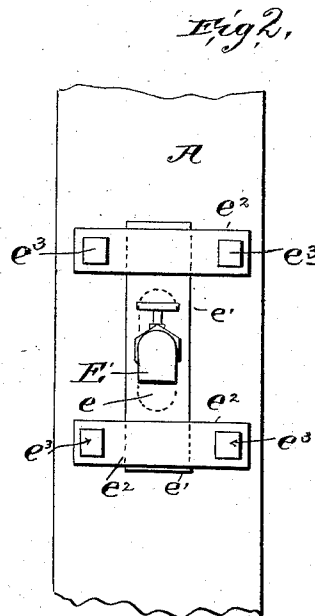
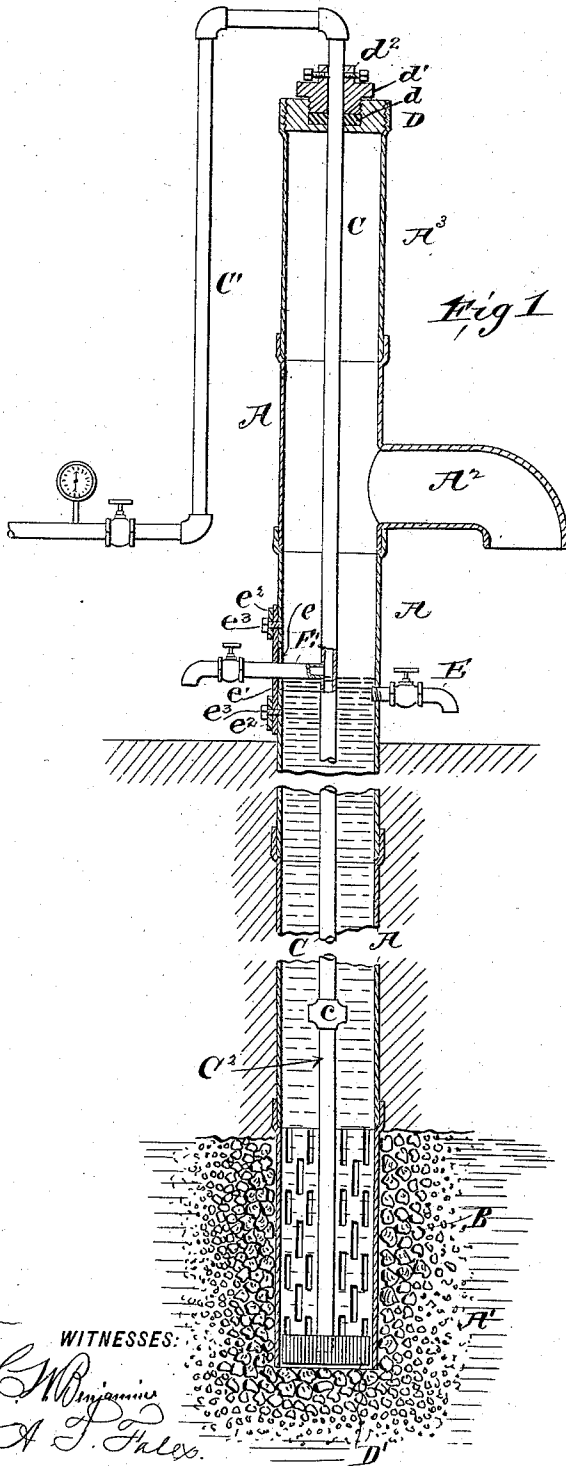


(No Model.)

S. W. TITUS.
COMPRESSED AIR WATER ELEVATOR.

No. 546,038.

Patented Sept. 10, 1895.



WITNESSES:

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SILAS W. TITUS, OF BROOKLYN, NEW YORK.

COMPRESSED-AIR WATER-ELEVATOR.

SPECIFICATION forming part of Letters Patent No. 546,038, dated September 10, 1895.

Application filed January 25, 1895. Serial No. 536,213. (No model.)

To all whom it may concern:

Be it known that I, SILAS W. TITUS, a citizen of the United States, residing at Brooklyn, county of Kings, State of New York, have invented certain new and useful Improvements in Compressed-Air Water-Elevators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to apparatus for effecting the elevation and discharge at the ground-level of water from a subterranean source in which compressed air is injected into the column of water in an eduction-tube, the intake of which is sunk in the water-bearing strata or source, and parts of my invention relate particularly to apparatus, as aforesaid, which is employed for the purpose stated in connection with wells in which the water rises by natural pressure in the eduction-tube to or near the ground-level or has a natural flow thereat.

