

Feb. 25, 1936.

A. C. SAXE

2,031,983

WELL POINT

Filed Nov. 1, 1934

2 Sheets-Sheet 1

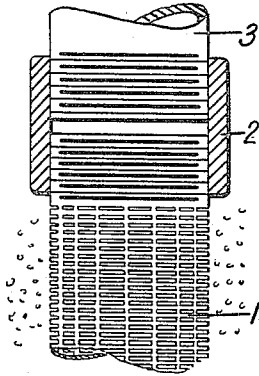
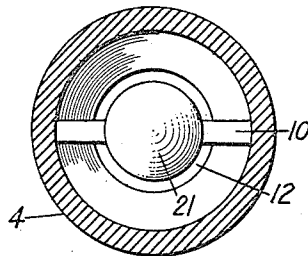


Fig. 2

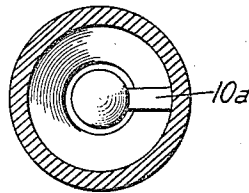


Fig. 5

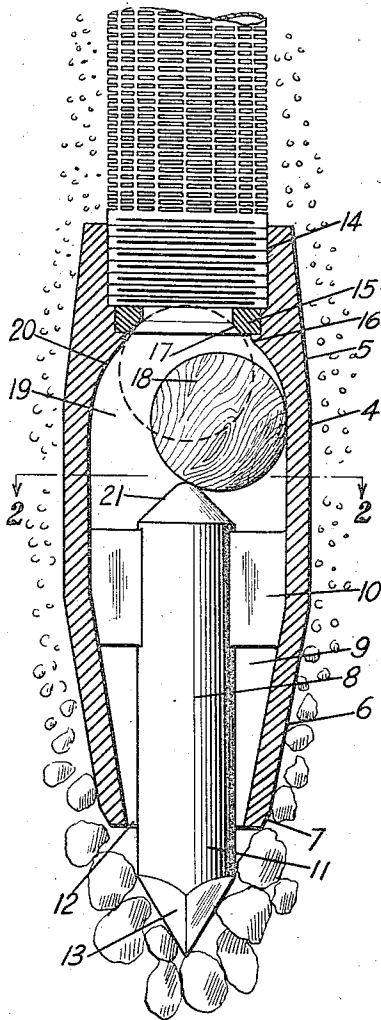


Fig. 1

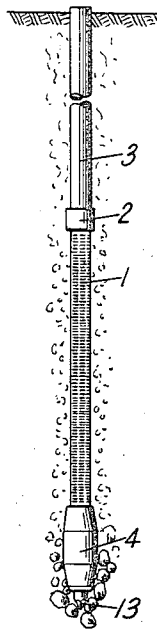


Fig. 3

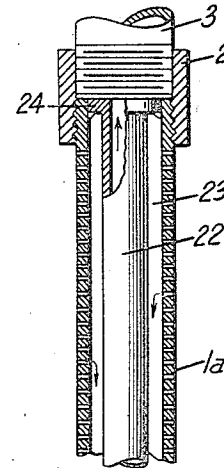
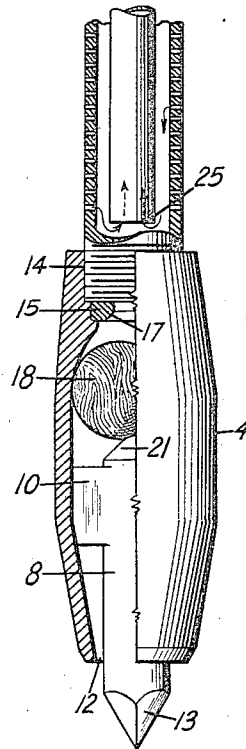


Fig. 4



INVENTOR.
Arthur C. Saxe.

BY
Robert Mahoney
ATTORNEYS.

