(No Model.)

C. LA DOW.

PUMP BUCKET.

No. 401,954. Patented Apr. 23, 1889.

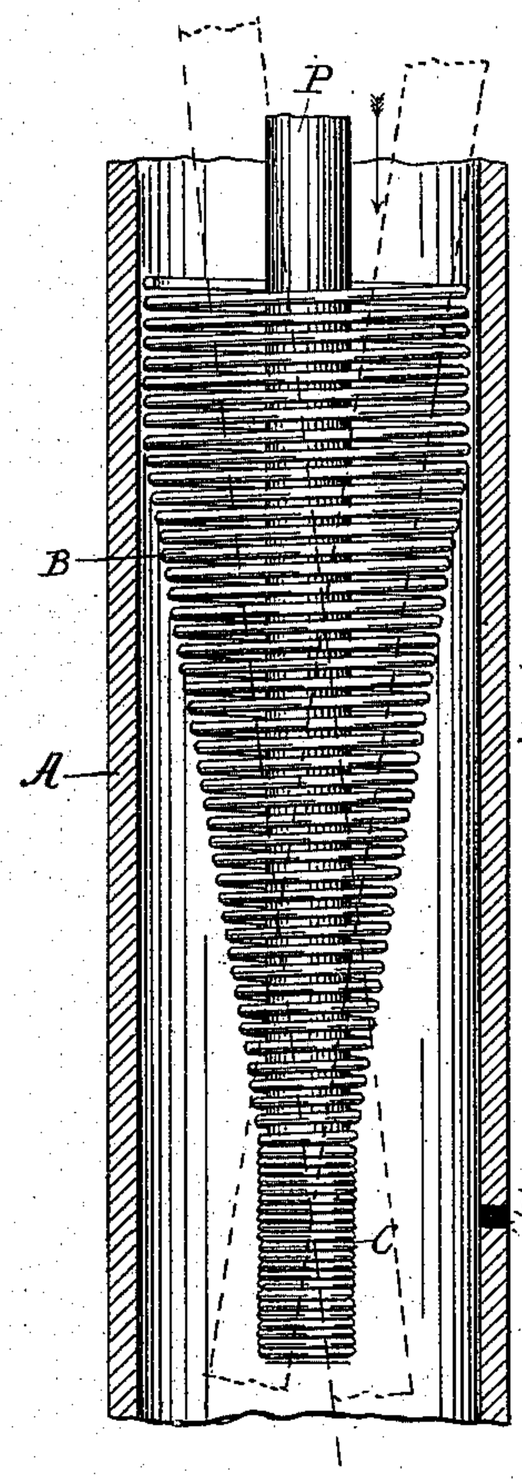


Fig. 1.

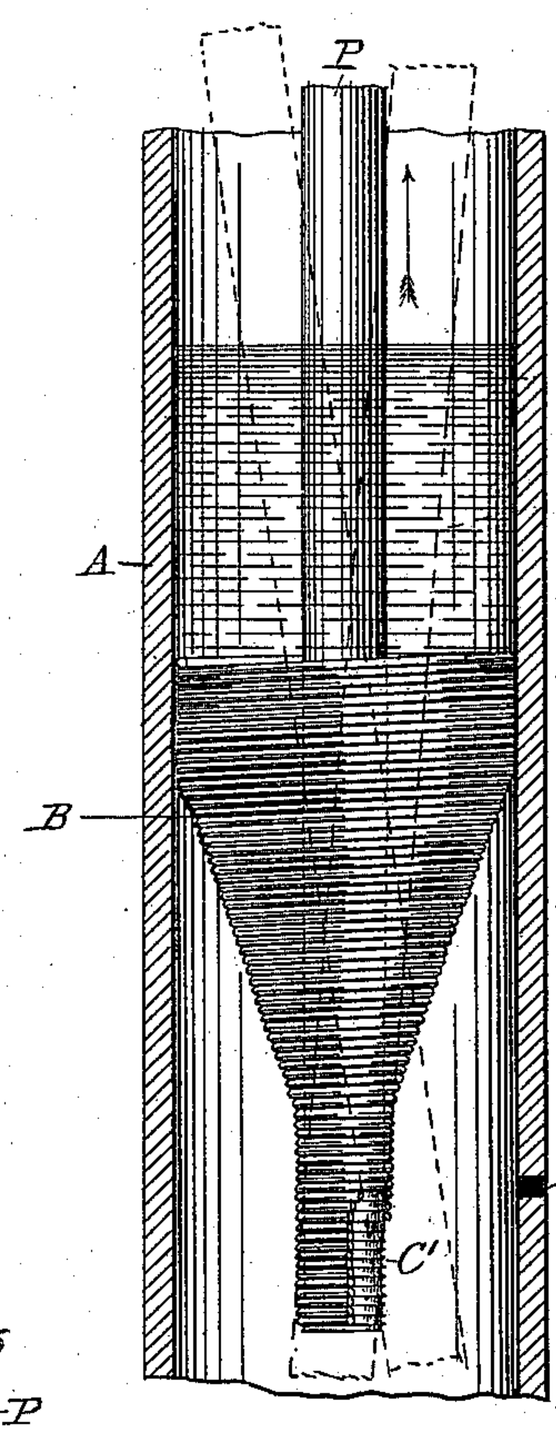


Fig. 2.

