T. Byrne,

Oil Pump.

No. 50,986. Patented Nov. 14, 1865.

Fig. 1.

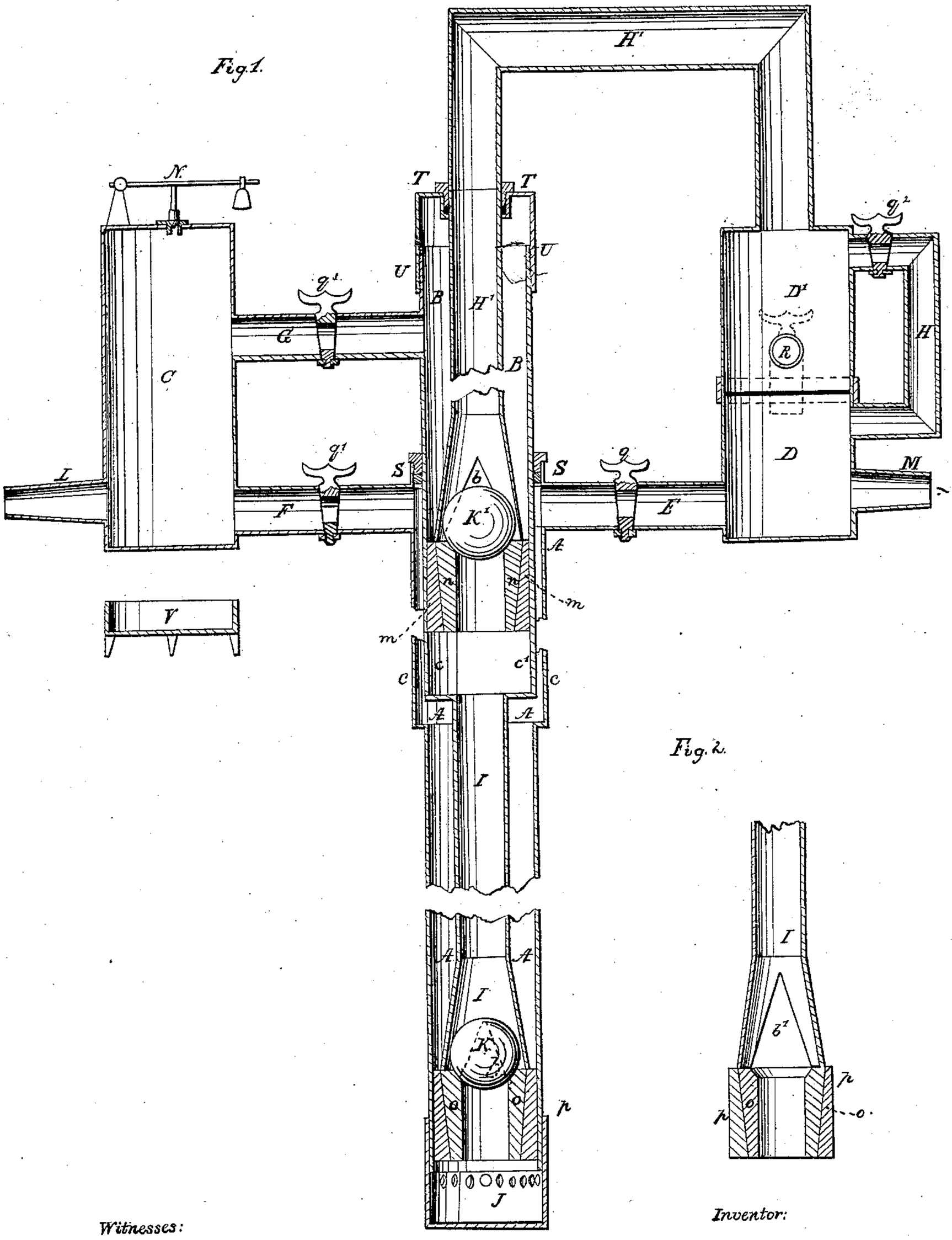

Fig. 2.

