Dec. 27, 1938. C. C. TAYLOR 2,141,672

BAILER

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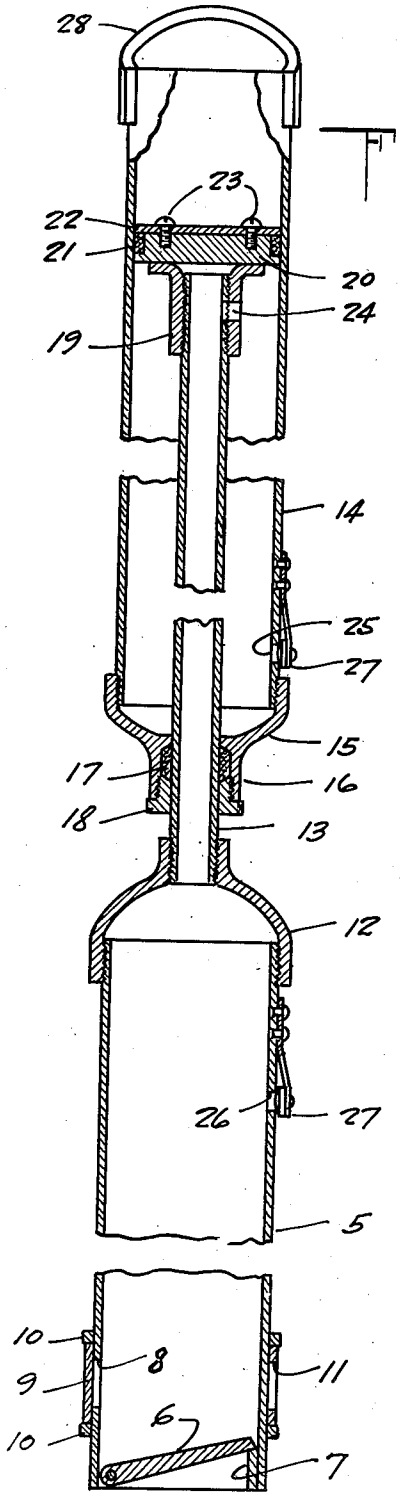



Fig. 1

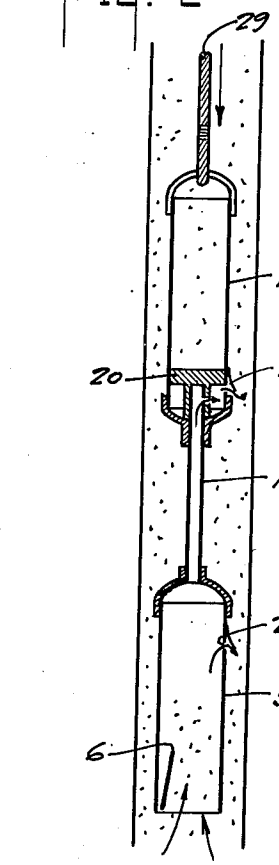



Fig. 2

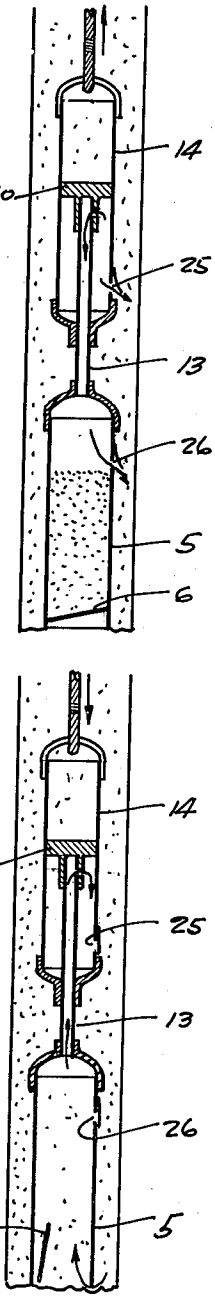



Fig. 4




Fig. 3

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## BAILER

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16 Claims. (Cl. 166—19)

This invention relates to vacuum bailers and more specifically to devices of that character comprising in combination a sand pump adapted to suddenly create a chamber of reduced pressure and expose the same to the debris accumulated at the bottom of a well.

In preliminary oil well operations where drilling tools are being used, detritus, consisting generally of cavings and drillings fill the bottom of the well, and unless promptly and efficiently removed greatly impede progress of the hole. During subsequent flowing or pumping of the well, sand, carried into the screen through perforations thereof, settles in the casing, and building up the bottom of the well greatly restricts the exposed area of producing sands with a consequent reduction in the quantity of oil produced. Tools of various types have been devised for removing this accumulated debris, such, for instances, as agitators and gravity bailers, the use and disadvantages of which being well known.

A principal object of the present invention is to provide a sand bailer having a receiving chamber adapted in operation to be dropped forcibly against the bottom of a well hole and through the automatic relative movement of an auxiliary chamber therewith to draw debris into said receiving chamber.

