M. J. CHRISTENSEN.

MECHANISM FOR ELEVATING LIQUIDS.

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957,656. Patented May 10, 1910.

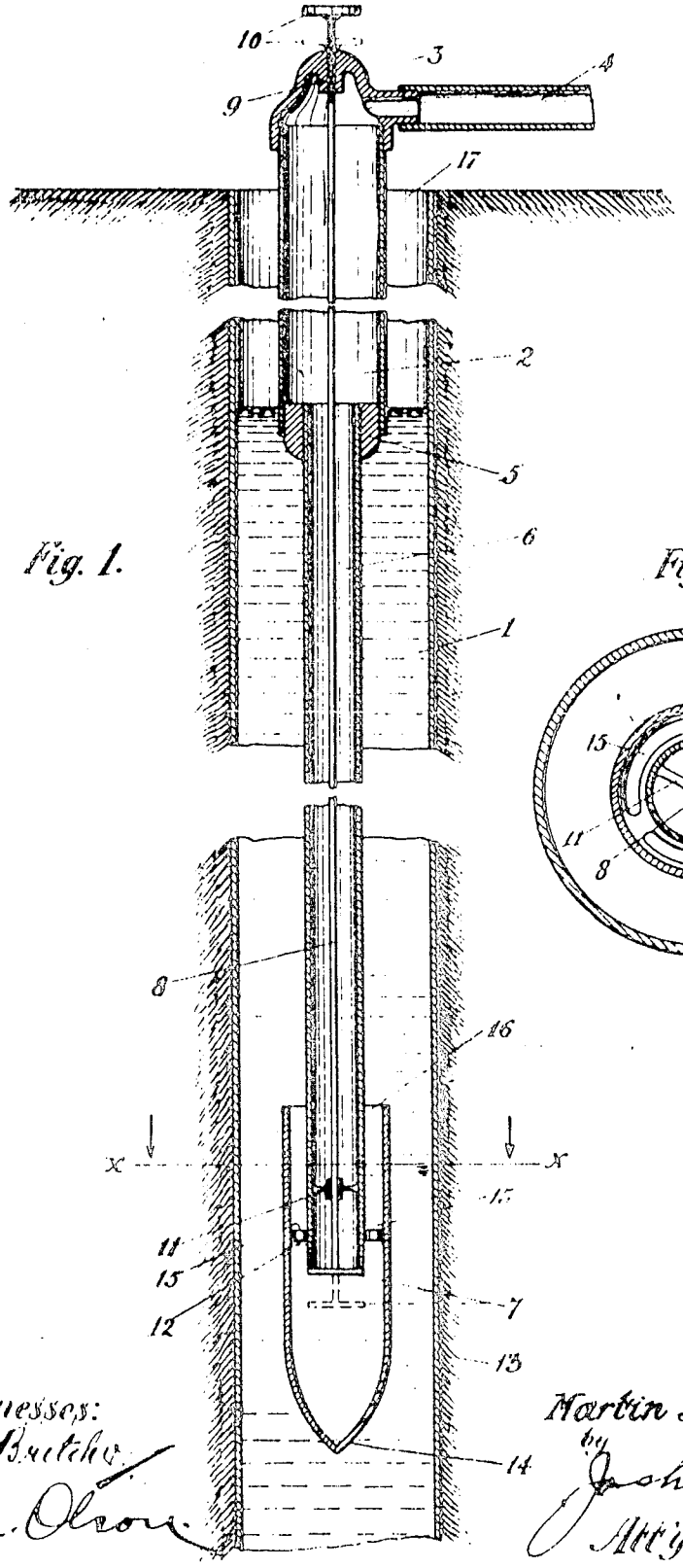

Fig. 1.

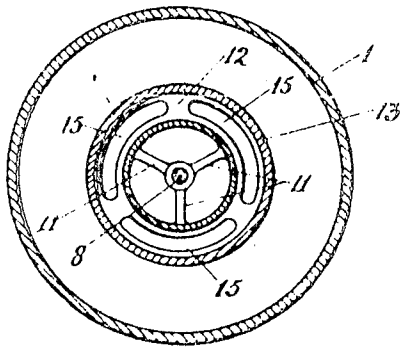

Fig. 2.

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UNITED STATES PATENT OFFICE.

MARTIN J. CHRISTENSEN, OF CHICAGO, ILLINOIS.

MECHANISM FOR ELEVATING LIQUIDS.

957,656. Specification of Letters Patent. Patented May 10, 1910.

Application filed October 24, 1908. Serial No. 459,417.

To all whom it may concern:

Be it known that I, MARTIN J. CHRISTENSEN, a citizen of the United States, residing at Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Mechanisms for Elevating Liquids, of which the following is a specification.

My invention relates to mechanisms for raising or elevating liquids, and more particularly to that class of the same especially applicable for raising liquids from deep wells, as for example, oil-wells and like places.

The object of my invention is to provide a mechanism of the character mentioned, which will be of such construction as to be adapted to raise or elevate liquids by means of compressed air.

A further object of my invention is to provide a mechanism of the character mentioned, which will be of the highest possible efficiency, and further, one which will be extremely simple of construction, hence of low cost to manufacture.

