

Nov. 23, 1937.

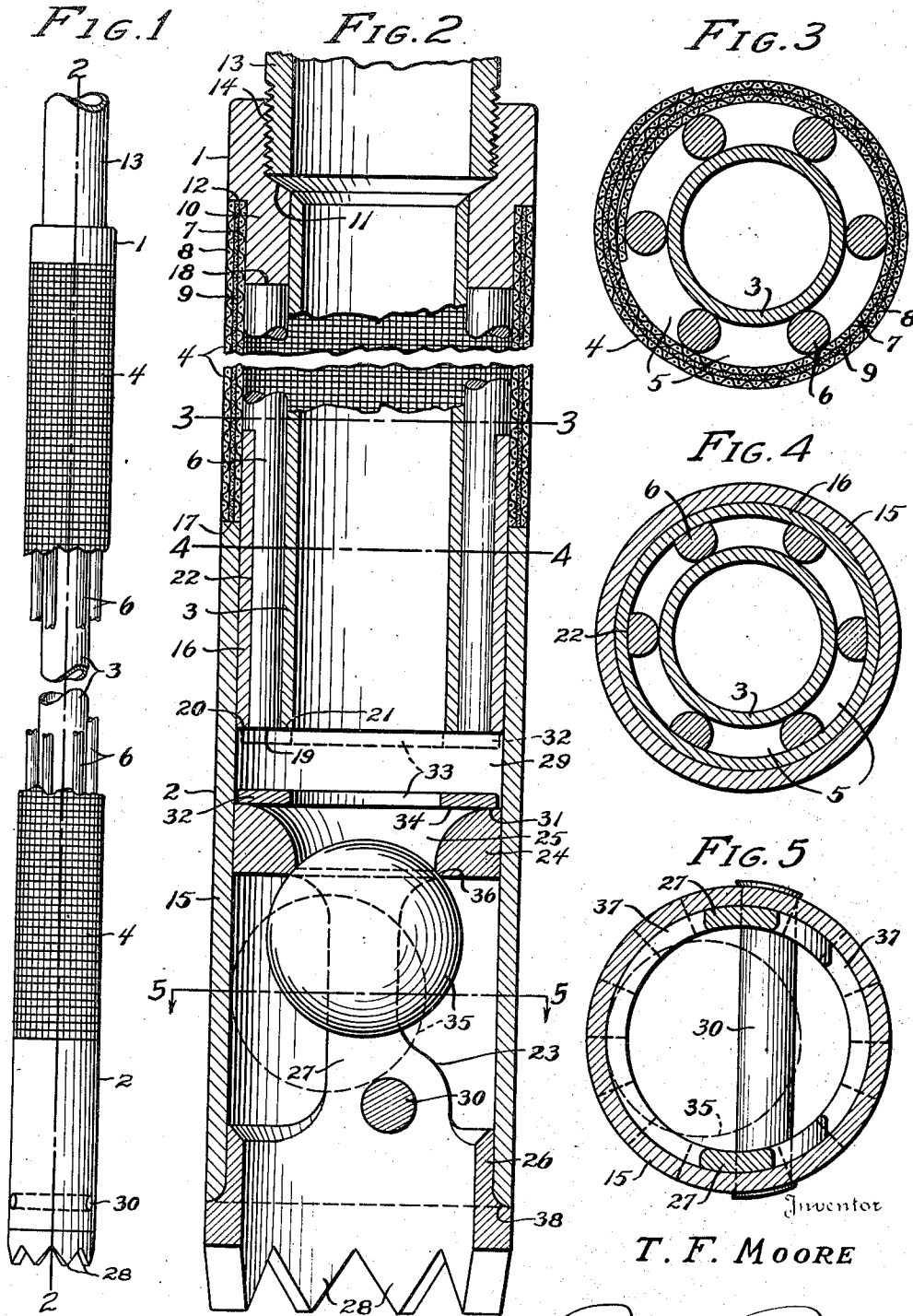
T. F. MOORE

2,100,145

WELL POINT

Filed Aug. 6, 1936

2 Sheets-Sheet 1



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Nov. 23, 1937.

