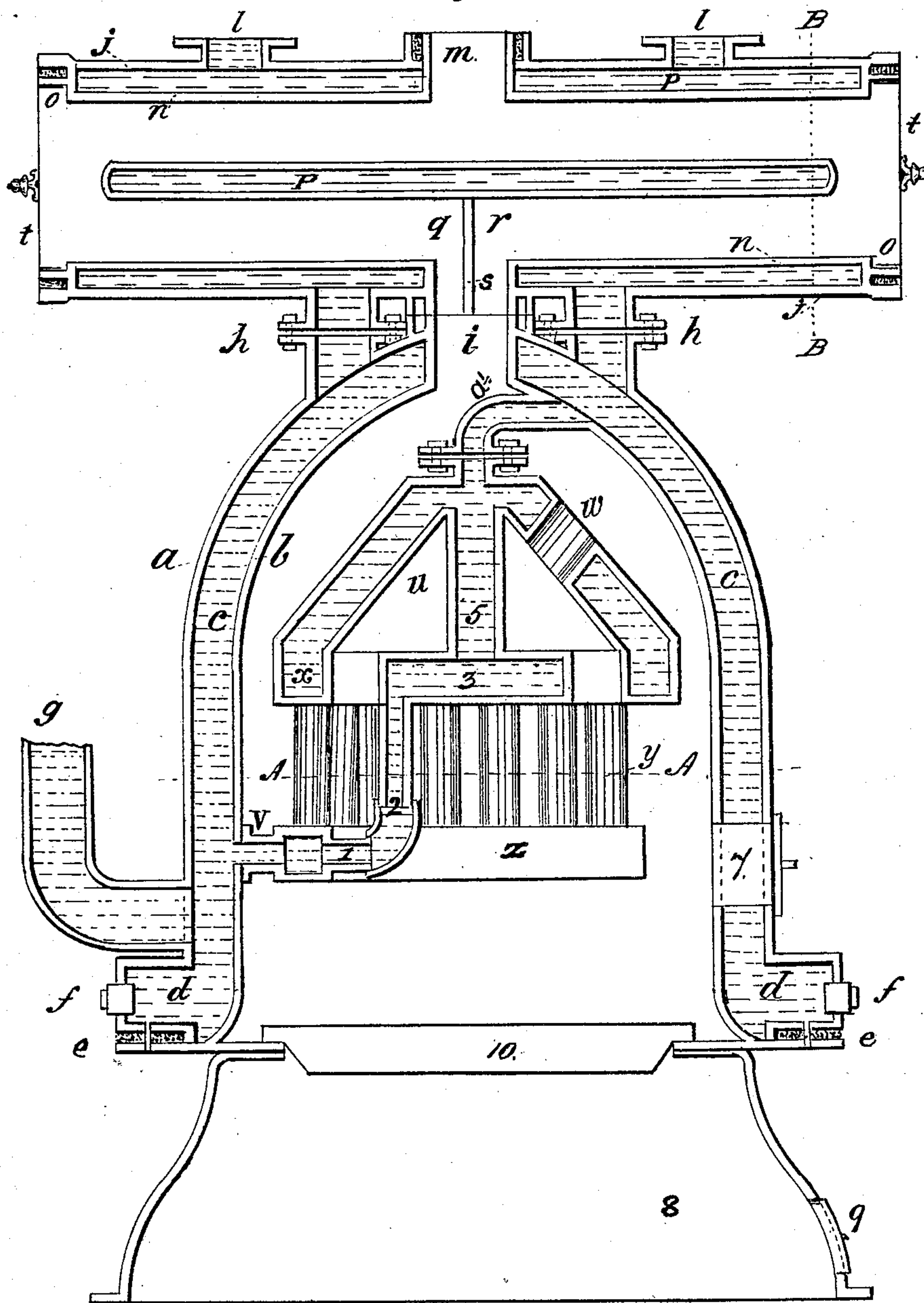


A. SPENCE.
Water-Heaters.

No. 145,457.

