

Oct. 18, 1938.

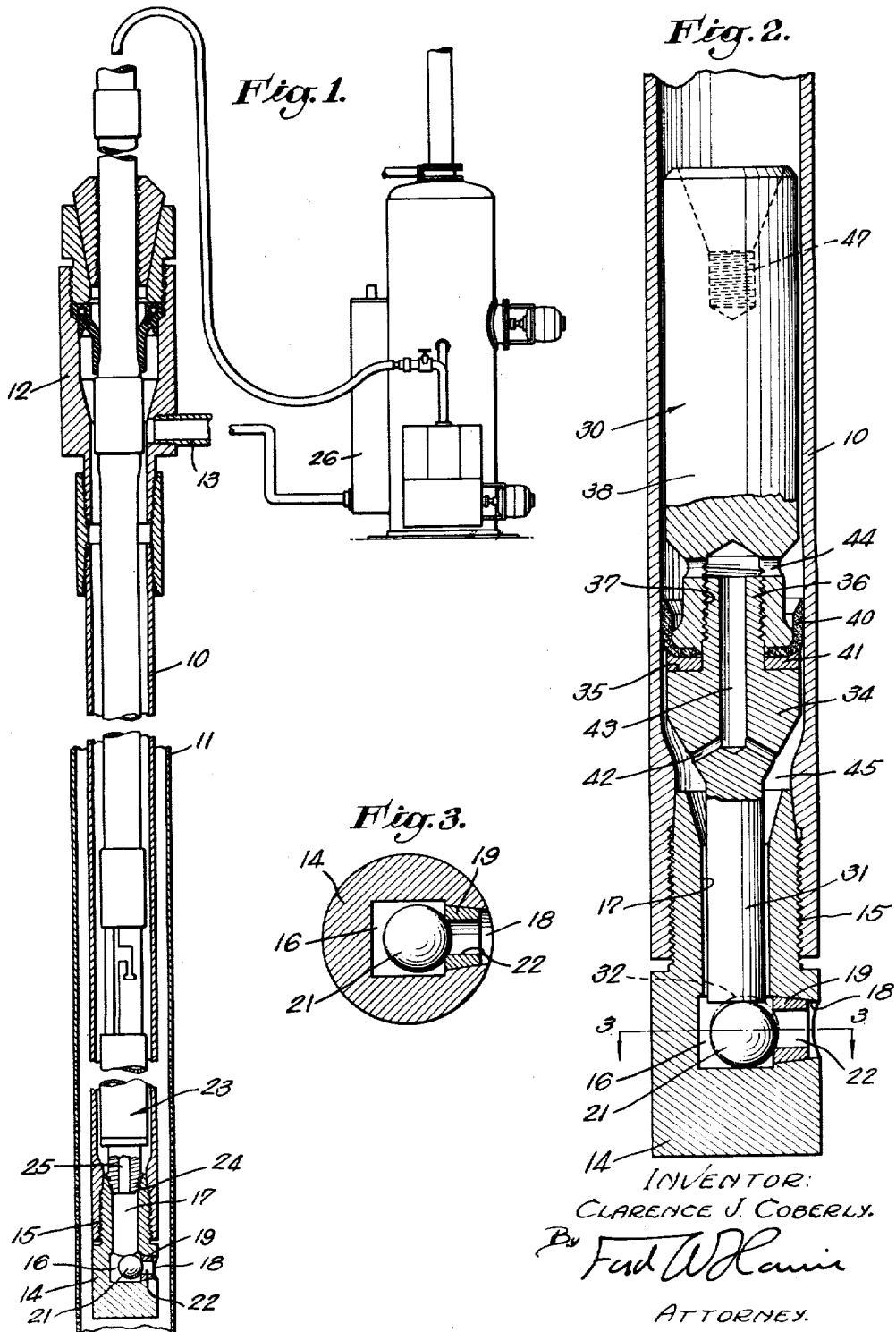
C. J. COBERLY

2,133,272

MEANS FOR DRAINING OIL WELL TUBING

Filed Feb. 11, 1935

2 Sheets-Sheet 1



Oct. 18, 1938.

