L. S. BARENGUERAS.

WATER ELEVATING APPARATUS.

APPLICATION FILED MAR. 17, 1916.

1,233,439. Patented July 17, 1917.

Fig. 1.

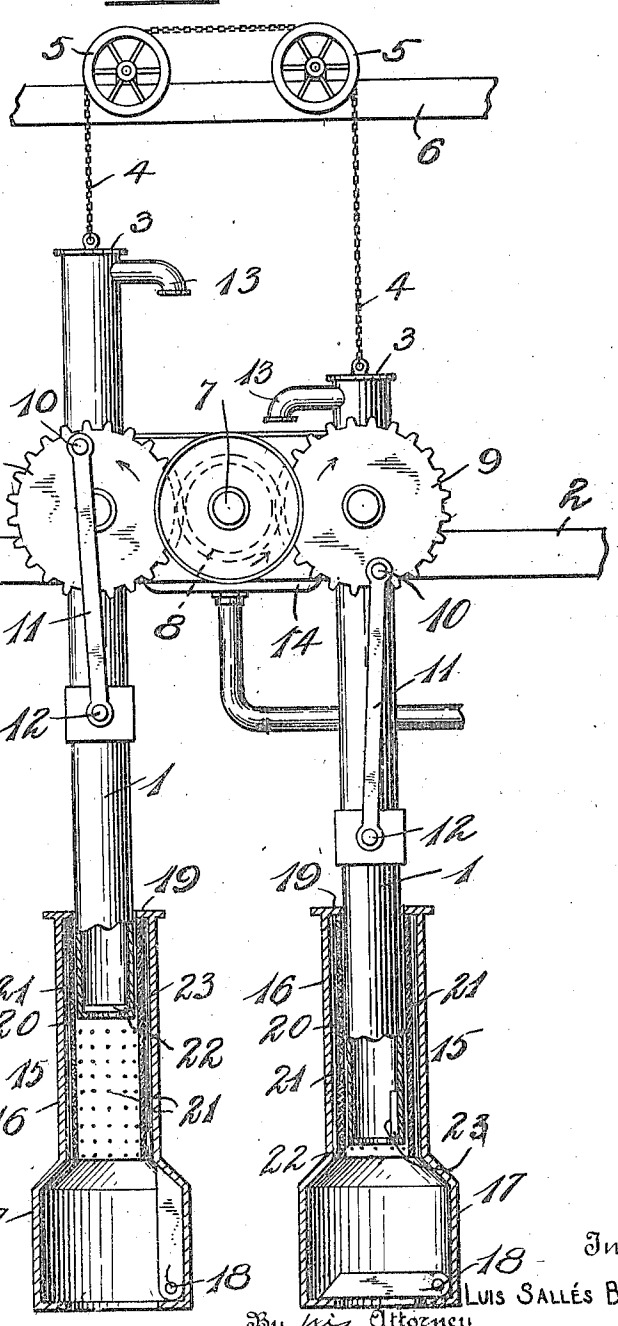
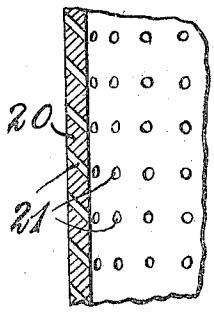


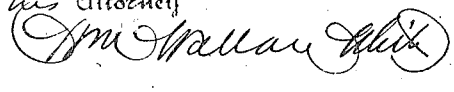
Fig. 2.



Inventor

LUIS SALLÉS BARENGUERAS

By his Attorney



UNITED STATES PATENT OFFICE.

LUIS SALLÉS BARENGUERAS, OF HABANA, CUBA.

WATER-ELEVATING APPARATUS.

1,233,439. Specification of Letters Patent. Patented July 17, 1917.

Application filed March 17, 1916. Serial No. 84,804.

To all whom it may concern:

Be it known that I, LUIS SALLÉS BARENGUERAS, a subject of the King of Spain, residing at No. 89 Villegas street, Habana, Province of La Habana, Republic of Cuba, have invented new and useful Improvements in Water-Elevating Apparatus, of which the following is a specification.

