4 Sheets—Sheet 1.

J. BROWN.

Steam Heater.

No. 10,982. Patented May 30, 1854.

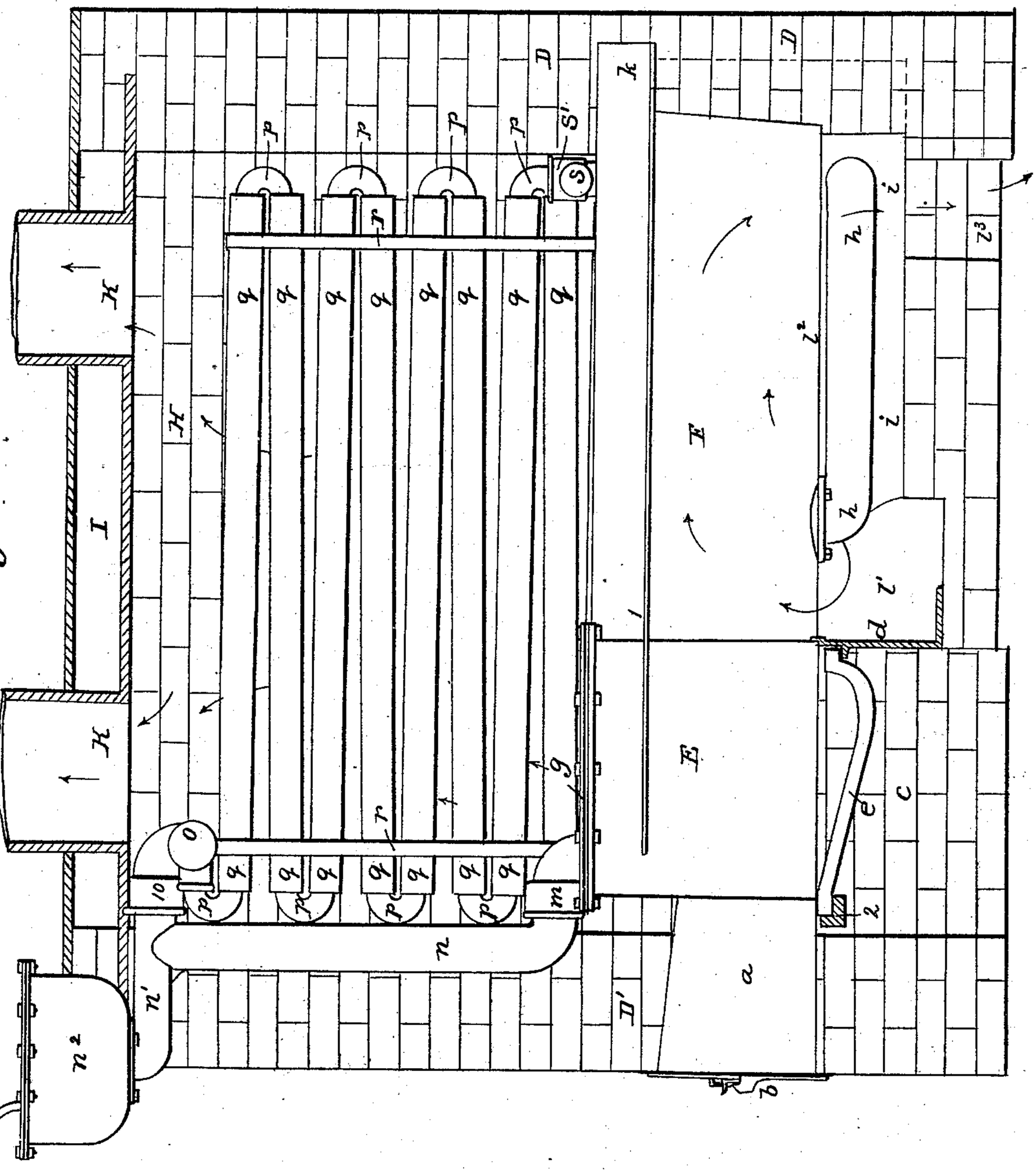

Fig. 1.