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2 Sheets-Sheet 2

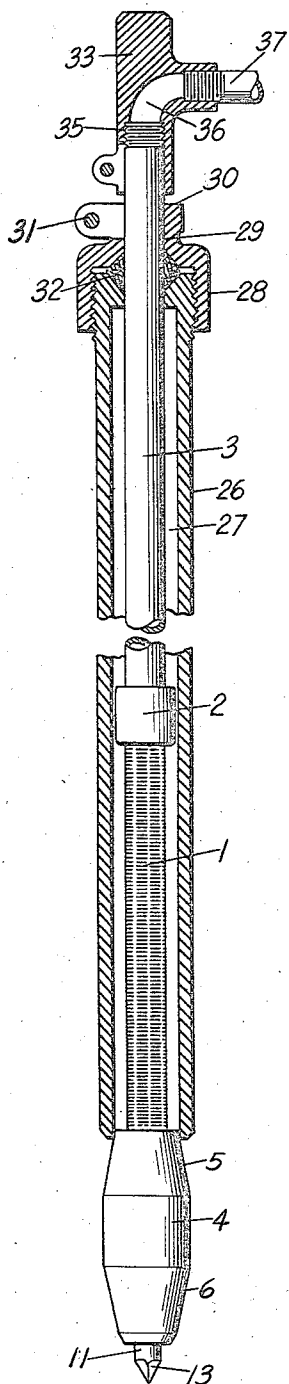


Fig. 6

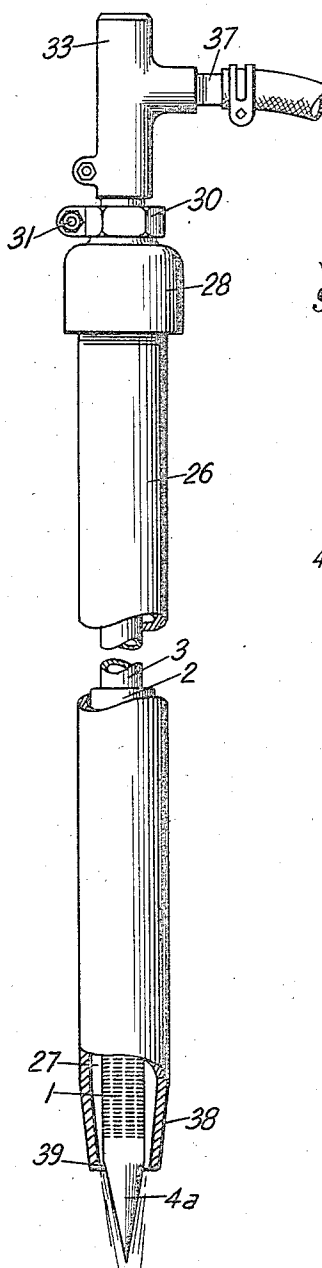


Fig. 7

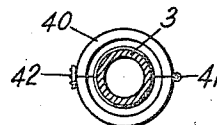


Fig. 9

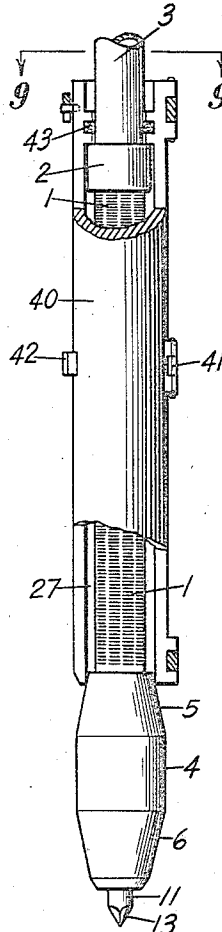


Fig. 8

INVENTOR.
Arthur C. Saxe.

BY
Robert Mahoney
ATTORNEYS.

UNITED STATES PATENT OFFICE

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WELL POINT

Arthur C. Saxe, Columbus, Ohio, assignor to The
Jaeger Machine Company, Columbus, Ohio, a
corporation of Ohio

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8 Claims. (Cl. 166—5)

My invention relates to well points. It has to do, more particularly, with devices which are particularly adaptable to the drainage of water from the earth preparatory to excavating or other operations. However, such devices are capable of use for other purposes.

