J. W. AVERY.

CHAIN-PUMPS.

No. 195,435. Patented Sept. 25, 1877.

Fig. 1.

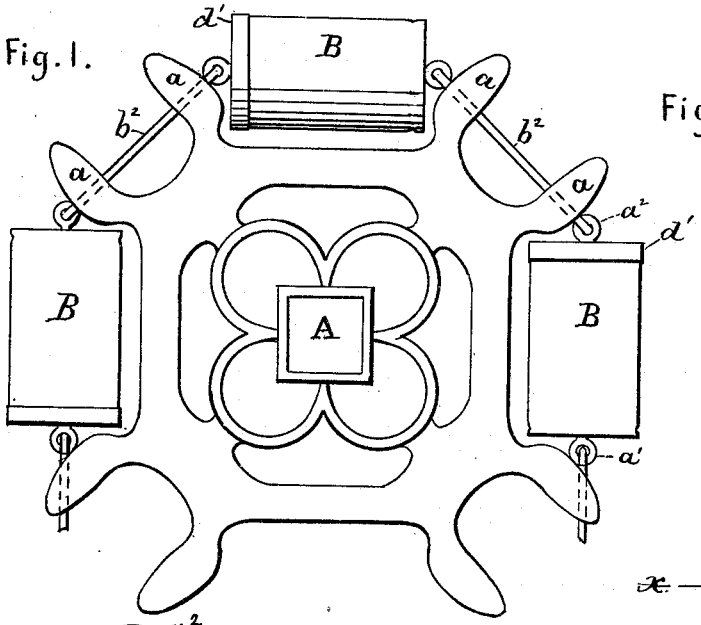



Fig. 2.

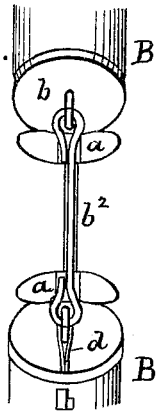



Fig. 3.

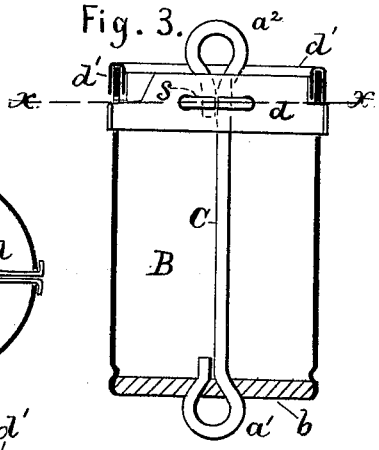



Fig. 4.

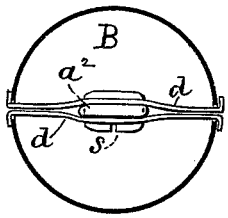



Fig. 5.

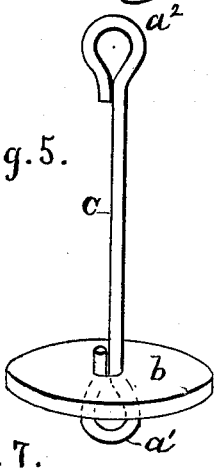
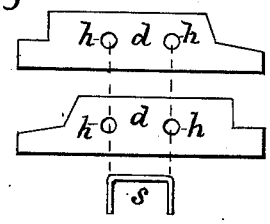



Fig. 7.



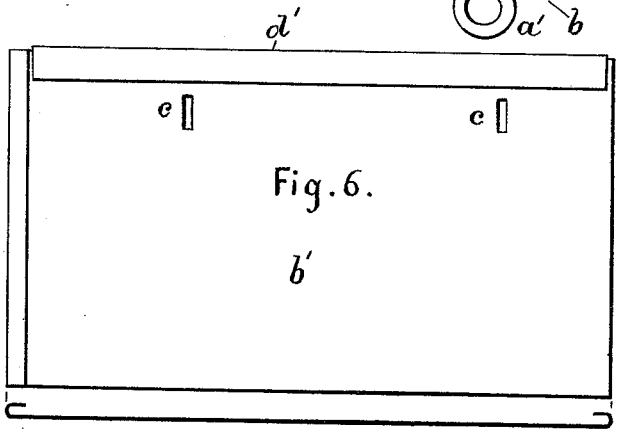




Fig. 6.

Witnesses:

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# UNITED STATES PATENT OFFICE.

JAMES W. AVERY, OF PEORIA, ILLINOIS.

## IMPROVEMENT IN CHAIN-PUMPS.

Specification forming part of Letters Patent No. **195,435**, dated September 25, 1877; application filed September 13, 1877.

*To all whom it may concern:*

Be it known that I, JAMES W. AVERY, of Peoria, in the county of Peoria and State of Illinois, have invented certain new and useful Improvements in Chain-Pumps or Water-Elevators; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification, in which drawings—

Figure 1 is a side elevation of the sprocket-wheel, with the chain and buckets. Fig. 2 is top view of a section of the wheel holding one of the links. Fig. 3 is a vertical section of one of the buckets. Fig. 4 is a transverse section on line *x x* of Fig. 3. Fig. 5 is a perspective view of one of the cast-iron bottoms, with the longitudinal rod and eyes. Fig. 6 is a plan and edge view of the blank-plate of the shell. Fig. 7 shows the plates and staple of the eye-brace at the mouth of the bucket.