Witnesses:
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J. BROWN.

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Patented May 30, 1854.

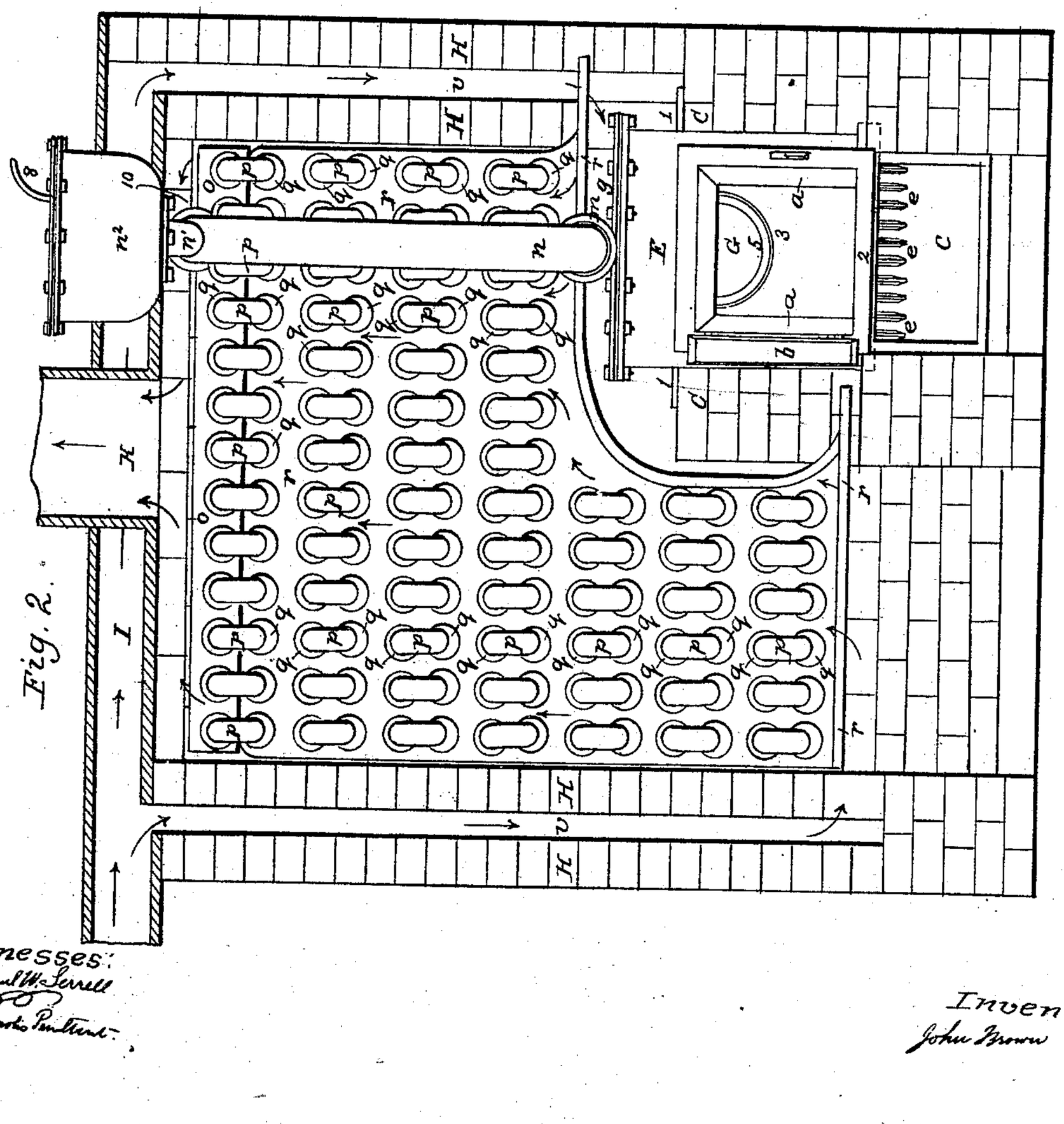

Fig. 2.

Witnesses:
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Steam Heater.

