

Feb. 11, 1930.

A. D. LINDSEY

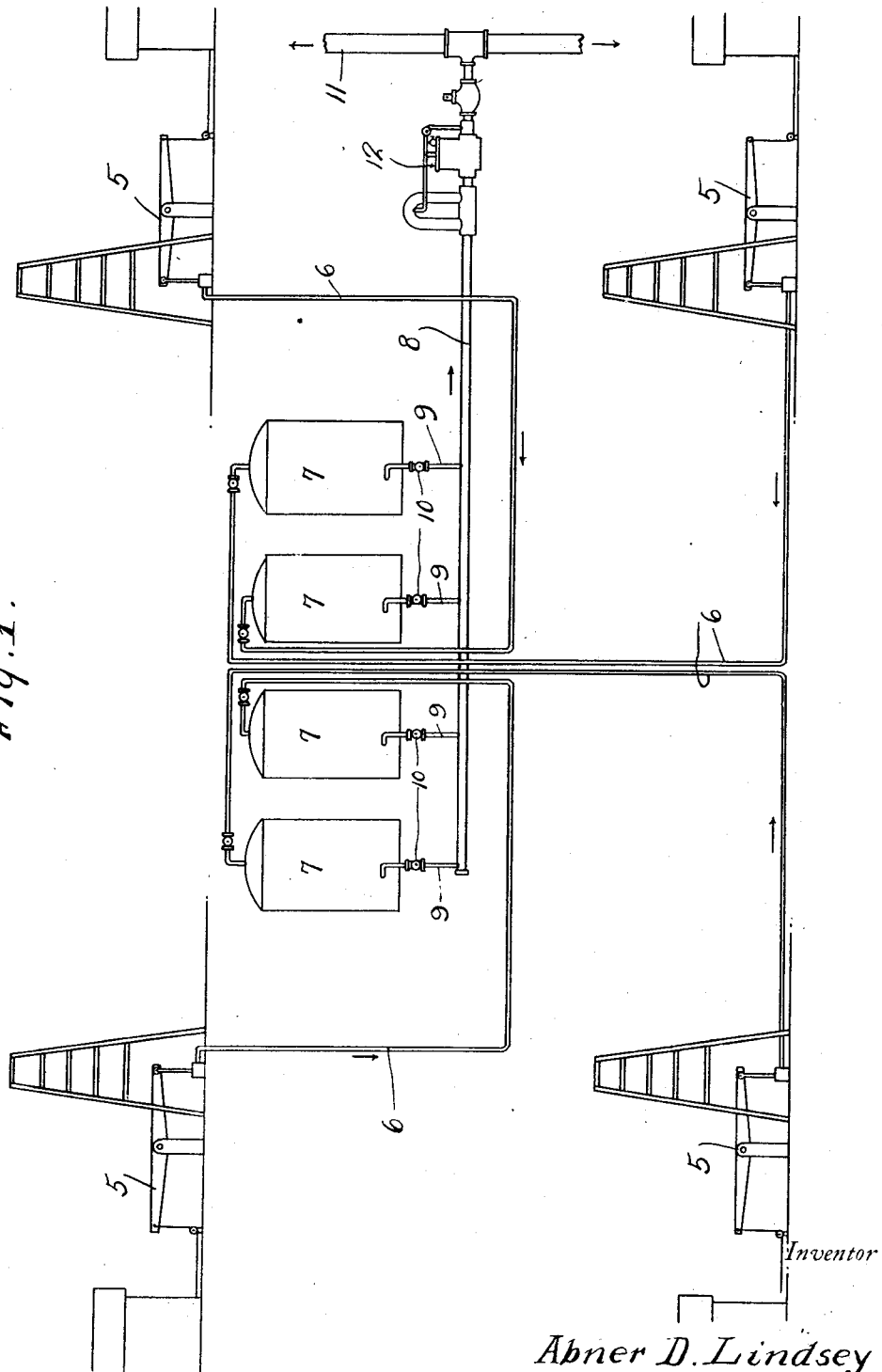
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AIR TRAP FOR PIPE LINES

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3 Sheets-Sheet 1

Fig. 1.



