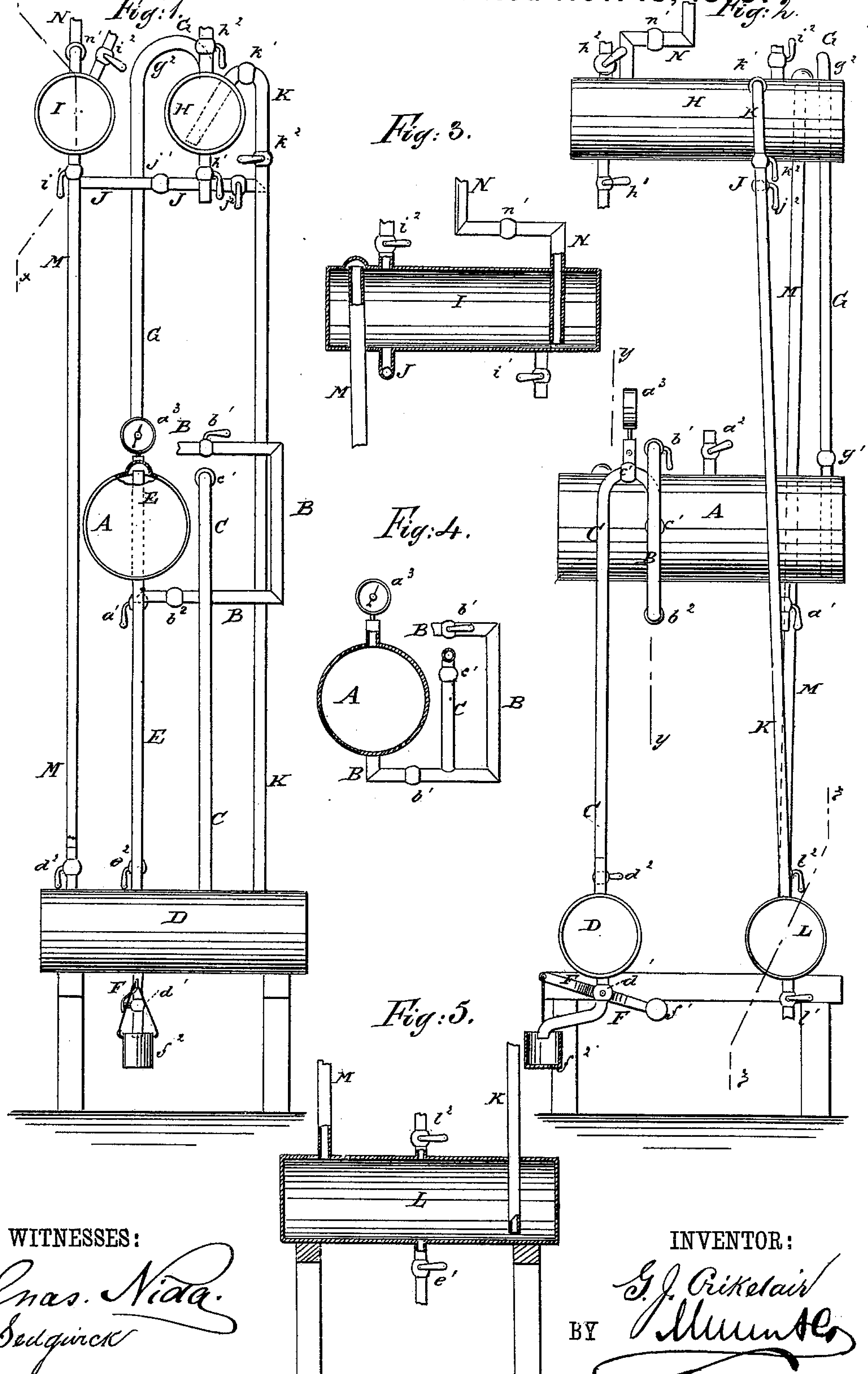
G. J. CRIKELAIR.

Water-Elevating Apparatus.

No. 221,722. Patented Nov. 18, 1879.



WITNESSES:

Chas. Nida.

C. Sedgwick

INVENTOR:

G. J. Crikelair

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

GUSTAVE J. CRIKELAIR, OF NEW YORK, N. Y.

IMPROVEMENT IN WATER-ELEVATING APPARATUS.

Specification forming part of Letters Patent No. **221,722**, dated November 18, 1879; application filed February 5, 1879.