In the past, there have been several different types of well points devised, but all of them have been possessed of certain undesirable features. One type of such devices can only be driven through the earth and can not be used for jetting a hole to receive itself. Other prior art devices are of such a structure as to be capable of use for jetting holes to receive themselves, but it is impossible, due to the structure of such points, to drive them through material where jetting is ineffective. For example, such devices may be used for jetting holes to receive them when the soil which they enter is sandy soil or the like. However, if gravel or the like is encountered, the jetting operation is ineffective to make a hole ahead of the well point to receive it. This is because the jetting water which is forced into the well point will merely spread through the interstices between the gravel and will be ineffective. In hard packed gravel formations and similar formations, jetting alone is ineffective and it is desirable to drive and jet simultaneously, if possible.

In the past, when installing well points and when a material is encountered wherein jetting alone will be ineffective, it has been impossible to drive the well point through such material, as previously stated. In such an instance, it is customary to remove the well point and then insert in the hole a casing of fairly large diameter with a jet pipe of smaller diameter disposed there-within. The casing is driven through the strata, where jetting alone is ineffective, with an air hammer, and the jetting operation is also carried out through the medium of the jet pipe within the casing. The casing must be driven down until it passes through the strata where jetting alone is ineffective. Then it is necessary to remove the jet pipe from within the casing, position the well point within the casing, and then pull up the casing, leaving the well point in position.

This method of installing well points is not very satisfactory. If the jet pipe is almost as large in diameter as the casing, there is a constant tendency for gravel or other particles to clog between the two pipes due to the fact that a stream of water from the jetting operation will always flow up through the space between the jet pipe and the casing and will carry particles of gravel or the

like up towards the surface. If a sufficiently large casing is used to prevent clogging, it must be so large that it will be difficult to drive it down through the earth and also difficult to pull after the well point has been properly positioned.

Another disadvantage of prior art well points resides in the fact that they are usually of a complicated structure and are, therefore, expensive to manufacture. Also, they have not been of a sturdy structure.

One of the objects of my invention is to provide a well point which is of such a structure that it may be very effectively used as a jetting head where jetting is practical or as a driving head where jetting is impractical or for both operations simultaneously.

Another object of my invention is to provide a well point which is of a very sturdy structure and which is very simple in design so that it can be manufactured and sold at a low cost.

Another object of my invention is to provide a well point which has a jetting and driving head of such a structure that it will be very difficult or impossible for it to become clogged.

The preferred embodiment of my invention is illustrated in the accompanying drawings wherein similar characters of reference designate corresponding parts and wherein:

Figure 1 is a view, partly in vertical section and partly in side elevation, showing a well point made in accordance with my invention.

Figure 2 is a section taken substantially on line 2—2 of Figure 1 through the driving and jetting head of the well point.

Figure 3 is a side elevation showing the well point inserted in the earth and illustrating how it operates after it has been properly positioned.

Figure 4 is a view, partly in vertical section and partly in side elevation, showing a slight modification of my well point.

Figure 5 illustrates a slightly modified structure for holding the driving point member of the driving and jetting head in position.

Figure 6 is a view, partly in side elevation and partly in vertical section, illustrating a method for installing my well point.

Figure 7 is a view illustrating a method which I have devised for installing a different type of well point.

Figure 8 is a perspective view, partly broken away, of a device which may be used in installing my novel well point.

Figure 9 is a view taken substantially along 9—9 of Figure 8.

With reference to the drawings and particularly

to Figure 1, my device is shown as comprising a screen pipe 1 which is of such a structure that it can withstand the forces developed when the well point is driven through gravel or other strata, as will be explained more in detail hereinafter. The upper end of the screen pipe 1 is threaded and is connected by a coupling 2 to the threaded lower end of a pipe section 3. The pipe 3 is adapted to be used in conducting water under pressure to the well point for jetting purposes and when the well point is properly positioned, to serve as a suction conduit for extracting the water from the earth.

On the lower end of the screen pipe 1 a jetting and driving head 4 is mounted. This head 4 is preferably made from a single casting of steel which is subsequently hardened. It is preferably of the shape shown embodying a central portion of substantially cylindrical form, having a slightly tapering upper end 5 and a lower end 6 which tapers inwardly to a greater extent. The extreme lower edge of the head 5 is bevelled as indicated at 7 at a predetermined angle, for a purpose to be described subsequently.