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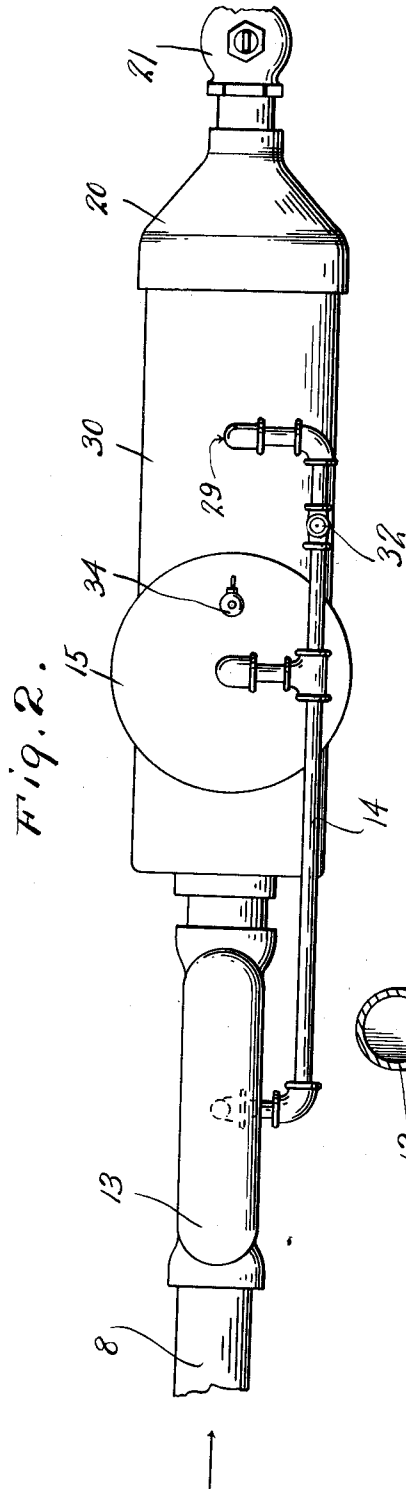


Fig. 5.

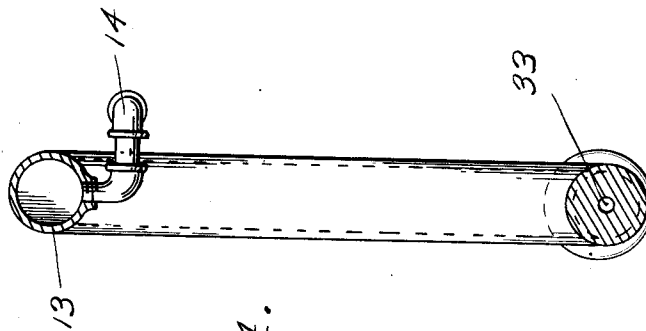
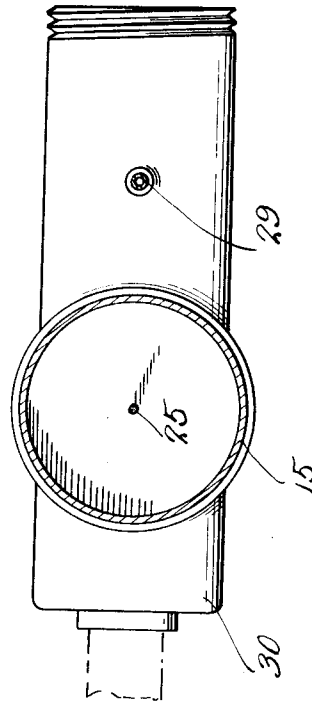


Fig. 4.