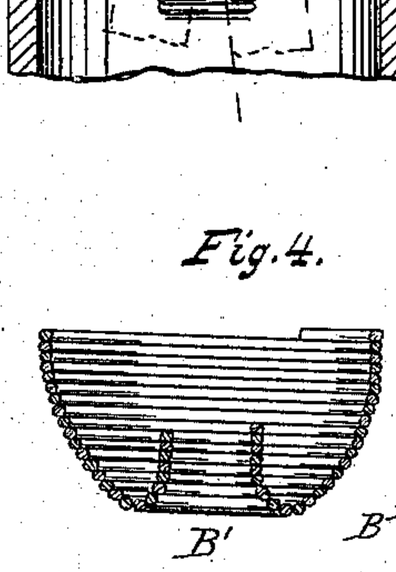
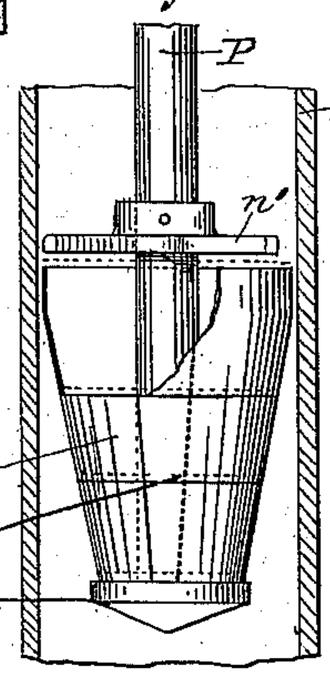


Fig. 4.



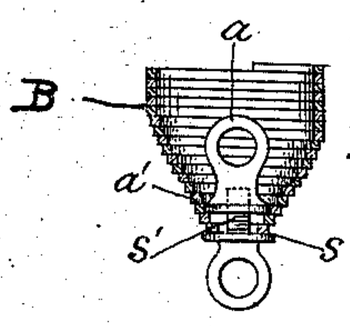


Fig. 5.

Fig. 6

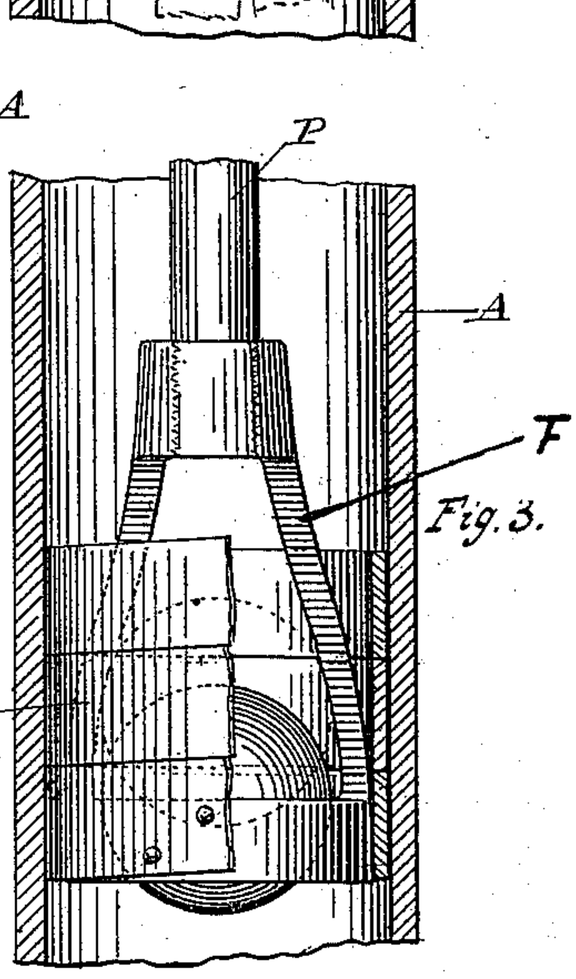


Fig. 3.

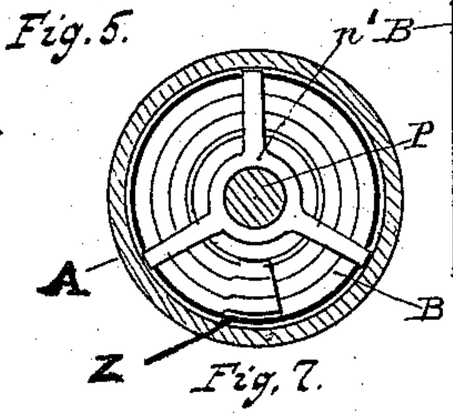


Fig. 7.

