

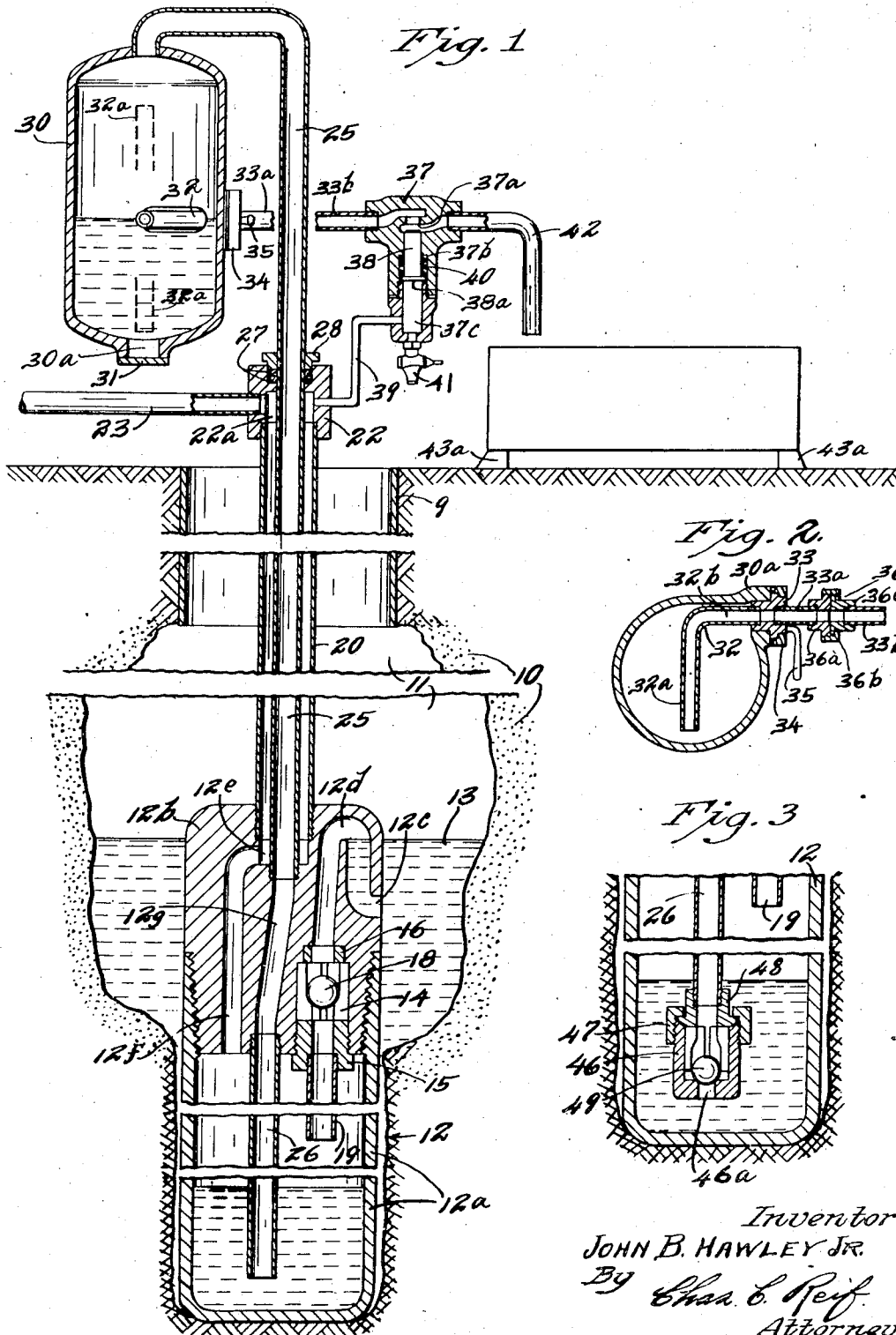
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J. B. HAWLEY, JR.