Fig 1

Patented Dec. 9, 1873.



Witnesses.

Charles H. Hill
Peter H. Ferguson

Inventor.

Archibald Spence

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Water-Heaters.

No. 145,457.

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Fig 2.

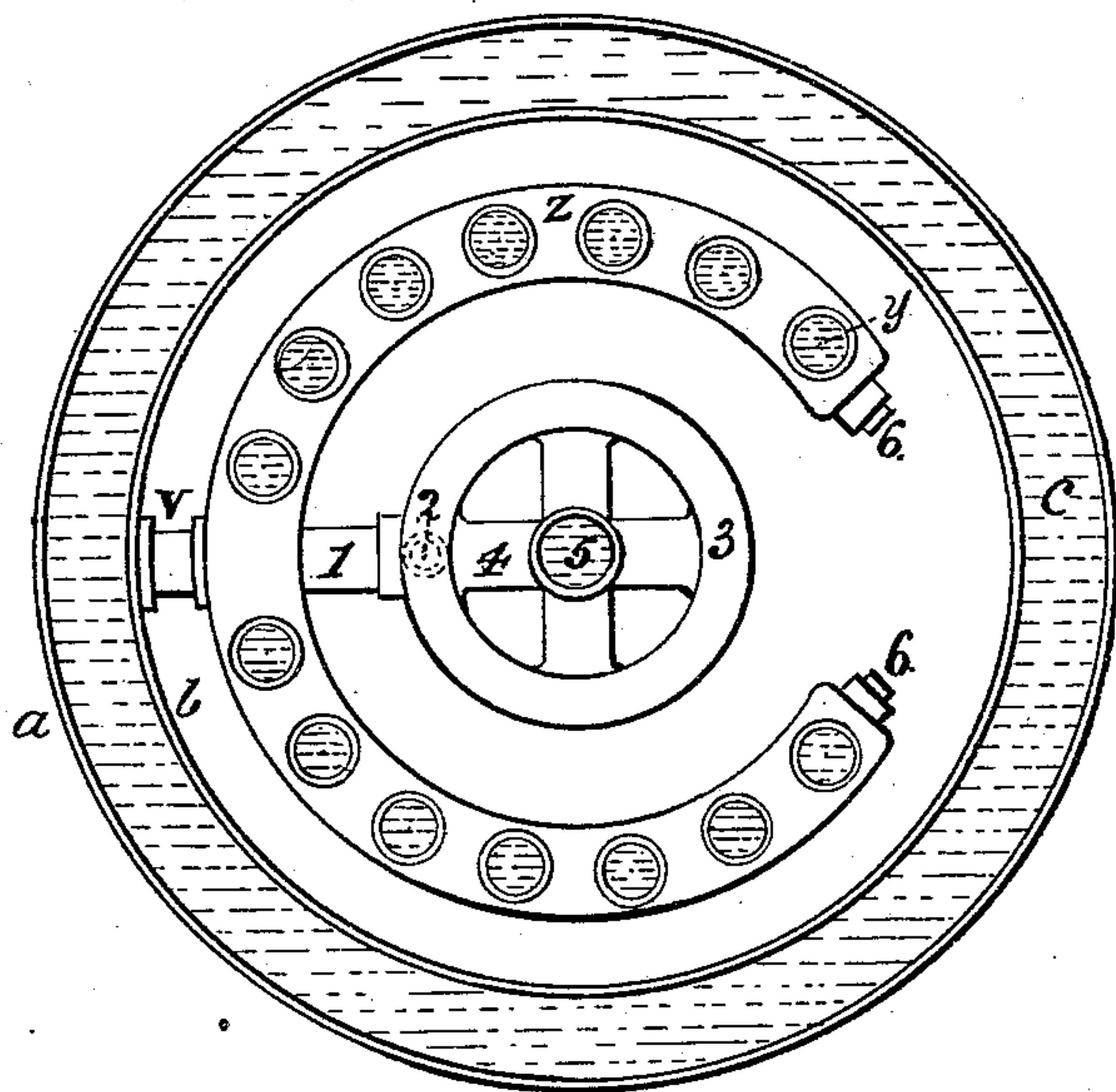
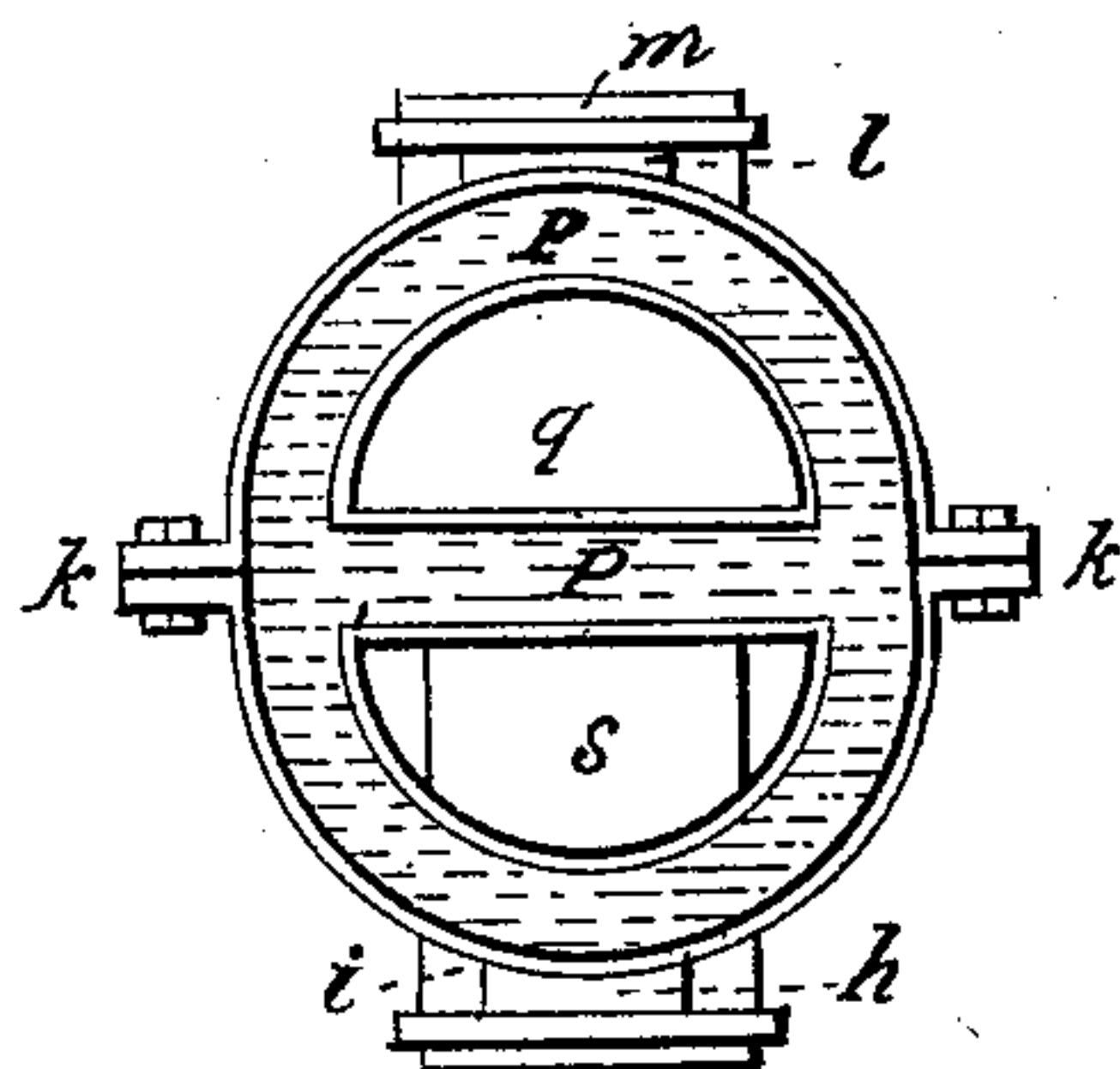


Fig 3.