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2 Sheets-Sheet 2

FIG. 6

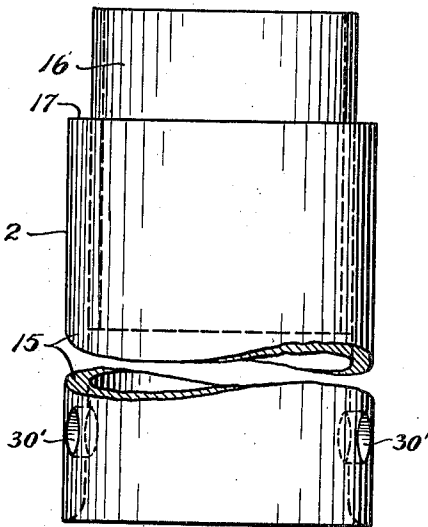


FIG. 8

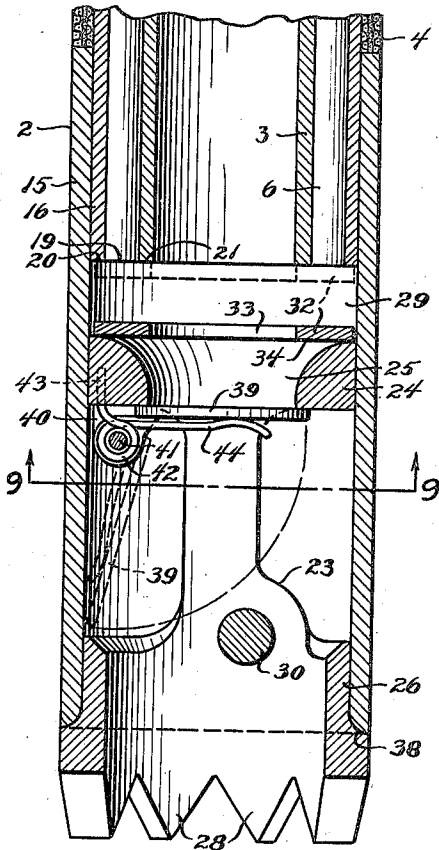


FIG. 7

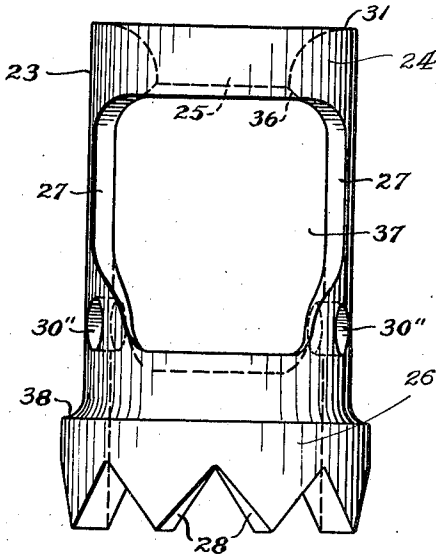


FIG. 9

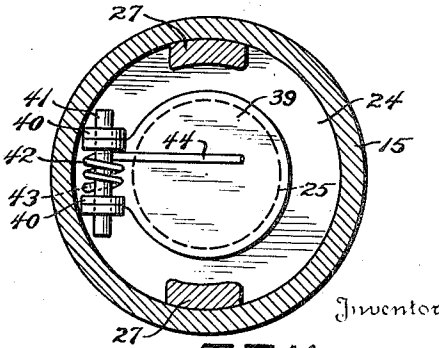
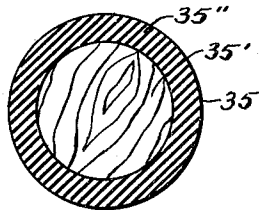


FIG. 10



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UNITED STATES PATENT OFFICE

2,100,145

WELL POINT

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10 Claims. (Cl. 166—5)

This invention appertains to apparatus for facilitating and effecting the withdrawal of fluids from the soil, and more particularly, to what is commonly known as a well point which is primarily adapted to be sunk into the earth in dewatering or dehydrating the soil. The sinking of the well point is preferably accomplished in the usual manner, as by forcing a jetting fluid stream through the well point at relatively high velocity and pressure, which, by its impinging action on the underlying soil, produces an erosion of the soil which allows the well point to gradually sink to the desired depth. When the well point has attained the necessary depth, extending into the stratum from which the water or other fluid, as the case may be, is to be removed, the jetting action is discontinued, and by the application of a suction action on the well point, through means of any suitable suction-producing instrumentality, such as a vacuum pump, the water is withdrawn through the well point to the surface, where it can be disposed of in any appropriate manner.

In order to prevent, as effectively as is practical, grit, sand and other foreign matter from being drawn into the well point, and to avoid the deleterious action of these materials on the pumping apparatus during the suction action, the water is preferably filtered by suitable filtering means as it passes into the well point.