Disposed centrally within the head 4 and in the lower portion thereof is a driving point 8. This driving point 8 is of substantially cylindrical form and is of a comparatively large diameter. However, an annular space 9 is provided between the driving point 8 and the wall of the head 4. The driving point 8 is held rigidly in position by a pair of lugs 10 which are formed integrally with the driving point and the wall of the head. The lower end of the driving point 8 projects out of the lower end of the head 4 a considerable distance as indicated at 11. Because of the tapering lower end 6 of the head and because of the fact that the driving point 8 projects from the lower end of the head, an annular space 12 of narrow width is formed at the lower end of the head.

On the extreme lower end of the driving point 8, a sharp point 13 is formed. As illustrated, the surface of this point tapers upwardly and outwardly in all directions. The angle of taper of the surface of the point 13 is the same as the angle of bevel of the lower edge 7 of the head. Furthermore, the driving head 8 extends from the lower end of the head to such a degree that the surface of the bevelled edge 7 and the surface of the point 13 lie exactly in alignment or in the same plane. This is important, because if made in this manner, the gravel or large particles of earth will be deflected upwardly and outwardly away from the head as it is being forced into the earth. As shown in Figure 1 the large particles will be deflected outwardly by the surface of the point 13 and as the head continues to move downwardly, the bevelled surface 7 will continue this deflection. Because of the fact that only a narrow space 12 is provided between the lower edge of the head and the driving point 8, particles of gravel or earth of appreciable size cannot enter this space or wedge therein causing clogging of the lower end of the head and reducing the efficiency of the jetting operation. Any particles that do enter this space will be so small that the jetting water will readily wash them therefrom. The lower end of the head is tapered as described and as indicated by the numeral 6, so that it will also serve to deflect gravel or stones from the head.

The extreme upper end of the head 4 is provided with a threaded socket 14 which receives the threaded lower end of the screen pipe 1. In the bottom of the socket 14, which is slightly reduced

in diameter, a ring 15 is disposed. This ring rests on a shoulder 16 and will be held in place by the lower end of the screen pipe. The lower edge of the ring 15 is bevelled and machined, as indicated at 17, to serve as a valve seat for a ball float valve 18.

The ball float valve 18 is preferably made of wood or other material that will float and is of accurate diameter so that it will firmly seat on the valve seat 17, at the proper time, as indicated by the dotted lines in Figure 1. This ball float valve 18 is disposed in a valve chamber 19 which is formed in the upper portion of the head 4 above the upper end of the driving point 8. The wall of the valve chamber 19 is curved inwardly at the upper end of the chamber in order to direct the ball towards its seat as it rises. The extreme upper end of the point 8 is tapered almost to a point as indicated at 21. The valve chamber is of such a diameter as to permit movement of the ball valve 18 to one side thereof where it will not interfere with passage of jetting water into the head. Since the upper end of the point 8 is tapered, as indicated, when the jetting operation is being carried out, the jetting water which enters the head under pressure will force the valve to one side of the chamber causing it to rest against the tapered surface 21 and the wall of the chamber 19. It will be firmly held by downward pressure of jetting water in the position indicated by the full lines in Figure 1.

In installing my device, the head is mounted on the screen pipe as indicated in Figure 1 and the screen pipe is connected to a pipe section 3. Water is then forced through the pipe 3 and the screen pipe 1 and then through the head 4 and finally out through the lower end thereof where it will serve to jet a hole in the earth into which the well point will pass. The jetting operation may be continued as long as the well point passes through sandy soil or the like until the screen pipe 1 is wholly within the water bearing strata. However, it often happens that before reaching the water bearing strata gravel or the like is encountered and the jetting operation is ineffective as previously explained. Then it will be necessary to drive the well point through the gravel. Because of the structure of my well point, it can be readily driven through the gravel without injury thereto. Both the driving and the jetting operation may be carried on simultaneously.

