July 26, 1955 A. C. CURTIS 2,713,908

APPARATUS FOR COATING THE INTERIOR OF WELL PIPES

Filed Feb. 9, 1953 2 Sheets-Sheet 1

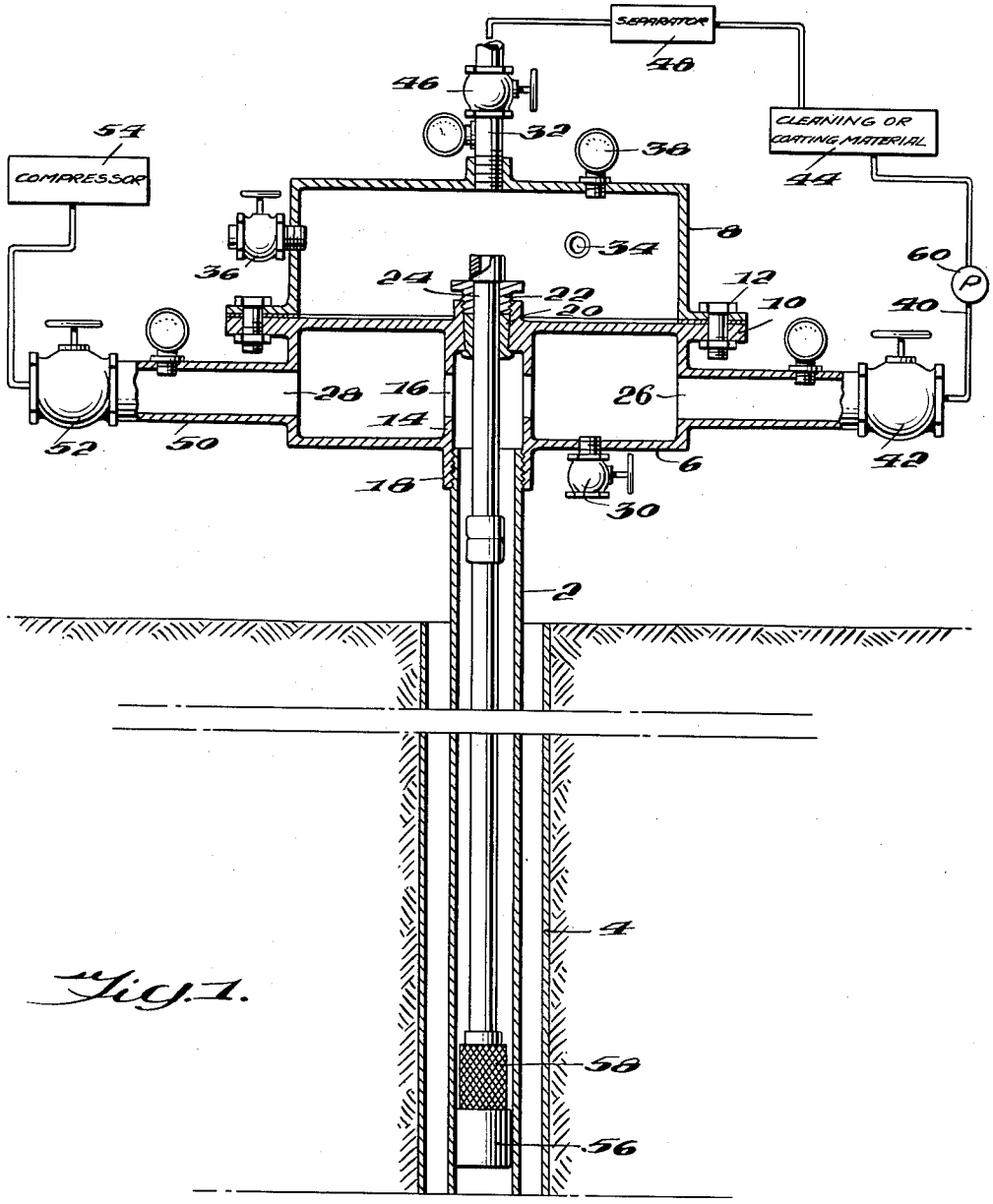


Fig. 1.

INVENTOR
ARVEL C. CURTIS,

BY Bailey, Stephens & Huettig

ATTORNEY

July 26, 1955 A. C. CURTIS 2,713,908

APPARATUS FOR COATING THE INTERIOR OF WELL PIPES

Filed Feb. 9, 1953 2 Sheets-Sheet 2

Fig. 2.