For insuring the effectiveness of the jetting-and-suction actions, valve means are provided in the well point, said valve means being so arranged as to prevent the jetting fluid from escaping outwardly through the filtering means during the jetting operation, while permitting the jetting fluid to pass through the well point so that it is discharged through the tip of the well point with its full force exerted onto the soil below the well point. During the suction action, the valve means serve to close the passage through the tip of the well point, thereby preventing dirty water and foreign materials from being drawn upwardly into the well point, while permitting the water to be drawn in through the filtering means. The valve means are preferably automatically operable, and various types of valves have been employed heretofore with various degrees of success. In most instances, the valves have been previously actuated by springs, particularly in the case of the valve which closes or blocks the passage through the tip of the well point during the suction operation.

One of the primary objects of the present invention is to provide in a well point, an improved valve assembly which completely eliminates the

use of springs and the attending failures resulting from the weakening of the springs and their occasional breakage, while at the same time, being so constructed and arranged as to provide a substantially straight, unobstructed, axial passage through the well point from end to end when the valves assume their operative positions in the jetting operation.

A further object of the invention is to provide a self-closing valve of the float type which is more durable and efficient than those which formerly have been employed.

Another object of the invention is to provide a novel and improved valve frame having a unitary construction, and which is of such form as to permit the use of a well point of smaller diameter than formerly, to obtain the same volume of water discharge during the jetting action, under comparable conditions.

Still another object of the invention is to provide a new and improved well point tip which is of simple, inexpensive, rugged and efficient construction, and constituting a combination valve assembly and soil piercing means.

A still further object of the invention is to provide an improved float valve assembly, said assembly embodying a frame adapted to be inserted into the lower end of the lower head of the well point and constituting a skeleton cage in which is located a ball float valve, the cage being of such construction as to allow the free passage of the jetting fluid past the ball during the jetting operation, and the ball being so supported in the cage during the jetting operation as to prevent vibration thereof and consequent damage to the ball and/or its seat.

Other and further objects and advantages of the invention will be hereinafter described and the novel features thereof defined by the appended claims.

In the drawings:—

Figure 1 is a side elevation, partly broken away, of a well point constructed in accordance with the invention;

Figure 2 is an enlarged longitudinal sectional view through the well point, taken approximately on the line 2—2 of Figure 1;

Figures 3, 4 and 5 are respectively, transverse sectional views on the lines 3—3, 4—4 and 5—5 of Figure 2;

Figure 6 is a detail view in side elevation of the outer shell or lower head of the well point;

Figure 7 is a detail view in side elevation of the combination valve frame and soil-piercing means

constituting an insert unit adapted to be received in the shell of Figure 6;

Figure 8 is a longitudinal sectional view through the lower portion of the well point and showing a slightly modified form of valve assembly;

Figure 9 is a transverse sectional view, taken approximately on the line 9—9 of Figure 8; and

Figure 10 is a view, partly in section and partly in elevation, of a ball float valve which forms a part of the valve assembly illustrated in Figures 2, 5, 6 and 7.

Like reference characters designate corresponding parts in the several figures of the drawings.

As illustrated, my well point is of cylindrical or tubular form of any suitable length, and preferably having a substantially uniform external diameter from end to end to enable it to be more readily sunk endwise into the soil, so that when brought to the required depth, the fluid in the soil may be withdrawn through the well point by some suitable suction device (not shown) connected with the upper end of the well point.

In general, the well point comprises an upper head 1, a lower head or shell 2, these heads being spaced apart axially any desired distance, and an inner coaxial jetting-and-suction pipe or conduit 3 extending between the heads and having its opposite ends respectively projecting into the same. A tubular filtering screen, designated 4, surrounds the pipe 3 in radially spaced concentric relation thereto to form an intervening filtrate chamber 5 for receiving the water or other fluid as the same passes through the filtering screen 4 and into the well point in withdrawing the fluid from the soil. Spacing rods or bars 6 maintain the filtering screen 4 in radially spaced relation to the conduit 3, there preferably being a plurality of these rods arranged in uniformly spaced relation around the conduit 3, and fixed thereto, as by welding. The rods also serve to reinforce the screen and prevent the same from being crushed inwardly, while affording unobstructed passages between the rods through which the fluid may pass downwardly about the outer surface of the conduit 3, on its way to enter the lower end of the latter.

