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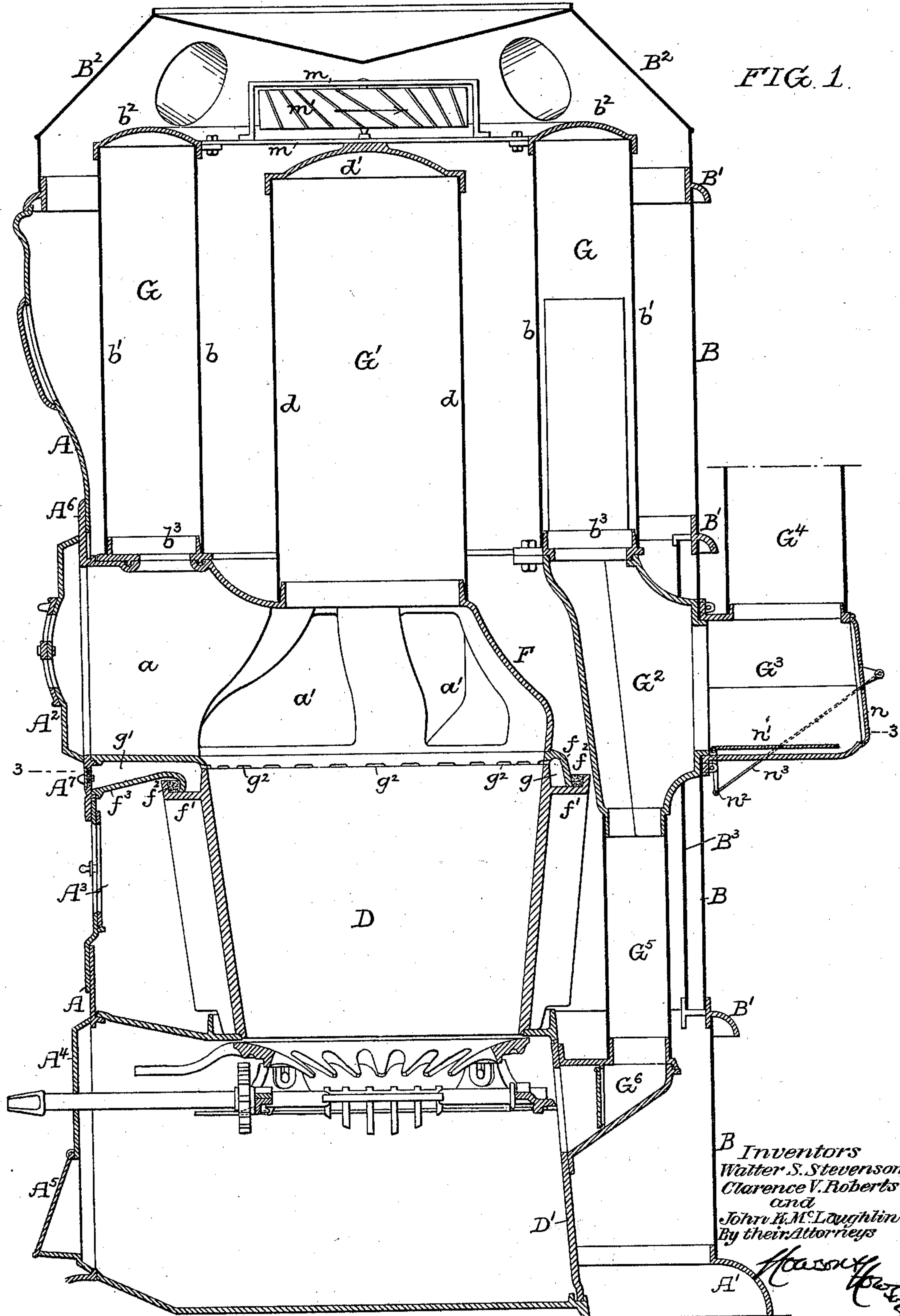
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W. S. STEVENSON, C. V. ROBERTS & J. K. McLAUGHLIN.

AIR HEATING FURNACE.

No. 545,829.

Patented Sept. 3, 1895.



B Inventors
Walter S. Stevenson
Clarence V. Roberts
and
John K. McLaughlin
By their Attorneys

(No Model.)

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AIR HEATING FURNACE.

No. 545,880.

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AIR HEATING FURNACE.

Patented Sept. 3, 1895.

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(No Model.)

