

Nov. 7, 1961

P. CLAUSSE

3,007,522

WELL CONSTRUCTION IN SILTY SUBSOIL

Filed Jan. 15, 1958

3 Sheets-Sheet 1

Fig. 1

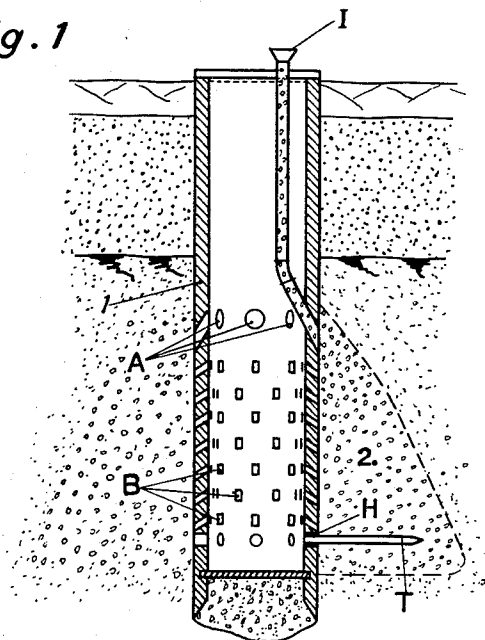
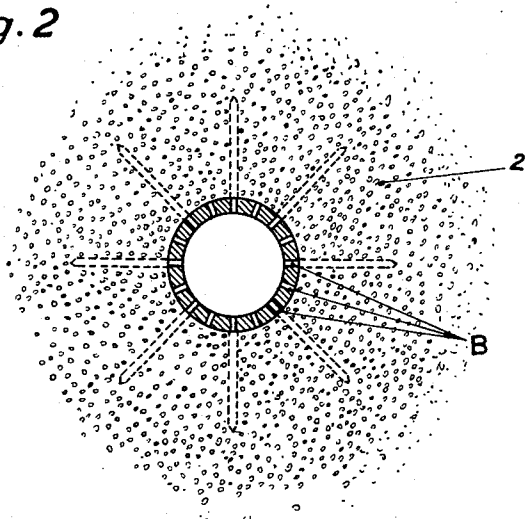


Fig. 2



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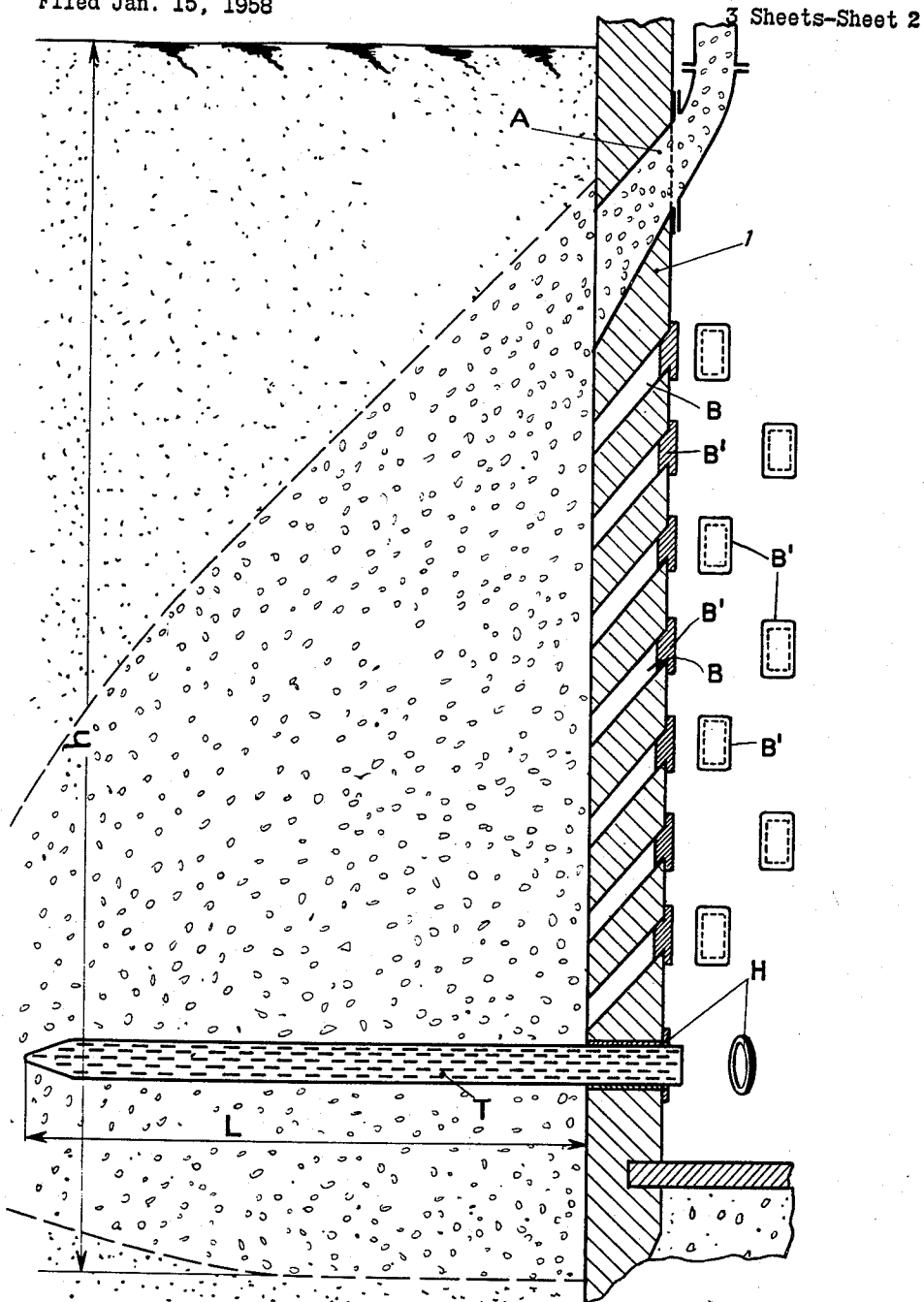
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Fig. 6

