fluid is forced downwardly in the tube and to uncover the opening when the tube is employed as a suction device, said sleeve having a valve seat surrounding the opening into its lower end, and a float valve in the head below the sleeve and adapted to engage with said seat to prevent water from being drawn up into the tube through the end thereof.

3. In a device of the character described, a tubular strainer element having at the lower end a soil-piercing head provided with a jetting passage, a tube within and extending lengthwise through the strainer element into the vicinity of the head, said tube being open at and having a large side opening near the lower end, a sleeve slidable on the tube for closing said opening when the sleeve moves downwardly, a spring surrounding said tube and acting on the sleeve in a manner tending to hold the latter raised, said sleeve having its bore restricted at the lower end, and a float valve in the head below and cooperating with the sleeve alternately to close and uncover the open lower end of the tube.

4. In a device of the character described, a tubular strainer element having at the lower end a soil-piercing head provided with a jetting passage, a tube within and extending lengthwise through the strainer element into the vicinity of the head, said tube being open at and having a large side opening near the lower end, an external flange on the lower end of the tube below said opening, a sleeve slidably mounted in the tube to close said opening when fluid is forced downwardly in the tube and to uncover the opening when the tube is employed as a suction device, a flange on the lower end of the sleeve adapted to engage the end of the tube to arrest the upward movement of the sleeve, a spring surrounding the tube and resting at its lower end against the flange on the tube, said tube having opposed longitudinal slots therein, a cross pin carried by the sleeve and extending through said slots into engagement with the top of said spring, and a valve device for opening and closing the lower end of the sleeve.

WILLIAM W. LEE.