G. W. BLAKE.

COMBINED BOILERS AND STEAM HEATERS.

No. 190,949. Patented May 22, 1877.

Fig. 3.

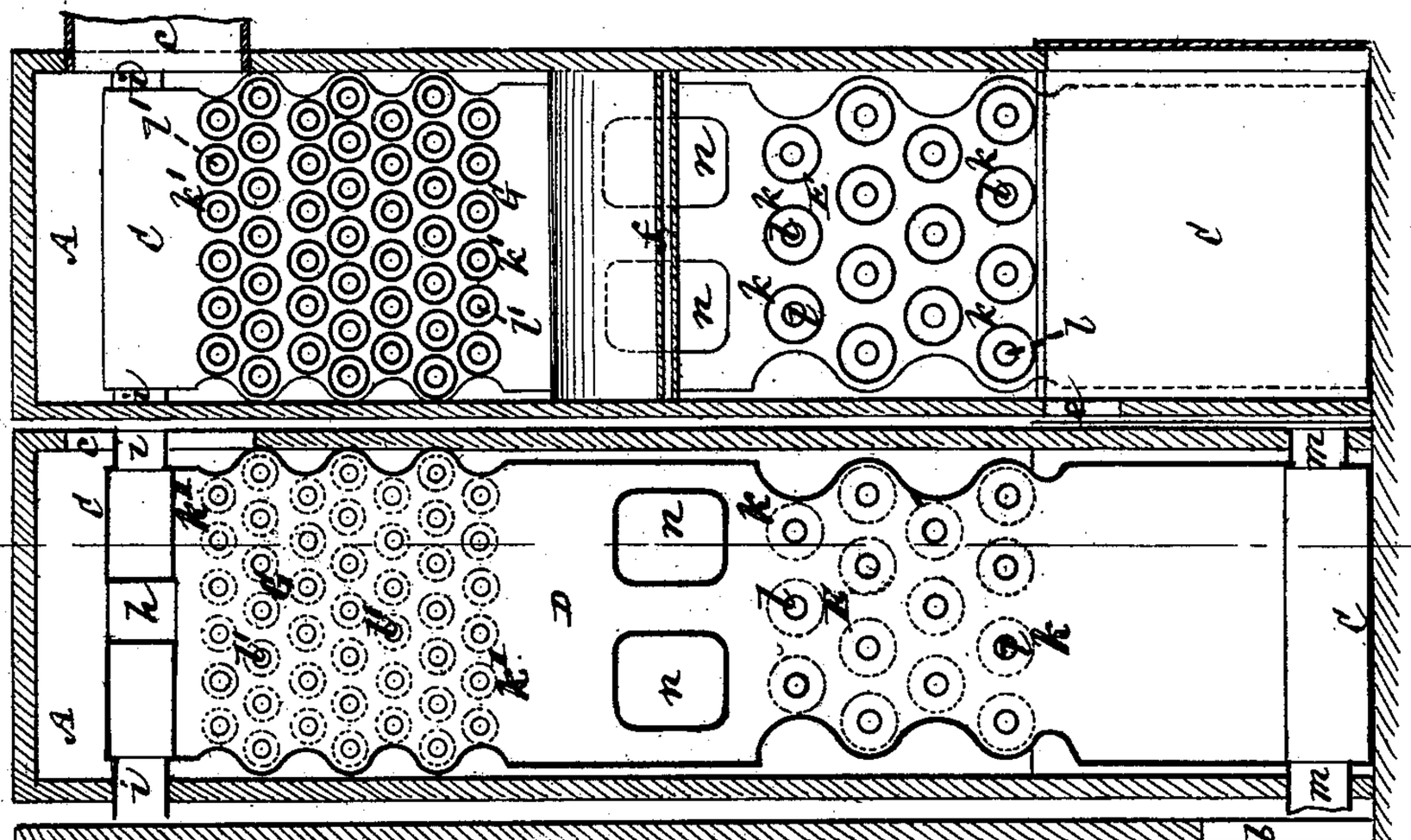

Fig. 2.

