(No Model.)

G. HILLYER.

WATER COOLER.

No. 431,464. Patented July 1, 1890.

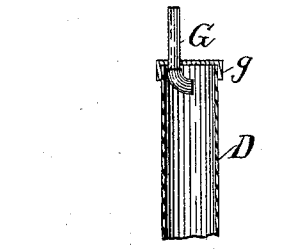


Fig. 3.

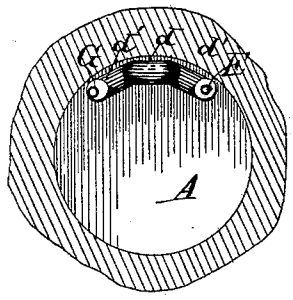


Fig. 2.

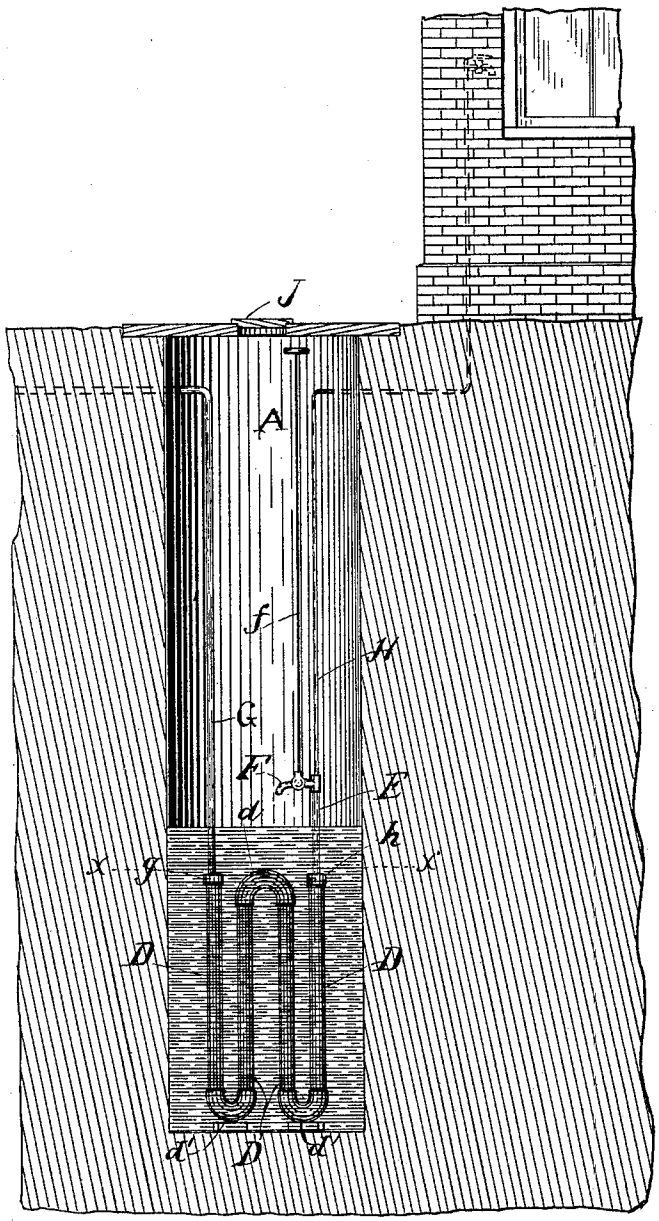


Fig. 1.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

GEORGE HILLYER, OF ATLANTA, GEORGIA.

WATER-COOLER.

SPECIFICATION forming part of Letters Patent No. 431,464, dated July 1, 1890.

Application filed July 20, 1888. Serial No. 280,532. (No model.)

To all whom it may concern:

Be it known that I, GEORGE HILLYER, a citizen of the United States, residing at Atlanta, in the county of Fulton and State of Georgia, have invented a new and useful Water-Cooler; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as 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 letters of reference marked thereon, which form a part of this specification.

This invention relates to that class of water-coolers in which the water is cooled in its passage through pipes, the cooling agent being in this case the natural water of a well.

It consists of a novel arrangement of the pipes in the water of a well, means for relieving the pipes of sediment, and of conducting the cooled water rapidly, and consequently in good condition, to its destination.

In some localities the water of wells is impure and wholly or partially unfit for drinking, on account of organic matter it contains, or from natural causes, and at the same time of a low temperature. The object of this invention is to utilize such water to extract a portion of the heat from water-works or Artesian-well water, the natural temperature of which is usually comparatively high. The apparatus by which the cooling is accomplished is illustrated in the accompanying drawings, and will be hereinafter fully described in this specification.

