

R. SCHORR.  
DIRECT DRIVEN DEEP WELL PUMP.  
APPLICATION FILED MAY 26, 1919.

1,374,116.

Patented Apr. 5, 1921.

2 SHEETS—SHEET 1.

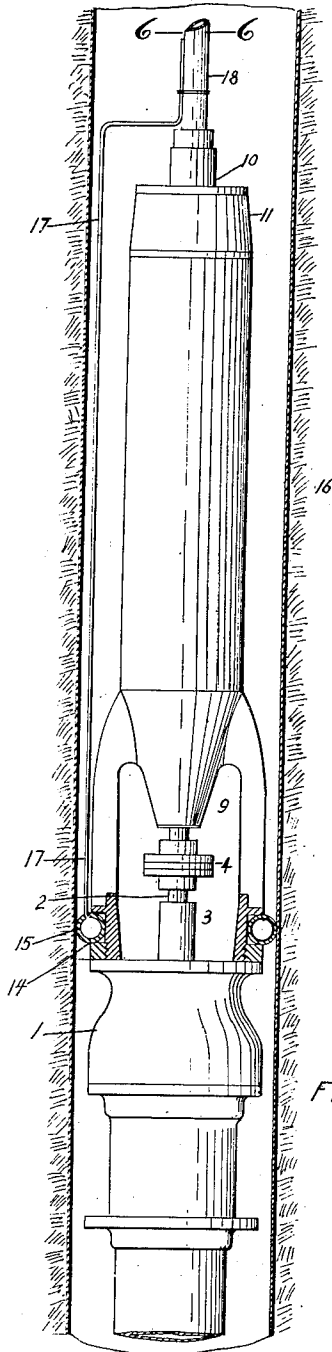


FIG. 2.

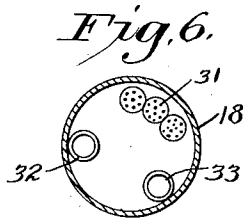


Fig. 6.