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OIL WELL BLOWING APPARATUS

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OIL WELL BLOWING APPARATUS

John Blackstock Hawley, Jr., Minneapolis, Minn.,
 assignor to Northern Ordnance Incorporated,
 Minneapolis, Minn., a corporation of Minnesota

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This invention relates to an apparatus for blowing oil from an oil well or from a chamber within a casing in said well.

It is an object of this invention to provide an apparatus for blowing oil from an oil well which requires the use of a comparatively small quantity of compressed air.

It is another object of the invention to provide an apparatus for blowing oil from an oil well by periodically blowing charges of oil through a discharge pipe and regulating the quantity of oil discharged. By having means for regulating the quantity of oil discharged a number of wells can be connected and simultaneously blown by supplying the compressed air through a single main conduit which is connected by suitable conduits to the various wells.

It is still another object of the invention to provide an apparatus for blowing oil from an oil well providing a casing adjacent the oil supply having an inlet opening for oil from said oil supply, a discharge pipe leading from said chamber, a vessel to which said discharge pipe delivers oil, a delivery pipe leading from said vessel and means for varying the position of said delivery pipe in said vessel to vary the amount of oil which can be discharged into said vessel.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawings in which like reference characters refer to similar parts throughout the several views and in which:

Fig. 1 is a vertical central section through the parts of the apparatus, a small portion being shown in side elevation and some parts being broken away;

Fig. 2 is a horizontal section taken substantially on line 2—2 of Fig. 1; and

Fig. 3 a partial vertical section through the oil receiving member showing a modification.

Referring to the drawings a portion of an oil bearing strata or sand is shown at 10 in which will be the cavity or well 11 shown as having the casing 9 therein at its upper end, which casing will extend to the surface of the ground. An oil receiving member or reservoir 12 is provided which will be set into the earth at or adjacent the strata 10, the upper portion of member 12 being disposed in the well 11 so as to be surrounded by the body of oil 13 which accumulates from the strata 10. While member 12 could be made in various forms, in the embodiment of the invention illustrated it is shown as a substantially cylindrical tank having a lower portion 12a which has a somewhat tapered and interiorly threaded upper end into which is screwed the upper portion 12b. Portion 12b has an opening 12c in the side thereof adjacent its top from which a passage 12d leads upwardly and then downwardly

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to a valve cage 14 held in place by or formed on a flanged lug 15 threaded into the lower end of portion 12b. A collar 16 is shown above cage 14 having a valve seat at its lower side adapted to be engaged by a ball valve 18. A pipe 19 extends downwardly from plug 15 some distance into the portion 12a. Portion 12b is centrally bored and threaded at its upper end to receive a pipe or conduit 20. At its lower end within portion 12b conduit 20 communicates with a chamber 12e from which a passage 12f leads downwardly to the bottom of portion 12b, thus communicating with the interior of portion 12a. Conduit 20 extends to the surface of the ground in which the well is located and is threaded into a connection member 22. Member 22 has a chamber 22a therein with which communicates a pipe or conduit 23 threaded into member 22. Pipe 23 will be connected to a source of compressed air or air under suitable pressure. Another pipe or conduit 25 is shown disposed centrally of pipe 20 and thus extends downwardly in portion 12b and is threaded thereinto below chamber 12e. Pipe 25 communicates with a passage 12g in portion 12b and with a pipe 26 threaded into the lower end of portion 12b, which pipe 26 extends to a point adjacent the bottom of member 12. Pipe 25 extends upwardly through member 22 and member 22 is provided with a packing recess at its top adapted to receive packing 27 which will be held in place by a packing gland 28 adapted to be secured and moved by bolts not shown. Pipe 25 is secured in the top of a vessel 30 and communicates with the interior thereof. While vessel 30 could be variously formed, in the embodiment of the invention illustrated it is shown as a tank of general cylindrical form, the same having a somewhat rounded bottom and a sump recess 30a at its bottom closed by a cover 31 which will preferably be removable. A discharge pipe 32 is disposed in vessel 30 and has an end portion 32a bent at an angle to its portion 32b, which latter is secured in a member 33. Member 33 has a cylindrical portion disposed in a boss 30a of vessel 30, which portion is rotatable in said boss and member 33 has a flange engaged by a packing and sealing member 34 secured to the boss 30a in any suitable manner. Member 33 can be rotated by means of a handle 35 secured thereto. Another pipe 33a has one end threaded into member 33 and its other end threaded into one member 36a of a pipe union 36. Union 36 comprises an outer interiorly threaded member 36b into which member 36a is threaded and a third member 36c having a flange disposed within the end flange of member 36b and contacting member 36a. A pipe 33b is threaded into member 36c and extends to a valve casing 37. Valve casing 37 is provided with a valve seat 37a adapted to be engaged by the upper end of a vertically