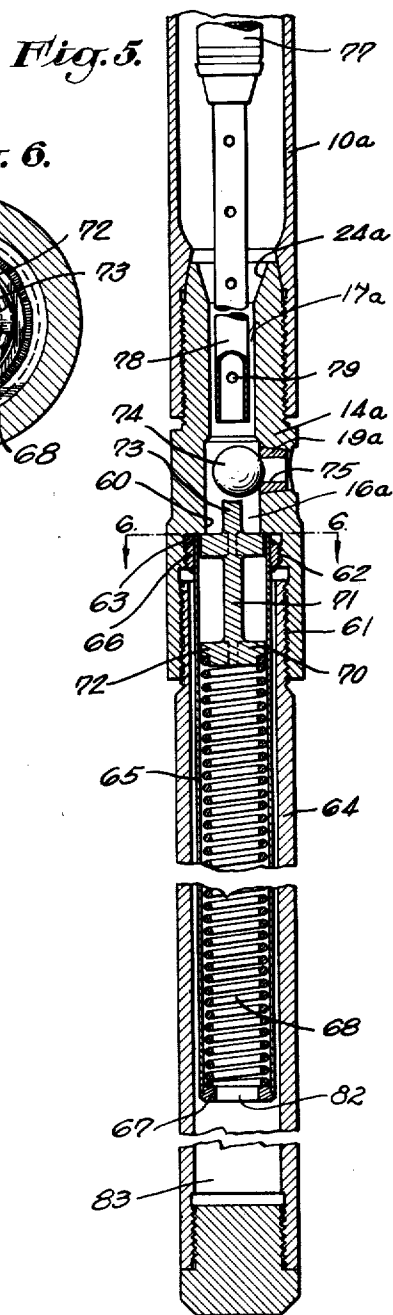
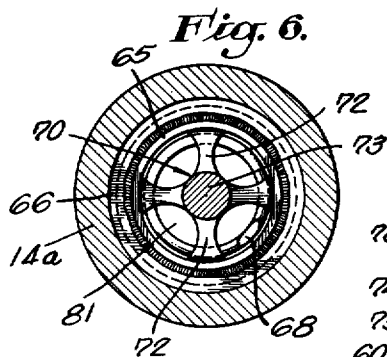
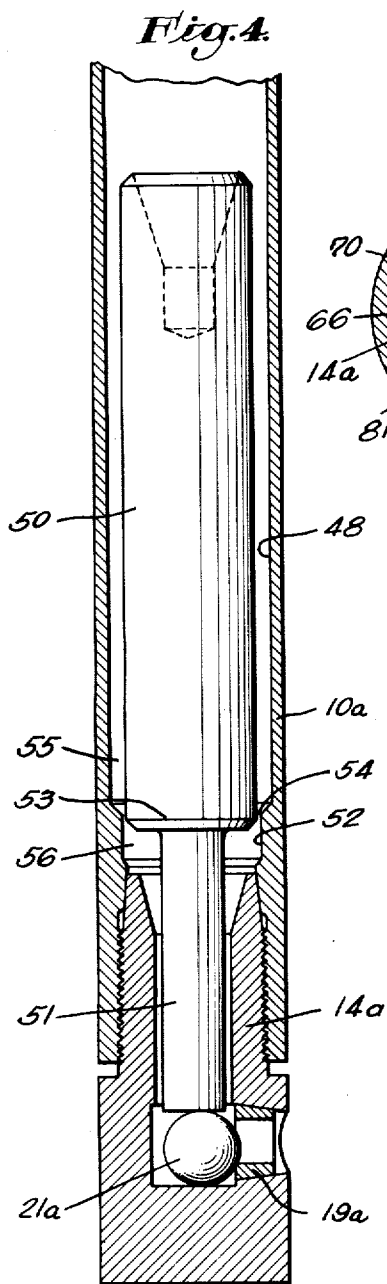
C. J. COBERLY

2,133,272

MEANS FOR DRAINING OIL WELL TUBING

Filed Feb. 11, 1935

2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

2,133,272

MEANS FOR DRAINING OIL WELL TUBING

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of Nevada

Application February 11, 1935, Serial No. 5,928

24 Claims. (Cl. 103-46)

This invention is in part a division of my co-
pending application Serial No. 740,452, filed Aug-
ust 18, 1934, and entitled "Method and appara-
tus for installing deep well pumps", which is-
sued on October 6, 1936, as Patent No. 2,056,418,
and relates in particular to a simple means
for preventing loss of oil from the production
tubing of a well pumping device, together with
means for draining the oil from the tubing when
it is desired to pull the same from the well.