No. 10,982.

Patented May 30, 1854.

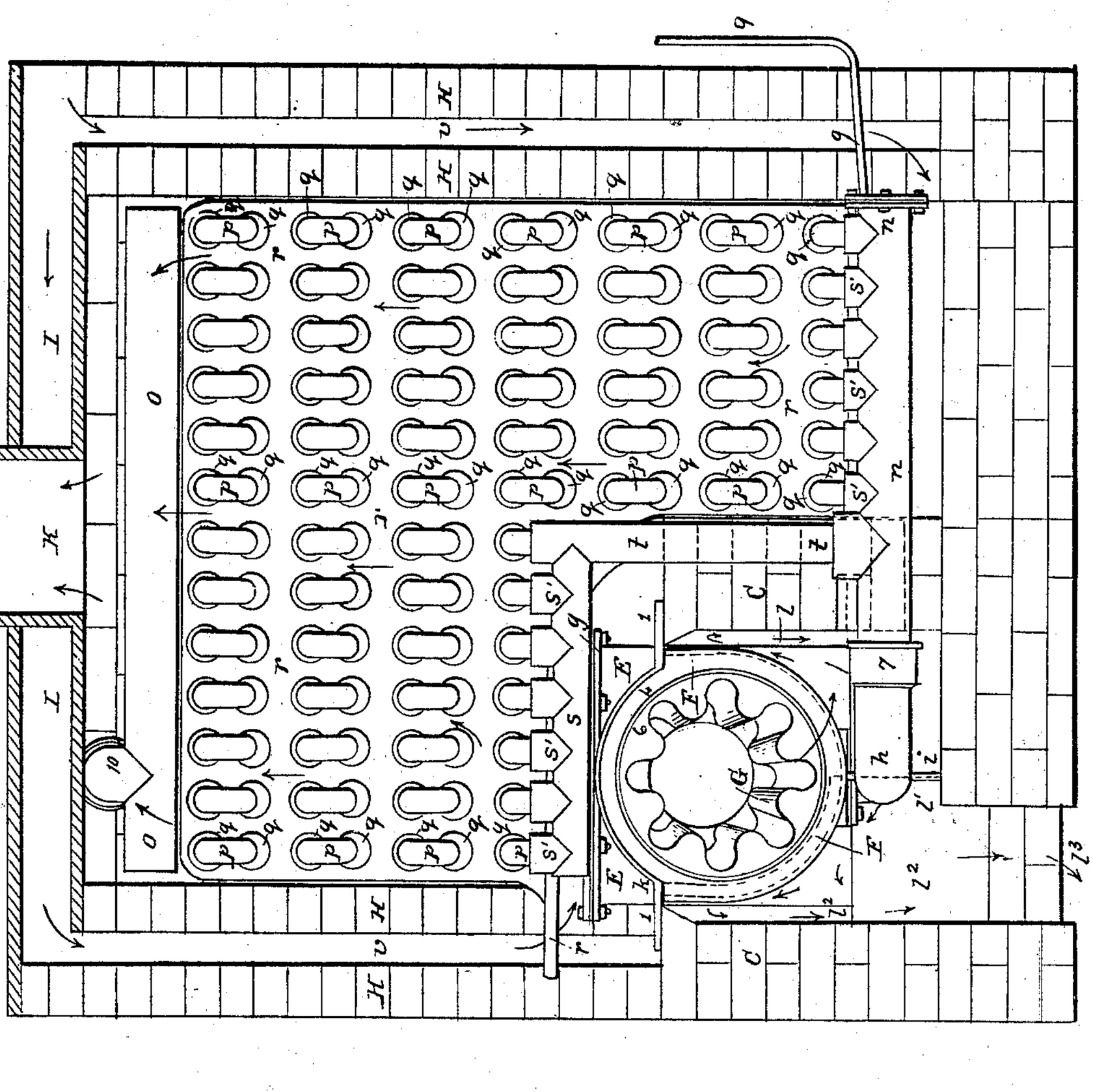

Fig. 3.