In the drawings, Figure 1 is a central vertical section through a well, showing the coil of pipe submerged in water, the valve for relieving the coil of sediment, and the pipe-connections to and from the coil and valve. Fig. 2 is a horizontal section through the well, on the line X X, Fig. 1, showing a plan of the coil conforming to shape of well. Fig. 3 is an enlarged sectional view of the inlet end of the coil, showing the curved end of the inlet-pipe.

In the figures, like reference-marks refer to corresponding parts.

A is a well, in the water of which is submerged the coil of pipes, consisting of the pipes D and the return-bends *d* and *d'*. The coil, constructed as shown in Fig. 1, is made the form or shape of the well, whether round, square, or otherwise, as shown in Fig. 2, in order to leave room in the well to draw water by a bucket or pump, if desired; but if the well is to be used exclusively for the purpose of this apparatus the pipe or pipes of the coil may be disposed in any convenient shape, direction, or position. The coil may consist of any number of pipes, according to the depth of the water in the well and the quantity of water to be held by them, the position of the pipes of the coil being preferably, though not necessarily, vertical; but the height of the coil should not exceed the depth of the water in the well, and the holding capacity of the coil must conform to the conditions of depth and the temperature of the water in the well and the quantity to be cooled. In determining the necessary holding capacity of the coil the difference in temperature of the cooling-water and the water to be cooled must be taken into account, as well as the quantity that will be drawn from it in the time required for cooling the water in the coil. It is also desirable to have the pipes of the coil so small as to minimize any interchange of temperature by convection between the water just entering and the water being drawn off, which would result from the use of pipes of very large diameter and short length—that is to say, the pipes D should be so small as to cause a uniform forward circulation of the whole volume contained in them when water is drawn from the outlet end. The number of pipes is immaterial so long as the above conditions are complied with.

The caps *g* and *h* are screwed or otherwise fastened on the inlet and outlet ends of the coil. The inlet or supply pipe G may be of any convenient size; but the outlet or discharge pipe H, that leads to a hydrant at the surface or in a house or other place at which the water is to be delivered for use, should be much smaller than the inlet-pipe, and so small as to convey a given quantity of water in a given time, in order that the waste may be slight in driving out or getting warmer water that stood in the pipe, and in cooling the pipe all the way to the point of use, and

so that its movement, being rapid, will not absorb heat to any appreciable extent, but be delivered at about the temperature of the well.

The pipe G should be of about the size of the service-pipe that it connects with, its size being immaterial; but after entering the service-pipe D it should turn, as shown in Fig. 3, to cause the force of the water to be broken against the side of the pipe D and prevent the unnecessary disturbance of the water in the coil that would result from the forcible injection of the water directly in line with the pipe D.

The pipe H should be as small as is practicable, for the reasons above stated; but there should be a short pipe E between it and the coil, as shown in Fig. 1, of about the same size as the pipe G. The valve F on the pipe E should be of about the same capacity as the pipe, as its office is to draw the water through the coil so rapidly as to remove all sediment in the coil of pipes. The water from the valve F may be discharged into the well; but its discharge-opening should be above the water in the well, in order that its action may be easily ascertained, and at as low a position as possible, in order that there may be but a short length of large pipe above the well-water, for the reason given in the description of the pipe H and its function. In case it is undesirable to have water from the valve F discharge into the well on account of its quantity or for any other reason it may be carried by a connected pipe to the surface of the ground, a sewer, or any other place to be utilized for irrigation or for any other purpose. In case the water is carried to a point above the valve F, that valve should be of the kind known as "stop and waste," in order to drain the pipe above it, as in many cases water would otherwise stand in it for weeks or even months. The valve F should have a rod, chain, or other connection *f*, extending to the top of the well, by means of which it may be opened and closed, or it may be allowed to close automatically. It is preferable to have the connection by which the valve is operated under the cover J of the well or in some other protected position.

In case the service H is to be carried a long distance it may be covered with a jacket or wrapping of some suitable non-conducting material to protect the cool water in it from reabsorbing heat.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A refrigerating device consisting of the coil D, submerged in the water of a well, the inlet-pipe G, the outlet-pipe H, of a smaller diameter than the coil, and the short intermediate pipe E, connecting the outlet-pipe with the coil and provided with a waste-cock F, adapted to be operated from the mouth of the well, substantially as and for the purpose specified.

2. A refrigerating device consisting of the coil D, submerged in the water of a well, the inlet-pipe G, connected with said coil and having its entering end turned so that the water leaving it will strike against the side of the coil, the outlet-pipe H, of smaller diameter than that of the coil, and the intermediate pipe E, connecting the outlet-pipe with the coil and provided with a waste-cock adapted to be operated from the surface of the ground, substantially as specified.

In testimony whereof I hereunto affix my signature in presence of two witnesses.

GEO. HILLYER.

Witnesses:
W. P. PATTILLO,
J. HENLY SMITH.