No. 704,043. Patented July 8, 1902.

A. H. HUMPHREY.

HEATER.

(Application filed July 13, 1898. Renewed Dec. 30, 1901.)

(No Model.)

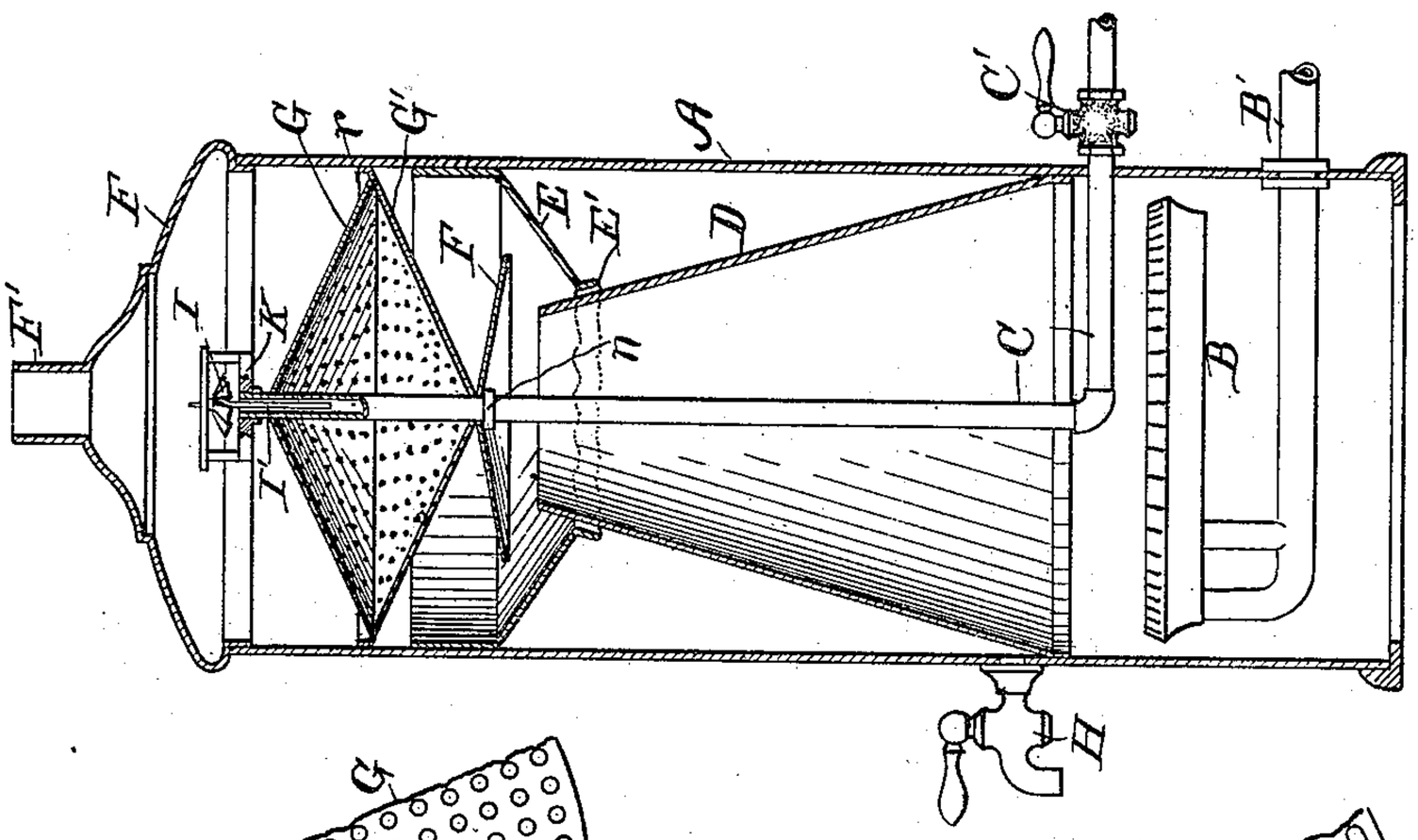

Fig. 1.

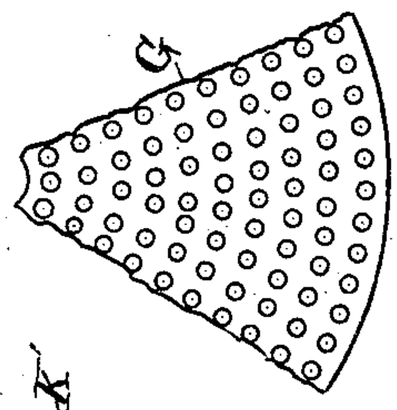

Fig. 5.