This invention relates to water elevating apparatus for use in drawing water from wells, cisterns, and the like.

In the usual pumping apparatus, the water is forced upwardly through a comparatively long pipe. There is so much friction within the pipe that the power required for the operation of the apparatus is very great. It is therefore my purpose to provide an apparatus which is capable of lifting water to great heights with the exertion of minimum power.

A further object is to provide an apparatus of this character wherein the joints between the movable parts which are intended to be submerged within the water, in which position it is difficult to properly lubricate the parts, are rendered substantially frictionless without the use of the customary frictional packing.

To these ends the invention resides in the construction and combination of parts specifically described in the following specification and illustrated in the annexed drawing, in which:

Figure 1 is a side elevation of a duplex apparatus, partly in section, one lifting pipe being shown at the end of its operative stroke and the other at the opposite position in its stroke; and,

Fig. 2 is a detail sectional view through a portion of the perforated sleeve of one of the collectors.

Referring to the drawing by numerals, 1 designates the vertical lifting pipe of each element of the duplex apparatus, which pipe is mounted for axial reciprocation within the guide member 2. The upper end of each lifting pipe of the complete apparatus is provided with a closed head 3 and both of these heads are connected by means of a flexible connecting member 4, preferably in the form of a chain or the like, which passes over the guide pulleys 5 which are mounted upon the supporting frame 6. The connecting member is of such length and disposition with relation to the lifting pipes that it permits each one of the latter to counterbalance the weight of the other to a certain extent.

The lifting pipes of both elements of the apparatus are reciprocated simultaneously in opposite directions by power applied to the drive shaft 7, which is journaled in the bearing member 2. A pinion 8 carried by this drive shaft meshes with two gears 9, each of which is arranged with its axis intersecting the longitudinal axis of one of the lifting pipes at right angles thereto. These gears are for the sake of convenience shown as being rotatably mounted upon the bearing member 2. A crank pin 10 upon each gear 9 is connected by means of a connecting rod 11 with a wrist-pin 12 which projects radially from the corresponding lifting pipe. The crank pins are relatively disposed upon the said gears so that the lifting pipes will be moved in opposite directions and to the same extent of throw during rotation of the drive shaft by means of a suitable prime mover (not shown).

Discharge spouts 13 are provided near the upper ends of the lifting pipes and are arranged so that they overlie a reservoir 14 adapted to receive the water as it issues intermittently from the said spouts.

The remaining parts of the apparatus will now be described in connection with one element of the duplex apparatus alone. A stationary collector 15 for each lifting pipe is adapted to be submerged within the water or other liquid to be elevated and includes primarily a substantially cylindrical, hollow body 16. The lower end of this body is enlarged somewhat as at 17 to provide an intake port, which is closed normally by means of an inwardly opening clack-valve 18. From the annular top wall 19 of the body 16, a tubular sleeve 20 depends to a point situated just above the enlarged portion 17 of the body. The periphery of this sleeve is spaced to a slight extent from the inner surface of the body and has its inner surface substantially flush with the circular inner edge of the top wall 19. The lower end of the corresponding lifting pipe 1 projects into the sleeve 20 from the upper end thereof and is adapted to move vertically through the same to an extent nearly equal to the length of the sleeve. The periphery of the said pipe is barely spaced from the inner surface of the sleeve, this being to prevent friction between these relatively movable parts. However, in order to provide an ef-

fective bearing for the pipe end within the collector, the sleeve 20 is provided with a multitude of minute perforations 21, each one of which is disposed diametrically opposite to a corresponding one and all of which are evenly distributed throughout the sleeve. Each perforation is inclined at an oblique angle to the longitudinal axis of the sleeve and is disposed with its innermost end lower than its outer end. Owing to the presence of these perforations in the sleeve, when water is placed under compression within the collector during the down-stroke of the lifting pipe, it will rise through the space afforded between the body of the collector and the said sleeve and will exert pressure evenly in all directions against the periphery of the lifting pipe to center the latter within the collector and afford a comparatively frictionless and true bearing therefor. Owing to the specific inclination of the perforations in the sleeve, the water acting upon the periphery of the said pipe will exert its pressure downwardly in an oblique direction, thereby avoiding danger of leakage through the top of the collector. Furthermore, the direction of application of the force is such that there will be an appreciable tendency to reduce the resistance to the downward movement of the pipe.