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UNITED STATES PATENT OFFICE.

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PUMP-BUCKET.

SPECIFICATION forming part of Letters Patent No. 401,954, dated April 23, 1889.

Application filed November 7, 1887. Serial No. 254,456. (No model.)

To all whom it may concern:

Be it known that I, CHARLES LA DOW, a citizen of the United States, residing at Albany, in the county of Albany and State of New York, have invented new and useful Improvements in Pump-Buckets, of which the following is a specification.

My invention relates to pump-buckets adapted to be used in connection with a cylinder of any suitable construction, so as to form either a lifting or a force pump capable of lifting or forcing water or other fluids.

The invention consists, primarily, in forming a pump-bucket of coils or rings, so as to be light, durable, and effective.

It consists, further, in constructing a pump-bucket of a series of coils or rings, preferably elastic, the coils or rings being adapted to separate vertically from each other, so as to form openings or inlets for the fluids and to close together, so as to form a cup or piston adapted to retain or force liquids, and adapted, further, to be attached to any suitable operating mechanism, such as a rod or chain.

It consists, further, in so constructing a bucket that the parts which form the bucket will be adapted to separate to receive a liquid and to close together, so as to retain fluids without the use and employment of a separate valve, and in said action filter the fluid while being forced between the coils or rings.

It consists, further, in so constructing a pump-bucket having coils or rings forming a bowl or piston that the coils or rings will be adapted to expand in diameter when lifting or forcing the fluid.

It consists, further, in a pump-bucket which, while dispensing with a separate and independent valve and also a jointed rod, offers the least possible resistance in its operation and acts equally effectively in accomplishing its work, whether the bucket-rod to which it is attached vibrates out of a perpendicular line or not when plunging or lifting.

These objects I accomplish by means of elements substantially similar to those shown in the accompanying drawings. I do not limit myself, however, to the exact constructions shown, my invention being of a generic nature and contemplating, broadly, a pump-bucket of any form when composed of coils or rings.

In the drawings, Figure 1 represents a vertical cross-section of a pump-cylinder, showing a side view of a rod carrying a bucket in the act of descending, the dotted lines indicating the possible positions in which the rod may vibrate. Fig. 2 represents the same parts shown in Fig. 1 in the act of ascending and carrying fluid. The lower portion of the bucket is broken away, showing the manner in which said bucket is mounted on the rod. Fig. 3 represents a vertical cross-section of a pump-cylinder, with a side view of a rod carrying a bucket having flat spiral coils, not adapted to stretch endwise, and therefore employing a separate valve with the coil-bucket. Fig. 4 represents a vertical cross-section of modification of form of bucket designed to be mounted upon suitable operating mechanism by means of the inner series of coils. Fig. 5 represents a vertical cross-section of a coil-bucket provided with means whereby it may be attached to a chain or other operating mechanism. Fig. 6 represents a vertical cross-section of a pump-cylinder and a side view of a bucket-rod carrying a bucket formed of circular rings, preferably made tapering and resting one upon another. Fig. 7 represents a plan view of the parts shown in Fig. 6.

A represents a pump-cylinder of any suitable construction provided, if desired, with a vent-hole, V, placed below the lower end of the bucket-stroke and above the water-level. Within such a cylinder a bucket, constructed substantially like those shown in the drawings, may be placed and attached to mechanism of any suitable construction capable of operating the bucket. I prefer for most purposes to construct the bucket of a series of layers in the shape of coils or rings, superimposed in such a manner as to form a cup or bowl, as may be done by making each superior layer exceed in diameter the layer next below it, but not so much as to wholly overlap such lower layer, the series of layers together taking the shape of an inverted cone. Several of the layers at the upper part of the bucket may be of substantially the same diameter, making this part of the series of layers cylindrical in shape. Several of the layers at the lower part of the bucket may also, if desired, be of the same diameter, as shown by the part C in Fig. 1, the spiral layers thus

forming a kind of screw-thread adapted to engage with corresponding grooves upon the end of the bucket-rod P, as shown by that portion of the rod marked C′ in Fig. 2.

The shape of the layers and of the series may be varied without departing from my invention. Thus in some instances I propose to use layers arranged somewhat as shown in Fig. 4, the inner series of layers being adapted to act as spiral threads to engage with a grooved portion of a bucket-rod, as already explained.

The manner of attaching the bucket to operating mechanism may also be varied, and instead of securing the bucket to a rod, screw-eyes, similar to those shown in Fig. 5, may be attached to the bucket and secured to a chain or other mechanism having similar capabilities.