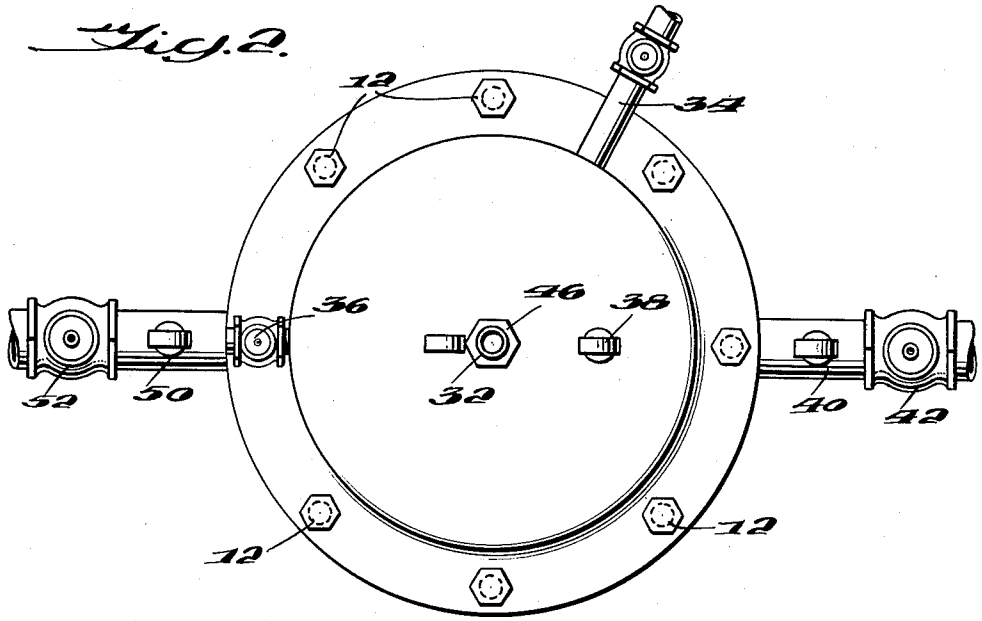
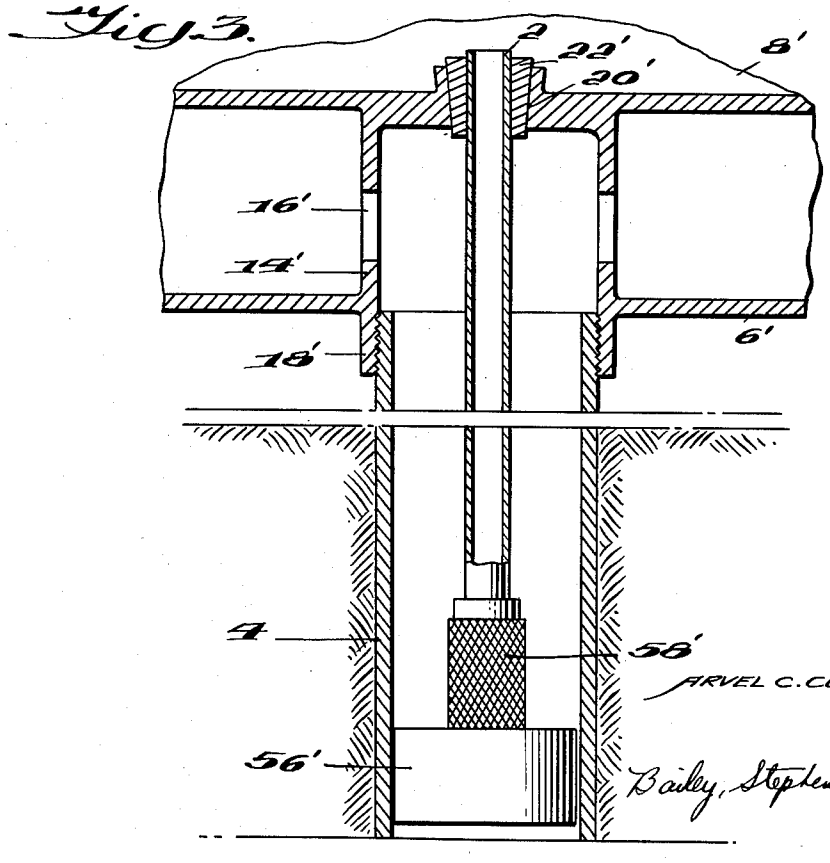


Fig. 3.