Witnesses.

Charles Pittman
Peter H. Ferguson

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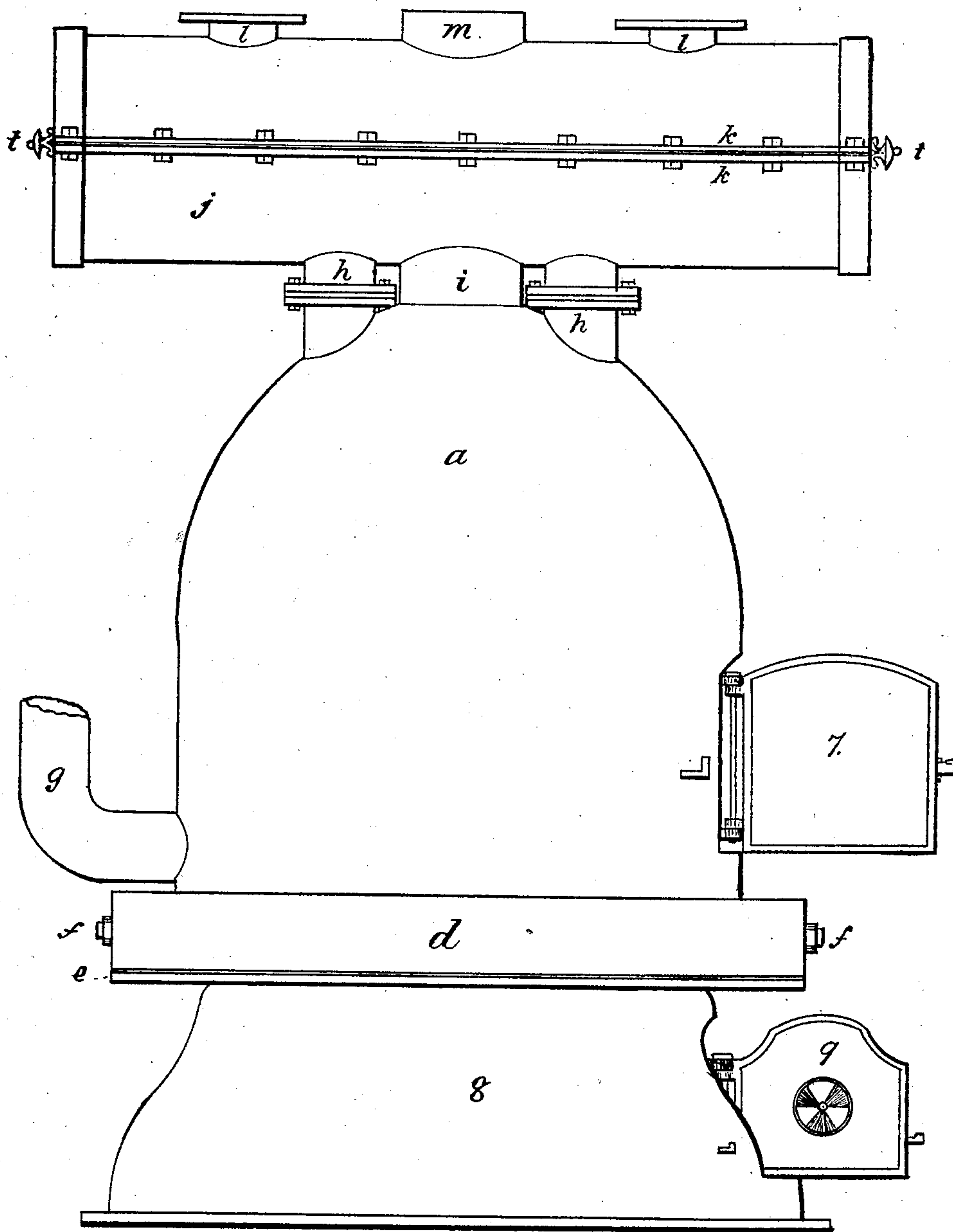
Archibald Spence

A. SPENCE.
Water-Heaters.

No 145,457.