The lower end of the lifting pipe is provided with a seat 22 for the inwardly opening clack-valve 23. Consequently, when the lifting pipe is depressed the valve 23 will open to permit the lower end of the pipe to receive a definite volume of water as the edges of the pipe cut down through the water within the collector. The water is thus admitted into the lifting pipe without any appreciable friction. During the down-stroke the valve 18 at the bottom of the collector will be closed, but when the lifting pipe rises in its opposite stroke, the valve 23 will close automatically to support the water within the pipe and the lower end of the said pipe will act as a piston to draw water into the collector through the valve 18, which has automatically opened due to the suction from within. It is during the down-stroke of the lifting pipe that the water within the collector exerts its bearing influence upon the said pipe through the perforation in the sleeve 20.

From the foregoing description, taken in connection with the accompanying drawings, it should be apparent that considering the operation of each element of the apparatus, during each down-stroke of the lifting pipe, a column of water of predetermined length will be cut through and inclosed within the said pipe beneath the superimposed water column. As a result, there is no tendency to compress the water within the long lifting pipe as in the ordinary pumping apparatus. The action is one of descent of an inclosing pipe over a column of water, rather than one of ascent of water within the pipe due to the exertion of force upon the water column.

During each up-stroke of the lifting pipe, the column of water which surmounts its valve 23 at the end of the down-stroke is lifted one step without any friction between the water and the inner surfaces of the pipe. Then, as the pipe begins its succeeding down-stroke, the elevated water column will simply be incumbent upon the short water column which has been drawn into the collector. There will thus be progressive upward movement of the water through the lifting pipe without the application of force thereto while in the pipe, and there will be intermittent flow of water through the discharge spout 13 into the reservoir 14. The great advantages of this practically frictionless elevating action should be readily apparent, the primary one being economy in the use of power, which is a most important consideration when the water has to be elevated to a great height, such as to the top of a tall building.

While the complete apparatus is illustrated in the drawings as comprising two water elevating elements, it is obvious that there may be any number of combined elements, and that there may be only one, should this be found necessary to meet the conditions of practice in any instance. When a single element is used, its lifting pipe should be counterbalanced by means of the equivalent of another co-acting lifting pipe, such as a counter weight of some suitable kind. Such an arrangement is considered to be obvious from the disclosure and should not require illustration.

Having thus described the invention, what it is desired to claim and to secure by Letters-Patent of the United States is:

1. An apparatus for elevating liquids comprising a stationary, submersible collector having a check-valve at its bottom, a vertical lifting pipe mounted for longitudinal reciprocation and having its lower end extending into the top of the said collector for sliding movement therein, the said collector having a perforated sleeve depending from its top wall and fitting the said pipe with slight play, the said sleeve being spaced from the vertical walls of the collector to afford a fluid space communicating with the main interior of the collector, a check-valve provided in the lower end of the lifting pipe, and means for operating the said pipe.

2. An apparatus for elevating liquids comprising a stationary, submersible collector having a check-valve at its bottom, a vertical lifting pipe mounted for longitudinal reciprocation and having its lower end extending into the top of the said collector for sliding movement therein, the said col-

lector having a perforated sleeve depending from its top wall and fitting the said pipe with slight play, the said sleeve being spaced from the vertical walls of the collector to afford a fluid space communicating with the main interior of the collector, a check-valve provided in the lower end of the lifting pipe, and means for operating the said pipe, the perforations in the said sleeve of the collector being inclined axially and having their innermost ends disposed lower than their outer ends.

3. In a pump the combination comprising a pair of balanced pipes and means for reciprocating the same in opposite directions, collectors into which the lower ends of the pipes are slidably disposed, sleeves disposed between the lower ends of the pipes and the sides of the collectors and provided with downwardly extending perforations, and valves disposed in the lower ends of the pipes and the lower ends of the collectors.

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

LUIS SALLÉS BARENGUERAS.

Witnesses:

DUDLEY B. HOWARD,

JOHN C. SANDERS.