During jetting, water which is forced laterally through the wall of the screen pipe will aid in jetting the well point into position, since it will flow upwardly along the well point and carry sand and other particles with it and will also serve as a lubricant. However, most of the stream of water will issue through the head, since the surrounding earth serves to resist lateral flow of water from the screen pipe, and will be under considerable pressure so that it will jet effectively. When the well point has been properly positioned, as indicated in Figure 3, the jetting operation is discontinued and the pipe 3 is connected to the suction line of a pump. The suction force developed by the pump and the fact that the valve 18 is a float valve will cause it to seat on the valve seat 17 as indicated by the dotted line in Figure 1. The pump will then withdraw water through the screen pipe 1 from the surrounding water bearing strata. However, since the float valve will be closed, the pump will not draw into the screen pipe sand or other extraneous matter, which would otherwise enter through the lower end of the head 4.

In Figure 4, I show a slight modification of my device. In this instance a driving and jetting head 4, exactly like that previously described, is provided. A screen pipe 1a is connected to the upper end of the head 4. The upper end of this screen pipe is connected to a pipe section 3 by a coupling 2. However, in this instance the screen pipe has an imperforate pipe 22 of smaller diameter which is disposed centrally therewithin so as to form an annular space 23. This pipe 22 may be held in position within the screen pipe by an outwardly projecting flange 24 at its upper end which is welded or otherwise secured in the screen pipe. This flange 24 closes the upper end of the space 23. The pipe 22 extends to a point 25 almost at the lower end of the screen pipe 1a.

When this well point is inserted in the earth and water is taken in through the screen pipe, it first enters the space 23. Then it must flow downwardly through the space 23 to a point below the lower end of pipe 22 before it can pass upwardly through this pipe to the surface.

This structure is particularly useful where bed rock is struck below the water bearing strata which makes it impossible to get the screen pipe wholly within the water bearing strata. If the pipe 22 were not provided in such an instance, air would be taken through the upper portion of the screen pipe not within the water bearing strata.

In the structure shown in Figures 1 to 4 inclusive, the driving point 8 of the driving and jetting head 4, is held in position by a pair of lugs 10. However, as illustrated in Figure 5, only one lug 10a may be used. Moreover, it is also possible to use more than two lugs if desired.

In Figure 6, I show apparatus which may be used and illustrate a novel method for installing the well point previously described. The well point is exactly like that previously described. As shown, I provide a casing 26 which is impervious to the flow of water and which is disposed in surrounding relation to the well point. This casing will surround the well point and a space 27 will be formed therebetween. This casing is of such a diameter that its lower end will rest on the tapered upper portion 5 of the head 4 and will close the lower end of the space 27. A head 28 is threaded on the upper end of the casing 26. This head is provided with an opening 29 which is of such a diameter that the pipe 3 may slide therethrough. The upper portion of the head 28 is reduced as at 30 and is split to form a split collar adapted to grip the pipe 3. The split collar is caused to grip pipe 3 by adjustment of a bolt 31. A packing gland 32 is provided for sealing the upper end of the space 27. The casing 26 may be slipped over the well point and the pipe 3 and dropped until the lower end rests on the portion 5 of the head 4. Then the split collar on the head 28 may be tightened to hold it in position relative to the well point.

In order that the well point may be driven at the same time that the jetting operation is being carried out, I provide a member 33 upon which the driving force may be exerted. The member 33 may be threaded and clamped on the upper end of pipe 3, as at 35. A passageway 36 communicates with the end of pipe 3 and leads laterally from the member 33. A conduit 37 may be threaded into the outer end of the passageway 36 and this conduit is adapted to be connected by a flexible hose or the like to a source of water under pressure.

In installing my well point with this apparatus,

I first position the casing on the well point as indicated in this figure. Then water under pressure is forced into the pipe 3 and screen pipe 1. During the initial application of water under pressure, some of it will flow laterally from the screen pipe into the space 27. However, this space 27 will soon be filled because both its upper and lower ends are closed. Thereafter, all the water will flow through the pipe 3, screen pipe 1 and will then flow out through the lower end of head 4 and will jet a hole for receiving the well point and the casing. If necessary or desirable, the well point may be driven simultaneously while the jetting operation is being carried out.