Although the invention may be used with vari-
ous types of pumping equipment, it is particu-
larly adapted for use with the oil production tub-
ing of a fluid operated deep well pump. In such
a pumping device the pump proper is lowered
into the production tube to a point near the
bottom thereof and operates to pump oil from
the well upwardly through the production tube
to suitable discharge piping at the top of the
well. It becomes necessary at times to remove
the pump from the well for the purpose of in-
spection or repair, and it is desirable to do
this without the loss of the oil which is in the
production tube, as the result of the same drain-
ing back into the well when the pump is raised
from its seat at the lower end of the production
tube. This loss of oil is prevented by the plac-
ing of an inlet check valve at the lower end of
the production tube.

Under ordinary conditions of operation the
pump may be operated for long periods of time
and may be removed and repaired many times
without the necessity of pulling the production
tubing.

My invention has for its principal object to
provide a means for opening the inlet check
valve of the production tubing so that the oil
therein will drain back into the well, should it
become necessary for any reason to pull the pro-
duction tubing, thereby avoiding what is known
as a "wet" pulling job.

It is a further object of the invention to pro-
vide a production tube with a check valve struc-
ture at the lower end thereof, and a member
adapted to be lowered through the production
tube for engaging the check valve structure so as
to open the valve of the check valve struc-
ture, this member being so constructed as to pro-
duce a pressure differential above and below the
same, so as to hold the check valve in open re-
lation against hydraulic forces tending to close
the same.

It is an object of the invention to provide a
production tubing with an inlet check valve at
the lower end thereof, and means adapted to be

lowered into the production tubing from the up-
per end thereof, which, upon reaching the bot-
tom of the well will open the inlet check valve
so that the oil content may drain from the same.

It is a further object of the invention to pro-
vide a valve opening means of the above char-
acter having an orifice therein through which
the escaping oil must pass on its downward flow
through the production tubing to the check valve,
thereby producing a pressure differential above
and below the device to produce a force sufficient
to hold the inlet check valve open against the
hydraulic pressure tending to close the same.

It is a further object of the invention to pro-
vide a valve for the lower end of an oil tube in
a well, comprising a body having a chamber con-
nected through a vertical passage with the in-
terior of the tubing and having a lateral passage
extending laterally through the side thereof to
the exterior of the body, with an inwardly faced
valve seat in this lateral opening and a closure
member preferably consisting of a steel ball
adapted to be moved by hydraulic pressure into
engagement with the valve seat. In conjunction
with the foregoing, it is an object to provide a
means adapted to be lowered down through the
tubing into engagement with the closure member
so as to move such closure member from en-
gagement with the seat.

It is a further object of the invention to pro-
vide a device of the above character which will
operate satisfactorily even though a material
amount of sediment may collect in the lower end
of the oil tube.

Further objects and advantages of the inven-
tion will be made evident throughout the fol-
lowing part of the specification.

Referring to the drawings, which are for illus-
trative purposes only,

Fig. 1 is a schematic sectional view showing
a preferred use of the valve structure.

Fig. 2 is an enlarged sectional view showing
a valve opening means and the method of its
operation.

Fig. 3 is an enlarged cross section through
the valve structure taken as indicated by the line
3-3 of Fig. 2.

Fig. 4 is an enlarged sectional view showing
an alternative form of valve opening means.

Fig. 5 is a sectioned view showing the form
of the invention adapted for use in the presence
of sediment which may accumulate in the oil
tube, or which may be scraped down from the
wall thereof.

Fig. 6 is a cross section on a plane represented by the line 6—6 of Fig. 5.

In Fig. 1 I show an oil production tube 10 which may be extended down through the piping 11 of a well to the oil producing zone of the well. The oil production tube may be hung in the well by the use of a head 12 having an oil discharge pipe 13 leading therefrom for carrying the oil to a suitable means for disposal. In the lower end of the tube 10 is a valve body 14 which is secured in place preferably by threaded engagement at 15 with the lower end of the tube 10. This valve body constitutes the casing of a valve structure and has a chamber 16 formed therein which communicates through a vertical opening 17 with the interior of the production tube, and which communicates with the exterior of the body 14 through a lateral opening 18 through which oil may pass inwardly from the well. In the lateral opening 18, which tapers outwardly, an inwardly facing valve seat 19 is secured. The diameter of this valve seat is slightly less than the diameter of the vertical opening 17 so that it may be passed through the vertical opening 17 into engagement with the tapered walls of the lateral opening 18 in which it seats in fluid-tight engagement. In the chamber 16 is a closure member, preferably in the form of a ball 21, adapted to move laterally into a position of engagement with the seat 19 whereby to close the opening 22 through the same. Hydraulic pressure exerted on the interior of the tube 10 due to a static head of oil therein will be transmitted to the chamber 16 and will cause the movement of the valve ball 21 into engagement with the seat 19.

