E. B. SYMONS.

PROCESS AND APPARATUS FOR REMOVING SAND FROM WELLS.

APPLICATION FILED SEPT. 3, 1921.

1,432,425. Patented Oct. 17, 1922.

Fig. 1.

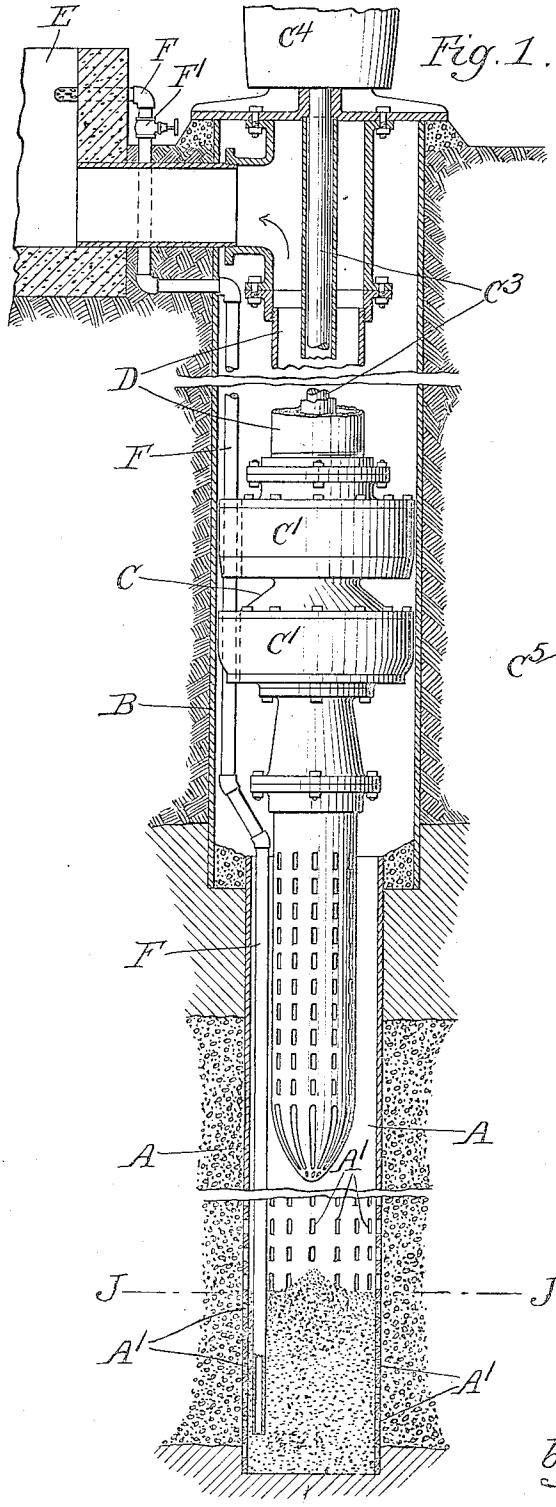
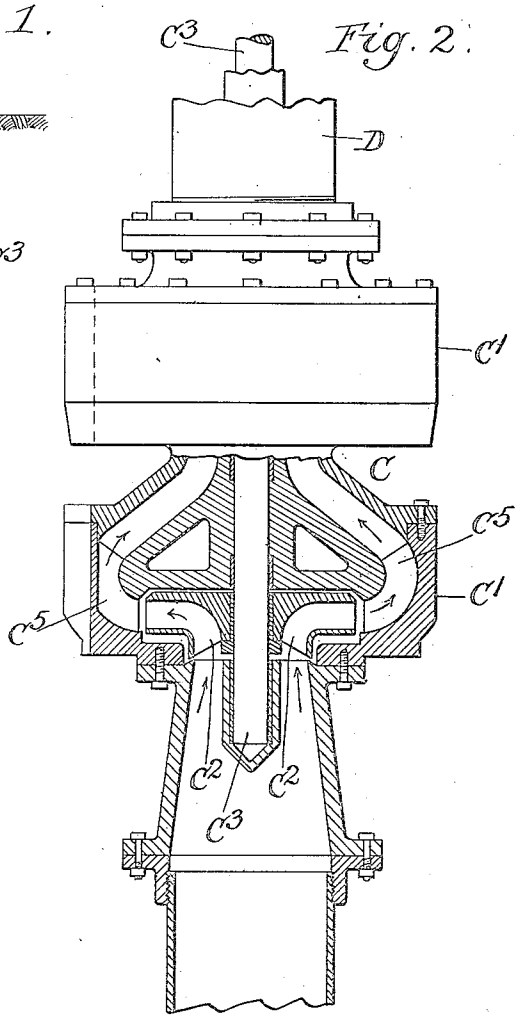