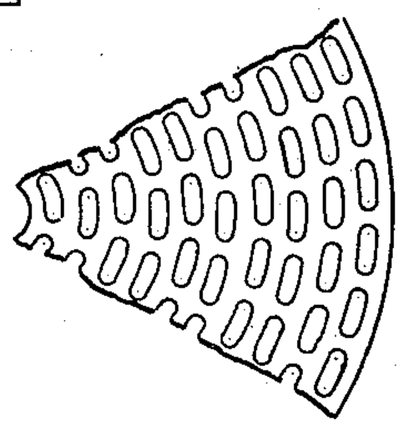

Fig. 6.

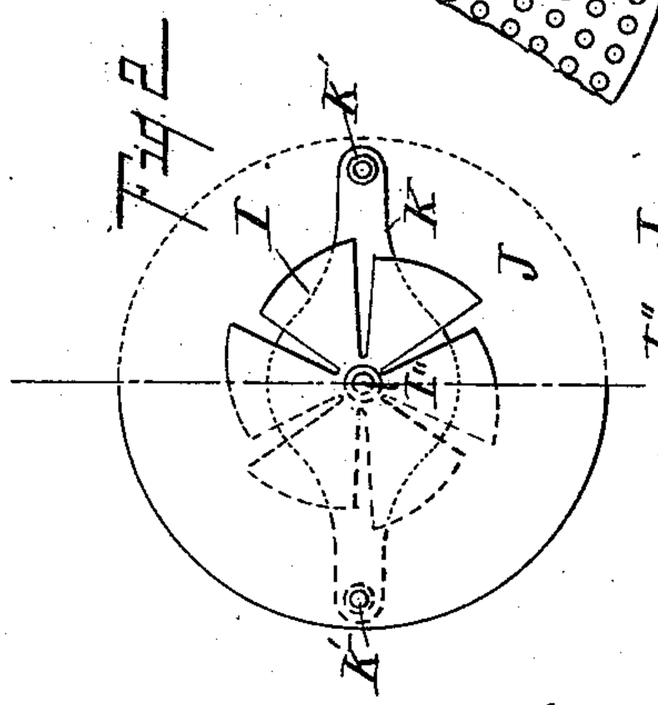

Fig. 2.

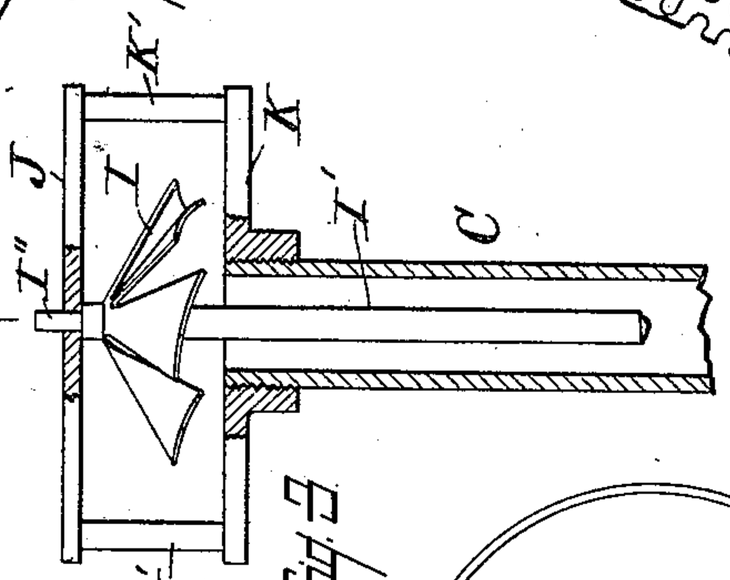

Fig. 3.