Fig 4.

Patented Dec. 9, 1873.



Witnesses,

Witnesses,
Charles F. Fennell
Peter H. Ferguson

Inventor.

Archibald Spence

UNITED STATES PATENT OFFICE.

ARCHIBALD SPENCE, OF MONTREAL, CANADA, ASSIGNOR OF ONE-HALF HIS
RIGHT TO PETER H. FERGUSON, OF SAME PLACE.

IMPROVEMENT IN WATER-HEATERS.

Specification forming part of Letters Patent No. **145,457**, dated December 9, 1873; application filed
October 24, 1873.

To all whom it may concern:

Be it known that I, ARCHIBALD SPENCE, of the city of Montreal, district of Montreal, Province of Quebec, Dominion of Canada, molder, have invented an Improved Hot-Water Boiler, of which the following is a specification:

This invention relates to that class of boilers made of cast-iron, but which may be made of any suitable metal, and are used for heating water, the heated water being conveyed, in pipes or other suitable device, through public buildings, churches, dwelling-houses, green-houses, &c., for the purpose of warming them, instead of using the steam-boiler, hot-air furnace, stove, &c.; all of which are, under certain conditions, extremely dangerous to life and property.

My improved hot-water boiler will not explode under any circumstances; neither can wood ignite from contact with the boiler or pipes. From the novel construction of my boiler it saves a larger percentage of fuel by utilizing all the products of combustion, a greater part of which, in other appliances, goes into the chimney, and is wasted.

I proceed, therefore, by reference to the annexed drawings, where like letters of reference indicate like parts, to more fully describe and explain my invention.

Figure 1 represents a vertical sectional elevation of boiler. Fig. 4 is an outside view of complete boiler with ash-pit.

Letter *a* in Fig. 1 is the outer shell, of any desired shape, cast in iron, or made of any suitable metal. *b* is the inner shell, cast to correspond with the outer shell, *a*. The outer shell, *a*, and inner shell, *b*, form, when joined, the water-space *c*, as shown in Fig. 1. *d d* is a sediment-chamber, formed on the base of the outer shell, *a*, as shown in Figs. 1 and 4. *e e* indicate the flange on the inner shell, *b*, projecting to the face of the sediment-chamber *d d*. The bases of the chamber *d d* and flange *e e* are tapped through at intervals, for the reception of small bolts, and a rust-joint is then formed, in the usual manner, between the base of the chamber *d d* and the flange *e e*. *f f* are plugs inserted in the face of the sediment-chamber *d d*, which may be withdrawn at any time to allow the sediment that may have accumulated