Other objects will appear hereinafter.

With these objects in view, my invention consists in a liquid-elevating mechanism characterized as above mentioned, and in certain details of construction and arrangement of parts all as will be hereinafter more fully described and particularly pointed out in the claim.

My invention will be more readily understood by reference to the accompanying drawings forming a part of this specification, and in which,

Figure 1 is a longitudinal section of my mechanism showing the application of the same, and Fig. 2 is a transverse section thereof taken on the line x—x of Fig. 1.

Referring now to the drawings, 1 indicates a tubular metal casing, the same being of any suitable diameter, but preferably of about eight inches. Centrally positioned, and longitudinally extending within the upper portion of said casing 1 is an air-delivery pipe 2, of a diameter less than that of the pipe 1 and forming a compression chamber. To the exteriorly projecting upper extremity of the pipe 2, is suitably secured, but preferably threaded, a hood member or casing 3 of any ordinary or preferred design into which leads a compressed air-supply pipe 4, the latter being connected with any suitable air-compressing means (not shown). Suitably secured, preferably by means of an intermediate annular connecting member 5, to the lower end portion of said pipe 2, is a pipe 6, of a diameter less than that of the pipe 2, preferably of a diameter one-half that of said pipe 2. 7 is a disk-valve, the same being adapted to normally close the lower extremity of the pipe 6. It is understood, however, that I do not wish to be limited to the specific form of valve used, as any other valve of suitable construction might be employed without departing from the spirit of my invention. Said valve 7 is secured to the lower extremity of the valve-stem 8, the upper end portion 9 of said valve-stem projecting through the hood member 3, it being preferably threaded therein as shown. 10 is an actuating hand-wheel fixed to the upper extremity of said valve-stem 8. A spider 11 provided in the lower portion of said pipe 2 serves as a means of centrally guiding said valve-stem. Concentrically arranged upon and suitably secured, preferably by means of an internally and externally threaded annular member 12, to the lower end portion of the pipe 6, is an air nozzle 13. Said nozzle is preferably cylindrical in form, the upper extremity being open and the lower tapering extremity 14 thereof closed. The annular connecting member 12 is provided with a plurality of circular slots or perforations 15, preferably three in number, for obvious reasons.

The operation of my mechanism is extremely simple, it being as follows: Highly compressed air is admitted through the supply-pipe 4, said air passing through the delivery-pipes 2 and 6 to the lower extremity of the latter, which is submerged say two hundred or three hundred feet below the surface of the liquid to be raised. The valve-stem 8 is then actuated, more specifically, rotated, so as to lower, that is, open the disk-valve 7, the latter in which case assuming the position shown in dotted lines in Fig. 1. By so doing, compressed air is discharged into the nozzle 13, which obviously directs the same upwardly through the perforations 15 in the member 12 and out of the upwardly opening mouth 16 thereof. Upon leaving the mouth of the nozzle 13, the compressed air contacts the

column of liquid contained within the casing 1, which it pierces or breaks forcing the liquid above it upward through said casing 1 to the mouth 17 thereof, or to the surface of the earth.

By the employment of a nozzle and a perforated annular connecting member therefor of a construction as described, it is obvious that the compressed air discharged from the lower extremity of the pipe 6 will be immediately directed upwardly, and will be broken up and evenly and uniformly distributed within the casing 1. hence, under the column of liquid raised, resulting in obvious advantages. By the provision of the pipe 2 in the upper portion of the casing 1, said pipe being of a greater diameter than that of the pipe 6, the column of liquid upon leaving the lower portion of the casing 1 in which is contained the pipe 6 will be caused to lengthen, thereby enabling the compressed air to be more effective than it could otherwise be, if a delivery pipe of uniform diameter were employed, it being understood, of course, that in forcing the liquid upward by means of compressed air, it is always desirable to have a thick stratum of liquid above the air in order to prevent the air from passing through it.

While I have shown what I deem to be the preferable form of my device, I do not wish to be limited thereto as there might be many changes made in the details of construction and arrangement of parts without departing from the spirit of my invention.

Having described my invention what I claim as new and desire to secure by Letters Patent, is:

In a device of the class described, the combination with a tubular casing of comparatively large diameter, of a compression chamber of less diameter than said tubular casing and centrally positioned within the upper end thereof, a bell shaped hood closing the upper end of said chamber, an annular reducing member secured to the lower end of said chamber, an air delivery pipe of less diameter than said chamber extending downwardly from said reducing member, a disk valve adapted to close the lower opening of said air delivery pipe, a stem on said valve extending upwardly through said air delivery pipe and said compression chamber and threaded through said hood, said hood being provided with a sleeve to receive said stem, an upwardly opening cylindrical nozzle encircling the lower end portion of said air delivery pipe, an annular perforated member interposed between the lower end of said pipe and the adjacent wall of said nozzle for holding the latter in position, and an air supply pipe leading into said compression chamber through said hood, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MARTIN J. CHRISTENSEN.

Witnesses:
JANET E. HOGAN,
ANNA L. EKVALL.