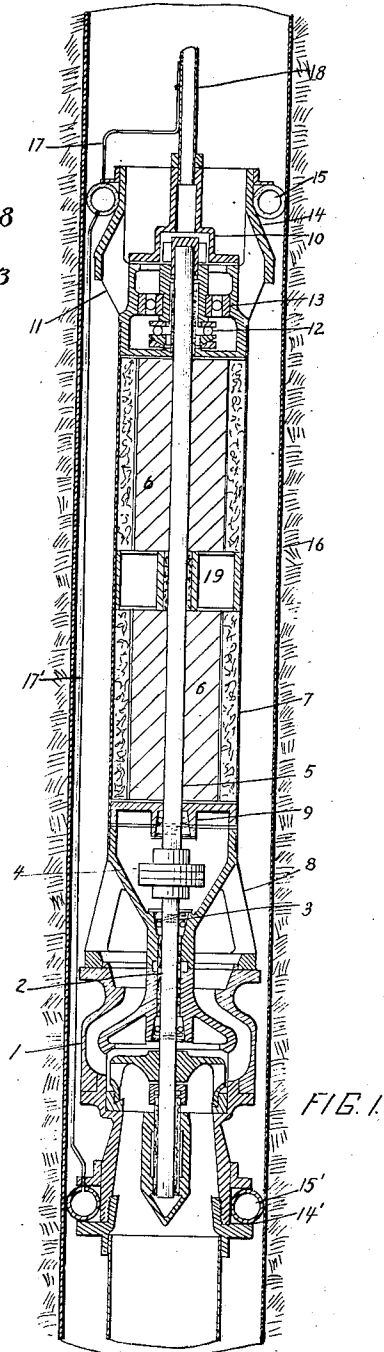


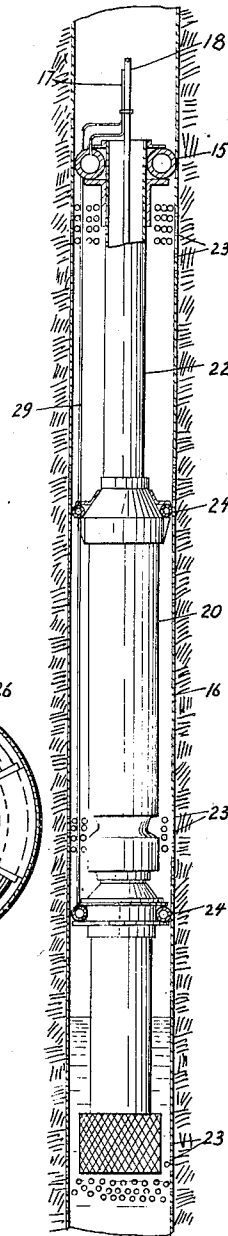
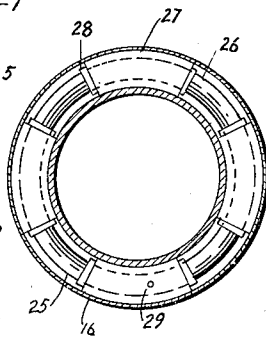
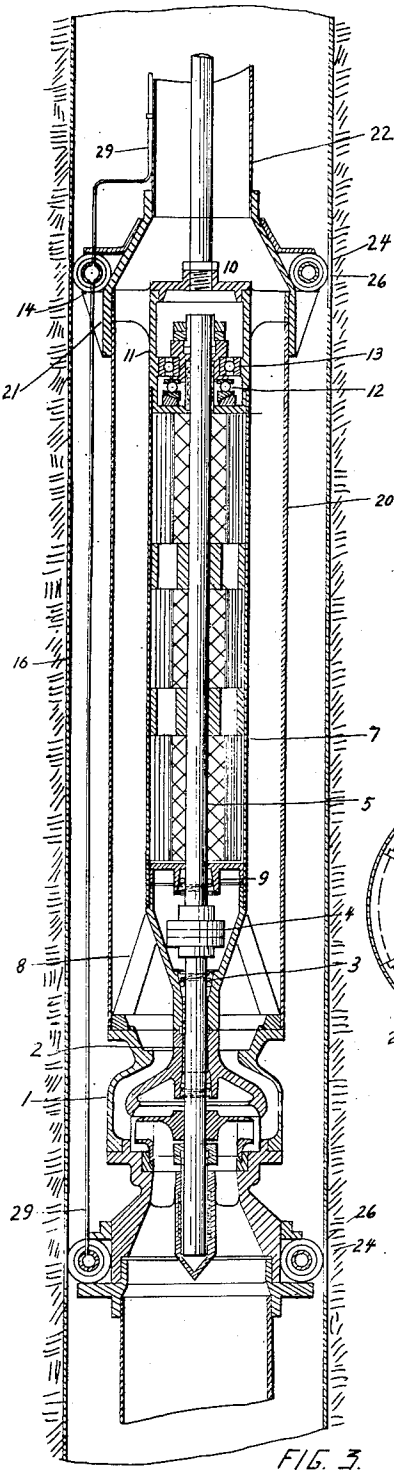
FIG. 1.

INVENTOR  
ROBERT SCHORR  
BY *J. M. Wright*  
ATT'Y.

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INVENTOR  
ROBERT SCHORR

BY

*Frederick Wright*

ATTY.

# UNITED STATES PATENT OFFICE.

ROBERT SCHORR, OF SAN FRANCISCO, CALIFORNIA.

## DIRECT-DRIVEN DEEP-WELL PUMP.

1,374,116.

Specification of Letters Patent.

Patented Apr. 5, 1921.

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*To all whom it may concern:*

Be it known that I, ROBERT SCHORR, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Direct-Driven Deep-Well Pumps, of which the following is a specification.

The object of the present invention is to provide an improved direct driven rotary deep well pump.

Deep well pumps of the present types have their driving power applied to the motor above the surface of the ground, and the driving shaft extends therefrom through the well down to the pump. Since this shaft is sometimes several hundred feet long, it requires many bearings and it also requires protection of these bearings from sand and grit which may be carried by the water. This is not only an expensive arrangement but is also absorptive of power. In time, the bearings wear and it is also difficult to maintain them in exact alinement. Another source of expense is the long discharge pipe which has to reach up to the surface of the ground from the pump, which is located close to the bottom of the well. Since the well hole is rarely straight, it is sometimes very laborious to lower or to withdraw such a pump. The withdrawal for inspection is very costly, as the pump column and the inclosed transmission elements have to be dismembered, piece by piece, until the pump itself reaches the surface.

The object of the present invention is to avoid all these objections by connecting a fluid (including an internal combustion) or electric motor directly to the pump and lowering this directly connected pumping outfit into the well and sealing it therein. As the pumping outfit can be sealed at any point in the well casing, it can be raised at times of highwater and can be lowered with the receding of the water level, thus effecting great economy in operation.

In the accompanying drawings, Figure 1 is a vertical section showing one form of my improved pump; Figs. 2, 3, and 4 are similar sectional views showing other forms thereof; Fig. 5 is a plan view of an expandible and collapsible anchor ring; Fig. 6 is an enlarged sectional view on the line 6—6 of Fig. 2.