The general object of my invention is the provision of means whereby the maximum flow attainable from a well to which the apparatus is applied may be obtained and conserved; and to this end my invention comprises the provision of means which, while they will enable an immediately available and uninterrupted discharge of water from the eduction-tube to be obtained when the compressed air is initially injected into the water-column thereof, will also readily permit the adjustment of the air-outlet of the compressed-air supply-pipe, relatively to the body of said water-column, to secure the most effective application of the air to the water for the purposes of elevation, and will also provide for the rigid support of a screen or strainer, independently of the intake of said eduction-tube, in the open end of said intake, and removably therefrom without disturbance thereof or said eduction-tube; and my invention also comprises the provision of means which, in the case of wells having a natural flow or in which the water naturally rises to or near the ground-level, will operate to prevent the freezing of the well in cold weather during such times as its enforced

discharge by air-pressure is suspended without interference with the functional arrangement of the other parts of the apparatus.

My invention consists in the combination in an apparatus of the class stated, with the well tube or casing, having an intake adapted to be sunk in the water-bearing strata or source, of a section of said tube or casing extending above and in open communication with the ground-surface end thereof and beyond a discharge-spout therein, an apertured plug closing the upward end of said extension-section, a stuffing-box and gland in the aperture of said plug, and a clamp-collar on said gland, together with a compressed-air supply-pipe adapted to have longitudinal play in said plug and to seat in said stuffing-box and collar and to reach longitudinally within said tube or casing, a rigid extension on said air-pipe below the air-outlet thereof adapted to reach to the lower end of the intake of the tube or casing, and a screen or strainer fixed on the free end of said pipe extension and adapted to fit loosely within said well-tube and its intake and to stand in the open lower end of said intake; and my invention also includes the combination, with the well tube or casing provided with a valved vent immediately below the line of the natural water-level of the well therein, of a compressed-air supply-pipe having longitudinal adjustability within said tube or casing and provided with a removable valved vent-pipe communicating with said air-pipe at the aforesaid natural water-level and extending adjustably therein longitudinally of the well-tube through the wall of said well-tube.

Figure 1 illustrates in vertical central sectional elevation an apparatus containing my invention and shows the same in position in a well, and Fig. 2 illustrates in front elevation a detail of the apparatus containing a part of my invention.

In the apparatus illustrated the well tube or casing is composed of the usual tube-sections A A, adapted to be driven into the well-bore in the customary manner and to be united endwise in the fashion ordinarily employed. At A' is shown the intake-section of the casing, the same being in the well-known form, having longitudinal slits in its wall for

the inlet of the water and adapted to be sunk in the water-bearing strata or source B, as shown.

C is the compressed-air supply-pipe, having communication through a valved connection C' with any compressed-air supply and adapted in length to extend longitudinally within the well-tube, as shown, with the outlet *c* at its lower end for the discharge of air into the water-column within said well-tube. The upper end of the sectional casing above the ground-surface has the lateral discharge-spout A² or water-outlet.

In carrying out my invention I unite to the upper open end of the casing, substantially as shown, an additional section or sections A³ of tubing similar to the sections of the well-casing and above the spout or outlet A². I provide a suitable transversely-apertured plug D, preferably of metal, to close the upward end of the extension-section A³, and said plug is recessed to form a stuffing-box *d*, which has a gland *d'*, said gland fixedly supporting a clamp-collar *d*², substantially as shown. The pipe C is adapted to have longitudinal play in the apertured plug D and to be held rigidly in place therein by the clamp-collar *d*², the stuffing-box serving to hermetically close the plug-aperture when the pipe is adjusted in position. To the lower end of the pipe C, beyond the outlet *c* thereof, I fixedly unite a rigid connection C², which may be constituted of a length of pipe screw-seated in a T, as indicated, which constitutes the air-outlet and is in turn screwed to the lower end of pipe C. The rigid extension C² is adapted in length to reach through the lower part and intake of the well-tube, as shown, and upon the extremity of said extension I fixedly attach a screen or strainer D', which is adapted in diameter and contour to pass through the well-tube and to fit loosely within the intake A' and stand on its support, as shown in the open lower end of said intake. By means of the extension-section A³, arranged as described, and provided with the plug D and its stuffing-box and clamp-collar, I not only provide an air-chamber beyond the discharge A² of the well-tube, which operates, when the compressed air is initially injected into the water-column in said tube, to start or accelerate the flow of the well to secure an immediately available and a thereafter uninterrupted discharge of water at the outlet A², but I also provide such air-chamber in a simple and economical construction and at the same time obtain a convenient and effective support for the air-pipe C and its attached parts, as set forth, and a support which permits an easy and quick adjustment of the air-pipe and its connections longitudinally within the tube A, and which sustains the extension C² of the air-pipe and its attached screen or strainer D' within and independently of the intake A', while by the loosening of the collar *d*² and gland *d'* the plug D may be unseated without

rotating or otherwise disturbing the air-pipe and its connections, and said pipe and its connections may then be withdrawn from the well-tube without disturbance thereof, and may be in like manner replaced and resealed.

