Dec. 15, 1953

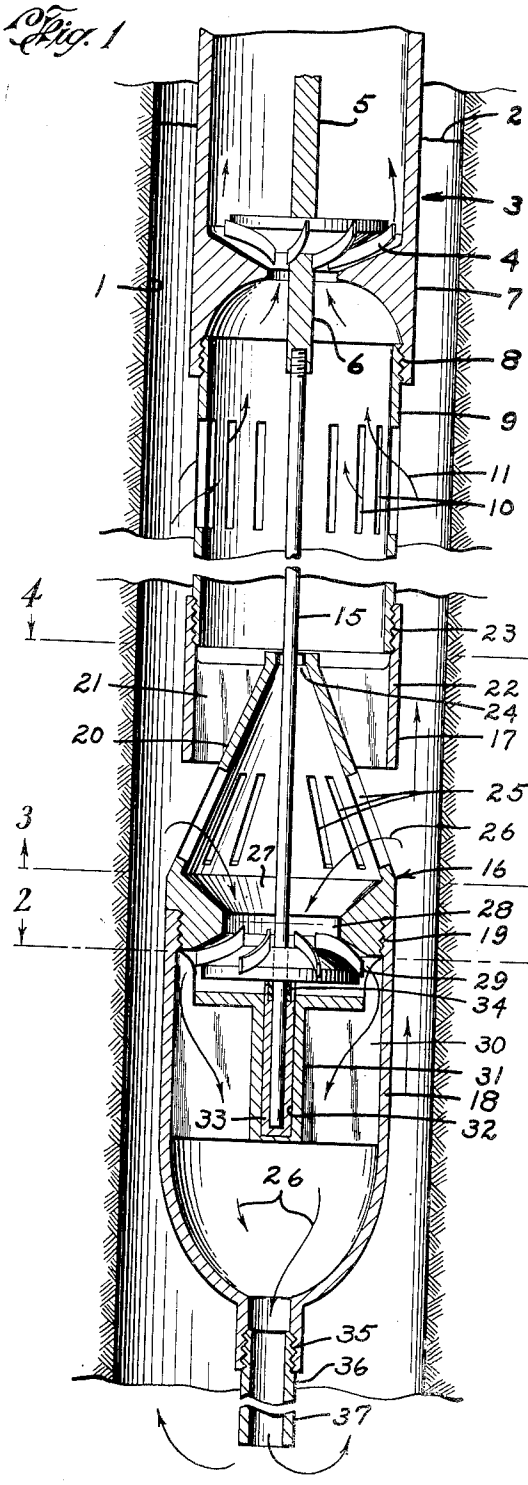
B. R. HILLGER

2,662,486

SAND AGITATOR FOR WELL PUMPS

Filed Oct. 12, 1950

Fig. 1



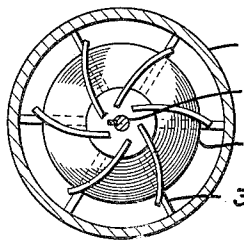


Fig. 2

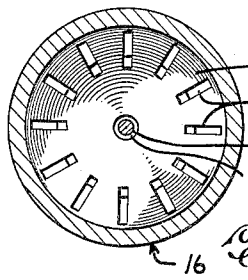


Fig. 3

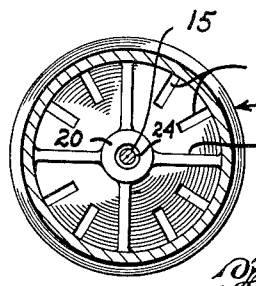


Fig. 4

Ben R. Hillger
INVENTOR.

BY Lester B Clark

ATTORNEY

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SAND AGITATOR FOR WELL PUMPS

Ben R. Hillger, Fort Stockton, Tex.

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2 Claims. (Cl. 103—204)

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This invention relates to an attachment for well pumps and more particularly to an agitator mechanism for breaking up detritus within a well bore and maintaining such material in suspension in the well fluid so that it will be picked up and discharged from the well by the pump to which the device is attached.

Many wells, especially water wells, penetrate formations from which sand and other materials enter the well bore with the formation fluids. Such materials gradually accumulate and eventually form a compact mass which requires withdrawal of the pump and a pulling operation in order that the well fluids may freely enter the well and the pump may operate efficiently.

An object of the invention is to provide means for removing earth particles from a well and thereby prevent accumulation of the particles at the bottom of the well resulting in ultimately restricting flow of fluids into the well and in stoppage of the pump used therein.

Another object is to provide an agitator that will effectively break up large particles entering a well and will thereafter keep the particles in suspension within the well fluids so that such particles will be removed from the well by the pumping mechanism provided for reducing such fluids.

A further object is to provide a fluid circulating system proximate the bottom of a well to agitate the fluids and maintain earth particles, which enter the well, in suspension in the well fluids.