Fig. 2.



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Patented Oct. 17, 1922. 1,432,425

UNITED STATES PATENT OFFICE.

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PROCESS AND APPARATUS FOR REMOVING SAND FROM WELLS.

Application filed September 3, 1921. Serial No. 498,513.

To all whom it may concern:

Be it known that I, EDGAR B. SYMONS, a citizen of the United States, residing at Hollywood, in the county of Los Angeles and State of California, have invented a certain new and useful Improvement in Processes and Apparatus for Removing Sand from Wells, of which the following is a specification.

My invention relates to a process and an apparatus for removing sand from wells particularly those of considerable depth and has for one object to facilitate the removal of sand from such wells without serious interruption of pumping. It is illustrated more or less diagrammatically in the accompanying drawings, wherein,

Fig. 1 is an elevation partly in section of my invention applied to a well.

Fig. 2 is a vertical section of the pumping apparatus in the well.

Like parts are indicated by like characters in all figures.

A is the lower casing of the well perforated as at A′. It extends deeply into the water bearing sand strata.

B is the upper casing of the well which extends down to the water bearing sand strata and is not perforated.

C is a two stage centrifugal pump mounted within the upper casing. C′ are bowls of the pump. C^2 are blades or runuers keyed to the shaft C^3 which is rotated at a high velocity by means of the belt driven pulley C^4 which is operated by any suitable power source not here shown. C^5 are stationary blades which arrest the whirling motion set up by the blades C^2 and cause a straight upward flow of the water. Any kind of a pump can be used.

D is a delivery pipe extending upward and enclosing the shaft C^3 connecting with the over-flow tank E.

F is a pipe extending from the over-flow tank almost to the bottom of the well shaft. F′ is a valve in the pipe F. The pipe F extends far below the perforated end of the pump intake.

The use and operation of my invention are as follows:

The object of my invention is to keep the lower section of a deep well free from permanent deposits of sand or in other words, to keep the well from filling up with sand and I have shown it as applied to a deep well containing a relatively long section of perforated well casing which has been driven down deep into the water bearing sand strata. Well up in this well and far above the bottom is the lower preferably perforated inlet end pipe of the pump. When the well has thus been established and the perforated casing driven to a satisfactory depth and the pump is started, a very considerable amount of sand is carried out by the pump with the first flow of water, so much so that it often takes several days before a clear flow of water is established. This will not occur until the sand has ceased to flow in quantity through the perforations A′. For a considerable time the flow of water will continue and be relatively clear of sand, carrying off, however, by its large volume and slow current most of the sand which works in through the perforations in the well casing. But after a few months, sufficient sand will have gotten through these perforations and will have fallen down through the water current to create a deposit in the bottom of the perforated casing. This deposit gradually increases in depth and becomes more and more solid until eventually the action of the pump is greatly interfered with and the freedom of the flow of water in the casing is greatly diminished. The effective length of the perforated wall casing is reduced and this casing may be even in time completely filled so as to stop the flow of water altogether.