INVENTOR
ARVEL C. CURTIS,

Bailey, Stephens & Huettig
ATTORNEY

United States Patent Office 2,713,908 Patented July 26, 1955

2,713,908

APPARATUS FOR COATING THE INTERIOR OF WELL PIPES

Arvel C. Curtis, Odessa, Tex., assignor to Pipelife, Inc., a corporation of Texas

Application February 9, 1953, Serial No. 335,858

6 Claims. (Cl. 166—67)

The invention relates to the cleaning and coating of the interior of wells, and more particularly to the coating of the inside of the tubing, or of the inside of the casing and the inside and outside of the tubing, of oil wells. It is especially directed to apparatus useful for this purpose.

It is recognized that many liquids which are present in wells either damage the interior of the well by corrosive or other action or are likely to coat the interior and clog up the pipes. It is of course possible to coat the pipe sections internally before they are placed in the wel, but when this is done the joints are not properly coated, and are still subject to attack by the liquids in the well.

The primary object of the present invention is to provide an apparatus which can be used in connection with the coating of the interior of wells in position in the ground.

Another object of the invention is to provide an arrangement of this type which is of simple construction and which is easy to use in the cleaning and coating operations.

Still another object of the invention is to provide a device by which it is possible to displace the liquid cleaning or coating material downwardly through the well pipe which is being coated, so as to leave a satisfactory smooth even coating on the interior of the pipe.

Still another object of the invention is to provide an apparatus in which, the liquids being displaced from the well by air pressure, the pressure used can be relatively small compared to the head of liquid in the well.

An additional object of the invention is to provide an arrangement which is of simple and light construction, and is easily portable so that it can be carried to wells such as oil and gas wells which are in remote areas.

Further objects and advantages of the invention will appear more fully from the following description, especially when taken in conjunction with the accompanying drawings which form a part thereof.

In the drawings:

Fig. 1 shows in cross-section an apparatus embodying my invention;

Fig. 2 is a top plan view; and

Fig. 3 is a cross-section showing a part of a slightly modified form of apparatus.

The arrangement shown in Fig. 1 is intended to be used for coating the interior of the tubing **2** of a well having a casing **4**.

The apparatus according to the invention resides primarily in a container or expansion chamber **6** of round horizontal cross-section and a similar cover piece **8** forming a second expansion chamber above the first chamber. The two parts are connected by flanges **10** and bolts **12**.

The chamber **6** has a central tubular part **14** extending upwardly therethrough and provided with openings **16** in its side walls. This part also extends downwardly as at **18** to engage over and be threaded on the top of the tubing **2**. Aligned with the tubular portion **14** is a seat

20 having tapered wells for receiving a wedging arrangement **22**. This is adapted to hold a pipe **24** of smaller cross-section than the tubing **2**, which extends down into the tubing.

Chamber **6** also has lateral openings **26**, **28** at opposite sides thereof. It further has at the bottom a drain valve **30**.

Upper expansion chamber **8** has extending from its top wall a pipe **32** in alignment with the pipe **24**, as well as lateral outlets **34** and **36**, and a pressure gauge **38**.

Opening **26** is connected by a pipe **40** containing a valve **42** to a suitable source **44** of cleaning or coating material. Pipe **32** is connected through a valve **46** and a separator **48** to the container **44**. Opening **28** is connected through a pipe **50** containing a valve **52** to a compressor **54** or other suitable source of compressed gas under pressure.

In using the apparatus just described, a plug **56** is set in the bottom of the tubing **2**, and the lower expansion chamber **6** is threaded on the top of the tubing **2**. A screen **58** is provided at the bottom end of the pipe **24** which extends almost down to the plug **56**. Tubing **24** is introduced through seat **20** and secured in position by holding member **22**. The cap **8** is then secured in position by bolts **12**. Pipes **32**, **40** and **50** are connected to tank **44** and to compressor **54** in the manner shown.