In the ordinary operation of the pumping device shown in Fig. 1, a deep well pump 23 rests in a tapered seat 24 formed at the upper end of the valve body 14 so that the inlet opening 25 of such pump 23 connects directly to the upper end of the vertical opening 17 of the valve body. Accordingly, during the operation of the pump, oil is drawn by the pump through the opening 22 and the vertical passage 17, and such oil is discharged by the pump into the space existing around the same in the production tube 10 wherein it travels to the surface of the ground and is discharged through the piping 13 to a suitable oil receiver 26, the characteristics of which form no part of the present invention but which are shown in my copending Patent No. 2,046,770, issued July 7, 1936. The pump 23, when it becomes worn or inefficient from any other cause, is pulled from the production tube 10. As soon as the pump 23 rises from the seat 24, the full pressure of the oil within the production tube 10 is exerted in the valve chamber 16 and causes the closing of the valve structure represented by the ball 21 and the seat 19. Ordinarily, the production tube remains in the well for a long period of time, but when it becomes necessary to remove the production tube from the well, it is desirable to drain the oil therefrom so that such oil will not be spilled upon the derrick floor, as occurs when oil well tubing filled with oil is pulled from a well.

My invention provides a means for moving the ball or closure member 21 into open relation to the seat 19 when it is desired to drain the production tube 10. Such means comprises a member 30 such as shown in Fig. 2 adapted to be moved downwardly through the production tube to the lower end thereof, this member 30 having a downwardly extending part or stem 31 of such size

that it will pass through the vertical opening 17 to strike the ball 21 and displace the same downwardly from the position indicated by dotted lines 32 in Fig. 2 to the position in which it is shown in full lines. In this preferred form of the invention the stem 31 has a head 34 at the upper end thereof formed with an upwardly faced shoulder 35 and a threaded pin 36 adapted to enter a threaded opening 37 of a body 38 which forms the upper part of the member 30 and is of sufficient weight to cause the member 30 to pass downwardly through the body of oil in the production tube 10 at desired velocity.

So that the stem 31 of the member 30 will positively hold the ball 21 in open relation against the hydraulic forces tending to move the same into closed position relative to the seat 22, I provide hydraulic means in connection with the member 30 for producing a downwardly acting pressure differential above and below the same. This hydraulic means consists of a cup washer or sealing member 40 which is held against a dished ring 41 carried by the shoulder 35 of the head 34, and the hydraulic means further consists of metering fluid passages 42 in the member 30 which connect through passages 43 and 44 with the space above the cup washer 40. It will be noted that the metering orifices 42 are formed diagonally in the lower part of the head 34 and that they are of such restricted size that the flow of fluid therethrough will be less than the flow capacity of the opening 22 when the ball 21 is held in open relation to the seat 19, as shown in Fig. 2. The pressure differential thus produced results in a lower pressure in the space 45 below the cup washer 40, the result being that the member 30 is held forcibly downwardly by a superior pressure of fluid against the upper end thereof, to assure the holding of the ball 21 in open relation as shown in Fig. 2. Not only is the ball 21 held downwardly with great pressure, but the forces tending to move the same laterally into engagement with the seat 19 are reduced by reason of the fact that the pressure of fluid in the space 45 and in the chamber 16 is reduced as the result of the passage of the fluid through the restricted metering orifices 42. Should it be desired to remove the opening device 30 from the position in which it is shown in Fig. 2, without removing the production pipe 10 from the well, I provide a socket 47 in the upper end of the body 38 which may be engaged by use of a suitable device lowered into the production tube 10 for this purpose.

In Fig. 2 I have shown a form of valve actuating device in which the hydraulic pressure differential is produced by the use of flow restricting orifices formed in the body of the valve actuating device represented by the member 30 of Fig. 2. In Fig. 4 I show a form of my invention in which the pressure differential is produced by the use of exterior orifice means. In Fig. 4 I have shown a valve body 14a threaded into the lower end of a tube member 10a. The major portion of the opening 48 through the tubing 10a is sufficiently large for the free downward passage of a cylindrical body 50 having a downwardly extending part 51 for engaging a part of the check valve structure carried in the valve body 14a, the engaged part being shown as a ball 21a which is displaced downwardly by the part 51 from a position of cooperation with an inwardly faced seat 19a, as shown in Fig. 4.