to be scraped out and removed. By this contrivance the water-space *c* is always kept clean, and incrustation does not take place. *g* is the feed or inlet pipe from the tank or water-works to the boiler. *h h* are flanged water-pipes connecting the lower and upper parts of the boiler by means of bolts and nuts and a rust or other suitable joint, as shown at Fig. 1. *i* is the smoke-flue, also joined to the top by means of a rust-joint. The outer shell, *j*, of the top or head consists of two semicircular or semi-elliptical pieces, of any suitable length, each having two flanges, *k k*, as fully shown in Fig. 4, extending along their whole length. The halves are securely put together by having the flanges *k k* drilled through at intervals, and bolts and nuts with a rust or other suitable joint used, as shown in Fig. 4. The upper part of the shell *j* has two or more branches, marked *l*, to which may be connected the pipes necessary for conveying the heated water through the building. There is, also, a plain pipe, *m*, to which the smoke-pipes leading to the chimney may be attached in the ordinary way. The inner shell, *n*, of the top or head is cast in one piece, of iron, or any suitable metal, with head *o o* at each end, and is fastened to outer shell, *j*, with a rust-joint, the whole forming, in conjunction with the outer shell, *j*, the water-space *p*, and smoke and heat passages *q* and *r*. Openings for the exit of smoke and heat are provided, and made to correspond with and fit into the openings *i* and *m*, and made tight at these places by means of a rust or other suitable joint. Attached to the outer surface of the inner shell, *n*, is a cast or wrought iron plate, *s*, of any convenient thickness, riveted or cast on, which descends through the smoke-flue *i* in its center, touching at both sides, making two flues as shown in Fig. 1, thereby more effectually causing the draft to go through both ends of the top or head, and, in consequence of the greatly-increased surface presented to the action of heat, the entire product of combustion is utilized. At each end of the top or head I insert, in the heads marked *o o*, tin or sheet-iron stoppers *t t*, which may be withdrawn to allow the heat-chamber and smoke-flues to be cleaned, when necessary. Into the interior of the lower part of the boiler I put the hollow

water-cone *u*, connected with the water-space *c* by the pipe *v*, as shown in Fig. 1, said cone *u* having one or more openings, *w*, for the purpose of allowing the product of combustion to pass through it, thereby causing the water in the cone to heat much quicker than if the cone was not perforated. The base of the cone is formed, as shown in Fig. 1, as an annular water-space, *x*, into the base of which is cast, or secured in the ordinary way, (preferably cast,) any desired number of vertical tubes, *y*. These serve as water-channels between the annular water-space *x* and a lower annular water-space, marked *z*. By this new combination I present a greatly-increased heating-surface in the interior of the boiler, as shown in vertical section, Fig. 1. The tubes *y* and the lower annular water-space *z* are so arranged as to leave, opposite the fire-door, an opening for replenishing the fire, when desired. No. 1 is the branch pipe leading from the lower annular water-space *z* to the elbow and upright pipe 2, as shown in Fig. 1; No. 2, the pipe with elbow connecting flanged elbow-pipe *a'*, leading from top of cone *u*, through inner shell *b*, into water-space *c*; also, connecting the annular water-space *x* with an inner ring, marked 3, with cross-pipe in ring marked 4, into the intersection of which is secured the lower end of pipe marked 5, as shown in Fig. 2. The upper end of pipe 5 is secured in cone *u* by being cast with it. In the ends of the lower annular water-space *z* are two plugs, marked 6 6, which can be withdrawn to permit of cleaning away any sediment that may have accumulated

in water-space *z*. No. 7 is the door, and is attached to the boiler in the ordinary way. No. 8 is the ash-pit, cast in iron, and fitted to base of boiler. No. 9 is the door of ash-pit. No. 10 represents the bars or grate. Any of the grates at present in use may be used, with handle projecting through an aperture left for that purpose in ash-pit, so that the grate may be shaken, when desired, by attaching a lever to the projecting handle; or plain bars may be used, if preferred.

I claim as my invention—

1. A boiler constructed of outer shell, *a*, with sediment-chamber *d d*, plugs *f f*, inner shell, *b*, with flange *e e*, as and for the purposes set forth and described.

2. Flanged pipes *h h*, branching from the shoulder, connecting the top or head, composed of outer shell, *j j*, flanges *k k*, branches *l l*, pipe *m*, in combination with inner shell, *n*, heads *o o*, stoppers *t t*, space *p*, smoke and heat passages *q* and *r*, plate *s*, double smoke-flue *i*, as and for the purposes fully described and set forth.

3. The hollow water-cone *u*, with openings *w*, annular water-space *x*, in combination with vertical tubes *y*, lower annular water-space, *z*, elbow-pipe 2, ring 3, cross-pipe 4, vertical pipe 5, movable plugs 6 6, as and for the purposes fully described and set forth.

ARCHIBALD SPENCE.

Witnesses:

CHARLES STILLWELL,
PETER H. FERGUSON.