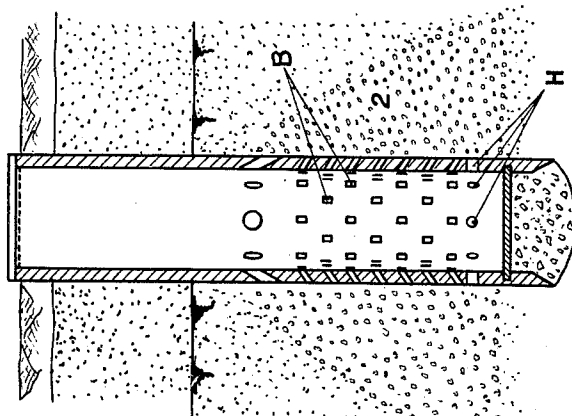


Fig. 5

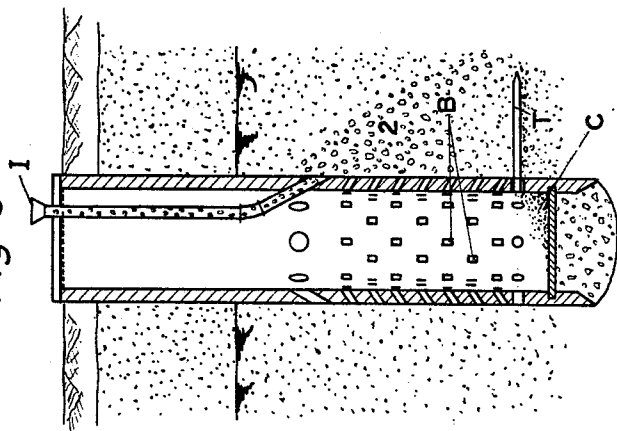
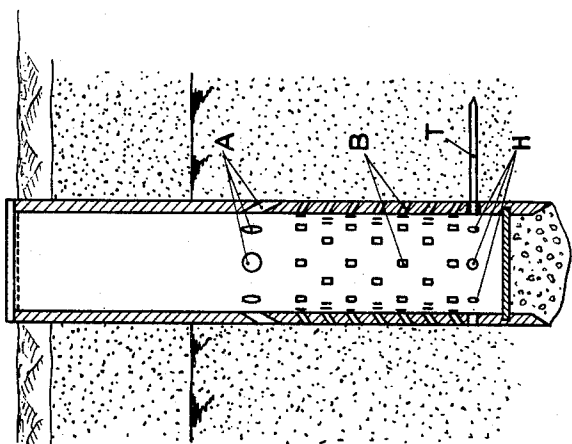


Fig. 4



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3,007,522

WELL CONSTRUCTION IN SILTY SUBSOIL

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Claims priority, application France Jan. 17, 1957

3 Claims. (Cl. 166—15)

Vertical wells of the types currently employed for collecting underground water in fine sand or silt require the construction of a filter bed surrounding the well below the water-table and extending to a depth below the lowest intake apertures in the well. The construction of such a filter bed has involved a considerable amount of earth-moving and other work, especially difficult to perform under water-logged conditions.

The process provided by the invention comprises driving a set of silt-draining pipes radially outward from the bottom of a well, preferably a reenforced concrete well, by means of hydraulic power jacks or other suitable equipment, after first having sealed the water-collecting inlets, said pipes extending into the surrounding silty subsoil. Further, conduit apertures are provided through the well wall above the de-silting pipes and preferably towards the upper level of the bed of water-bearing silt, through which calibrated gravel or the like is dumped while simultaneously silt-laden water is withdrawn through said pipes so that the calibrated gravel or other filler material gradually replaces the space left vacant by the withdrawn silt. The conduits may be provided at more than one vertical level depending on the depth of the water-bearing bed. In this way a highly efficient filter-bed is provided around the well which will prevent a silting-up of the water intake apertures in the well at a minimum amount of labor and expense.