The filtering screen 4 is preferably of such construction as that disclosed in my copending application, Ser. No. 26,994, filed June 17, 1935, although other forms of filtering instrumentalities may be substituted in lieu thereof if desired. As disclosed in my application just referred to, the filtering screen is preferably tubular in form and composed of several laminae arranged one upon the other. The inner layer 7 and the outer layer 8 are preferably made continuous and of comparatively heavy wires interwoven to form a relatively coarse mesh, the screen being wound about the rods 6 so as to extend slightly more than two complete turns thereabout so that its ends may overlap, as best seen in Figure 3. The other layer, 9, is approximately one-half of the length of the continuous layers 7 and 8, and is interposed between the layers 7 and 8 and extends slightly more than a single turn about the rods 6, as also seen in Figure 3. This layer 9 is preferably composed of wires of comparatively small gauge interwoven to form a relatively fine mesh. The arrangement of the turns of the filter screen and the manner in which they are secured in position is more fully disclosed in my prior application, to which reference may be had for a more complete understanding thereof. Inasmuch as I make no claim herein to the details of the filtering screen, further description thereof is unnecessary. It will be clear, however, that the coarser mesh layers 7 and 8

cover respectively, the outer and inner surfaces of the finer mesh layer 9, to protect the latter against injury by contact with the rods 6 and with the soil, and at the same time, the screens, particularly the fine mesh layer, filter the fluid as it passes from the adjacent soil into the well point, to the exclusion of the solids. Such an arrangement also prevents the fine layer from becoming clogged as readily during sinking of the well point as would be the case were this screen directly exposed to the soil, inasmuch as the outer coarse mesh layer displaces the contiguous soil as the well point descends. Moreover, the inner coarse layer 7 provides a foraminous support for the intermediate layer 9 and prevents the openings in the latter from being blocked by the rods 6, as would be the case were the layer 9 wound directly about the rods.

The construction of the upper head 1 and the lower head or shell 2 preferably conforms to that disclosed in my copending application, Serial No. 78,460, filed May 5, 1936, to which reference may be made for a full explanation of the details thereof. Briefly, the upper head 1 is provided with a reduced annular flange 10, depending from the lower end thereof, and providing inner and outer annular shoulders 11 and 12 respectively, the filter screen unit 4 abutting against the latter shoulder so as to form a smooth joint at this point, whereby the well point may be sunk into the ground and withdrawn without offering any material resistance to axial movement of the well point, as would otherwise be the case where the joints form projections on the outer surface of the well point. The upper end of the head 1 is adapted to be connected with an extension pipe 13, as by the threaded connection 14, and the shoulder 11 forms a seat limiting the extent of entrance of the pipe 13 into the head. This pipe 13 may be of any desired length and is adapted to be connected at its upper end to a fluid pressure pump (not shown) or other source of fluid supply from which the jetting fluid may be conveniently obtained. Also, it is adapted to be connected to the suction device previously referred to, for withdrawing the fluid from the soil.

The lower head or shell 2, according to the construction disclosed in my prior application Ser. No. 78,460 above referred to, comprises a tubular shell or pipe 15, instead of the usual heavy casting heretofore most commonly employed, and this pipe 15 is of uniform internal and external diameter throughout its length. The upper portion of the pipe 15 is adapted to fit snugly about the lower end of a short pipe section 16, and is preferably secured to the latter, as by welding. The upper end face 17 of the pipe 15 provides a shoulder similar to the shoulder 12 on the upper head 1, and the lower edge of the filter screen unit 4 abuts the shoulder 17 and likewise forms a smooth joint at this point. The pipe section 16 extends upwardly slightly beyond the upper extremity of the shell 15, and fits snugly within the tubular filter unit 4, as best seen in Figure 2. Such an arrangement greatly reduces the cost of the well point, and considerably simplifies its manufacture and fabrication.

The spacing rods 6 are preferably cylindrical and are arranged in uniformly circumferentially spaced relation around the outer periphery of the conduit 3, and are welded thereto, if desired, to hold them in position with their upper ends abutting against the lower face 18 of the annular

flange 10 of the upper head 1, and their lower ends 19 on a level with the lower edge 20 of the short pipe section 16, this latter edge being at the same level as the lower edge 21 of the inner conduit 3. In other words, the lower ends of the pipe 16, the rods 6 and the inner conduit 3, all terminate in the same plane transversely through the lower head 2, which is an important feature of my last mentioned copending application, and as will hereinafter become more apparent as this description proceeds.

The lower ends of the rods 6 are machined down, as at 22, to provide recesses, as best seen in Figures 2 and 4, for receiving therein the pipe 16. The depth of the recesses 22 is preferably substantially equal to the thickness of the pipe 16, so that the outer surface of the latter will be flush with the outermost surfaces of the rods 6, when the parts of the well point are assembled, as can be best seen in Figure 2. The pipe 16 is preferably secured to the rods 6, as by welding, thereby uniting the lower head 2 with the parts of the well point located above the same, and affording a more or less unitary and rigid structure.