A secondary object hereof is the provision of means to drive a pipe section of maximum diameter into the sand at the bottom of a well adapted to simultaneously cooperate with the suction above mentioned to facilitate filling the chamber with the sand or the like for its subsequent removal.

Other objects, obvious to one skilled in the art to which this invention appertains, are ease of assembly, durability, positive and complete action, and facility of operation.

To the attainment of these ends and the accomplishment of other new and useful objects as will appear, one embodiment of my invention is illustrated in the accompanying drawing, in which,—

Fig. 1 is a longitudinal section of my invention;

Figs. 2, 3 and 4 are reduced sectional views, illustrating by means of arrows the effect on fluid and debris in the well at consecutive stages of the operation of the device.

Referring to the drawing in detail, the numerals of which indicate similar parts throughout the several views, 5 designates a pipe section at the bottom of which, illustrated diagrammatically by numeral 6, is an inwardly-swinging back-pressure valve, having a seat 7 on the inner periphery of said pipe section 5. A port 8 near the bottom of pipe 5 is normally maintained in closed position by a sleeve 9 held in rotative engagement with pipe 5 by annular flanges 10 thereon. A port 11 through sleeve 9 may thus be brought into registry with port 8 for the dumping or debris within the pipe as will hereinafter more fully be described.

A reducing coupler 12 threaded to the upper end of pipe 5, permits the attachment thereto of tubing 13 which is adapted to project into a second pipe section or vacuum chamber 14. A reducing collar 15 is provided on the lower end of section 14, to slidably engage tubing 13, having an annular downwardly-extending projection 16 in which packing 17 is compressed by gland 18 threaded to the inner periphery of said projection 16, to prevent loss of suction therethrough.

A piston is provided within pipe section 14 comprising pipe flange 19 threaded to the upper end of tubing 13, which is also secured by any suitable means to disk 20 adapted to slidably engage the walls of pipe section 14. The periphery of disk 20 is annularly cut away to receive packing 21. Plate 22, secured to the main body of said disk 20 by means of screws 23—23 is provided for the removable placement and compression of packing 21. Directly below the piston a port 24, located in tubing 13, completes means for the circulation of fluid between pipe sections 5 and 14.

At the top of pipe 5 and at the bottom of pipe 14 a pair of holes 25 and 26, respectively, are provided, furnished with one-way valves 27, to relieve pressure within said pipes and prevent ingress therethrough.

A bail 28, secured to the open upper end of pipe 14 furnishes means for the attachment of a manila rope or cable 29 for lowering the device in the well and controlling the position of the piston within pipe section 14.

Referring to the operation of my invention: As the device is lowered in the well, tubing 13 is relatively extended (Fig. 2) and valve 6 is opened by the pressure of fluid through which it passes. When the strata to be bailed out is nearly reached the speed of descent is increased to forcibly precipitate pipe 5 against the bottom where its narrow walls tend to imbed in the soft accumulations. The downward progress of pipe 5 being stopped, tubing 13 telescopically contracts in pipe 14, which raises the piston relative thereto, creating a pressure differential between the two sections of pipe 5 and 14, which tends to diminish

by the suction of debris below the bailer through valve 6 into pipe 5. This operation may be repeated, if necessary, until the bailer is full when it may be removed from the well.

Raising of the device from the well-bottom closes valve 6 due to the weight of the material thereabove within section 5. As pipe section 14 is raised the pressure below the piston, created by the relative downward movement thereof with respect to pipe 14, is relieved through valves 25 and 26. After withdrawal of the bailer from the well, detritus may be drained therefrom by rotating sleeve 9 so as to bring port 11 into registry with port 8 as aforesaid.

Pipe 14 may be constructed with a greater capacity than pipe 5 in which instance the maximum suction would be created as above noted, which could never be entirely counteracted by the filling of cylinder 5, and pipe 14 would be restrained in its precipitation by the suction in the lower part of said pipe section; or if the pipe 14 be made smaller than pipe 5 its weight may be utilized, wholly or partially, to drive the lower pipe into the sand by direct blows to fill the bailer, the piston and tubing 13 being primarily employed as a guide for said pipe 14.

It will be observed that the bucket performs the dual function of a receptacle and an abutment to compel actuation of the pump by stopping downward progress of the piston to which it is rigidly connected upon its contact with the matter to be bailed without immediately impeding continued precipitation of the pipe section 14, thereby enabling the creation of suction in the pump.

The appended drawing and the above description combine to disclose what I believe to be a preferred embodiment of my invention, but numerous changes may be made in design and relative proportions of the various parts without departing from the spirit of my invention.