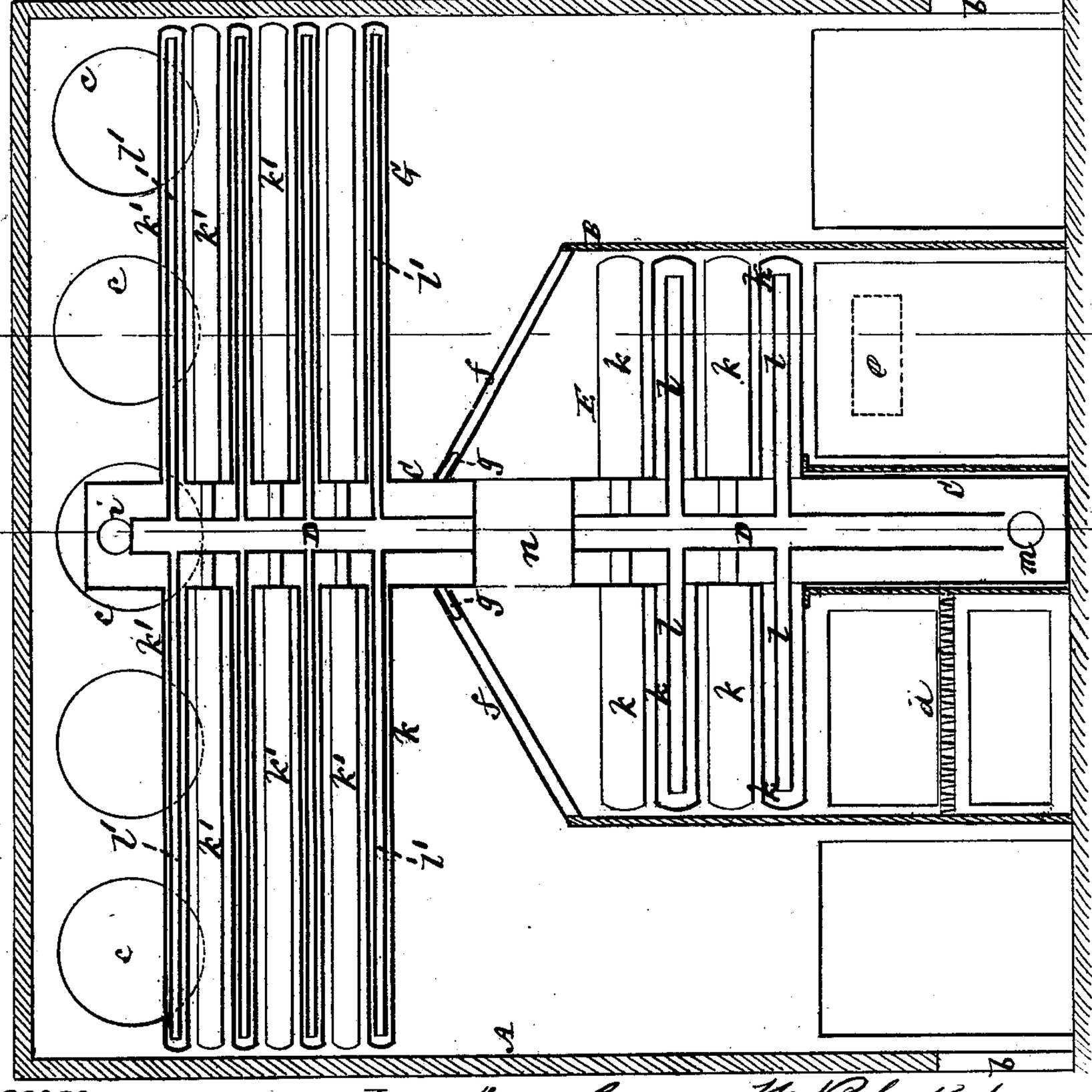

Fig. 1.

Witnesses
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UNITED STATES PATENT OFFICE.

GEORGE W. BLAKE, OF NEW YORK, N. Y.

IMPROVEMENT IN COMBINED BOILER AND STEAM-HEATER.

Specification forming part of Letters Patent No. **190,949,** dated May 22, 1877; application filed September 7, 1876.

To all whom it may concern:

Be it known that I, GEORGE W. BLAKE, of the city, county, and State of New York, have invented certain new and useful Improvements in Combined Boilers and Steam-Heaters; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing, which forms part of this specification.