movable valve 38 having a flange 38a at its lower end. A compression coiled spring 40 surrounds valve 38 and bears against flange 38a, the same bearing at its other end against the top of a chamber 37b and thus acting to hold valve 38 normally in open position. Valve casing 37 has a chamber 37c below flange 38a with which communicates a pipe 39 which is connected at its other end to member 22 and communicates with chamber 22a therein. The chamber 37c has an opening at its lower end communicating with a pet cock 41 secured in the lower end of casing 37. A pipe 42 is connected to casing 37 and has a downwardly directed end adapted to discharge into an oil receiving reservoir 43 supported upon legs 43a resting upon the surface of the ground.

In operation pipe 23 will constitute an air line which will extend to a central control station. The apparatus will form part of a system controlling possibly 15 to 100 wells, each of which will be equipped with the apparatus shown. A pipe 23 will extend to each one of the wells and as stated, these pipes will be controlled from a central station. The oil 13 will accumulate in the chamber 11 and will pass through opening 12c into passage 12d through collar 18, cake 14, member 15 and pipe 19 into tank or reservoir 12 and will accumulate in the bottom thereof as shown in Fig. 1 until such time as the oil is discharged. The handle 35 will be turned to bring the end of portion 32a of pipe 32 to the desired position. It will be seen that as member 33 is rotated pipe 32 will be rotated. In Fig. 1 pipe 32 is shown as having its portion 32a substantially horizontal. Portion 32a could extend upwardly as indicated in dotted lines and could also extend downwardly as also indicated in dotted lines in Fig. 1. When pipe portion 32a is horizontal as shown in Fig. 1, then oil can be discharged from vessel 30 above said pipe but a certain amount of oil will be retained in vessel 30 below said pipe portion. It will be seen that the portion of oil retained in vessel 30 can be varied by varying the position of pipe portion 32a. In one installation when the end of portion 32a is at its lowest position one barrel of oil could be discharged from vessel 30. When the end of portion 32a is in the position shown in Fig. 1, a half barrel could be discharged. After a period when oil is accumulated in reservoir 12 the operator at the central station will turn air under pressure into pipe 23. While this pressure could be varied as desired, in practice a pressure used has been equal to the weight of the column of oil in pipe 25 plus 50 pounds. When air is thus turned into pipe 23 it passes through chamber 22a downwardly in pipe 20, through passage 12f and air pressure is imposed on top of the oil in member 12. This air pressure acting upwardly through pipe 19 forces ball valve 18 against its seat in collar 16 so that passage 12d is closed. The pressure of the air on the oil in reservoir 12 forces the oil upward through pipe 26, passage 12g and through pipe 25 into vessel 30. Since vessel 30 is already substantially half full due to the position of pipe portion 32a, only approximately one half of a barrel of oil can be discharged thereinto. Another well being operated might have pipe portion 32a positioned so that a full barrel could be discharged into vessel 30 or pipe portion 32a could be disposed so that less than one-half of a barrel could be discharged into vessel 30. The position to which pipe 32a is set will depend on the flow in the individual well. It will be seen that when air pressure is turned into pipe 23 it will pass from chamber 22a