What I claim and desire to secure by Letters Patent, is:

1. In a well bailer, a bucket, an inlet valve located in the lower end thereof, a vacuum pump comprising a cylinder and a piston connected with said bucket adapted for actuation to create suction by the precipitation of the bucket against the matter to be bailed and means to communicate suction from said pump to said bucket.

2. In a well bailer, a bucket, a pump connected to said bucket comprising a cylinder having a piston therein adapted for relative movement to create suction in the bucket by the abrupt precipitation of said bucket against matter to be bailed, means to communicate suction from said pump to said bucket, and a valve-controlled port to relieve pressure created by the relative movement of said piston and cylinder.

3. In a well bailer, a bucket, a cylinder, a piston within said cylinder linked to both cylinder and bucket, and adapted to move relative to said cylinder by the precipitation of said bucket against matter to be bailed.

4. In a well bailer, a bucket, a cylinder reciprocable relative to said bucket, a piston, a pipe connected to the bucket supporting said piston above said bucket and within said cylinder, and communicating said bucket with said cylinder, said cylinder having means to relieve pressure created by the relative movement of said piston with respect to said cylinder.

5. In a well bailer, a bucket, a pipe connected to the upper end of said bucket, a cylinder concentric with and slidably engaging said pipe at its lower end, a piston connected with said pipe and reciprocable within said cylinder to create a partial vacuum by movement of said cylinder toward said bucket, said pipe having a port therein to communicate said bucket with said cylinder.

6. In a bailer, a pair of pump elements consisting of a plunger and a barrel, said plunger and barrel being relatively reciprocable, means connected to one of said elements to support the same by means of a rope, one end of said barrel being restricted to limit movement of said pump elements, an abutment extending below the pump element to which said means is attached and connected to the other of said pump elements so as to allow relative movement of said elements by precipitation of the abutment against the matter to be bailed, a bucket, and means to communicate the bucket with the area between the plunger and the end of the cylinder separated from the plunger by gravitation of the pump element to which said first-mentioned means is connected.

7. In a bailer, a bucket, two elements of a pump consisting of a barrel connected to said bucket and a plunger in said barrel to divide the bore thereof into two chambers, said plunger being slidable in said barrel to reduce and enlarge the chambers of the barrel by gravitation of one of said elements with respect to the other, means to communicate the enlarging chamber with said bucket, and means to relieve pressure in the other of said chambers.

8. In a bailer, a bucket, a plunger carried by the upper end of said bucket, a barrel above said bucket in which said plunger is adapted to reciprocate, and means to communicate the chamber in said barrel below said plunger with the bucket.

9. In a bailer, means comprising a bucket, a piston connected to said means, an inclosed suction chamber formed by said means and said piston, said piston being reciprocable within said chamber to simultaneously create pressure and suction on opposite sides thereof, means to communicate suction created by said piston and chamber to said bucket, and means to relieve pressure and preserve suction in said first-mentioned means, including means to relieve pressure simultaneously with the preservation of suction in said first-mentioned means.

10. In a bailer, a pair of pump elements comprising a cylinder having a piston in and movable with respect to said cylinder to create suction below said piston by the gravitation of one of said pump elements with respect to the other thereof.

11. In a bailer, means comprising a bucket and a cylinder, a piston in and movable with respect to said cylinder to create a partial vacuum by precipitation of the bailer against the matter to be bailed, means to communicate the vacuum to said bucket simultaneously with its creation in said cylinder by said relative movement of said piston.

12. In a bailer, means comprising two closed chambers forming a bucket and a cylinder, a piston within and slidable relative to the walls of said cylinder to create pressure and suction, means to retain said piston within said cylinder, and means to relieve pressure below said piston while suction is created above said piston, and means to communicate suction below said piston to said bucket while relieving pressure above said piston.

13. In a bailer, means comprising a cylinder and a bucket, means comprising a passageway and a piston movable in said cylinder to create suction in said bucket by precipitation of the bailer against the matter to be bailed.

14. In a bailer, a pair of pump elements consisting of a cylinder, and a plunger in said cylinder, an abutment extending below the lower end of one of said elements connected to the other of said elements to limit by its abutment against the matter to be bailed the gravitation of the element to which it is attached to cause said plunger and one end of said cylinder to separate, and means to seal the last-mentioned end of said cylinder.

15. In a well bailer, a pair of pump elements comprising a cylinder having a sealed end and a piston in said cylinder, means to lower the bailer into a well connected to one of said pump elements, a member connected to the other of said pump elements extending below the pump element to which said means is attached, a bucket, and means to communicate the zone between the sealed end of said cylinder and said piston to the bucket.

16. In a bailer, a bucket, two elements of a pump consisting of a barrel connected to said bucket and a plunger in said barrel to divide the bore thereof into two chambers, said plungers being slidable in said barrel to reduce and enlarge the chambers of the bailer by gravitation of one of said elements with respect to the other, and means to communicate the enlarging chamber with said bucket.

CLAUDE C. TAYLOR.