The interior of the tube 10a is restricted near its lower end to provide a constricted bore por-

tion 52 of a diameter very little larger than the diameter of the lower end of the cylindrical body 50. The restricted bore 52 is so placed, and the length of the downwardly extending part or stem 51 is so selected, that as the ball 21a is displaced downwardly, the lower end 53 of the member 50 will pass into the upper end of the restricted bore 52, the parts 52 and 53 then forming a flow restricting valve means providing a very narrow annular orifice 54 between them through which oil may pass from the space 55 above the restricted bore portion 52 to the space 56 below the restricted bore portion 52.

In the alternative form of the invention shown in Fig. 5 a valve body 14a is shown connected to the lower end of a tubing member 10a. The valve body 14a has a tapered seat 24a in the upper end thereof, but the lower end of the valve body 14a is provided with an axial opening 60 equipped with internal threads 61 and 62 and a radial, downwardly faced shoulder 63 above the threads 62. Into the threads 61 a chamber member or sediment receptacle 64 is screwed, and in the upper portion of the receptacle 64 a guide sleeve 65 is secured. This guide sleeve 65 consists of a thin-walled tube having a threaded collar 66 secured to the upper end thereof, this collar being threaded to engage the internal threads 62. The internal diameter of the guide sleeve 65 is slightly greater than the diameter of the chamber 16a of the valve body 14a.

In the lower end of the guide sleeve 65 a collar 67 is secured to provide a stop for the lower end of a compression spring 68 which extends upwardly within the sleeve 65 and resiliently holds a movable spider 70 in raised position and against the downwardly faced shoulder 63 of the valve body 14a. This spider 70 comprises an axial portion 71 with legs or arms 72 extending radially from the ends thereof so as to have guiding engagement with the sleeve 65. Extending upwardly from the spider 70 is a post 73 adapted to support a ball 74 in a position to cooperate with the valve passage 75 through a valve seat 19a carried by the valve body 14a. Where the valve structure shown in Fig. 5 is employed, a pump 77, which is to be seated in the tapered valve seat 24a, is provided with a downwardly extending tubular inlet pipe 78 having a number of radial openings 79 therein. The length of this tube 78 is materially greater than the distance from the tapered seat 24a to the valve ball 74 so that when the pump 77 moves into engagement with the seat 24a, the ball 74 will be forced downwardly, pushing the spider 70 downwardly in the guide sleeve 65. Any sediment which has accumulated on the upper end of the spider 70 and around the valve ball 74, and also in or above the tapered seat 24a, will be displaced downwardly by the stem 78. As the stem 78 is moving downwardly from the position in which it is shown in Fig. 5, and before the pump 77 engages the tapered seat 24a, the rush of oil downwardly and outwardly through the valve seat 24a and then through the passage 75 will wash the seat 24a and the vertical passage 17a of the valve body 14a. The openings 81 between the arms 72 of the spider and the opening 82 through the collar 67 at the lower end of the guide sleeve 65 will permit sediment to pass downwardly through the sleeve 65 into the lower portion 83 of the sediment receptacle 64.

When the pump 77 is seated in the tapered seat 24a, its subsequent operation will draw oil inwardly through the inlet opening 75 and then

through the radial openings 79 of the hollow stem 78 into the pump. This form of my invention is of especial utility with the Deep well pump and method of installing and removing the same, application filed March 5, 1935, Serial No. 9,412, in which the fluid operated pump is adapted to pass downwardly through the inner tube of a pair of concentric tubes to operating position. It is found that when such a pump is moved downwardly into operating position, it scrapes sediment from the wall of the inner tube, this sediment collecting at the lower end of the outer tube. The valve structure shown in Fig. 5 makes it possible to dispose of this sediment so that the pump may properly seat in the tapered valve seat 24a.

It will be understood that the construction shown in Fig. 5 may also be used to drain the production tubing 10a when it is desired to remove the tubing from the well without the use of a special valve opening element such as the member 30 or the cylindrical body 50 shown in Figs. 2 and 4, respectively. When the pump 77 is seated in the tapered valve seat 24a, the ball is in lowered position on the spider 70, and the valve passage 75 is open to permit the pump 77 to draw fluid therethrough and force the fluid upwardly through the production tubing 10a. If it is desired to remove both the tubing 10a and the pump 77 from the well at the same time, the pump is raised a short distance away from the seat 24a so as to permit oil to flow downwardly from the production tubing 10a, through the vertical passage 17a, and outwardly through the passage 75, the ball 74 being held below the passage 75 by the stem 78 which is considerably longer than the distance from the tapered seat 24a to the passage 75. Both the tubing 10a and the pump 77 may then be pulled from the well, the tubing being free to drain during such pulling so as to prevent a "wet job." It will thus be apparent that the position of the pump 77 relative to the seat 24a, which may be adjusted from the surface of the ground, may be varied to control the draining action of the valve passage 75 and cooperating ball 74.