With valves **52** and **46** closed, and valve **36** open, cleaning material is introduced by pump **60** through opening **26** and the expansion chamber **6** until it fills the interior of the tubing **2** and of the pipe **24**. After the cleaning material has been left for sufficient time to loosen the deposits, pump **60** is shut off, valve **36** is closed, valves **52** and **46** are opened and the compressor **54** is started in operation. Compressed air is then introduced into the chamber **6** through opening **28**. This air will push down the liquid standing in the tubing **2**, and displace it upwardly through pipe **24**. Some of the liquid will collect in chamber **8**, while some of it will pass on through pipe **32** to container **44**.

When the liquid level reaches the bottom of tubing **2**, the air or other gas will enter the bottom of pipe **24** and move upwardly therethrough. In so doing, it will partially displace upwardly the liquid in the pipe **24** and will partially entrain this liquid. The entrained liquid will be carried out through pipe **32** and valve **46**, the air will be removed from it in separator **48** and the material will be collected in container **44**.

When all the cleaning material has been displaced, any remaining in chamber **8** can be removed through outlet **34**.

When the cleaning has been completed, compressor **54** is stopped and valves **46** and **52** closed. A container of coating material is substituted for container **44**, and the same operations are repeated with the coating material. This will leave a layer of coating material behind on the inside of tubing **2**, as the material is forced downwardly through this tubing by compressor **54**. Such a coating will be smooth and uniform, and of satisfactory thickness.

Fig. 3 shows an arrangement of a similar nature but adapted to be used for simultaneously coating both the interior of a well casing and the exterior and interior of the tubing. In this system, the apparatus is exactly the same except that the tubular section **14'** and the downward extension **18'** are of such size as to fit over the outside of the casing **4**, while the seat **20'** will receive a holding member **22'** for the tubing **2**.

In using this arrangement, the tubing **2** is first withdrawn from the well, and a plug **56'** is set in the casing at the desired depth. The apparatus is then set on top of the casing **4** in the manner described above, the tubing **2** being introduced with a screen **58'** at its bottom end.

The cleaning and coating are then carried out in the same manner as described above.

At the end of the operation, it is necessary to remove the tubing **2** to get out the plug **56'** and the tubing is then restored to the well and it is ready for operation.

While I have described herein some embodiments of my invention, I wish it to be understood that I do not intend to limit myself thereby except within the scope of the claims hereto or hereinafter appended.

I claim:

1. Apparatus for painting the interior of well pipes or the like comprising, in combination, means forming an expansion chamber having an opening in its bottom for receiving the upper end of a well pipe, the horizontal cross-section of said chamber being substantially larger than such opening, said chamber having at least one opening into the side thereof, means forming a second expansion chamber above the first chamber and separated therefrom, a second opening between said chambers aligned with and of smaller size than the first opening to receive a second pipe within the well pipe, said second chamber having at least one opening therefrom, and means to close the well pipe below the lower end of the second pipe, whereby paint can be forced down from said first chamber through the space between the well pipe and the second pipe and upwardly through said second pipe so as to coat the interior of the well pipe and the second pipe.

2. In a device as claimed in claim 1, means in said second opening to hold the upper end of the second pipe and to shut off communication between the chambers.

3. In a device as claimed in claim 2, means extending downwardly around the first opening to engage the upper end of the first pipe.

4. In a device as claimed in claim 1, means extending downwardly around the first opening to engage the upper end of the first pipe.

5. Apparatus for coating the interior of a well pipe which comprises, in combination, a source of compressed gas, a source of coating material, a casing having top and bottom walls and an intermediate wall dividing the casing into upper and lower expansion chambers, an opening into the bottom wall for connection with a well pipe, the horizontal cross-section of the casing being substantially larger than such opening, an opening in the intermediate wall aligned with the first opening to receive a smaller well pipe, connections from said sources to the lower expansion chamber, a connection from the upper expansion chamber to the source of coating material, and means to close the well pipe below the lower end of the second pipe, whereby paint can be forced down from said first chamber through the space between the well pipe and the second pipe and upwardly through said second pipe so as to coat the interior of the well pipe and the second pipe.

6. In apparatus as claimed in claim 5, said last connection being arranged in the top wall of the casing in alignment with said openings.

References Cited in the file of this patent

UNITED STATES PATENTS

1,587,441	Taylor	June 1, 1926
1,774,640	Dunn	Sept. 2, 1930
1,812,358	Minor	June 30, 1931
2,127,728	Grant	Aug. 23, 1938
2,384,192	Otis et al.	Sept. 4, 1945
2,512,801	Kinney et al.	June 27, 1950