On completion of the above operations the pipes are withdrawn and retrieved and the water intakes opened up. The tubular metal inserts provided near the base of the well through which the pipes were passed are sealed, but are desirably allowed to remain in place to provide for a subsequent repetition of the sand removing process in case of a silting-up of the filter bed.

The invention is illustrated by way of example but not of limitation in the accompanying drawings, it being understood that the details of practical procedure may depart from those shown and described provided the basic teachings of the invention are preserved.

FIG. 1 is a vertical sectional view of an improved water well to provide a general view of the process of the invention;

FIG. 2 is a horizontal cross section of FIG. 1 through a set of water intake apertures;

FIG. 3 is a fragmentary vertical section, drawn to an enlarged scale, and illustrating details of the novel filter bed obtained;

FIGS. 4, 5 and 6 are vertical cross sectional views illustrating successive stages of completion of the process.

FIG. 5 differs from FIG. 1 only by the omission of certain reference letters and of the dotted line surrounding zone 2 in FIG. 1.

As shown in FIG. 1, a well 1, preferably of reenforced concrete construction, is sunk by conventional methods into the water-bearing bed to be tapped. An annular array of spaced tubular metallic insert members H (also see FIG. 3) inserted during the casting of the concrete well wall, is provided near the bottom of the well and below the lowermost water intake apertures shown at B. The tubular members H serve to guide the de-silting tubes T radially outwards into the surrounding ground.

Further, outwardly and downwardly sloping parts A are provided circumferentially in the wall of the well at

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an elevation above the uppermost intakes B and somewhat below the static level of the water-table (see FIG. 4).

The intakes B are initially sealed preferably with removable plugs which may be made of rubber or suitable plastics. Large diameter vertical pipes such as I are connected with the conduits A, preferably while the well is dry or if this is not feasible, divers can be used for this operation.

The pipes T are driven radially outwards through the tubular inserts H, using any suitable power equipment such as fluid-operated rams. The extent, indicated as L in FIG. 3, by which the tubes T are driven beyond the outer wall of the well will of course depend on the dimensions of the well and the desired size of the filter-bed. If it is required that the overall length of pipes T should be greater than the diameter of the well, said pipes may then be formed of an assembly of short pipe lengths screwed together end to end. The pipes T are preferably formed with tapered ends to facilitate their insertion into the sand and have perforate side walls, and any suitable means may be used, e.g. compressed air, for drawing in the surrounding silt-laden water through the perforations in the pipes T and pumping it into and up the well.

Substantially concurrently with or subsequently to the de-silting operation calibrated filler material, e.g. gravel, is dumped by way of the vertical pipe I and parts A (see FIG. 5). It is found that owing to the difference in pressure created by the sand-removing process between the bottom area in which the pipes T are operating and the overlying point at which the filler material is dumped, a suction effect is created whereby the filler material quite readily and smoothly replaces the silt as it is removed and provides a generally conical, uniform region homogeneously filled with the calibrated filler or gravel material 2 (FIG. 6).

When it has appeared that the de-silting process has progressed to a satisfactory degree, as evidenced by the fact that the water pumped up the well is substantially free of silt, the pipes T are removed (FIG. 6). The tubular members H are sealed with cover plates and the plugs sealing the water intakes B are removed. It is noted that the parts A do not require to be sealed provided they are positioned well below the water-table. However said parts may be sealed if desired. Should it be found at some future date that the filter bed provided as described above has become silted up again and the well delivery has become inadequate, the plates sealing the members H may be removed and the pipes T driven out again to repeat the desanding process.

What I claim is:

1. In a method of constructing a well in silty water-bearing subsoil, said well including water intake apertures in the sides thereof and outwardly-downwardly extending ports in the well wall at a depth above the uppermost of said apertures, the steps of sealing said apertures, driving perforate pipes outwardly from the well wall at a depth lower than the lowermost of said intake apertures and in a generally radial outward direction, drawing in silt-laden water through said pipes into and up the well, and substantially concurrently dumping calibrated filler material through said ports whereby to fill the space left vacant by said silt until a substantial slit-free filter-bed of filler material has been provided around said intake apertures.

2. In the method claimed in claim 1, said well including further tubular inserts in the well wall for the passage of said perforate pipes, the step of withdrawing and retrieving said pipes and removably sealing the tubular inserts therefor in the well wall.

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3. A method of constructing a well in slity water-bearing subsoil comprising: sinking an apertured, cylindrical, concrete well body into the subsoil, plugging the intermediate ones of said apertures, driving pipes radially outward of said well through the lowermost ones of said apertures, connecting the uppermost ones of said apertures with a source of rubble at the well-head, pumping silt-laden water from said subsoil through said pipes into and up the well and concurrently dumping rubble through said uppermost apertures to replace the silt removed until said pumped water is substantially free of silt, then removing and retrieving said pipes, removably sealing

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said lowermost apertures and removing the plugs from said intermediate apertures.

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