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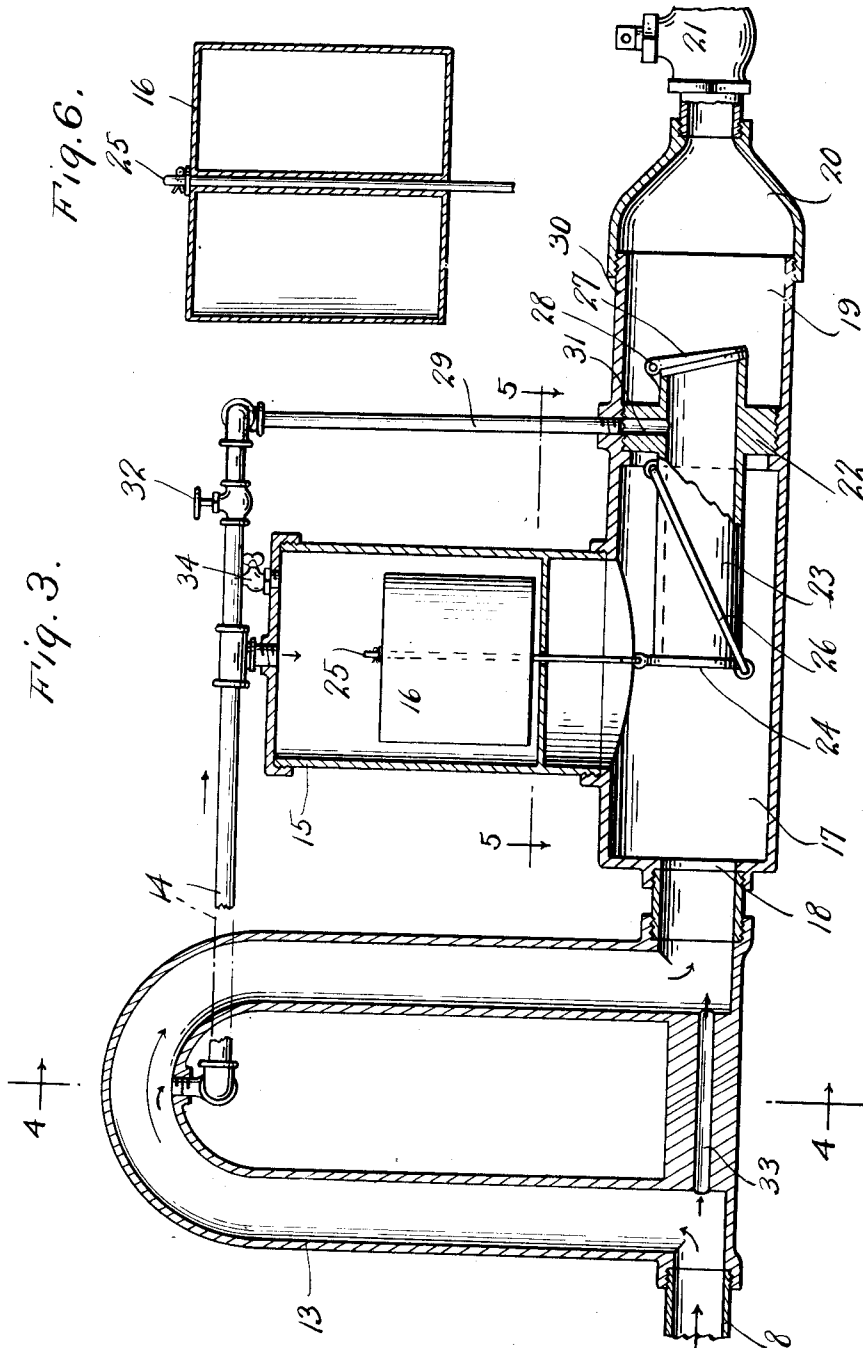
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AIR TRAP FOR PIPE LINES

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

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AIR TRAP FOR PIPE LINES

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The present invention relates to pipe systems adapted for the transporting or transferring of oil from the producer's stock tank to central storage or storage tank or refineries, such system usually consisting of the provision of a main pipe line with numerous branch pipe lines extending therefrom to the producer's stock tank, a siphoning system of pumping being frequently employed, where-
ever possible, throughout the pipe line as a means for transporting the oil. In utilizing such siphoning system however it is necessary that an attendant be constantly present at the stock tank from which the oil is being pumped to prevent the entrance of air into the pipe line upon the emptying of the tank.