Referring to the drawings, a centrifugal pump 1 has a shaft 2 which extends through a stuffing box 3 and is connected by a flexible coupling 4 to a driving shaft 5, said driving shaft 5 carries circular motor elements 6 which are inclosed in a tubular shell 7, which shell is connected to the pump casing by a saddle 8. The shell 7 is sealed tightly at its bottom by a stuffing box 9 and is closed tightly at its top by a cover 10, which is bolted to a housing head 11. The housing head 11 incloses a thrust bearing 12 and a radial bearing 13. It also provides a seat 14 for a hollow tire or sealing ring 15. At the lower end of the pump 1 is arranged a second sealing ring or hollow tire 15' in a seat 14', formed on the pump housing. These tires or sealing rings can be inflated, so as to be forced tightly against the well lining steel casing 16, by permitting air or other fluid through a small hose pipe 17, the two tires themselves being connected by a small hose pipe 17'. A somewhat larger pipe or hose 18 is provided for energy leads 31, pipes 32 for lubricants, and the like, and for the purpose of suspending and hoisting the pumping outfit. If the motor is of larger power, it has to be built up in series, requiring intermediate bearings 19. Bearings are preferably of the self-lubricating type, with graphite inserts and graphite grease-packed.

Fig. 2 illustrates a modification in which the shaft coupling 4 is located outside of the motor housing 7, and in which a single sealing ring 15 is placed close to the pump discharge end.

Figs. 3 and 4 illustrate a directly connected pumping outfit of slightly different design for use with wells which are perforated for some length to tap several water strata.

In this case, the entire motor structure is surrounded by a mantle 20 which joins a top casting 21. This top casting 21 is threaded or flanged at the top. This casting 21 is suitably shaped to make a connection to a section 22 of a discharge column reaching above the last or uppermost set of well perforations 23, and carrying at its upper end a sealing tire 15. At the bottom and top of the mantle 20 expansible anchor rings 24 are located to prevent undue vibrations. These anchor rings have passages

25 to permit the circulation of water, as shown in Figs. 4 and 5. An anchor ring 24 of the pneumatic tire type comprises an internal air tube 26 and a plurality, here  
5 shown as four, of rubber segmental tubes 27 surrounding the tube 26 and held in spaced relation by collars 28. 29 indicates a small hose or pipe for inflating the tube 26 with compressed air. The water as it is dis-  
10 charged by the pump can also be employed for inflating said tube 26.

To withdraw the pump, it is necessary to collapse the tire or tires by venting or draining, both operations being performed from  
15 the surface of the ground.

It is obvious that the provision of a sealing ring or tire, which only requires to be collapsed to permit the pump to be with-  
20 drawn, very much facilitates the withdrawal of the pump.

The well is generally perforated for the admission of water at its lower point, in which case no discharge pipe is used at all and the tire, or plurality of tires, is or are  
25 placed closely adjacent to the pump. In some cases, however, the perforations extend for some distance up the well and in that case, a short discharge pipe is used up to the uppermost perforation and the seal  
30 is arranged there. Even in the case that perforations should reach close up to the surface, requiring a discharge pipe for their entire length, an expansible and collapsible anchoring ring with fluid passages is ad-  
35 vantageous since it holds the pump steady and prevents undue vibration.

The discharge piece or elbow on the top of the well can be sealed also into the well casing, or it can be connected thereto by  
40 flanges or the like, in the event of not using a discharge pipe from the pump to the surface.

A small pipe 33 for compressed air can be added for the purpose of blowing out water  
45 which may seep in time into the motor casing.

It is obvious that sealing and anchor rings may be also expanded and collapsed by mechanical means, operatable from the surface  
50 instead of fluid pressure and draining or vacuum.

I claim:—

1. In combination with a well casing, an adjustably mounted pumping unit consist-  
55 ing of a vertical motor in a water-tight housing and a rotary pump directly connected to the motor-shaft, said well casing forming the discharge conduit for the fluid pumped, the fluid pumped surrounding said  
60 motor in the water-tight housing.