Although I have herein shown and described my invention in simple and practical form, it is recognized that certain parts or elements thereof are representative of other parts, elements, or mechanisms which may be used in substantially the same manner to accomplish substantially the same results; therefore, it is to be understood that the invention is not to be limited to the details disclosed herein but is to be accorded the full scope of the following claims.

I claim as my invention:

1. In a well structure of the character described, the combination of: a tube extended down into said well, said tube having a seat near the lower end thereof; an inlet check valve at the lower end of said tube below said seat, said valve comprising a valve opening and a closure member for said opening; and a body adapted to be dropped into the upper end of said tube, whereupon it will gravitate to a position in proximity to said seat, said body having a part adapted to extend through said seat to engage said closure member and displace the same from said valve opening.

2. In a well structure of the character described, the combination of: a tube extended down into said well, said tube having a seat near the lower end thereof; an inlet check valve at the lower end of said tube below said seat, said

valve comprising a valve opening and a closure member for said opening; and a member adapted to be dropped into the upper end of said tube, whereupon it will gravitate to the lower end thereof, said member having a part to extend through said seat to engage said closure member and dislodge the same from said valve opening, and said member having orifice means for producing a downward pressure differential sufficient to hold said closure member in open relation to said valve opening against the hydraulic pressures tending to close the same.

3. In a well structure of the character described, the combination of: a tube extended down into said well, said tube having a seat near the lower end thereof; an inlet check valve at the lower end of said tube below said seat, said valve comprising a valve opening and a closure member for said opening; and a member adapted to be dropped into the upper end of said tube, whereupon it will gravitate to the lower end thereof, said member having a part to extend through said seat to engage said closure member and dislodge the same from said valve opening, a tube-engaging sealing means thereon, and an orifice bypassing said sealing means for producing a downward pressure differential sufficient to hold said closure member in open relation to said valve opening against the hydraulic pressures tending to close the same.

4. In a well structure of the character described, the combination of: a tube adapted to extend down into a well; an inlet check valve in the lower end of said tube, said valve comprising a valve opening and a closure member for said opening; and a releasing member adapted to move downwardly through said tube and engage said closure member to dislodge the same from said opening, said releasing member being so formed as to restrict the downward flow of fluid through said tube to an extent producing a downwardly acting pressure differential above and below said releasing member sufficient to assure the holding of said closure member open against the hydraulic pressure tending to close the same.

5. In a well structure of the character described, the combination of: a tube adapted to extend down into a well, said tube having an inlet check valve structure at the lower end thereof; and means for operating said check valve structure to drain said tube, said means comprising a member adapted to be moved downwardly through said tube to operative engagement with said check valve structure and being so formed as to restrict the downward flow of fluid through said tube whereby to produce a pressure differential above and below said member.

6. In a well structure of the character described, the combination of: a tube adapted to extend down into a well, said tube having an inlet check valve structure at the lower end thereof; and means for operating said check valve structure to drain said tube, said means comprising a member having a tube-engaging seal and an orifice by-passing said seal, whereby to produce a pressure differential above and below said member.

7. In a well structure of the character described, the combination of: a production tube adapted to be extended into a well; an inlet check valve near the lower end of said production tube; and means operable within said production tube to open said valve, said means comprising

a body adapted to slide within said production tube, said body having sealing means thereon for engaging the wall of said production tube, a by-pass connecting above and below said sealing means, and a valve-actuating part projecting downwardly from said body.

8. In a well structure of the character described, the combination of: a tube adapted to be extended into a well; a valve body connected to the lower end of said tube, said valve body having a chamber, a vertical opening connecting said chamber with the interior of said tube, and a lateral opening connecting said chamber with the exterior of said valve body, there being an inwardly faced valve seat in said lateral opening; a valve ball in said chamber adapted to be moved laterally by fluid pressure into engagement with said valve seat; and means operable within said tube to open said valve ball, said means comprising a body adapted to slide within said tube, said body having sealing means thereon for engaging the wall of said tube, a by-pass connecting above and below said sealing means, and a valve actuating part projecting downwardly from said body.