My invention relates to that class of chain-pumps or water-elevators which elevate water by means of buckets or cups without tubing; and consists of cylindrical buckets, the bottoms of which are made of cast-iron, and the shells are made of wrought-iron, the buckets being connected by links, forming an endless chain, which is carried on a single sprocket-wheel.

It is important, in water-elevators, to have strong, durable buckets without unnecessary weight, but with sufficient weight to carry the buckets, filled with air, downward through the water to purify it.

By thorough tests in actual use it has been ascertained that buckets made entirely of cast-iron, of sufficient thickness to possess the requisite strength, are unnecessarily heavy, and it is impossible to cast such buckets thin enough to contain the required weight only, and they are liable to check and crack in casting and to break in using, causing a great loss of labor and material; and buckets made entirely of sheet-iron are too light. To avoid these difficulties, I make the bottoms only of cast-iron and the shells of wrought-iron plates, or of wrought-iron flues or tubes. The required weight is obtained by casting the bottoms of such thickness as will furnish sufficient weight, and no more, to carry the buckets downward through the water; and the shells made of wrought-iron, as hereinafter described, are less liable to break in using, and the entire bucket can be made cheaper than a bucket made entirely of cast-iron.

In the drawings, A represents the sprocket-wheel, and B the cylindrical buckets, having cast-iron bottoms *b* and wrought-iron shells $b^1$.

The sprockets *a* are forked, and sufficiently long to hold the chain securely in place without liability of being thrown off the wheel; and they are arranged the required distance apart to carry the connecting-links between the forks, and the buckets in the spaces between the sprockets, as shown in Fig. 1 of the drawings. The loops on the ends of the connecting-link $b^2$ are formed and adjusted to rest flatwise on the bearings, as near the eyes as possible, where the link is double, as shown in Fig. 2 of the drawings; and the bearings are sufficiently elevated to suspend the buckets, so that the entire weight of the buckets and chain will be carried by the connecting-links, with their looped ends resting flatwise on the bearings, the strain being on the center of the chain, and avoiding all side pressure upon the buckets. The bottom is cast around the eye $a^1$ of rod C, extending below the bottom to receive the connecting-link. The bottoms are cast in suitable molds instead of sand, to have them clean and smooth to form close joints with the shells, and to avoid the labor required in cleaning and truing them, if cast in sand. At the present I make the shells of the buckets of sheet-iron blanks $b^1$, cut the required size, and provided with the slots or mortises *c* near the upper end of the plates, to receive the braces *d* for holding in place the eyes $a^2$. These braces are formed of two plates, each having one long and one short tenon, for readily inserting them in the mortises when the bucket is formed, and they are provided with holes *h* to receive the staple *s*. The mouth of the bucket is strengthened by a strip, $d'$, folded and slipped over the top of the blank, and bent with the blank in forming the body of the

bucket. The blanks $b^1$ are bent at the ends, as shown in Fig. 5 of the drawings, to form lock-seams when the blanks are bent, forming the cylindrical body of the buckets, as shown in the drawings.

The shells are swaged onto the bottoms by a suitable tool, which creases the shell immediately above the bottom, forming a bearing-shoulder for the bottom, and also turns the lower edge of the shell inward against the bottom, holding it in place in the shell.

The plates of the braces are adjusted one on each side of the eye $a^2$ by first inserting the long tenon through one of the mortises, and extending it till the short tenon will enter the mortise on the opposite side of the bucket, and both plates being thus adjusted in place the staple *s* is inserted through the holes *h*, and by suitable tools or machines the ends of the staples and the ends of the braces are clinched, as shown in the drawings, thus firmly securing the eye $a^2$ in the center of the mouth of the bucket. After the buckets are thus completely formed they are galvanized, which unites all the parts together, and renders air-tight the joints and seams; and these buckets, made of wrought-iron and smooth cast-iron, as described, require less time and labor in preparing them, and hence cost less for galvanizing than buckets made entirely of rough cast-iron.

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

1. A chain water-elevator bucket, having a cast-iron bottom and a wrought-iron shell, constructed and connected to a chain carried on a sprocket-wheel, substantially as and for the purposes described.

2. The bottom *b*, cast separately from the shell around the eye $a^1$ on the rod C, provided with an eye, $a^2$, substantially as and for the purposes described.

3. A bucket, B, having a cast-iron bottom, *b*, wrought-iron shell $b^1$, longitudinal rod C, provided with eyes $a^1$ $a^2$, and brace *d*, substantially as and for the purposes described.

4. In combination with the sprocket-wheel A, having elevated bearings and elongated forked sprockets, as arranged, the chain of buckets B, adjusted to be carried suspended in the spaces between the sprockets by the connecting-links, having their looped ends resting flatwise on the elevated bearings, substantially as and for the purposes described.

In testimony that I claim the foregoing as my own invention I affix my signature in presence of two witnesses.

JAMES WILLIAMSON AVERY.

Witnesses:
S. E. CARPENTER,
P. W. PERRY.