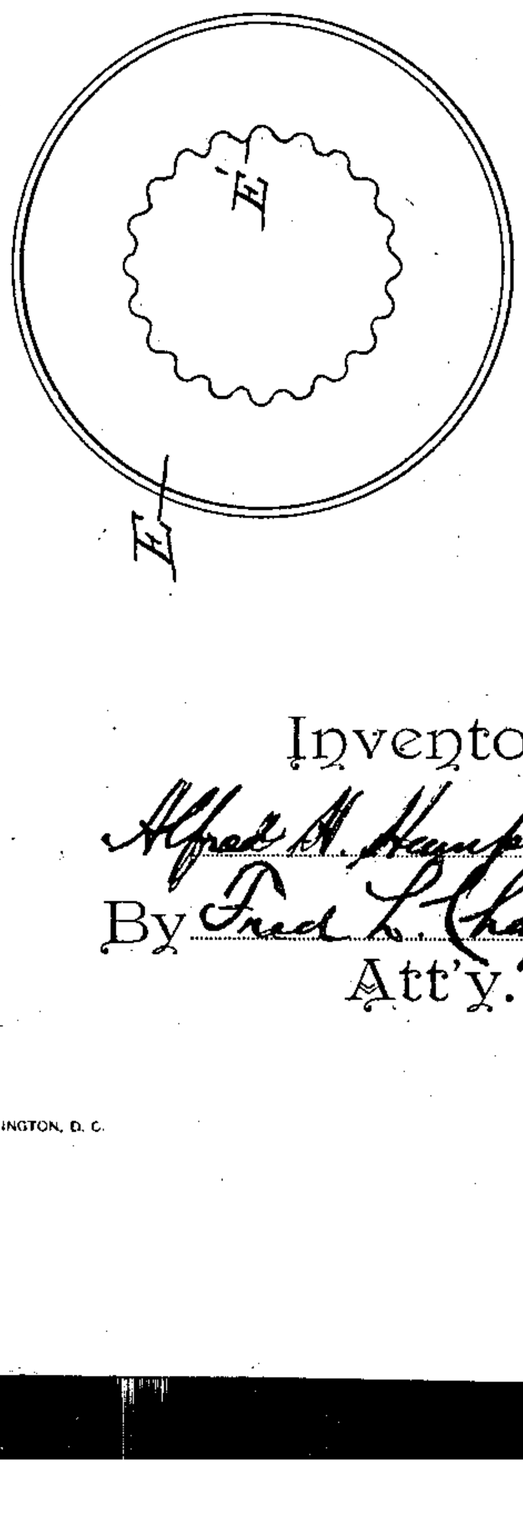

Fig. 4.

Fig. 7.

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UNITED STATES PATENT OFFICE.

ALFRED H. HUMPHREY, OF KALAMAZOO, MICHIGAN, ASSIGNOR TO HERBERT S. HUMPHREY, OF KALAMAZOO, MICHIGAN.

HEATER.

SPECIFICATION forming part of Letters Patent No. 704,043, dated July 8, 1902.

Application filed July 13, 1898. Renewed December 30, 1901. Serial No. 87,822. (No model.)

To all whom it may concern:

Be it known that I, ALFRED H. HUMPHREY, a citizen of the United States, residing at the city of Kalamazoo, in the county of Kalamazoo and State of Michigan, have invented certain new and useful Improvements in Heaters, of which the following is a specification.

This invention relates to improvements in heaters, and especially to heaters for heating water for baths or similar purposes.

The objects of this invention are, first, to provide a simple, effective, and durable heater of the class popularly known as "instantaneous;" second, to provide an efficient means of distributing the water in a heater of this class so that it will come in contact with and quickly absorb the heat from the gases and air arising from a suitably-confined burner; third, to cheapen the construction of water-heaters of this class generally without impairing their efficiency. Further objects will definitely appear in the detailed description to follow. I accomplish these objects of my invention by the devices and means described in this specification.

The invention is clearly defined, and pointed out in the claims.

The structure is fully illustrated in the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a vertical detail sectional view taken through the center of the device, which is preferably cylindrical in form. Fig. 2 is an enlarged detail plan view of the sprinkling device supported in the upper part of the heater, the upper portion J of the supporting-frame therefor being removed. Fig. 3 is an enlarged detail side elevation of the said sprinkler, partly in section. Fig. 4 is a detail plan view of the deflector E, showing the corrugated portion E′ at the bottom. Fig. 5 is an enlarged detail view of a portion of the screen. Figs. 6 and 7 are views of the said screen, showing a modification of the form of the perforations.

In the drawings similar letters of reference refer to similar parts throughout the several views.

Referring to the lettered parts of the drawings, A represents an upright cylindrical casing supported on any suitable base or suitably finished to stand on its bottom. Within the lower portion of the same is a suitable gas-burner B, connected to a gas-pipe B′, though of course a gasolene-burner or any other suitable heating means might be used. Just above the burner is a hollow conical tube D, which is fitted water and gas tight at its bottom to the walls of the main casing. This conical tube is open at its top for the passage of gases. Surrounding the upper portion of this conical tube is an inverted cone E, which is also fitted snugly within the casing and also embraces the upper end of the conical tube D. The inverted cone E has a downwardly and outwardly projecting flange E′, containing vertical corrugations, which form openings between it and the conical tube D for the passage of water.