The well point and the surrounding casing are forced into the earth until the well point reaches the desired level. The jetting and driving operations are then discontinued and the member 33 is removed. The split collar 30 is then loosened and the casing 26 is pulled out of the ground, leaving the well point and the pipe 3 in position.

It will be understood that with this method, the casing 26 will preclude a constant flow of water from the screen pipe 1 during the jetting operation and will cause all of the water, after the space 27 is filled, to flow through the head 4 and out of the lower end thereof, producing a still more efficient jetting action. Because there is no danger of clogging between the casing and the well point and pipe 3, the casing 26 can be of small diameter. Therefore, it may be readily pulled when the well point has been properly positioned. It will be understood that this method is very simple since the well point and casing are lowered simultaneously and since it is only necessary to remove the casing leaving the well point in position. This can be carried out in a much shorter time and with much less labor than prior art methods. Also, the entire force of the stream of water under pressure is exerted at the lower end of the well point, producing a very forceful jetting action.

In Figure 7, I illustrate apparatus and a method which I preferably employ in installing a different type of well point. In this instance, the well point embodies a screen pipe 1 which merely has a gad or driving point 4a mounted thereon. The rest of the apparatus is the same as that illustrated in Figure 6 with the exception that the lower end of the casing 26 is tapered inwardly slightly as at 38 so that the space 39 between the lower end of the casing and the well point will be of minimum width, producing a nozzle effect. The lower end of the casing, however, is of sufficient diameter to pass the coupling 2. The lower end of the well point projects a suitable distance from the lower end of the casing.

This well point is installed in much the same manner as that illustrated in Figure 6. When the jetting water is forced into the well point, it will flow from the screen pipe and fill the space 27. It will then continue to flow from the lower end of the casing through the space 39 producing an effective jet. The casing 26 serves to confine the water flowing from the screen pipe and causes it to issue from the lower end of the casing under considerable pressure. The gad 4a serves as a driving point. As before, when the well point is positioned at its proper level, the casing is withdrawn leaving the well point in position.

In Figure 8, I show somewhat different apparatus which may be used in installing my well point. This apparatus embodies a split casing 40. This casing 40 is made of two sections which are hinged together by a plurality of suitable hinges

41. The two sections may be clamped together by means of a plurality of suitable clamps 42 disposed opposite to the hinges. The split casing 40 is adapted to be clamped around the screen pipe 1 and the lower end thereof preferably rests on the tapered portion 5 of the head 4, thus closing the lower end of the space between the screen pipe and the casing. The upper end of this space will be closed by a packing joint 43 within the casing 40.

When installing my well point by using this device, the split casing is first clamped around the screen pipe as indicated. Then a hole is jetted into the earth, the casing serving to confine the water which passes from the screen pipe and to cause most of it to flow through the screen pipe and out through the head 4, producing an efficient jet. When a hole, substantially as deep as the length of the screen pipe, has been produced, the casing and screen pipe may be pulled out of the hole. The split casing may then be removed and the well point dropped in the hole and the jetting operation may then be continued. Thereafter, the walls of the hole serve to confine the water tending to issue laterally from the screen pipe.

It will be apparent from the above description that I have provided a well point having many desirable features. One of the most important features possessed by my device is that, due to its particular structure, it may be driven through the earth when jetting alone is ineffective. It is also very effective for jetting purposes. The well point which I have produced is of a very sturdy and simple structure. Also, the driving and jetting head is of such a structure that it will be very difficult or impossible for it to become clogged.