Passing now to my improved valve assembly, which forms the principal feature of my present invention, I have provided a valve frame insert, generally designated 23, which may be formed as a simple casting, or otherwise, and which is adapted to be received in the lower extremity or tip of the pipe 15 which constitutes the lower head or shell 2. This valve frame is preferably machined so as to fit snugly in the lower end of the pipe 15, and as illustrated, the frame includes an upper ring-shaped valve seat 24, having an upwardly flaring opening 25 extending axially therethrough, and a lower tubular pilot member 26, axially spaced below the seat 24, and integrally united therewith by means of the web-like connecting arms 27, there being one arm at each side, as best seen in Figures 5 and 7. The pilot 26 has its lower extremity serrated or toothed, as at 28, and constitutes soil piercing means. The frame 23 is secured in the lower head 2 so that the upper extremity of the frame is spaced below the lower extremities 20, 19 and 21 of the pipe 16, rod 6 and conduit 3, respectively, thereby providing an intervening chamber 29, with which the filtrate chamber 5 and the conduit 3 are respectively adapted to communicate, as will hereinafter more fully appear. For securing the frame 23 in the position just described, I employ a transversely extending pin or rivet 30, which is adapted to extend through suitable openings 30' and 30'' respectively formed in the shell 15 and the valve frame 23. It is important to note that this member 30 does not extend exactly diametrically through the head 2, but on the contrary, is offset slightly to one side of the diameter, for a reason which will later become more apparent. By virtue of the fact that the ring-like valve seat 24 and the pilot member 26 are connected together by the relatively narrow arms 27, there are provided at each side of the frame comparatively large cut-outs, and the frame may be said to be in the nature of a skeleton frame.

Mounted in the chamber 29, and interposed between the upper face 31 of the seat 24 and the lower extremities of the pipe 16, rods 6 and conduit 3, which latter members constitute a valve seat, is a ring-like valve 32. The valve 32 is preferably made of metal or some other hard and inelastic material which is capable of resisting wear during operation thereof. An opening 33

extends through the ring valve and is of a size approximately equal to the internal diameter of the conduit 3, but less than the diameter of the upper end of the opening 25 in the valve seat 24. The valve 32 thus overhangs the opening 25 in the seat 24, as best seen in Figure 2, so that during the jetting operation, the back pressure of the jetting fluid acts upon the lower face of the overhanging portion 34 of the ring, and causes the valve 32 to be forced upwardly to the dotted line position shown in Figure 2, against the seat formed by the lower faces 20, 19 and 21 of the pipe 16, rods 6 and conduit 3, consequently closing the lower end of the filtrate chamber 5 and preventing the jetting fluid from passing upwardly through the filtrate chamber and out through the filter unit 4. When the filtrate chamber is closed by the ring valve 32, as just described, the jetting fluid must pass through the opening 33 in the valve, and thence downwardly through the opening 25 in the valve seat 24, and thence downwardly through the frame unit and out at the bottom of the well point. When the jetting operation is discontinued, the ring valve 32 will fall of its own weight to the bottom of the chamber 29, until it comes to rest on the upper face 31 of the seat 24, where it remains during the suction action. In other words, the valve 32 assumes its uppermost position, closing the filtrate chamber, only during the jetting action. If the filtrate chamber were not closed during the jetting operation, the jetting fluid, or at least a portion thereof, would escape from the well point, out through the filter screen 4, and a considerable portion of the force of the jetting fluid would be lost insofar as the erosive action of the jetting fluid on the underlying soil is concerned. However, by reason of the automatic operation of the valve 32 to close off the lower end of the filtrate chamber responsive to the action of the jetting fluid on the valve during the jetting operation, the full force of the jetting fluid is obtained at the lower end of the well point where it is most desired to erode the soil for the purpose of sinking the well point.

Mounted within the cage of the frame unit 23, that is, between the rivet 30 and the seat 24, is a ball float valve 35 which acts as a check valve, as will hereinafter become more apparent. This valve 35 is preferably composed of a wood center 35' or some equivalent material having a specific gravity which will cause the valve to float in the fluid which is to be withdrawn from the soil, and the center or core is covered with an outer covering of rubber 35'', or some other equivalent resilient material. I have found that by covering the wood core 35' with the rubber covering 35'', the valve 35 is considerably more durable than a plain uncovered wood ball which is subject to fracture and chipping off, by reason of the repeated impacts of the ball against its seat. Should a plain wood ball be used, and become worn or chipped, it would soon lose its effectiveness because of its inability to fit closely against the seat, thereby allowing fluid to leak past the valve during the suction operation. According to my present construction of the ball valve 35, leakage of the valve is practically eliminated. When the valve 35 is buoyed up by the fluid standing in the lower end of the well point after the well point has been sunk into the soil, it assumes the full line position shown in Figure 2, and during the suction action, the valve is further urged firmly against its seat 36 formed by the lower edge of the opening 25 in the seat member 24, 75

thereby positively preventing the dirty fluid and any foreign material, such as sand, grit, stones, and the like, from being sucked up into the well point.