Extending up from the bottom of the heater is a pipe C, which delivers the water at its top and is controlled by a stop-cock C′. On this pipe I secure, by a suitable collar *n*, a concavo-convex disk F, of considerably larger diameter than the top of cone D, to deflect and prevent the descending water from falling into the cone. Resting on this disk F is a funnel-shaped disk G′, with its periphery in close contact with the casing A. A similar inverted disk G rests within the upturned flange at the periphery of the disk G′. These disks G G′ are perforated. The perforations in the disks when the disks are placed at the angle indicated in the drawings are a little less than one-fourth of an inch in diameter when made round, as appearing in Fig. 5, though the perforations might be slots, as appears in Figs. 6 and 7, of the same width. I show the perforations cut clean in the disks; but they could be punched without cutting away the metal, though of course the plates would be roughened.

On the upper end of the pipe C, I provide a frame consisting of cross-pieces K, screwed or otherwise secured to the pipe, with standards K′ K′ at each end and a cross-piece J at the top. A spindle I′, having a journal I″ at the top, is within the pipe G and projects into a journal-bearing in the cross-piece J. On this spindle is mounted a sprinkling-wheel I, which is made up of angular wings projecting radially and downwardly and so arranged as to revolve like a windmill or tur-

bine. The spindle I′ does not materially obstruct the flow of water through the top of pipe C. The casing A is provided with a suitable top F and flue F′ for carrying away the products of combustion.

A faucet or stop-cock H is inserted in the outer casing A just above the point where the cone D is joined to the casing to draw off the heated water, though a discharge pipe or spout could be substituted. In operation the burner B is lighted and the water is turned on. The heat passes up from the burner through the cones and through the perforations in the plates G G′ and out at the top. The water passes up through pipe C and rotates the sprinkler-head I, which distributes it evenly onto the perforated plate G, where, if it is undisturbed, it will practically spread over and seal all of the perforations. It also descends with like effect upon the perforated plate G′. The upward current of heated air and gases, however, breaks through the film of water over the perforations and is thus brought thoroughly into contact with it, and substantially all of the heat is thus absorbed. The water continuing to trickle down comes into contact with the disk F, which is more strongly heated, and then descends onto the inverted cone E, down the outside of the cone D, which is also thoroughly heated, and can be drawn off at the stop-cock H. The water is thoroughly heated from the start.

Having thus described my improved water-heater, I desire to state that it is capable of great variations in the details of its construction without departing from my invention. A single perforated plate would be found quite effective; but by reversing the current through the device, as I have done by a second plate, much more heat is utilized. By making the plate G a little more conical the necessity of the sprinkler I can be dispensed with. The structure will operate with a considerable degree of efficiency without the sprinkler I in its present form. Instead of using perforated plates woven-wire screen might be adopted, and by making the angle more abrupt the meshes or perforations can be considerably increased, and by making the screen flat and providing a distributer or sprinkler the perforations could be made smaller than I have here described. The cylindrical form for the outer casing is preferred, as it is most easily constructed; but it is obvious that other forms could be adopted. The special arrangement of parts in conjunction with the perforated screens here shown is especially available and practical.

By use of the screen the comparatively small quantity of water is spread over a broad surface and the current of heated gases penetrates the entire mass, finally dividing the same, and so heating it completely.

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

1. In a water-heater, the combination of a casing; a plurality of perforated cones mounted one upon another within the casing forming a complete partition therein and adapted to guide and finely divide the water fed to the same so as to seal or partially seal said perforations; devices for feeding the water to said cones in a finely-divided state; and means for introducing heated gases into said casing below said cones, whereby said gases are caused to pass upwardly through said perforations and break the film of water formed over the same, for the purpose specified.

2. In a water-heater, the combination of a casing; a perforated cone within the casing adapted to finely divide the water fed to the same so as to seal or partially seal said perforations; devices for feeding the water to said cone near its top in a finely-divided state; and means for introducing heated gases into said casing below said cone, whereby said gases are caused to pass upwardly through said perforations and break the film of water formed over the same, for the purpose specified.

In witness whereof I have hereunto set my hand and seal in the presence of two witnesses.

ALFRED H. HUMPHREY. [L. S.]

Witnesses:
LELA M. BROWN,
OTIS A. EARL.