It is an object of my invention to provide an automatic air trap interposed between the stock tank and the pipe line whereby to automatically close communication therebetween as soon as the oil in the stock tank has been lowered to a predetermined level.

By thus employing an automatic trap of this character the services of the attendant is dispensed with during the draining of the tank and thus considerable expense is saved in the operation of the pipe line system which usually is arranged for connection with numerous stock tanks throughout a wide area.

A further object of the invention is to provide an apparatus of this character of simple and practical construction, appreciably reliable in performance, inexpensive to manufacture and install and otherwise well adapted for the purposes for which the same is intended.

Other objects and advantages reside in the special construction and combination of the various elements comprising the invention, reference being had to the accompanying drawings forming a part hereof, wherein:

Figure 1 is a diagrammatic view showing a group of oil wells supplying the stock tanks and illustrating the relative position of the air trap interposed between the trap and the pump line,

Figure 2 is a top plan view of the trap,

Figure 3 is a longitudinal vertical section therethrough,

Figure 4 is a vertical sectional view taken

substantially along a line 4—4 of Figure 3,

Figure 5 is a horizontal sectional view taken along a line 5—5 of Figure 3, and

Figure 6 is a vertical sectional view through the float.

Referring now to the drawings in detail and with particular reference to Figure 1 I have illustrated a group of oil wells employing the use of pumping machinery indicated generally at 5 for feeding the oil from the well through the pipe 6 to an individual storage tank 7 with which is connected a common discharge line 8. The connection 9 of each of the tanks with the discharge pipe communicates with the tank a slight distance above the base thereof whereby to enable the sediment carried by the oil into the tank to settle at the base of the tank for draining therefrom at suitable intervals and thus preventing the same from being discharged with the oil through the pipe 8. Cut off valves 10 are arranged in the connection 9 communicating with each of the tanks.

The discharge pipe 8 communicates with a main oil pipe line 11 and between the pipe line 11 and the discharge pipe I interpose my automatic air trap indicated generally at 12.

The trap comprises a riser 13 arranged adjacent the connection with the discharge pipe 8 and constituting a vertically disposed elbow having its upper portion connected with a feed pipe 14 communicating with the float chamber 15 within which a float 16 is arranged for operation upon the entrance of oil into the chamber. Beneath the float chamber 15 is arranged a valve chamber 17 of a substantially cylindrical construction disposed horizontally having openings 18 and 19 respectively at each end thereof. The opening 18 communicates with the base of the riser and the opening 19 communicates with a reducer 20 leading toward the main pipe line 11 with a cut off valve 21 interposed therebetween.

Within the valve chamber 17 is arranged a partition 22 disposed intermediate the ends thereof and closing communication between the opposite ends of the chamber.

A hollow valve box 23 extends through the partition 22, the opposite end of the box being

open whereby to permit communication between the opposite ends of the valve chamber 17. At one end of the box is arranged a valve gate 24 connected by a rod 25 attached to the float 16. By reason of this connection, the gate 24 is mounted for vertical movement and is facilitated during its operation by a supporting arm 26 having one end attached to the valve gate 24. The opposite end of the box 23 is provided with a pressure operated valve 27 pivotally mounted at 28 to the upper edge of the box for outward swinging movement with respect to the adjacent end thereof.

The feed pipe 14 extending from the riser has an extension 29 attached thereto forming a connection with the valve box 23 through an opening in the casing 30 forming the valve chamber. The connection between the pipe extension 29 and the valve box 23 is preferably made through a duct 31 extending vertically through the partition 22. The pipe extension 29 also carries a cut off valve 32 interposed therein. The base of the riser 13 is provided with a bi-path 33 of a relatively smaller diameter than the passageway extending throughout the riser.