through pipe 39 into passage 37c and will force upwardly and close valve 38. This will close the discharge pipes 33b and 42 so that no oil can pass from vessel 30. After the air pressure has been on pipe 23 for a sufficient time it will be turned off at the control station. This will relieve pressure in chamber 37c and permit spring 40 to open valve 38 and thus open the discharge line through pipes 33a, 33b and 42 from vessel 30. The oil above the end of pipe portion 32a now passes through said discharge line and is discharged by pipe 42 into reservoir 43. There will be some pressure on the oil in vessel 30 which will cause it to discharge and it can also discharge by a syphon action. The oil will flow out of vessel 30 until it reaches the level at which the end of pipe portion 32a is set. The desired portion is thus discharged from the well and from vessel 30. Any sediment collecting in vessel 30 can be removed by removing cover 31 and any sediment collecting in chamber 37c can be discharged by opening pet cock 41. The U-shaped passage 12d acts to form a sand trap to prevent the entry of sand into the member 12. The thread on portions 12a and 12b is made left handed so that portion 12b can be removed and when it is turned it will not loosen the threaded connection of pipes 20 and 25. When the device is assembled the tightening of parts 12a and 12b at their threaded connection will not loosen the threaded connection of pipes 20 and 25 but will tighten the same.

In Fig. 3 a modification is shown in which a valve casing 46 is provided and secured to the lower end of pipe 26. A plug 48 is threaded on the lower end of pipe 26 and has a projecting flange at its lower end engaged by the upper end of casing 46. A connecting ring 47 is threaded on member 48 and has a flange at its top overlying the top of the flange on member 48. Casing 46 comprises a cage in which is disposed a ball valve 49 adapted to seat against a valve seat at the upper end of an opening 46a extending through the bottom of casing 49.

The structure shown in Fig. 3 is provided for low capacity wells. After the oil has been discharged upwardly through pipe 26 as above described and the air pressure is shut off from pipe 23 the column of oil in pipe 26 will act to close valve 49 so that said column will not drain back into member 12. Said column of oil will thus only have to be lifted once.

From the above description it will be seen that I have provided a very simple and efficient apparatus for discharging a predetermined quantity of oil from a number of wells. The discharging operation can be easily and conveniently controlled from a central station as above described. Also as above stated, the amount of oil discharged from each well can be varied in accordance with the flow and productivity of said well. It is apparent that the device will have a high degree of utility for the purpose intended.

It will of course be understood that various changes may be made in the form, details, arrangement and proportions of the parts, without departing from the scope of applicant's invention, which generally stated, consists in a device capable of carrying out the objects above set forth in the parts and combinations of parts disclosed and defined in the appended claims.

What is claimed is:

1. An apparatus for blowing an oil well having in combination, a member adjacent the oil supply having a chamber therein and an inlet opening for the entry of oil from said supply into said

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chamber, means for closing said opening by pressure in said chamber, a discharge conduit for oil extending into said chamber, a pipe through which air under pressure can be periodically supplied to said chamber for actuating said means, a vessel into which said oil is delivered from said discharge conduit and means for varying the effective capacity of said vessel to receive oil and thus to control the amount of oil which can be delivered to said vessel and thus the oil discharged from said chamber.

2. An apparatus for blowing an oil well having in combination, a member adjacent the oil supply having a chamber therein and an inlet opening for the entry of oil from said supply into said chamber, means for closing said opening by pressure in said chamber, a discharge conduit for oil extending into said chamber, a pipe through which air under pressure can be periodically supplied to said chamber for actuating said means, a vessel into which said oil is delivered from said discharge conduit, a discharge means in said vessel and means for varying the position of said discharge means for varying the amount of oil retained in said vessel and thus varying the receiving capacity of said vessel and the amount of oil that can be delivered to said vessel.

3. An apparatus for blowing an oil well having in combination, a member adjacent the oil supply having a chamber therein and an inlet opening for the entry of oil into said chamber, means for forcing the oil out of said chamber by air under pressure, a vessel into which said oil is discharged, a delivery pipe extending from said vessel, a valve in said delivery pipe constructed and arranged to be closed by air under pressure when the latter is supplied to said chamber whereby oil cannot be delivered from said vessel with said valve closed and means for varying the position of said delivery pipe in said vessel to retain different quantities of oil in said vessel.