Witnesses:

R. Wampbell
Edw. Shafer

Inventor:

Thomas Byrne
by his Attys
Mason, Fenwick & Lawrence

UNITED STATES PATENT OFFICE.

THOMAS BYRNE, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF AND SAMUEL S. SMOOT, OF SAME PLACE.

IMPROVEMENT IN DEEP-WELL ELEVATORS.

Specification forming part of Letters Patent No. **50,986**, dated November 14, 1865.

To all whom it may concern:

Be it known that I, THOMAS BYRNE, of the city, county, and State of New York, have invented a new and useful Improvement in Elevators for Petroleum and other Fluids; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a vertical section of my improved elevator; Fig. 2, a vertical section of one of the valve-seats and a portion of the central pipe.

Similar letters of reference in the two figures indicate corresponding parts.

The nature of my invention consists, first, in the combination of a heater and a chamber in which air is first compressed and then expanded with an oil-well elevator, as will be hereinafter described, this combination enabling me to employ the air for the double purpose of forcing up the oil after it has been introduced into the elevator and also of melting the paraffine.

Second. It consists in the combination of a compressed-air chamber with a vacuum-chamber and with one or more sections of an oil-well elevator, as will be hereinafter described, whereby the oil is raised out of the well by the aid of a vacuum in the elevator-tubes and a downward pressure upon the top of the column of oil, the extent of elevation of the oil being only limited by the number of sections of the pump.

Third. It consists in a novel mode of arranging the valve-seats and of connecting them respectively to the different sections of the inner tube of the elevator and together, whereby they singly or together may be removed entirely out of the elevator, or be raised slightly by the operator at the top of the well.

Fourth. My invention consists in first getting the oil into the elevator by its own tendency to rise and by the aid of a vacuum apparatus, then trapping it in the elevator, and afterward expelling it from the elevator to the top of the well (or into a second section of the elevator, according as the construction may be) by the combined agency of elastic pressure and vacuum, the pressure being upon the top of the column of oil outside of the central tube.

Fifth. My invention consists in the constructing of the elevator with a series of separate valved sections within one another, in combination with devices which operate with the respective sections in such manner that the oil is being received from the well by the lowermost section while the succeeding sections are passing oil to the top of the well.

To enable others skilled in the art to make and use my invention, I will proceed to describe the same with reference to the drawings.

A and B represent two sections, which form the main tube of an elevator of a given capacity, and I and H represent the inner discharging-tube of the elevator. The tubes represented are for an elevator which has two independent working-chambers, one within the other. The main tube may be constructed so as to have but one working-chamber, or it may have a greater number than two. The number depends upon the altitude at which the oil is to be raised. The lower end, J, of the tube A is perforated, so as to allow the oil to enter into it. The perforations are small enough to act as strainers.

In the lower end of tube A, just above the perforations, a fixed valve-seat, *p*, is arranged. This seat is conical internally, and its smallest diameter is at its base. Within said valve-seat another tubular valve-seat, *o*, which is conical externally, is fitted, as represented, so as to be movable. On this seat a ball-valve, K, rests so as to close the passage through it. The seat *o* is attached fast to the lower end of the tube I, said tube being flared, so as to inclose the ball-valve and also allow said valve a sufficient play upward when the oil is flowing from the well into the elevator. Through the sides of said flared portion triangular or inverted **V**-shaped apertures *b* are formed, so as to make a communication between the tubes A and I, as shown. The tubes A and I are enlarged at *c c'*, as represented—the former for the purpose of forming the chamber B and the latter for the purpose of accommodating the lower end of said chamber, as represented. In the chamber B thus formed devices M, N, K', *b'*, and H', which are similar to the devices *o p* K *b* I, are arranged, as represented. Thus two valved working-chambers are formed.

The two chambers A B and the tube H' are

furnished with stuffing-boxes S T, for the purpose of making tight joints between these parts. These stuffing-boxes are located so as to be under the control of the operator at the top of the well.

The part A of the main tube is connected by a pipe, F, directly to a compressed-air chamber, C, which is furnished with a safety-valve, N, to regulate the required pressure of air. It also communicates by a pipe, E, directly with a vacuum-chamber, D.