5 During the jetting operation, the downward pressure of the jetting fluid on the ball valve 35 forces the valve 35 downwardly away from its seat 36 and to the dotted line position shown in Figure 2, thereby opening the passage 25 so that
10 the jetting fluid can pass downwardly through the tip of the well point and discharge at the extreme lower end. The downward movement of the valve 35 is limited by the rivet 30, and it will be observed that when the valve is in its open position, it lies towards one side of the longitudinal axis of the well point, leaving ample clearance for the jetting fluid to pass by the valve without offering any substantial obstruction to the flow. Since the rivet 30 is offset to one side
15 of the diameter of the well point, as best seen in Figures 2 and 5, the ball valve 35 tends to rest in the largest space between the rivet 30 and the side of the well point head, where it remains until the jetting operation is discontinued. Moreover, the skeleton construction of the cage, afforded by the openings 37 in the side walls of the frame unit 23 at opposite sides of the axis of the rivet 30, allows the ball 35 to assume a greater laterally displaced position than would be the case if the walls of the frame unit 23 were continuous all the way around the circumference. The opening at the other side of the unit increases the clearance between the ball and the side of the well point, and further adds to the clearance around
20 the ball for the free passage of the jetting fluid downwardly past the ball.

Now the offsetting of the pin or rivet 30 from the diameter of the well point has the further advantage of eliminating vibration or oscillation of the ball valve 35 during the jetting operation. I have found that if the pin 30 were arranged diametrically through the head, the pressure of the jetting fluid on the ball tends to start the ball vibrating or bouncing up and down, or oscillating
25 from one side of the pin to the other, with the result that the ball will soon become damaged to such an extent as to prevent its closing completely during the suction operation. As a matter of fact, the vibrations or oscillations, if permitted, may even split the rubber covering 35', and then split the wood center 35'', which, of course, would render the valve 35 completely inoperative. The offsetting of the pin or rivet 30 overcomes these difficulties entirely, and at the same time, allows
30 the ball to lodge in the larger space at one side of the rivet until the jetting action is completed.

It will be observed that the lower end of the unit 23 is provided with a shoulder 33 which fits up against the lower extremity of the pipe 15, which constitutes the lower shell or head 2, and provides a smooth joint at this point. By rotating or oscillating the well point about its longitudinal axis during the jetting operation, the serrations or teeth 28 will effectively loosen the soil and facilitate the erosion of the soil as the well point pierces the same in sinking the well point. So long as the jetting operation is continued, the ball valve 35 remains in its dotted line position shown in Figure 2, which position it automatically assumes under the influence of the jetting fluid. Upon completion of the jetting operation, suction can be applied to the well point for withdrawing the water from the soil, which is allowed to enter through the filter screens 4
35 and pass downwardly through the filtrate cham-

ber 5 into the chamber 29 and thence upwardly through the inner conduit 3.

In Figures 8 and 9, there is shown a slightly modified form of valve assembly in which a spring actuated self-closing flap valve 39 is substituted
40 for the ball valve 35 shown in the previously described form. The valve frame 23 is practically identical with that shown in Figures 2 and 7, with the exception that the seat member 24 is provided on its underside with downwardly extending
45 lugs or ears 40 which serve to receive the hinge pin or pintle 41, upon which the flap valve 39 is mounted. The spring 42 encircles the pin 41 and has one end 43 anchored to the seat 24, and the other end 44 bearing against the underside of the valve 39. The spring is tensioned so as to normally urge the valve 39 closed to its full line position shown in Figures 8 and 9. When the jetting operation is commenced, the downward pressure of the jetting fluid on the upper side of
50 the valve 39 forces the valve to its dotted line position shown in Figure 8, thereby permitting free and unobstructed passage of the jetting fluid past the valve and out at the lower end of the well point. The other parts of the modified assembly being the same as previously described, as indicated by similar reference characters, further description thereof is unnecessary.