9. In a well structure of the character described, the combination of: a tube adapted to be extended into a well; a valve body connected to the lower end of said tube, said valve body having a chamber, a vertical opening connecting said chamber with the interior of said tube, and a lateral opening connecting said chamber with the exterior of said valve body, there being an inwardly faced valve seat in said lateral opening; a valve ball in said chamber adapted to be moved laterally by fluid pressure into engagement with said valve seat; and means operable within said tube to open said valve ball, said means comprising a body adapted to slide within said tube and having the lower end thereof formed so as to engage said valve ball and dislodge the same from said valve seat.

10. A valve for the lower end of the production tube of a well pumping device, comprising: a body connected to the lower end of said tube, said body having a chamber therein connected to the interior of said tube and a lateral inlet opening connecting said chamber with the exterior of said body, there being a valve seat in said opening faced inwardly toward said chamber; and a closure member in said chamber adapted to move laterally into engagement with said valve seat.

11. A valve for the lower end of the production tube of a well pumping device, comprising: a body connected to the lower end of said tube, said body having a chamber therein connected to the interior of said tube and a lateral inlet opening connecting said chamber with the exterior of said body, there being an inwardly faced valve seat in said opening; a closure member in said chamber adapted to move laterally into engagement with said valve seat; and a valve opening means operative from the inside of said chamber to move said closure member from engagement with said valve seat.

12. A valve for the lower end of the production tube of a well pumping device, comprising: a body connected to the lower end of said tube, said body having a chamber therein connected to the interior of said tube and a lateral opening connecting said chamber with the exterior of said body, adapted to permit the entrance of fluid into said chamber there being an inwardly faced valve seat in said opening; a closure member in said chamber adapted to move laterally into en-

gement with said valve seat; and a receptacle connected to the lower part of said chamber for receiving sediment from said tube.

13. A valve for the lower end of the production tube of a well pumping device, comprising: a body connected to the lower end of said tube, said body having a chamber therein connected to the interior of said tube and a lateral opening connecting said chamber with the exterior of said body, there being an inwardly faced valve seat in said opening, the lower part of said chamber extending below said valve seat so as to form a sediment receptacle; a closure member in said chamber adapted to move laterally into engagement with said valve seat; and downwardly yieldable means supporting said closure member in operative alignment with said valve seat.

14. In a device of the character described, the combination of: a tubular element; a valve means in said tubular element, said valve means comprising a valve opening and a closure member adapted to close said opening; opening means adapted to be longitudinally inserted into said tubular element so as to contact said closure member and unseat it from said opening to permit fluid in said tubular element to escape therefrom through said valve opening; and hydraulic means whereby said opening means is retained in position to maintain said valve means in open position.

15. In a device of the character described, the combination of: a tubular element adapted to contain a pumping means; an inlet check valve in said tubular element adapted to supply fluid to said pumping means, said valve comprising a valve opening and a closure member adapted to close said opening; opening means for moving said closure member from said valve opening so as to open said valve opening; and hydraulic means whereby said opening means is retained in position to maintain said closure member in open position with respect to said valve opening.

16. In a device of the character described, the combination of: a tubular element, said tubular element having a seat near one end thereof; a valve means in said tubular element, said valve means being positioned between said seat and said end, said valve means comprising a valve opening and a closure member adapted to close said opening; opening means adapted to be longitudinally inserted into said tubular element from the other end thereof from said valve means, said opening means having a part adapted to extend through said seat to engage said closure member and displace the same from said valve opening; and hydraulic means whereby said opening means is retained in position to maintain said valve means in open position.

17. In a well structure of the character described, the combination of: a tubular member in a well; valve means at the lower end of said tubular member, including walls forming a valve opening and a closure member adapted to close said opening; means for opening said valve means; and means for reducing the fluid pressure tending to close said valve means when said valve means is open.

18. In a well structure of the character described, the combination of: a tubular member in a well; valve means at the lower end of said tubular member, including walls forming a valve opening and a closure member adapted to close said opening; opening means adapted to be inserted longitudinally into said tubular member so as to open said valve means; sealing means

between said tubular member and said opening means; and walls forming an opening by-passing said sealing means.

19. In a well structure of the character described, the combination of: a tubular member in a well; valve means having a chamber therein, said valve means being adjacent the lower end of said tubular member, including walls forming a valve opening and a closure member in said chamber adapted to close the inner end of said opening; a seat adjacent the lower end of said tubular member; pumping means adapted to be lowered through said tubular member into seating relation with said seat; means for opening said valve means so as to clean said seat as said pump is lowered through said tubular member and before said pump seats on said seat.