The bucket may be made of circular rings or coils which are not spiral, or flat spiral coils or square-edge spiral coils of wire may be used, and may be coated with suitable material designed to resist the action of the fluid with which it may be brought in contact. With either of these constructions a valve may be used—such, for instance, as the ball-valve shown in Fig. 3. In the modification shown in Fig. 6 the bucket B is formed of a series of rings supported upon a cup attached to the end of the bucket-rod, each ring being larger in diameter at the top than at the bottom, so that the outer surface of each ring will be similar to the outer surface of the frustum of a cone, and adapted thereby to offer a large resisting surface when plunged into a fluid and to allow the resisting pressure of the fluid to separate the rings from each other vertically, so as to allow the water or other fluid to flow into the bucket between the rings, as through a valve. The lower edge of each ring is preferably made beveled, adapted to drop within the adjacent lower ring a short distance, so as to form a close joint to prevent the fluid from flowing out of the bucket.

To prevent the rings from being forced too far apart when plunged into the fluid, a cap, *n*, is attached to the bucket-rod above the bucket-top, but leaving suitable space between the cap and the upper edge of the bucket to allow the rings to separate vertically, so as to form openings or valves for the admission of a fluid. The cap *n*, constructed as shown in Fig. 7, consists of a ring adapted to be secured to the bucket-rod and provided with radial arms adapted to project over the upper edge of the top ring and limit the vertical movement of the rings.

Prongs may be attached near the outer edge of each spoke to extend down within the bucket along its inner face to guide the rings. When a bucket is constructed in the manner shown and described, it is obvious that when the bucket is plunged into water or other fluid the resistance offered by the fluid causes the layers of metal to separate vertically, as shown in Fig. 1. The openings thus formed act as valves to allow the water to flow into the bucket. When the layers are thus separated vertically, another result is produced, which is one of the special features of my invention—that is, the drawing in of the coils or rings or the decrease in diameter, thereby causing the least possible friction between it and the adjacent sides of the cylinder in which it acts; and, moreover, as each ring or coil separates vertically from the adjacent ones, the fluid readily enters the bucket at any part of the length of the bucket, so that it fills instantly. These coils or rings act also as a filter to prevent all unsizable objects from entering the bucket, and at the same time the vibrations of the coils or rings with elastic action tend to expel from the bucket all hard substances and sediment not designed to be received therein. The action of the coil being instantaneous in opening and closing, the bucket takes its load from all sides and along its length at once, and consequently performs its work quickly, easily, and effectively and with the least possible loss of power either in securing or retaining its load. After the bucket has secured its load and starts upward, the resistance of the water above, with what remains in the bucket, causes the layers to be held closely together, so as to form a cup or receptacle, and to expand in diameter until the upper coils or rings of the bucket completely fill the diameter of the cylinder, as shown in Fig. 2. The weight of the fluid lifted causes the coils or rings to expand sufficiently to always maintain frictional contact between them and the inner surface of the cylinder, and in course of time such surface becomes worn and causes the coils or rings to adapt themselves to any irregularities in such surface. The elasticity of the coils or rings also permits the bucket to yield to any lateral vibrations of the bucket-rod when being worked up and down, as with the ordinary pump-handle, without impairing the bucket's capacity and adaptability to hold fluid during such vibrations. The bucket may be inverted and used as a force-pump.

I claim—

1. A bucket or cup comprising a bottom or base or support and side walls composed of a series of superimposed vertically-separable layers of metal resting successively upon each other and upon the bottom, substantially as described.

2. A bucket or cup whose walls are composed of a series of superimposed vertically-separable layers of metal, with a bottom or base provided with or attached to a suitable support, said layers resting successively upon each other and upon the bottom, substantially as described.

3. A bucket constructed and composed of a series of superimposed layers of metal, which form the walls, and which are separable in the direction of the axis of the bucket, and a base or bottom provided with means for attaching it to a rod or chain and serving as a support

for the walls, substantially as and for the purpose described.

4. A bucket constructed and composed of a series of superimposed layers of metal, which form the walls, and which are separable in the direction of the axis of the bucket, and which are laterally expansible, and a base or bottom provided with means for attaching it to a rod or chain and serving as a support for the walls, substantially as and for the purpose described.

5. A bucket comprising a bottom or base provided with means for attaching it to a rod or chain and side walls composed of a series of superimposed layers of metal which overlap so as to be capable of lateral expansion, said layers being also separable in the direction of the axis of the bucket, substantially as and for the purpose described.

6. A pump-bucket whose walls are composed of a series of metal coils, the lower coil being connected with and supported by a socket adapted to be connected to a pump rod or chain, substantially as and for the purpose described.

7. A pump-bucket formed of superimposed coils of metal which gradually diminish in diameter toward the bottom, the lower coils forming a socket for the reception of a pump rod or chain, substantially as shown and described.

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