Witnesses:
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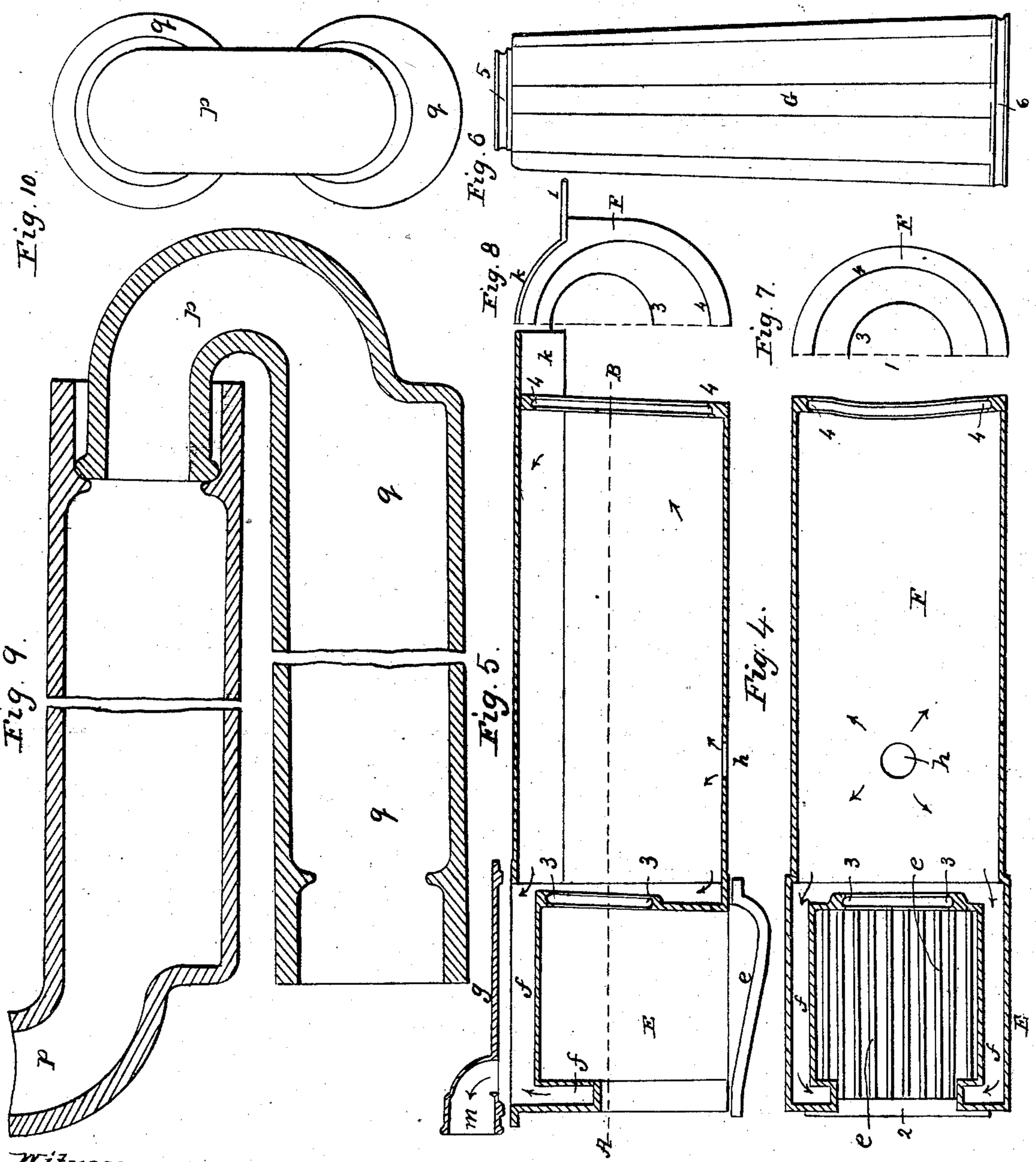
Steam Heater.

No. 10,982. Patented May 30, 1854.



Witnesses:
Samuel H. Lyall
Chas. Swallow.

Inventor
John Brown

UNITED STATES PATENT OFFICE.

