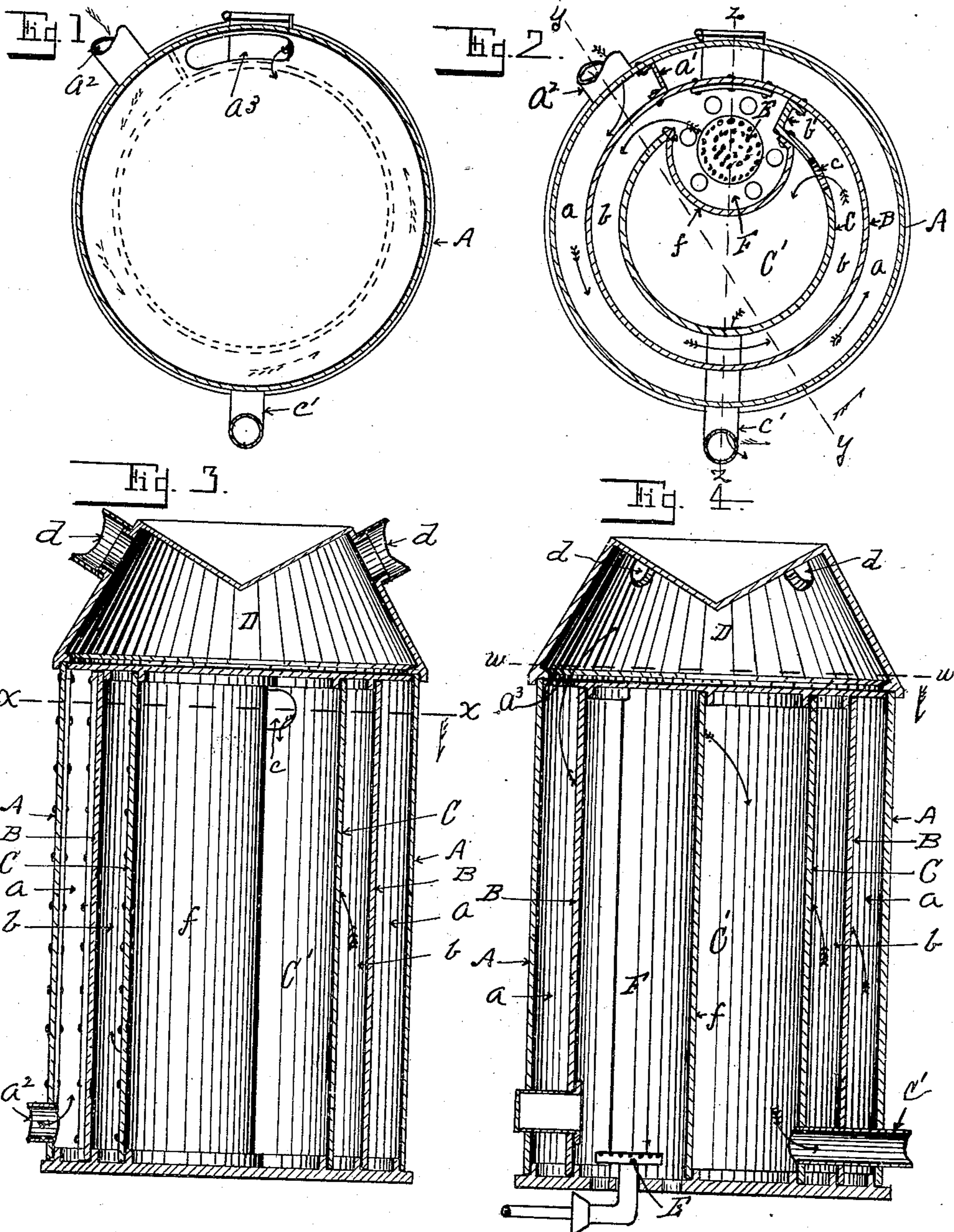


No. 842,881.

PATENTED FEB. 5, 1907.