The part B of the main tube is connected directly to the compressed-air chamber by a tube, G, and is also connected, but somewhat indirectly, to the vacuum-chamber D by means of the pipe H, chamber D′, pipe H′, and passages *b b′*. The pipes E, F, G, and H are furnished with cocks *q q′ q² q³*, by which the working of the apparatus is controlled.

L is a connecting-pipe between the compressed-air chamber and a force-pump.

M is a connecting-pipe between the vacuum-chamber and vacuum-pump.

D′ is a chamber, into which the oil is emptied after it is elevated. This chamber is furnished with a draw-off cock, R.

B is a furnace, by which the compressed air is highly heated when it is necessary to use the air for melting the paraffine.

U is a removable screw-cap at the upper end of the chamber B.

All the cocks being closed, the operation commences as follows: By opening *q* a vacuum will be formed in A. The oil will lift the valve K and flow into A about thirty feet above the level of the oil in the well. Next *q* is shut and *q²* opened. This will form a vacuum in H′, B, and I. Next *q′* is opened. This will force the oil down through A and up through I into B. All of the oil of chamber A being elevated into chamber B, the operation in lower chamber, A, commences again by opening *q*, and while chamber A is being again filled chamber B will be emptied by opening *q³*, forcing the oil down in B and up through H′ into D′, from whence it is drawn off through faucet R. Chamber B is to be again filled from A and emptied again, as above described.

Should the valve K get out of order, the stuffing-box S can be slackened and every part of the elevator taken out down to *o o*, inclusive. Should K′ get out of order, all that has to be done is to slacken stuffing-box at T T and unscrew the cap U. This done, the seat *n n*, with valve K′, can be easily lifted out of the elevator. Should paraffine collect about the strainer J, the furnace can be started under receiver C, the valve-seats *o o* lifted half an inch, and hot air can be blown down between the seats *o* and *p* and through the strainer J by opening cock *q′*. The hot air will effectually melt the paraffine, and thus overcome the difficulty from clogging of the inlet-passages and other causes.

I am aware that steam and air have been used for many years for the purpose of elevating sugar-sirups by depressing the sirup down through a column connected with an ascending-column, through which the sirup rises; but I am not aware that a vacuum has been employed in the same connection.

I also am aware that vacuum alone has been for many years in use for elevating all kinds of liquids; but I am not aware that the action of pressure and vacuum on the same column has ever been used on the principle I have set forth.

I am aware that water is elevated to different altitudes by different pumps on the Mississippi river, the pump used at high water being generally forty feet above the low-water mark. A low-water pump to supply the upper pump is rendered necessary; but my arrangement of a pump or elevator having its different valved chambers placed within each other for the purpose of having all the stuffing-boxes above the level of the arth, I am not aware of being used or known.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The method, substantially as herein described, of accomplishing the twofold function of elevating the oil and melting the paraffine by means of air, as set forth.

2. Constructing the valve-seats so that they answer the twofold purpose of a seat for the valve and also as a valve, substantially as and for the purpose described.

3. The connection between the conical valve-seats of the various valves and the discharge-pipe, substantially as and for the purpose described.

4. An elevator constructed with one or more valved chambers and with an outer and inner tube, substantially as described, in combination with a vacuum apparatus and a forcing apparatus, substantially as and for the purposes set forth.

5. The combination of the compressed-air chamber and the vacuum-chamber with the elevator which has one or more working-chambers, substantially in the manner herein described, and for the purpose set forth.

6. The arrangement of a series of elevators acting within each other in such a manner that each can act independently of the other, and so that the liquid in each will be acted on by a vacuum and pressure at the same time, substantially as herein described.

7. So arranging the several independent elevators within one another that all the stuffing-boxes may be above the level of the earth's surface, substantially as described.

8. Applying pressure to the top of the column of oil within the outer or main tube of the elevator and at the same time subjecting it to the lifting action of a vacuum by means of an apparatus constructed and operating substantially as described.

THOS. BYRNE.

Witnesses:

JOHN S. HOLLINGSHEAD,

CHAS. SIKKEN.