JOHN BROWN, OF NEW YORK, N. Y.

IMPROVEMENT IN HOT-WATER APPARATUS.

Specification forming part of Letters Patent No. **10,982**, dated May 30, 1854.

To all whom it may concern:

Be it known that I, JOHN BROWN, manufacturer of apparatus for warming buildings, of the city, county, and State of New York, have invented, made, and applied to use certain new and useful Improvements in Apparatus for Warming by Circulating Hot Water; and I hereby declare that the following is a full, clear, and exact description of the construction, operation, and effect of the same, reference being had to the annexed drawings, making part of this specification, wherein—

Figure 1, Sheet 1, is a side view of the apparatus with the inclosing wall removed. Fig. 2, Sheet 2, is an elevation of the front end with the wall removed. Fig. 3, Sheet 3, is a like elevation of the back end of the apparatus. Sheet 4, Fig. 4 is a plan in section of the boiler and furnace with the horizontal flue removed, through line A B of Fig. 5, which is a like sectional elevation. Fig. 6 is an elevation of the corrugated flue in the boiler. Fig. 7 is an elevation of the lower half of the boiler on the end opposite the furnace. Fig. 8 is an elevation of half of the boiler at the back end. Figs. 9 and 10 show the manner in which the pipes are set together at their ends, so as to form vertical ranges of circulating-pipes, each pipe lying nearly horizontally.

The like marks of reference denote the same parts in all the figures.

A proper foundation of masonry or brick-work is to be prepared, on which two walls C C are built parallel to each other and of a height to receive the flanges 1 1 on the sides of and supporting the furnace E and boiler F.

D is the back wall of the apparatus, and D′ is the front wall, through which is a chute *a* with a door *b*, through which the apparatus is fed with fuel.

c is an ash-pit beneath the furnace, with a dividing-plate *d* at the back end, on which is a rib sustaining this end of the grate-bars *e*, the front ends of which rest on a cross-bar 2.

The furnace and boiler are to be cast together, there being no pressure but the hydrostatic weight of water, and the case of the furnace is made double, to form a water-space *f*, through which is an opening corresponding with the chute *a*. The division between the furnace and boiler is formed with a circular opening 3, with a groove or recess formed in the metal around the opening, as seen in Figs. 4 and 5. The boiler itself is round, except where it is slightly flattened (see Fig. 3) to join the flanges 1, and the back end of the boiler is formed with a circular opening 4 similar to the opening 3. These openings 3 and 4 receive a circular tapering flue G, (see Figs. 3 and 6,) which may be either plain or corrugated in the manner shown. The smaller end of this flue is made as a short cylinder 5 with a groove around its outside, matching to the opening 3, and a flange or collar 6 at the larger end corresponds with the opening 4, and the joints thus made are to be filled or packed with proper cement. It will be seen that by fitting in this flue, as shown, its upper side is parallel, or nearly so, with the top of the boiler, and a large surface for heating the water is obtained, whereas if a flue were fitted in on the axis of the boiler, the grate-bars and fire-door would have to be lower down to prevent the coal from being thrown into the flue, whereas by inclining the conical flue upward, the same is fitted in as compactly and simply as possible; and by the construction of joint shown, a simple and permanent arrangement is obtained, and that with very little cost in construction or fitting together.

Beneath the boiler is a pipe *h*, connected by a flange and bolts and running lengthwise of the boiler and then bending horizontally, terminating as a socket 7. (See Fig. 3.)

i is a division-plate, cast with the pipe *h* and resting on the foundation. (See Figs. 1 and 3.)