To all whom it may concern:

Be it known that I, GUSTAVE J. CRIKELAIR, of the city, county, and State of New York, have invented a new and useful Improvement in Water-Elevating Apparatus, of which the following is a specification.

Figure 1 is a front view of my improved apparatus. Fig. 2 is a side view of the same. Fig. 3 is a detail sectional view taken through the line *x x*, Fig. 1. Fig. 4 is a detail sectional view taken through the line *y y*, Fig. 2. Fig. 5 is a detail sectional view taken through the line *z z*, Fig. 2.

Similar letters of reference indicate corresponding parts.

The object of this invention is to furnish an improved apparatus for elevating water above the height to which it would naturally rise by the combined action of gravity and compressed air, and which shall be simple in construction, convenient in use, and not liable to get out of order.

The invention consists in the combination of the two cylinders, placed at different levels, and the four connecting-pipes, with each other, to adapt them for use for raising water above its level by the combined action of gravity and compressed air; in the combination of the three cylinders, placed at different levels, and their four connecting-pipes, with each other, to adapt them for use for raising water above its level by the combined action of gravity and compressed air; in the combination of the two cylinders and the three connecting-pipes with the three cylinders and the four connecting-pipes; and in the combination of the lever provided with the weight and the bucket with the stop-cock of one or the other, or of both, the lowest cylinders, as hereinafter fully described.

A represents a cylinder of any desired capacity, and which is placed at or near the highest point to which water will rise from the pressure in the main. B is a pipe leading to the water-main, and which passes down beneath and is connected with a hole in the lower side of the bottom of the cylinder A. The pipe B is provided with a stop-cock, b', and with a check-valve, b^2, the said check-valve being placed between the stop-cock b' and the cylinder A. The cylinder A is provided with a stop-cock, a', in its lower side, for drawing off water, with a valve, a^2, in its upper side, for admitting air, and with a gage, a^3, for indicating the air-pressure.

From the pipe B, between the stop-cock b' and the check-valve b^2, a pipe, C, leads down to and enters a cylinder, D, placed at any desired distance below the cylinder A—the greater the better—and which may be of any desired capacity.

The pipe C above the pipe B should be curved in such a way that the top of its bend should be a little higher than the top of the cylinder A, and should be provided with an upright or horizontal check-valve, c'. The positions of both are shown in the drawings.

With the upper side of the cylinder D is connected the lower end of a pipe, E, the upper end of which is connected with the cylinder A, and extends to, or nearly to, the upper side of the said cylinder A. The cylinder D is provided with a stop-cock, d', in its lower side, for drawing off water, and with a valve, d^2, in its upper side, for admitting air.

To the valve-stem of the stop-cock d' is attached a lever, F, the rear end of which is provided with a stationary or adjustable weight, f'. From the forward end of the lever F is suspended a bucket, f^2, in such a position as to hang beneath the nozzle of the stop-cock d', as shown in Figs. 1 and 2.

With the upper side of the cylinder A is connected the pipe G, the lower end of which extends nearly to the bottom of the said cylinder, and its upper end enters the upper side of the cylinder H, and may extend nearly to the bottom of the said cylinder. The pipe G should be provided with a check-valve, g', in its lower part, and with a stop-cock at about the point g^2. The stop-cock is not shown in the drawings, and is only needed when the cylinder H is not used.

The cylinder H may be placed at any desired distance above the cylinder A, provided the said distance does not exceed the distance between the cylinders A D.

The cylinder H is provided with a stop-cock, h', for drawing off water, and with a valve, h^2, for admitting air. The lower side of the cylinder H is connected with the lower side of a cylinder, I, placed at the same level or below it, by a pipe, J, provided with a check-valve, j'.

With the upper part of the cylinder H is connected a pipe, K, the end of which extends nearly to the bottom of the said cylinder H. The upper part of the pipe K is provided with a check-valve, k', and a little lower down with a stop-cock, k^2. The pipe K, a little below the stop-cock k^2, is connected with a branch or extension of the pipe J, which branch or extension is provided with a stop-cock, j^2. The lower end of the pipe K is connected with a cylinder, L, and extends nearly to the bottom of the said cylinder L. The cylinder L is provided with a stop-cock, l', for drawing off water, and with a valve, l^2, for admitting air, and may be placed at any desired distance below the cylinder H. The cylinder L should be placed at a distance below the cylinder H equal to the distance above it of the point to which it is desired to raise the water.

With the upper side of the cylinder L is connected the lower end of a pipe, M, the upper end of which enters the lower side of the cylinder I and extends nearly to the top of the said cylinder.