Still another object is to provide circulatory flow within the well proximate the bottom thereof whereby such portion of the well bore will be kept free of accumulation of earth particles.

The foregoing objects together with other objects will be more fully apparent from the following description considered in connection with the accompanying drawings in which:

Fig. 1 is a sectional view of a device embodying the invention, shown within the well bore and attached to a turbine pump by means of which fluids are elevated to the surface;

Fig. 2 is a sectional view taken along line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken along line 3—3 of Fig. 1;

Fig. 4 is a sectional view taken along line 4—4 of Fig. 1.

In the drawings, a well bore is shown at 1 having liquid, such as water, rising to a level indicated at 2. At 3, there is shown the lower end of a turbine pump having impeller 4 on shaft 5, this shaft being provided with a downward extension 6 below the impeller for attachment to a shaft 15 of the agitator.

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The pump housing 7 is threaded at 8 to receive the upper end of the pump intake housing 9 which is provided with openings 10 so that liquid may enter the lower end of the pump as indicated by the arrows 11 and be elevated to the surface through the flow line or tubing extending upwardly from the pump 3.

The agitator assembled is shown generally at 16 and comprises a suction head 17 and a bowl 18 attached thereto by a threaded connection 19.

The suction head 17 has a cone-shaped body 20 integrally united at its upper end to the spider 21 in collar 22 connected to the lower end of the intake housing 9 by threads 23. The shaft 15 passes through an axial opening 24 at the upper end of the suction head. The side walls of the body 20 are provided with perforations 25 through which well fluids enter the body in the direction indicated by arrows 26. The flow of liquid within the body converges as it passes through the tapered surface 27 to the inlet 28 to the impeller 29 which is secured to the shaft 15.

The bowl 18 has a spider 30 therein including a central boss 31 counterbored at 32 to receive the bushing 33 into which the lower end of the shaft 15 extends. A seal 34 at the upper end of the bushing maintains a desirable condition of lubrication between the bushing and the shaft.

Below the spider 30 the bowl 18 is reduced and terminates in a threaded connection 35 with the foot pipe 36 which terminates at its lower end 37 proximate the bottom of the well bore. It seems apparent that the structure above described has its lower extremity at a point spaced from the openings 10 through which well fluids enter the bore 3. It is also apparent that as the impeller 4 of the pump 3 is driven by the shaft 5, the impeller 29 of the agitator is also driven in synchronism therewith. Rotation of the impeller 29 effects a suction whereby well fluids enter perforations 25 in the body 20 and pass downwardly therethrough as indicated by the arrows 26 to the foot pipe 36. These fluids are discharged from the lower end of the foot pipe and thus there is effected a circulatory flow of well fluids which prevents the accumulation of sand or other earth materials at the bottom of the well or, in any event, proximate the intake housing 9 of the pump 3. At the same time any large particles of earth material that enter the well pump are disintegrated by the agitation and by contact with the impeller 29 and in this manner earth particles are kept in suspension and move upwardly with

the well fluids to enter the openings 10 to be withdrawn from the walls by the pump 3.

Broadly, this invention comprehends an agitator for wells which operates to keep such wells free from detritus that would otherwise impede the flow of formation fluids into the well bore and which detritus will ultimately stop the pump whereby a clean-out, clean-up operation would be necessary.

What is claimed is:

1. An agitator device for connection to an upwardly discharging pump to prevent restriction of the flow of well fluid in a well to the pump, comprising an agitator housing having a conical intake body, radial perforations in said body for admission of fluid therein from the well, said body having an opening at its upper end, a shaft extending through said opening and said body to a point therebelow, an impeller on said shaft at said point below said body, means for rotating said impeller, a tapered surface at the lower portion of said body to direct incoming fluid to said impeller, a bowl connected with said body and forming the lower portion of said agitator housing, an outlet pipe connected to said bowl positioned adjacent the bottom of a well, whereby said impeller circulates well fluids and detritus near the bottom of the well to break up said detritus into small particles before being discharged back into the well.

2. An agitator and pump device for wells comprising a pump housing, a pump impeller therein for discharging fluids from a well upwardly to the surface above said well, a pump intake housing below said pump impeller for admitting well fluids to said impeller, an intake head below said intake housing, a conical intake body extending into said head and connected therewith by a spider, an opening in the upper portion of said conical intake body, a shaft extending from said pump impeller downwardly through said pump intake housing, said intake head and said opening in said intake body, means for rotating said shaft, a second impeller on the lower end of said shaft below said intake body arranged to direct fluid downwardly therethrough, suction inlet perforations in said body above the second impeller for admitting fluid therein from the well, an outlet in said body below said second impeller adjacent the bottom of the well so that fluid and detritus in the bottom part of the well will be circulated through said body by said second impeller and agitated thereby to break up said detritus into such small particles that upon passing to said pump clogging thereof is diminished.

BEN R. HILLGER.

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