Having thus described my invention, what I claim is:

1. A driving and jetting head for a well point comprising an outer substantially cylindrical shell, a driving point of substantially cylindrical form disposed within said shell, means for holding said driving point centrally within the shell in such a manner that an annular space is formed between the outer surface of the driving point and the inner surface of the shell, said driving point projecting out of the lower end of the shell a considerable distance, the lower end of said shell being tapered inwardly almost into contact with the lower end of said driving point so that a narrow annular space is formed between the extreme lower end of the shell and the lower portion of the driving point, the extreme lower end of said driving point being tapered inwardly in all directions to form a sharp point, the extreme lower edge of said shell being bevelled, the angle of bevel of the lower edge of the shell being substantially the same as the angle of taper of the point and being substantially in alignment therewith, a valve chamber formed in the upper end of said shell above the extreme upper end of said driving point, said valve chamber having a ball float valve loosely disposed therein, the upper end of the driving point being rounded or tapered so that when the ball valve is in its lowermost position it will rest thereagainst at one side of the valve chamber, a valve seat formed in the upper end of said valve chamber on a ring member separate from the shell, the upper portion of the inner wall of said valve chamber being curved inwardly to direct the valve towards its seat.

2. A well point comprising a screen pipe, a head mounted on the lower end of said screen pipe, said head comprising an outer shell, a driving

point disposed within said shell, means for holding said driving point within the shell in spaced relation to the wall thereof, said driving point projecting out of the lower end of the shell a substantial distance, the extreme lower end of said driving point being tapered to form a sharp point, the extreme lower edge of said shell being bevelled, the angle of bevel of the lower edge of the shell being substantially the same as the angle of taper of the point and being substantially in alignment therewith, a valve chamber formed in the upper end of said shell above the extreme upper end of said driving point, said valve chamber having a ball valve loosely disposed therein, the upper end of the driving point being rounded or tapered so that when the ball valve is in its lowermost position it will rest at one side of the valve chamber, and a valve seat formed in the upper end of said valve chamber.

3. A head for a well point comprising an outer shell, a point member disposed within said shell, means for holding said point member within the shell in spaced relation to the wall thereof, said point member projecting out of the lower end of the shell a substantial distance, the extreme lower end of said point member being tapered to form a sharp point, the extreme lower edge of said shell being bevelled, the angle of bevel of the lower edge of the shell being substantially the same as the angle of taper of the point and being substantially in alignment therewith, a valve chamber formed in the upper end of said shell above the extreme upper end of said driving point, said valve chamber having a ball valve loosely disposed therein, and a valve seat formed in the upper end of said valve chamber.

4. A head for a well point comprising an outer shell, a point member disposed within said shell, means for holding said point member within the shell in spaced relation to the wall thereof, said point member projecting out of the lower end of the shell a substantial distance, a valve chamber formed in the upper end of said shell above the extreme upper end of said driving point, said valve chamber having a ball valve loosely disposed therein, a port leading into said valve chamber, said valve controlling opening and closing of said port.

5. A head for a well point comprising an outer shell, a driving point member disposed within said shell, means for holding said point member within the shell in spaced relation to the wall thereof, said point member projecting out of the lower end of the shell a substantial distance, a valve chamber formed in said shell above the extreme upper end of said driving point, a port leading into said valve chamber, and a valve in said chamber for automatically closing and opening said port.

6. A head for a well point comprising an outer imperforate shell of circular cross section having its lower portion tapering inwardly, a driving point member disposed within said shell, and means for holding said point member within the shell in spaced relation to the wall thereof, said point member projecting from the lower end of said shell and being of such a diameter and so disposed that a narrow annular space is formed between the extreme lower end of the shell member and said driving point, said space being the only opening provided in the lower end of the head through which material might tend to enter, said point projecting from the lower end of said shell a sufficient distance to deflect material away from the said annular space.

7. A head for a well point comprising an outer imperforate shell, a driving point member disposed within said shell, and means for holding
5 said point member within the shell in spaced relation to the wall thereof, said point member projecting from the lower end of said shell and being of such a size and so disposed that a narrow space is formed between the extreme lower end of the shell member and said driving point, said space
10 being the only opening provided in the lower end of the head through which material might tend to enter, said point projecting from the lower

end of said shell a sufficient distance to deflect material away from said space.

8. A head for a well point comprising an outer imperforate shell, a driving point member disposed within said shell, and means for holding
5 said point member within the shell in spaced relation to the wall thereof, said point member projecting from the lower end of said shell and being of such a size as to provide a space therearound
10 between the extreme lower end of the shell member and said driving point.

ARTHUR C. SAXE.