

W. C. HOLLIDAY.
 APPARATUS FOR FORCING FLUIDS FROM WELLS.
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971,612.

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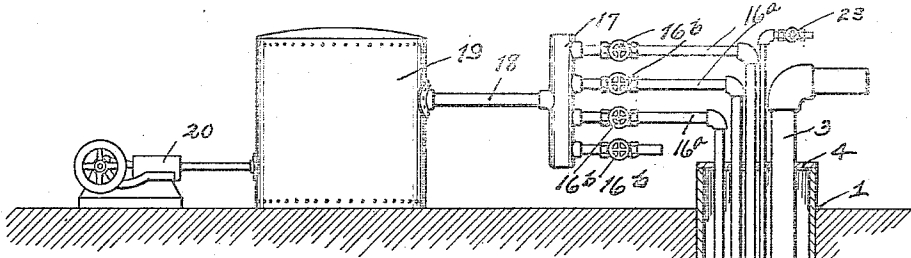


Fig. 1.

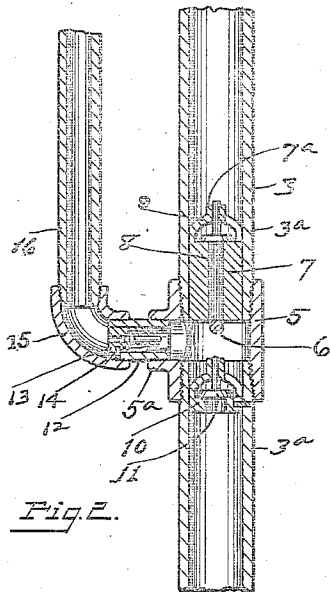
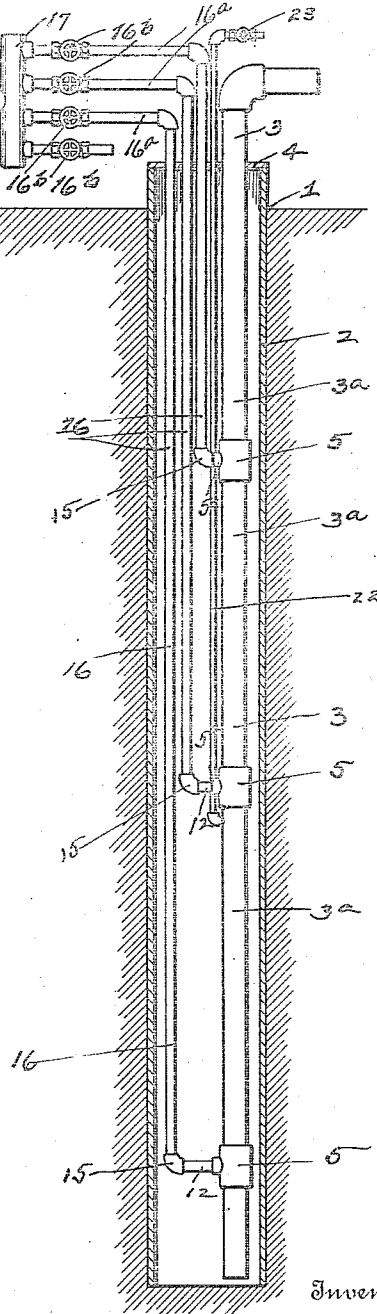


Fig. 2.



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Witnesses

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APPARATUS FOR FORCING FLUIDS FROM WELLS.

971,612.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM C. HOLLIDAY, a citizen of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Apparatus for Forcing Fluids from Wells, of which the following is a specification.

My invention relates to the improvement of apparatus for forcing fluids from wells and has particular relation to means for discharging oil from an oil well.

The objects of my invention are to provide an improved construction of apparatus of this character whereby oil or other fluid contained in a well may be readily driven outward therefrom; to so construct my improved apparatus as to obviate the necessity of lifting the entire volume of oil contained in the outlet pipe of the well at each discharging operation and to otherwise provide a simple and reliable mechanism whereby portions of the oil contained in the well outlet pipe may be successively discharged. These objects I accomplish in the manner illustrated in the accompanying drawing, in which—

Figure 1 is a central vertical section of an oil well showing in elevation my improved discharging mechanism, and, Fig. 2 is an enlarged vertical section through portions of one of the air supply pipes and the oil discharging pipe.

Similar numerals refer to similar parts throughout the several views.

1 represents an oil well and 2 a suitable metallic casing which is inserted therein in the usual manner. Within the oil well, preferably at one side of the center thereof, I provide a vertical oil discharge pipe 3, the upper portion of which extends through the cap plate 4 of the casing 2 from which said discharge pipe may lead to a tank or other oil receptacle. The pipe 3 is composed of a suitable number of sections 3^a, the ends of these sections, which are otherwise separated one from the other, being connected by sleeves or pipe coupling members 5, each of which is formed on one side with a central laterally extending neck 5^a.