4. An apparatus for blowing an oil well having in combination, a member adjacent the oil supply having a chamber therein and an inlet opening for the entry of oil into said chamber, means for closing said opening by pressure in said chamber, a conduit extending to adjacent the top of said chamber, a discharge conduit for oil extending to adjacent the bottom of said chamber, means for supplying air under pressure to said first mentioned conduit to force oil from said chamber through said discharge conduit, a vessel to which said discharge conduit is connected into which oil is discharged and means for varying the effective capacity of said vessel to receive oil to thus control the amount of oil which can be delivered thereto and thus removed from said chamber and well.

5. An apparatus for blowing an oil well having in combination, a member adjacent the oil supply having a chamber therein and an inlet opening for the entry of oil into said chamber, a conduit extending to adjacent the top of said chamber, a discharge conduit for oil extending to adjacent the bottom of said chamber, a third conduit for supplying air under pressure connected to said first mentioned conduit, a vessel to which said discharge conduit is connected adapted to contain various residues of oil, an outlet from said vessel, a valve in said outlet, a fourth conduit connecting said third conduit and said outlet for operating said valve to close the same, said valve being normally open.

6. An apparatus for blowing an oil well having in combination, means for forcing oil from said

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well including a discharge conduit a vessel to which said conduit is connected and to which oil is supplied, an outlet conduit connected to said vessel having an inlet end in said vessel and means for varying the position of said inlet end to determine the maximum amount of oil which can be discharged from said vessel and thus the amount of residual oil left in said vessel, said residual oil thus varying the receiving capacity of said vessel and controlling the amount of oil discharged thereinto.

7. An apparatus for blowing an oil well having in combination, a vessel for containing oil, a pipe connected to said vessel, means for forcing oil from said well through said pipe into said vessel by air pressure, a discharge pipe for subsequently discharging oil from said vessel extending into one side thereof, said pipe being rotatable and having a discharge portion in said vessel extending at an angle to the axis of said rotation and having an inlet end whereby said end may be disposed at different levels in said vessel by said rotation of said discharge pipe to vary the maximum amount of oil which will be retained therein and thus to vary the effective receiving capacity of said vessel to thus control the amount of oil forced from said well.

8. The structure set forth in claim 7, a valve in said discharge pipe, said valve being normally open and means for closing said valve by air pressure when oil is forced into said vessel.

9. An apparatus for blowing an oil well having in combination, means for forcing oil from said well including a discharge conduit, a vessel to which said conduit is connected and into which oil is discharged, said vessel retaining a body of residual oil therein, and means for varying the amount of said residual oil and thus the receiving capacity of said vessel to control the amount of oil forced from said well.

10. An apparatus for blowing oil from an oil well having in combination, a tank disposed in said well for receiving oil therefrom, a discharge conduit connected to said tank, a second conduit adapted to carry air under pressure and connected to said tank for forcing oil from said tank through said discharge conduit, a vessel to which said discharge conduit is connected and into which said oil is discharged, and means for varying the effective capacity of said vessel to receive oil for thus controlling the amount of oil discharged into said vessel and from said tank.

11. The structure set forth in claim 9, said means including a discharge pipe connected to said vessel, a passage connecting said second conduit and said discharge pipe, and a valve in said discharge pipe arranged to be closed by pressure of air in said second conduit and passage to prevent discharge of oil from said vessel while oil is being discharged thereinto.

JOHN BLACKSTOCK HAWLEY, Jr.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
350,761	Neff	Oct. 12, 1886
364,084	Boals	May 31, 1887
919,416	Boulcault	Apr. 27, 1909
964,693	Richardson	July 19, 1910
1,210,988	Rosendahl	Jan. 2, 1917
1,839,405	McCabe	Jan. 5, 1932