The operation of the well point should be obvious from the foregoing description, and may be briefly summarized as follows: The well point is usually placed in an upright position with its lower end resting upon the ground at the point where it is to be sunk, and its upper end is connected to a pressure pump or other source of supply of the jetting fluid, such as water. The jetting fluid is forced downwardly through the well point, passing through the conduit 3 and into the chamber 29, thence through the opening 33 in the ring valve 32, thence through the opening 25
40 in the seat member 24, thereby forcing the ball valve 35 or the flap valve 39, as the case may be, open to allow the fluid to continue its substantially unobstructed flow downwardly to the extreme lower end of the well point. As the jetting fluid
45 impinges against the underlying soil, a back pressure is created, acting upon the underside of the overhanging portion 34 of the ring valve 32, causing the ring valve to be lifted to its dotted line position shown in Figures 2 and 8, thus closing
50 off the filtrate chamber 5 and preventing the escape of the jetting fluid laterally outwardly through the filter screens 4, and causing the full force of the jetting fluid to be directed against the underlying soil for displacing the same to cause
55 the well point to sink. During this jetting operation, the sinking of the well point may be aided by a rotary or oscillating motion of the well point about its vertical axis.

The sinking operation is preferably continued
60 until the entire length or major portion of the tubular screen 4 is brought to the level at which the fluid in the soil is to be drained. So long as the jetting operation continues, the ball valve 35 or the flap valve 39 will remain in an open position, and the ring valve 32 will remain in its position closing or blocking the filtrate chamber. When the well point has been sunk to the required depth, the jetting fluid is shut off, thus permitting the ball valve 35 to close against its seat by flotation, or the flap valve to close against its seat by the action of the spring 42, and the ring valve 32 will drop to the bottom of the chamber 29 by its own weight, thus opening the filtrate chamber. Then by the application of suction to the well
65 70 75

point through any suitable suction device, the fluid in the soil is caused to be drawn into the well point through the filter screens 4, and the fluid passes downwardly through the filtrate chamber into the chamber 29 and thence upwardly through the inner conduit 3. The suction action aids in holding the ball valve 35 or the flap valve 39 closed so long as this suction operation continues, and by reason of the fact that these valves remain closed throughout the suction period, the entire suction force may be directed to the withdrawal of the fluid from the soil, leaving the lower part of the well point below these valves free from the influence of the suction action, and eliminating the tendency for dirty fluid and foreign substances to be drawn upwardly into the well point through the lower end. The operations of the valves are entirely automatic and the parts of the well point require little if any care or attention, thus materially contributing to the economic and expeditious sinking of the well point into the soil and removal of fluid from the soil.

In case the area of the soil to be drained is relatively large, a number of well points may be similarly sunk in or around said area and connected to a common source of supply of jetting fluid so that all of them may be sunk simultaneously or in quick succession. Similarly, the well points may be connected to the same suction device for removing the fluid from the soil in one operation.

While the specific details have been herein shown and described, the invention is not confined thereto, as changes and alterations may be made without departing from the spirit thereof as defined by the appended claims.

Having thus described my invention, what I claim is new and desire to secure by Letters Patent is—

1. In a well point, a jetting and suction conduit, a foraminous filter surrounding said conduit in radially spaced relation thereto and forming an intervening filtrate chamber normally communicating with the lower end of said conduit, valve means actuatable by the influx of jetting fluid whereby to prevent the jetting fluid from entering the filtrate chamber and escaping outwardly through the foraminous filter, a tubular shell surrounding the lower extremity of the jetting and suction conduit and extended downwardly beyond the lower end thereof whereby to constitute a lower head for the well point, a valve seat disposed in said lower head and spaced below the lower extremity of the jetting and suction conduit, a float valve coacting with said valve seat and being free to move axially and laterally within the head aforesaid, responsive to the influx of jetting fluid, and means for limiting the axial movement of said float valve and also for displacing said float valve laterally towards one side of the head pursuant to the passage of jetting fluid through the well point, whereby to provide a substantially unobstructed space for the passage of the jetting fluid past the float valve and through the head.

2. In a well point, a jetting and suction conduit, a foraminous filter surrounding said conduit in radially spaced relation thereto and forming an intervening filtrate chamber normally communicating with the lower end of said conduit, valve means actuatable by the influx of jetting fluid whereby to prevent the jetting fluid from entering the filtrate chamber and escaping outwardly through the foraminous filter, a tubular shell surrounding the lower extremity of the

jetting and suction conduit and extended downwardly beyond the lower end thereof whereby to constitute a lower head for the well point, a valve seat disposed in said lower head and spaced below the lower extremity of the jetting and suction conduit, a float valve coacting with said valve seat and being free to move axially and laterally within the head aforesaid, responsive to the influx of jetting fluid, and means for limiting the axial movement of said float valve and also for displacing said float valve laterally towards one side of the head pursuant to the passage of jetting fluid through the well point, whereby to provide a substantially unobstructed space for the passage of the jetting fluid past the float valve and through the head, said last named means comprising a member extending transversely across the space within the head and below the float valve, and said member being offset to one side of the axis of the head.