Immediately beneath the lower end of each of the pipe sections 3^a with the exception of the lowest section, the T-coupling 5 formed as above described, is provided with a central transverse rod 6 upon which is normally supported the lower end of a plunger

7 which plunger fits slidably in the next higher pipe section 3^a. Formed centrally through each of the plungers is a comparatively small vertical opening or passage 8, the upper end of which is normally closed by a check valve 9, the latter having an upwardly extending stem which passes loosely through a guide opening in an upward extension 7^a of the plunger. Within the upper end portion of each of the pipe sections 3^a is fitted a check valve casing 10, the upper side of the central opening therein, being normally closed by a check valve 11, which is adapted to be raised off its seat by pressure from below.

Connected with the neck 5^a of each of the T-couplings is a short outwardly extending pipe member 12 within which is secured a hollow valve casing 13 within the central bore of which is contained a spring actuated valve 14, the latter being normally closed against a seat formed within the central passage of the casing 13. Through the medium of a suitable coupling or pipe connection 15, the outer end of each of the pipe sections 12 is connected with the lower end of a vertical air pipe 16, said air pipes extending downward into the well through the cap plate 4 and there being one of said air pipes for each of the couplings 5. The upper ends of the air pipes 16 above the well, are connected through the medium of horizontal pipes 16^a with a manifold or air containing head 17, said pipes 16^a each having a suitable cut-off valve 16^b. The head or manifold 17 has leading thereto an air supply pipe 18, which connects with a compressed air tank 19, the latter receiving its charge of compressed air from a suitable pump or compressing engine 20.

The air pipe valves 16^b being closed, it will be understood that oil from the bottom of the well will rise in the pipe 3, the natural pressure of the oil raising the valves 11 and 9 and permitting the oil to move freely upward in the pipe. It being desired to force the oil contained in the pipe 3 upward and outward to a receiving tank or other receptacle, the operation is as follows: The opening of the valve 16^b of the upper pipe arm 16^a results in a discharge of compressed air through the corresponding pipe 16 downward to the first or higher joint of the pipe sections 3^a. The air thus discharged through said pipe section, operates to open the valve 14, thus permitting the entrance of the com-

pressed air into the space between the plunger 7 and the next higher valve 10, thereby forcing said plunger upward in its pipe section. Owing to the weight of the oil above the plunger and the fact that the opening 8 of the plunger is comparatively small, the plunger valve 9 will be retained in a closed position and the oil above the plunger will thus be forced upward and outward through the discharge pipe. It is obvious that when the oil has thus been discharged from the upper section of the discharge pipe, the previously opened valve 16^b may be closed and the next lower valve 16^b opened, resulting in the oil in the next lower pipe section 3^a being forced upward through the valve casing 10 and through the opening 8 of the next higher plunger. It will readily be understood that if the force of the oil is sufficient to raise the next higher plunger, such operation will not interfere with the passage of the oil through the plunger opening 8 which as is obvious will result in the raising of the valve 9.

As indicated at 22 I may if desired employ an air outlet pipe having a suitable controlling valve 23 and having its lower end entering one of the main pipe sections 3^a below the second lowest coupling 5 and valve casing 10. This pipe may be employed if needed to relieve the pipe sections above said next lower valve 11 from any undesirable pressure of air which may exist therein after the air has served the purpose of forcing the oil outward through the discharge pipe.

From the construction and operation described, it will readily be understood that the operation of successively clearing the pipe sections of oil, may be carried out until all of said sections have been emptied and that by these successive operations, the necessity of lifting at one time the entire body of oil contained in the oil discharge pipe, is obviated.

From the foregoing description, it will be seen that simple and efficient means are herein provided for accomplishing the objects

of the invention, but while the elements shown and described are well adapted to serve the purposes for which they are intended, it is to be understood that the invention is not limited to the precise construction set forth, but includes within its purview such changes as may be made within the scope of the appended claims.

What I claim, is:

1. In an apparatus for forcing fluid from wells, the combination with a well, a casing therein, a discharge pipe extending into said well, a plurality of plungers in said discharge pipe having a limited downward movement, each of said plungers having a vertical valve controlled passage, a valve and valve casing below the plungers, and a plurality of air pipes leading into said discharge pipe between the discharge pipe valve and the plunger, said air pipes having valve controlled connections with the compressed air supply.

2. In an apparatus of the character set forth, the combination with a well, a fixed casing in said well, a discharge pipe leading out of said well, a plurality of plungers supported within said discharge pipe and having a limited downward movement, each of said plungers having a central valve controlled opening therethrough, a valve in said discharge pipe below each of said plungers and adapted to be opened by upward pressure from below, an air pipe connected with said discharge pipe between each pair of said plungers and discharge pipe valves, a normally spring closed valve in the connection between each of said air pipes and discharge pipe, said air pipes having valve controlled connections with a common head or manifold, said manifold having a connection with a compressed air supply.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM C. HOLLIDAY.

Witnesses:

A. L. PHELPS,
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