E. E. GRAHAM.  
HEATING FURNACE.  
APPLICATION FILED AUG. 19, 1906.



Witnesses.

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# UNITED STATES PATENT OFFICE.

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## HEATING-FURNACE.

No. 842,881.

Specification of Letters Patent.

Patented Feb. 5, 1907.

Application filed August 19, 1905. Serial No. 274,959.

*To all whom it may concern:*

Be it known that I, ELMER E. GRAHAM, a citizen of the United States, residing at Erie, in the county of Erie and State of Pennsylvania, have invented certain new and useful Improvements in Heating-Furnaces; 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 the letters of reference marked thereon, forming part of this specification.

My invention relates to heating-furnaces, and consists in the improvements herein-after set forth and explained, and illustrated in the accompanying drawings, in which—

Figure 1 is a transverse section of my improved heating-furnace on the line *ww* in Fig. 4 looking in the direction of the arrow. Fig. 2 is a transverse section of the same on the line *xx* in Fig. 3 looking in the direction of the arrow. Fig. 3 is a vertical section of the same on the line *yy* in Fig. 2. Fig. 4 is a vertical section of the same on the line *zz* in Fig. 2.

In the drawings illustrating my invention, A is the outside shell of the furnace, B a concentric shell inside of the shell A, and C another concentric shell within the shell B, so as to leave comparatively narrow spaces *a* *b* between the shells A B and B C. The space *a*, where the air is to be heated, is provided with a vertical wall *a'*, and the air enters at an air-inlet *a<sup>2</sup>* and passes around the furnace until it is discharged on the opposite side of the wall *a'* through an opening *a<sup>3</sup>* in the top thereof into the upper part D of the furnace, from whence it passes to the distribution-pipes *d*. The inner wall B of this air-chamber forms the outer wall of an annular heating-chamber *b*, closed at one end by a vertical wall *b'*, which forms, in conjunction with a semicircular wall *f*, the inner wall of an enlargement F of the heating-chamber *b* and which opens at one side thereof into the annular portion of the heating-chamber *b*, as is clearly shown in Fig. 2. In this enlarged portion F of the heating-chamber I place an ordinary gas-burner E, from which the heat and products of combustion pass out side-wise in the direction of the arrows into the annular portion of the heating-chamber *b* and pass around and upward in said cham-

ber to a discharge-opening *c* in the upper part of the inner wall C adjacent to the vertical wall *b'* and nearly opposite to the point where it enters said heating-chamber, thereby traveling nearly around the furnace. From the opening *c* the products of combustion pass into a central chamber C', through which they pass downward to a smoke-flue *c'* at the rear of the bottom of the furnace.

It will be observed from the foregoing description that the heating-surface to which the air is presented is very great, and as the air travels around the chamber and over the heating-surface in a thin sheet the maximum amount of heat is taken up thereby, while the products of combustion in a comparatively cooled condition pass out of the small exit *c'*, thus utilizing the maximum amount of the heat generated by the gas-burner E.

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

The combination in a heating-furnace of an annular outer shell having an air-inlet opening near the base thereof, a vertical wall at one side of said opening extending inwardly from said shell, a second annular shell inside of said outer shell and joined to said vertical wall, a top on the chamber formed by said annular shells having an air-outlet opening at the side of said vertical wall opposite to said air-inlet opening, a third annular shell inside of said second shell, and forming with second shell an annular heating-chamber part of which third shell is curved inward so as to form an enlargement of the annular heating-chamber formed by the said walls, said third shell having an opening for the passage of the products of combustion from the annular part of said heating-chamber into a central heating-chamber inside of said third shell, a vertical wall between said opening and the enlarged part of the heating-chamber, a gas-burner in the enlarged portion of the heating-chamber, and a smoke-exit pipe extending from the central chamber outward, substantially as set forth.

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

ELMER E. GRAHAM.

Witnesses:

EDWIN E. GRAHAM,  
G. J. MEAD.