The top of the boiler at the back end extends beyond the end of the boiler, as at *k*, and, with the flanges 1, forms a connection to the brick-work, which at this end is set off from the boiler sufficient to form a flue within the back wall D and the inner wall C, the wall at the outer angle being built so as to connect with one side of the boiler, as shown by dotted lines in Fig. 3. The draft and heat from the fire thus pass through the corrugated flue G in the boiler into the flue *l* between the boiler and wall C, crossing under the boiler at *l′*, Fig. 1, returning along between the sides of the boiler and outer supporting-wall C in the flue *l²*, and is finally

led off by a descending flue l^3 to any proper chimney. Thus the heat is compelled to travel a long distance and operate on a large amount of surface, and at the same time the part of the furnace and boiler above the flanges 1 is radiating off heat into the receptacle for warm air.

g is a cover bolted onto the top of the furnace E, on which is a socket m, taking the lower end of the vertical pipe n, on the upper end of which is a branch pipe n' to the underside of expansion and steam-box n^2. This box has a small pipe 8, by which any steam that may be formed is led away, and another pipe 9 connects the circulating-pipe u (see Fig. 3) with any suitable reservoir at the proper level, in which a ball and cock supplies any evaporation or leakage. The pipe u is connected to a cross-pipe o by a socket 10. This pipe o sets on top of a vertical supporting plate or frame r and has thimbles taking the return-bends p of the pipes q, which pipes q lie nearly horizontally, supported by the frames r, the end connecting with the pipe next above being formed slightly higher than the other end to allow of the escape of air. These pipes q are set in ranges or tiers vertically in the frames r, so that the water in the apparatus being heated in the boiler ascends through the pipe m into the cross-pipe o, and then circulates backward and forward through the ranges of pipes, descending as it cools, and being returned to the boiler by the pipes s, u, and h. The pipes s and u have thimbles s', connecting to the ends of the horizontal pipes, and the pipe s, which is over the back end of the boiler, is connected by a vertical pipe t to the pipe u, which passes through the inner wall C.

The side walls H inclosing the apparatus are made hollow to form air-passages v, and the covering of the apparatus is also to be made hollow, as at I, through which are the openings K, connecting to the interior of the apparatus to pass the heated air off as usual; and I would here remark that the general arrangement of the pipes q, s, t, and u is old, and the operation of the heat in the pipes and the circulation of the air are so well known and understood as to need no further explanation.

In all other hot-water apparatus with which I am acquainted the connection between each pipe and the one above it was made either by a return-bend screwed on by flanges and bolts or by a curved socket connected by a joint to each end of each pipe; but it will be seen by my mode of making the return-bends p, as shown in Figs. 9 and 10, by curving the return-pipe around from the top of the pipe q of a size to enter within the next pipe above, and forming the pipe q the same diameter from end to end, that they will pass the openings in the supporting-plates r, which thus do not require to be large to pass flanges or sockets on the ends of the pipes, and the pipes can be set so much closer together and expose so much more surface for the size of the apparatus and the bends p, turning around and passing into the end of the next pipe above; but one joint has to be packed with cement instead of two, which is the case where a separate curved elbow is used. Thus the apparatus is rendered more compact, efficient, and cheap. At the same time the return-bends p, commencing at the top or highest end of each pipe, allow all air to pass off as the apparatus is filled with water; but where a separate return-bend is used, either set into the ends of the pipes or bolted on, there is almost always a space in which air remains and will expand when heated, bubbling up through the apparatus and interfering with the circulation.

It will be evident that by the construction and arrangement of the boiler herein set forth with the inclined flue G the advantage is obtained of giving the requisite amount of depth below the opening into the flue G for the fire without having to raise the whole boiler, as would be the case if the axis of the flue G were horizontal; and by the arrangement of the water box and pipes the water does not all circulate through the box, but the box merely receives the bubbles of steam and supplies any evaporation or leakage, keeping the requisite hydrostatic pressure in the pipes to consolidate the column of water, so that the same will circulate freely.

What I desire to secure by Letters Patent is—

1. The curved return-bends p, formed with and on the upper part of the end of each pipe to pass into and connect with the next pipe above, thereby allowing of the pipe q being the full size of any flange or socket that would be needed with a separate elbow, exposing more surface for the size of the apparatus and preventing air remaining in the apparatus, as described and shown.

2. The construction and arrangement of the apparatus for the purposes and substantially as specified.

In witness whereof I have hereunto set my signature this 15th day of May, 1852.

JOHN BROWN.

Witnesses:

LEMUEL W. SERRELL,

CHARLES TENCELLENT.