2. In combination with a well casing, an adjustably mounted pumping unit consist-  
ing of a vertical motor in a water-tight housing and a rotary pump directly connected  
65 to the motor-shaft, said well casing forming

the discharge conduit for the fluid pumped, and a hollow, inflatable ring around the pump to form a watertight partition, or seal, between said suction and discharge ends of the pump. 70

3. In combination with a well casing, an adjustably mounted pumping unit consisting of a vertical motor in a watertight housing and a rotary pump directly connected to the motor-shaft, said well casing forming the  
75 discharge conduit for the fluid pumped, and hollow, inflatable rings around the pumping unit, the lowermost of said rings forming a water-tight partition between the suction and discharge sides of the pump. 80

4. In combination with a well casing, an adjustably mounted pumping unit consisting of a vertical motor in a water-tight housing and a rotary pump directly connect-  
85 ed to the motor-shaft, said well casing forming the discharge conduit for the fluid pumped, an inflatable ring around the pumping unit, and means extending to the surface of the ground for inflating and for collaps-  
90 ing said ring. 90

5. In combination with a well casing, an adjustably mounted pumping unit consist-  
95 ing of a vertical motor in a water-tight housing, and a rotary pump directly connected to the motor shaft, said well casing forming the discharge conduit for the fluid pumped, the fluid pumped surrounding said motor in the water-tight housing, and means for sus-  
100 pending and for withdrawing the pumping unit. 100

6. In combination with a well casing, an adjustably mounted pumping unit consist-  
105 ing of a vertical motor in a watertight housing and a rotary pump directly connected to the motor shaft, said well casing forming the discharge conduit for the fluid pumped, and means for providing energy-leads, a lubricant and other elements necessary for operation of the pumping outfit. 105

7. In combination with a well casing, an  
110 adjustably mounted pumping unit consisting of a vertical motor in a watertight housing and a rotary pump directly connected to the motor-shaft, said well casing forming the discharge conduit for the fluid pumped, and  
115 a pipe for compressed air leading into the motor housing to blow out occasionally seepage water. 115

8. In combination with a well casing, an adjustably mounted pumping unit consist-  
120 ing of a vertical motor in a water-tight housing, and a rotary pump directly connected to the motor shaft, said well casing forming the discharge conduit for the fluid pumped, the fluid pumped surrounding said motor  
125 in the water-tight housing, and a thrust bearing located in the motor housing to take up unbalanced pump thrust. 125

9. In combination with a well-casing hav-  
ing a vertical series of perforations, an ad- 130

justably mounted pumping unit with its motor, a discharge pipe extending vertically from the pump to a point above the uppermost well casing perforations, and an inflatable sealing ring at the upper end of the discharge pipe to form a watertight joint between suction and pressure zones.

10. In combination with a well casing having a vertical series of perforations, an adjustably mounted pumping unit with its motor, a discharge pipe extending vertically from the pump to a point above the uppermost well casing perforations, and an inflatable sealing ring at the upper end of the discharge pipe to form a watertight joint between suction and pressure zones, and collapsible and expansible anchor-rings at the pump unit for anchoring the same to the well casing.

11. In combination with a well casing having a vertical series of perforations, an adjustably mounted pumping unit with its motor, a discharge pipe extending vertically from the pump to a point above the uppermost well casing perforations, an inflatable sealing ring at the upper end of the discharge pipe to form a watertight joint between suction and pressure zones, collapsible and expansible anchor-rings at the pump unit for anchoring the same to the well casing, and such anchor rings constructed to provide fluid passages.

12. In combination with a well casing, an adjustably mounted pumping unit with its motor, and collapsible and expansible anchor-rings at the pumping unit for holding the same in the well-casing.

13. In combination with a well casing, an adjustably mounted pumping unit with its motor, collapsible and expansible anchor rings at the pumping unit for holding the same in the well casing, the lower portion of

the discharge conduit from said pump surrounding the motor.

14. In a vertical pumping unit, a motor inclosed in a watertight casing of smooth exterior constructed and adapted to present the least resistance to water flow thereover, a centrifugal pump axially alined therewith and adapted to be driven by said motor, said pump having a casing with a bottom inlet thereto and an annular formed discharge outlet passage therefrom constructed and adapted to direct water flowing therethrough over the said smooth exterior casing substantially as and for the purpose set forth.

15. In a vertical shaft pumping unit as set forth in claim 14 and in combination with said casing sealing means constructed and adapted to seal said casing within a well to separate the said inlet from the said outlet of the pump and to prevent the return of pumped water to said inlet.

16. In a vertical shaft pumping unit as set forth in claim 14 and in combination with said casing sealing means constructed and adapted to seal said casing within a well to separate the said inlet from the said outlet side of the pump and to prevent the return of pumped water to said inlet, said sealing means comprising an inflatable annular casing substantially as shown and described.

17. In a vertical shaft pumping unit as set forth in claim 14 and in combination with said casing sealing means constructed and adapted to seal said casing within a well to separate the said inlet from the said outlet side of the pump and to prevent the return of pumped water to said inlet, said sealing means comprising an inflatable annular casing substantially as shown and described and connections whereby said casing may be inflated or deflated from a remote point.

ROBERT SCHORR.