In the operation of the device, the valve 21 interposed between the air trap and the main pipe line is normally maintained in a closed position and it will be apparent from an inspection of Figure 3 of the drawings that when the trap is empty the valve 24 and valve 27 will also be closed. The valve 32 is also retained in a closed position when the trap is not in use. When it is desired to drain one of the storage tanks 7 and convey the oil therefrom through the main pipe line 11 a pet cock 34 arranged in the upper portion of the float chamber 15 is open to permit the release of air therefrom and the valve 10 arranged adjacent the tank is also opened permitting oil to flow therefrom to the trap 12 by gravity, which as will be seen from Figure 1 of the drawings is disposed at a lower horizontal level than the tank. The oil entering the riser 13 will pass over the elbow through the feed pipe 14 and into the float chamber 15 thus operating to raise the float and force the air from the trap out of the chamber through the pet cock 34. The cut off valve 32 disposed in the pipe extension 29 is also opened which thereby will allow the oil to also enter the valve box 23 back of the valve 24 and prevent the pressure of the oil upon entering the float chamber from interfering with the raising of the float and the opening of the valve 24 attached thereto. As the float 16 is raised, the valve gate 24 will be opened opening communication to the end 19 thereof adjacent the cut off valve 21. As soon as the trap has been filled with oil and the same begins to overflow through the pet cock 24, the same is then closed and upon

opening the valve 21 the oil will then be permitted to flow into the main pipe line 11.

As soon as the tank 7 has been drained, the oil will stop flowing over the elbow of the riser 18 and into the float chamber thereby permitting the float 16 to lower which results in a closing of a gate valve 24 and preventing any air from entering the main pipe line. The valve 27 will also close as soon as the pressure of the flowing oil ceases so as to prevent air entering the chamber 19 through the pipe 29. The attendant may then close the cut off valves 21 and 32 at his leisure until it is desired to transport the oil from another of the storage tanks to the refinery, these valves being closed before the discharge valve of the storage tank is opened.

The use of the pipe extension 29 is not always necessary and is provided only in cases where the pressure in the tanks 7 is so great as to interfere with the raising of the float at the initial entrance of the oil to the float chamber. The bi-path 33 arranged in the base of the riser enables a limited quantity of oil to be constantly fed into the trap chamber 17 to maintain a constant supply of oil in the chamber even when the level thereof has reached a point below the upper portion of the riser.

It is obvious that the invention is susceptible of various changes and modifications, without departing from the spirit or scope of the invention or sacrificing any of its advantages, and I accordingly claim all such forms of the device to which I am entitled.

Having thus described my invention, what I claim as new is:

1. In an air trap of the class described, a valve casing interposed in an oil feed line, open at each end and constituting intake and discharge ends therefor, a riser attached with the intake end of the casing, a partition arranged intermediate the ends of the casing forming a closure between the ends thereof, a valve box extending through the partition forming a communication between the ends of the casing, a valve arranged at each end of the box, a float operatively connected with one of the valves and a feed pipe extending from the riser to the float.

2. In an air trap of the class described, a casing constituting a valve chamber open at each end, a partition arranged intermediate the ends thereof closing communication between the ends of the casing, a valve box extending through the partition, said valve box being of a tubular formation, valves arranged at each end thereof, a float chamber disposed above the casing, a float arranged therein operatively connected with one of said valves and a riser connected with one end of the casing, said riser also having a connection with said float chamber.

3. In an air trap of the class described comprising a cylindrical casing interposed in a

pipe line at the discharge end of a stock tank,
said casing being horizontally disposed and
open at each end constituting intake and dis-
charge ends of the casing, a partition ar-
ranged within the casing adapted to normally
5 close communication therebetween, a tubular
valve box extending through the partition,
valves arranged at each end thereof, a float
chamber mounted above the casing, a float
arranged therein and oppositely connected
10 with one of said valves, a riser connected to
the intake end of the casing, said riser having
a vertically extending elbow formed therein,
a feed pipe connected with the upper portion
of the elbow communicating with the float
15 chamber, said feed pipe having an extension
communicating with the valve box and a bi-
path formed in the base of the riser forming
a direct communication between the tank and
the intake end of the casing.

20 In testimony whereof I affix my signature.
ABNER D. LINDSEY.

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