The cylinder I is provided at its lower side with a stop-cock, i', for drawing off water, and at its upper side with a valve, i^2, for admitting air.

The cylinder I may also be provided with a pipe, N, when the apparatus is to be extended still higher. The pipe N is provided with a check-valve, n', and corresponds in function with the pipe G that connects the cylinders A H.

The operation of the apparatus is as follows: The stop-cock b' is opened, and the water passes through the pipe B, lifts the check-valve b^2, and enters and fills the cylinder A. The air contained in the cylinder A, as it is compressed by the entering water, passes down through the pipe E into the cylinder D and escapes through the stop-cock d', which is held open by the weight f' upon the lever F. As the water rises in the cylinder A it also rises in the short arm of the pipe C, and as the cylinder A becomes nearly full the water lifts the check-valve c' and flows down through the long arm of the said pipe C into the cylinder D. This movement of the water lessens the pressure upon the outer end of the check-valve b^2, and allows the pressure of the water in the cylinder A to close the said valve. As the water enters the cylinder D it flows out through the stop-cock d' into the bucket f^2 until the weight of the water in the said bucket overbalances the weight f' and closes the stop-cock d'. The entire apparatus is now closed air-tight. As the water rises in the cylinder D the air contained in the said cylinder D is compressed and forced up through the pipe E into upper part of the cylinder A. As the air is compressed in the upper part of the cylinder A it forces the water contained in the said cylinder up through the pipe G, causing it to lift the check-valve g' and flow into the cylinder H, the air in said cylinder escaping through the valve h^2, which must be left open. As the water enters the cylinder H it flows through the pipe J, opens the check-valve j', and enters the cylinder I, filling the two cylinders H I equally, the valve i^2 of the cylinder I being also left open. As the cylinders H I become full the water opens the check-valve k' and flows from the cylinder H through the pipe K into the cylinder L. This movement of the water lessens the pressure upon one side of the valve j', and allows the pressure of the water in the cylinder I to close the said valve, thus keeping the said cylinder I full of water. As the water rises in the cylinder L it forces the air through the pipe M into the upper part of the cylinder I, compressing it and forcing the water contained in it out through the pipe N. The stop i^2 must be closed as soon as the water begins to flow down through the pipe K.

The opening and closing of the valve i^2 may be avoided and the operation of the apparatus made entirely automatic by providing the stop-cock e' of the cylinder L with a weighted lever and bucket, in the same manner as the cylinder D.

By duplicating parts of the apparatus and connecting said duplicates with the pipe N, water may be raised to any desired height.

With this construction the flow of water will be intermittent, the cylinder A being filled and emptied alternately; but by duplicating the cylinders A D the flow of water may be made constant.

When cylinder D is full of water the stop-cock d' is opened to let the water run out, the cylinder A filling as cylinder D empties. When cylinder A is full the water flows out of the pipe B into the short arm of the pipe C, through its long arm and into the cylinder D. While this movement of the water takes place the check-valve b^2 closes and check-valve c' opens, the stop-cock d' closing and the compressed air being forced up through the pipe E into the cylinder A. The water passes out through pipe g and up into the cylinders H I, both being filled through the connecting-pipe j, which is provided with check-valve j'.

While cylinders H I are refilling the cylinder L is emptied by the opening of the stop-cock e', the water flows out of the cylinder H, down through the pipe K, and into the cylinder L, when the stop-cock e' is closed and the compressed air forced up through the pipe m into the cylinder I, from which the water is then forced up through the pipe N.

I am aware that a lever with movable weights to overcome the balance of the water is not new; but

What I claim is—

1. The combination, with cylinder A, of the pipe B, having stop-cock b' and check-valve b^2, and the pipe C, having check-valve c', as shown and described, to keep the water in cylinder and pipes below its natural level by the action of gravity.

2. The combination of three cylinders, A D H, placed at different levels, with pipe E

and the pipes B C G, having check-valves b^2 c' g', as shown and described, to allow water to be elevated above its natural level by the action of gravity and compressed air.

3. In a water-elevator apparatus, a cylinder provided with a stop-cock, d', and a lever, F, balanced by a weight at one end and an empty bucket at the other, as set forth.

4. The combination of the cylinders I L and the connecting-pipes J K M with the cylinders A D H and the connecting-pipes B C E G, substantially as herein shown and described.

GUSTAVE J. CRIKELAIR.

Witnesses:
JAMES T. GRAHAM,
C. SEDGWICK.