This invention relates to combined boilers and steam-heaters, mainly designed for warming buildings, but the steam generated by the boiler may also be used for any other purpose. The invention more particularly relates to an apparatus in which there is combined a furnace, a boiler or steam-generator, a steam-radiator, and a hot-air chamber inclosing these several devices, and serving to supply heated air to a building free from mixture with the products of combustion.

The invention consists in various novel constructions and combinations of details, whereby the desired results are obtained in a very perfect and economical manner.

Figure 1 represents a vertical longitudinal section on the line *w w* of a combined boiler and steam-heater constructed in accordance with my invention. Fig. 2 is a transverse vertical section of the same on the line *x x*, and Fig. 3 a similar sectional view on the line *y y*.

A is a hot-air chamber or outer case, to which air to be heated is admitted by one or more openings, *b*, below, and from which the heated air, as required, is drawn off by one or more openings, *c*, above.

Within this chamber, which may be arranged in the cellar or basement of a building to be heated, is a furnace, B, of which *d* is the fire-place, and *e* the outlet for the products of combustion.

C is an upright trunk closed at its ends, and passing up through the furnace on one side of the fire-place *d*, with the roof *f* of the furnace meeting the sides of said trunk, and supported by brackets *g* thereon.

The roof *f* may be made hollow for the circulation of a cooling current of air through it.

Within the upright duct C, and in parallel relation therewith, is an upright duct, D, open at its bottom in the lower portion of the furnace, but closed at its top above the furnace, excepting as the same is provided with one or more apertures, *h*, which should be provided with an expanding-valve, to allow of the expulsion of air through it, but closing against egress of steam.

The upper portion of the trunk C may also have one or more apertures, *i*, for conducting steam to adjacent heaters, or for any other purpose that may be required.

The trunk C, with its upright interior duct D, forms part of a boiler, E, arranged within the furnace B, and part of a steam radiator or heater, G, above the furnace, but within the case or chamber A.

The boiler E is furthermore composed of tubes *k* branching outward from either side of the trunk C within the furnace, and closed at their outer ends, but in communication at their inner ends with the trunk C, and a series of smaller tubes, *l*, arranged longitudinally within the larger tubes *k*. These smaller tubes *l* are open at both ends, and communicate at their inner ends with the duct D.

The steam radiator or heater G is of like construction with the boiler, only more extended, being mainly composed of lateral tubes *k'*, closed at their outer ends, but communicating with the trunk D at their inner ends, and tubes *l'* arranged longitudinally within the tubes *k'*, and open at both ends thereof connecting with the duct D.

This tubular coustruction of the boiler and heater, in connection with the trunk C and duct D, provides for a free circulation of the water and steam; also, for the escape of air from the boiler and heater through the valvular apertures *h;* likewise, for the return of any water of condensation from the heater back to the boiler.

Water is admitted to the boiler by one or more openings, *m*, below.

The products of combustion from the fire-place *d* are caused to circulate around and between the lateral series of tubes *k* over the fire, from thence through tubular passages *m* intersecting the trunk C and duct D, to the opposite side of said trunk, and then down around and between the other lateral series of tubes *k* to the outlet *e*.

I claim—

1. The combination, with the furnace B and its fire-place *d*, of the upright trunk C and inner duct D, one or more intersecting draft-passages, *n*, the outlet *e*, the tubes *k* closed at their outer ends and connecting at their inner ends with the trunk C on opposite sides of the latter, and the tubes *l* open at both ends, arranged within the tubes *k*, and connecting at their inner ends with the duct D, essentially as described.

2. The combination, with the outer case or hot-air chamber A, of the furnace B, its boiler E, and the steam heater or radiator G composed in part of an upright trunk, C, and inner duct D, forming an extension of the boiler above the furnace, and the inner and outer branch tubes *k' l'*, constructed and connecting, respectively, with the trunk C and duct D, substantially as specified.

3. The combination of the furnace B and its fire-place *d*, the upright trunk C, and inner duct D, the tubes *k k'*, closed at their outer ends and connecting with the side of the trunk C, and the open-ended tubes *l l'* within the tubes *k k'*, and connecting at their inner ends with the duct D, substantially as specified.

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Witnesses:
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