In the drawing I have arbitrarily indicated a level at JJ at which the sand might stand or to which the deposit might rise without the application of my invention. Under these circumstances the action of the well would be greatly interfered with. The stirring pipe which extends down from the overflow tank almost to the bottom of the perforated well casing will when supplied with water tend to stir up and break the deposit of sand in the bottom of the perforated casing. Any desired pressure can be applied but ordinarily and particularly in deep wells the weight of water in the pipe is sufficient. The sand will be stirred up and moved about and forced out some of it perhaps through the perforations but in any event it will be set in motion so that the flow of water in the well pump will carry such sand with it until substantially the whole of the perforated casing has been cleared. When the

water begins to flow in such substantially clear manner the water may be cut off from the stirring pipe until the well shows signs of again tending to fill up in its lower casing.

The drawings here shown are intended to illustrate the application of my invention to a well where the perforated section of the pump inleading pipe is about one hundred feet down and the end of the stirring pipe is about three hundred feet down so that there is a very long interval of perforated casing between the end of the pump pipe and the end of the stirring pipe. The object of the stirring pipe is to keep the sand in this lower end of the perforated pump casing so stirred up that it will be for the most part carried off with the water current pumped out and thus overcome the objections which otherwise would result from the steady deposit of some portion of the sand which enters the perforated casing with the water in the bottom of the perforated casing.

I do not, of course, desire to be limited to size, proportion or shape of parts or their exact relation nor to the particular kind of pump shown.

I claim:

1. A means for maintaining a flow of water from a deep well comprising a well section in the water bearing strata, a pump adapted to pump water from an upper level of such section and a sediment stirring device comprising a pipe adapted to deliver water under pressure to a lower level of such well section and means for supplying water to such pipe.

2. A means for maintaining a flow of water from a deep well comprising a perforated well casing in the water bearing strata, a pump adapted to pump water from an upper level of such perforated casing and a sediment stirring device comprising a pipe adapted to deliver water under pressure to a lower level of such perforated casing and means for supplying water to such pipe.

3. A means for maintaining a flow of water from a deep well comprising a perforated well casing in the water bearing strata, a pump whose receiving end is placed near and adapted to receive water from an upper level of such perforated casing and a sediment stirring device comprising a pipe adapted to deliver water under pressure near a lower level of such perforated section and means for supplying water to such pipe.

4. A means for maintaining a flow of water from a deep well comprising a well section in the water bearing strata, a pump adapted to pump water from an upper level of such section and a sediment stirring device comprising a pipe adapted to deliver water under pressure to a lower level of such well section and means for supplying water to such pipe, said pump provided with an inleading pipe having a perforated end through which the water is drawn.

5. A means for maintaining a flow of water from a deep well comprising a perforated well casing in the water bearing strata, a pump adapted to pump water from an upper level of such perforated casing and a sediment stirring device comprising a pipe adapted to deliver water under pressure to a lower level of such perforated casing and means for supplying water to such pipe, said pump provided with an inleading pipe having a perforated end through which the water is drawn.

6. A means for maintaining a flow of water from a deep well comprising a perforated well casing in the water bearing strata, a pump whose receiving end is placed near and adapted to receive water from an upper level of such perforated casing and a sediment stirring device comprising a pipe adapted to deliver water under pressure near a lower level of such perforated section and means for supplying water to such pipe, said pump provided with an inleading pipe having a perforated end through which the water is drawn.

7. The process of maintaining a flow of water from a deep well which penetrates the water bearing strata and preventing the accumulation of sediment in the bottom thereof which consists in pumping the water directly from an upper level of the water bearing strata and forcing a current of water under pressure into a lower level of such water bearing strata so as to keep the sediment which otherwise would solidify in the bottom of such water bearing section in a disturbed state so that it can be carried off with the water through the pump.

8. The process of maintaining a flow of water from a deep well which penetrates the water bearing strata and preventing the accumulation of sediment in the bottom thereof which consists in pumping the water directly from an upper level of water in the well and forcing a current of water under pressure into a lower level of such water in the well so as to keep the sediment which otherwise would settle in the bottom of such well in a disturbed state so that it can be carried off with the water through the pump.

Signed at Chicago, county of Cook, and State of Illinois, this 26th day of August, 1921.

EDGAR B. SYMONS.