3. In a well point, a jetting and suction conduit, a tubular head surrounding the lower extremity of said jetting and suction conduit and extended below the same, a valve seat disposed within the head in axially spaced relation to the lower end of the conduit, a float valve disposed below said seat within said head and free to move axially and laterally within said head, and means for limiting the axial movement of said float valve and for displacing said float valve laterally towards one side of said head responsive to the passage of a jetting fluid through the conduit and head, said means comprising a member disposed transversely within said head and engageable by the float valve, and said member being offset to one side of the axis of the head.

4. A valve assembly unit for well points, comprising a tubular frame having an axial passage therethrough and having openings in opposite sides thereof which extend substantially about the frame so as to provide relatively narrow web-like arms, one at each side of the frame, which serve to unite the upper and lower portions of the frame, the upper portion of the frame constituting a valve seat, a float valve mounted in said frame below said valve seat, said float valve being freely movable in all directions in said frame, and a pin extending transversely through the lower portion of said frame below said float valve and serving to limit the downward movement of said float valve.

5. A valve assembly unit for well points, comprising a tubular frame having an axial passage therethrough and having openings in opposite sides thereof which extend substantially about the frame, the upper portion of the frame constituting a valve seat, a ball float valve mounted in said frame below said seat, said ball float valve being freely movable axially and laterally in said frame, and a pin extending transversely through the lower portion of said frame below said ball float valve and serving to support said float valve in spaced relation to its seat, and when so supported, to displace said float valve laterally towards one side of the frame with a portion of said ball float valve received by one of the openings in the side of the frame.

6. In a well point, a jetting and suction conduit, a tubular head surrounding the lower extremity of said jetting and suction conduit and extended below the same, a valve seat disposed within the head in axially spaced relation to the lower end of the conduit, a float valve disposed below said seat within said head and free to move axially and laterally within said head, and means offset

to one side of the axis of the head for limiting the axial movement of said float valve and for displacing said float valve laterally towards one side of said head responsive to the passage of jetting fluid through the conduit and head.

7. A combination valve frame and soil-piercing means for well points, comprising a tubular member having an axial passage therethrough and adapted to be inserted in and secured to the lower end of the well point, the lower edge of said tubular member being serrated and the wall of said tubular member being provided with openings therein extending substantially about the same, leaving relatively narrow web-like arms uniting the upper and lower portions of the member, the upper portion of said tubular member constituting a valve seat, and the intermediate portion a valve cage.

8. A well point tip comprising an outer tubular shell, a valve assembly unit mounted in the lower end of said shell and including a tubular frame having an axial passage therethrough, a ring valve normally adapted to rest on the upper end of said frame in overhanging relation to the axial passage through the frame, and being freely shiftable axially in the tubular shell towards and away from said frame, a float valve mounted in said frame and adapted to freely move therein towards and away from a position closing the axial passage through the frame, and a pin below the float valve and extending transversely through the frame and the tubular shell, said pin being offset to one side of the axis of the axial passage through the frame, and constituting means for fastening the frame to the shell and

for supporting the float valve when the latter is in an open position as respects the passage through the frame.

9. In a well point, the combination with a tubular shell, of a tubular soil-penetrating member partially inserted in the lower end of the shell and provided with a lengthwise passage therethrough and a valve seat surrounding the passage, a float valve loosely mounted in said member below said seat, and means for holding said member and shell in fixed relation, said last named means comprising a pin extending transversely through said shell and member in offset relation to the diameter of said passage, and constituting means for limiting movement of said valve, and for displacing said valve laterally so as to leave the passage substantially unobstructed.

10. A valve assembly unit for well points, comprising a tubular frame having an axial passage therethrough, the upper portion of said frame constituting a valve seat, a float valve mounted in said frame below said valve seat, said float valve comprising a ball having a wood center and an outer resilient covering, and said ball being freely movable in said frame, and a pin extending transversely through the lower portion of said frame below said ball float valve, said pin being offset to one side of the center of said axial passage, and serving to limit the downward movement of said float valve and to displace said float valve laterally to one side of said axial passage whereby to leave an unobstructed passage of substantial size at the other side of the center of said passage.

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