20. In a well structure of the character described, the combination of: a tubular member in a well; inlet check valve means having a chamber therein, said valve means being adjacent the lower end of said tubular member in said chamber, including walls forming a valve opening and a closure member adapted to close the inner end of said opening; a seat adjacent the lower end of said tubular member; pumping means adapted to be lowered to the lower end of said tubular member into seating relation with said seat; means for opening said valve means; and means for closing said valve means as said pumping means is raised through said tubular member.

21. In a well structure of the character described, the combination of: a tubular member in a well; inlet check valve means having a chamber therein, said valve means being adjacent the lower end of said tubular member, including walls forming a valve opening and a closure member in said chamber adapted to close the inner end of said opening; a seat adjacent the lower end of said tubular member; pumping means adapted to be lowered to the lower end of said tubular member into seating relation with said seat; means for opening said valve means as said pumping means is lowered through said tubular member; and means for automatically closing said valve means as said pumping means is raised through said tubular member.

22. In a deep well structure of the character described, the combination of: well tubing extending from the surface of the ground down into a well; inlet check valve means having a chamber therein, said valve means being adjacent the lower end of said tubing and associated therewith and providing an inlet therefor, including walls forming a valve opening and a closure member in said chamber adapted to close the inner end of said opening; a pump seat at the lower end of said tubing; and pumping means adapted to seat on said seat in said tubing movable from the surface of the ground for opening said inlet check valve means.

23. In a deep well pumping device, the combination of: a tubular member in a well; check valve means adjacent the lower end of said tubular member and associated therewith and providing an inlet therefor, including walls forming a chamber communicating with said tubular member, walls forming a valve opening communicating between said chamber and the exterior of said valve means, and a closure member in said chamber adapted to close the inner chamber end of said opening; a pump seat adjacent the lower end of said tubular member; pumping means adapted to be lowered through

said tubular member into seating relation with said seat; and means operable by the movement of said pump for removing said closure member from said opening to open said check valve means before said pump seats on said seat.

24. In a deep well pumping device, the combination of: a tubular member in a well; check valve means adjacent the lower end of said tubular member and associated therewith and providing an inlet therefor, including walls forming a chamber communicating with said tubular member; walls forming a valve opening communicating between said chamber and the exterior of said valve means, and a closure member in said chamber adapted to close the inner chamber end of said opening; a pump seat ad-

jacent the lower end of said tubular member; pumping means adapted to be lowered through said tubular member into seating relation with said seat; means for maintaining said check valve means open while said pump is in seating relation with said seat to permit well fluid to enter said pumping means, said means also maintaining said check valve open as said pumping means is raised less than a predetermined distance above said seat to permit well fluid in said tubular member to drain through said opening into said well; and means for closing said check valve means when said pumping means is raised farther above said seat.

CLARENCE J. COBERLY.

CERTIFICATE OF CORRECTION.

Patent No. 2,133,272.

October 18, 1938.

CLARENCE J. COBERLY.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 5, second column, lines 22 and 23, claim 20, strike out the words "in said chamber" and insert the same after "member", line 24, same claim; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 6th day of December, A. D. 1938.

Henry Van Arsdale

(Seal)

Acting Commissioner of Patents.

said tubular member into seating relation with said seat; and means operable by the movement of said pump for removing said closure member from said opening to open said check valve means before said pump seats on said seat.

24. In a deep well pumping device, the combination of: a tubular member in a well; check valve means adjacent the lower end of said tubular member and associated therewith and providing an inlet therefor, including walls forming a chamber communicating with said tubular member; walls forming a valve opening communicating between said chamber and the exterior of said valve means, and a closure member in said chamber adapted to close the inner chamber end of said opening; a pump seat ad-

jacent the lower end of said tubular member; pumping means adapted to be lowered through said tubular member into seating relation with said seat; means for maintaining said check valve means open while said pump is in seating relation with said seat to permit well fluid to enter said pumping means, said means also maintaining said check valve open as said pumping means is raised less than a predetermined distance above said seat to permit well fluid in said tubular member to drain through said opening into said well; and means for closing said check valve means when said pumping means is raised farther above said seat.

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October 18, 1938.

CLARENCE J. COBERLY.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 5, second column, lines 22 and 23, claim 20, strike out the words "in said chamber" and insert the same after "member", line 24, same claim; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 6th day of December, A. D. 1938.

Henry Van Arsdale

(Seal)

Acting Commissioner of Patents.