I am aware that the combination of an air-chamber with the eduction-tube of a well is not novel, and I make no claim herein broadly to such combination, nor do I make claim herein to the combination, with the well-tube having an open-end intake, of a screen or strainer adapted to fit loosely within said tube and intake and to lie within the open end of said intake, together with a rigid support adapted in length to extend longitudinally through said tube and intake and having said screen or strainer fixedly attached to its end within said intake and removably sustained in position in said well-tube, as I have made these devices in combination the subject-matter of claims in a separate application for Letters Patent, Serial No. 536,215, filed the 25th day of January, 1895; but I do herein make claim to the combination, with the well tube or casing and its described intake and discharge, and the air-pipe and its described rigid extension below its air-outlet, and the screen or strainer carried by said extension, as set forth, of the extension-section on the upward end of the well-casing and its apertured plug, stuffing-box, gland, and the clamp-collar carried thereby, wherein the said extension-section on the well-tube not only constitutes, in a simple and inexpensive manner, an air-chamber for said tube, but the described structure of said extension-section and its connected parts constitutes a convenient support for the air-pipe and its connections, in the manner and with attainable functions hereinbefore specified, believing the same to be new.

In further carrying out my invention I provide the well-tube with a valved vent E, which taps the tube at a point immediately below the line of the natural water-level of the well within said tube, and I provide the air-pipe C with a valved vent-pipe E', which taps said pipe at the line of said natural water-level, and which extends through and adjustably therein longitudinally of the well-tube the wall of said tube. This may be accomplished by means of a longitudinal slot *e* in the tube-wall, through which the pipe E' extends, and a movable apertured plate *e'*, covering said slot and adjustably clamped to the tube-wall by bands *e*², held by threaded bolts *e*³, and through which plate said pipe passes, as shown in Fig. 2. When the operation of a well in which the water naturally rises in the casing to or near the ground-surface by means of compressed air is temporarily suspended for any cause during cold weather and the water in the casing stands at its said natural level, it is evident that by means of the valved vents E and E', arranged as set forth, a flow of the water from the well-casing and from the air-

pipe into which it rises to said natural level when the air-pressure is cut off may be maintained, so that the water will be prevented from congealing in said casing and air-pipe, while at the same time, owing to the described adjustability of the vent-pipe E' in its passage through the wall of the well-tube, the presence of the said vent-pipe in the apparatus will not interfere with the herein-described functional arrangement and movements of the air-pipe and its connections. The vent-pipe E' may be screw-seated in the air-pipe wall and fitted snugly in the aperture in the plate, through which it passes to the exterior of the well-tube, so that when it is desired to withdraw the air-pipe and its connections from the well-tube the said pipe E' may be readily unseated and the aperture in the plate e' temporarily closed by a suitable plug, if desired.

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

1. In a compressed-air water-elevating apparatus, the combination with the well-tube or casing and its intake and discharge-outlet, and the compressed-air supply-pipe having a rigid extension below its outlet in the casing, adapted in length to extend to the open lower end of said intake and having a screen or strainer, adapted to fit loosely within said casing and

its intake and to stand within the said open end of said intake, attached to the extremity of said rigid extension, of an extension-section of said well-tubing mounted on and communicating with the discharge-end of said casing above the outlet therefrom, an apertured plug in the upward end of said extension-section in which said air-pipe has longitudinal play, a stuffing-box on said plug and a clamp-collar on the gland of said box adapted to engage said air-pipe; substantially as and for the purpose set forth.

2. In a compressed-air water-elevating apparatus, the combination with the well-tube having a valved vent which taps said tube at a point immediately below the natural water-level therein, of a compressed-air pipe, which extends and is longitudinally adjustable within and removable from said well-tube, provided with a removable, valved vent-pipe which taps said air-pipe at said natural water-level and extends, adjustably therein longitudinally of the well-tube, through the wall of said well-tube, substantially as and for the purpose set forth.

SILAS W. TITUS.

Witnesses:

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A. T. FALES.