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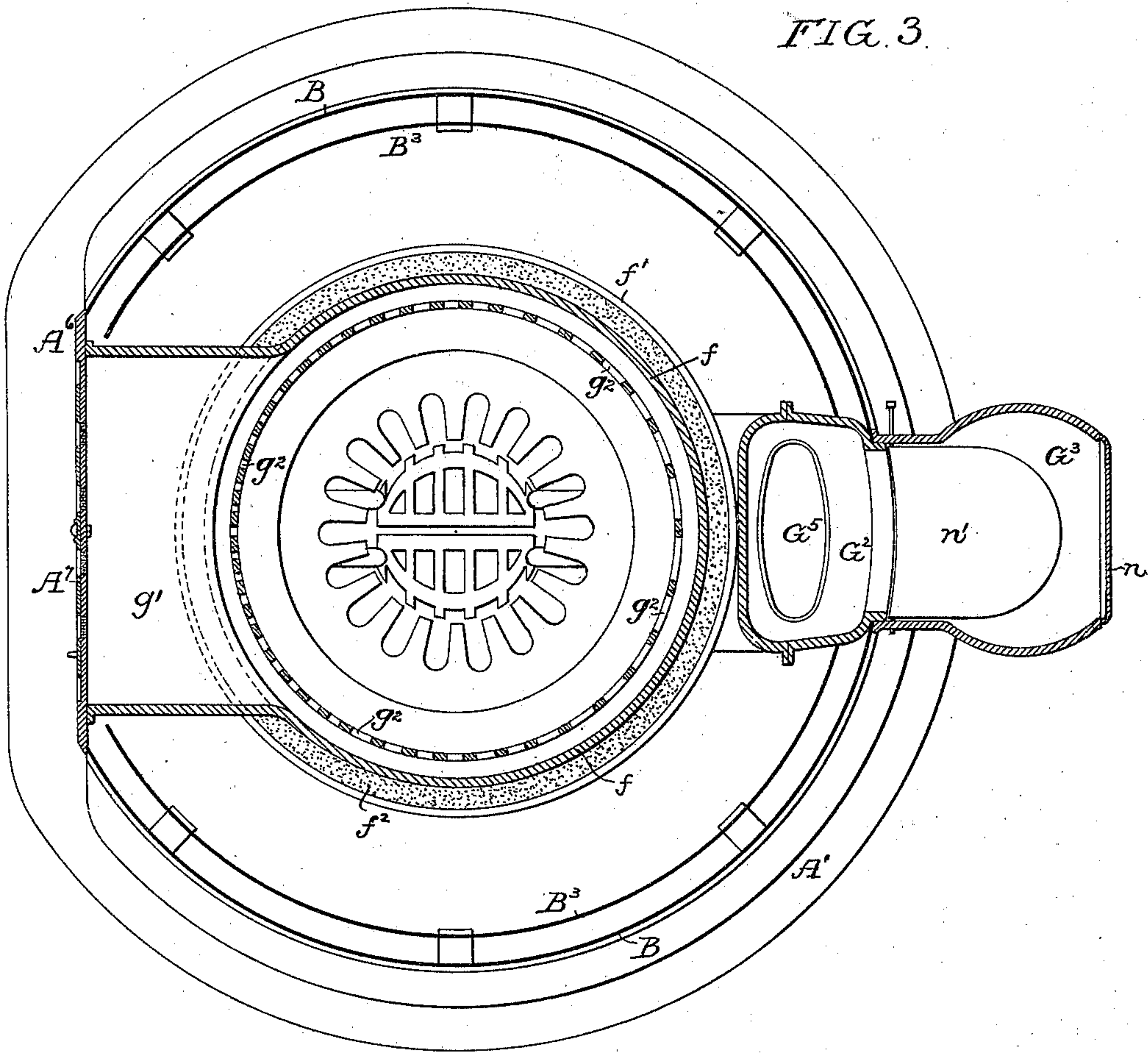
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FIG. 3.



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UNITED STATES PATENT OFFICE.

WALTER S. STEVENSON, CLARENCE V. ROBERTS, AND JOHN K. McLAUGHLIN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO THE THOMAS ROBERTS STEVENSON COMPANY, OF SAME PLACE.

AIR-HEATING FURNACE.

SPECIFICATION forming part of Letters Patent No. 545,829, dated September 3, 1895.

Application filed February 21, 1895. Serial No. 539,253. (No model.)

To all whom it may concern:

Be it known that we, WALTER S. STEVENSON, CLARENCE V. ROBERTS, and JOHN K. McLAUGHLIN, citizens of the United States, and residents of Philadelphia, Pennsylvania, have invented certain Improvements in Air-Heating Furnaces, of which the following is a specification.

The objects of our invention are, first, to provide for the convenient and economical formation of an air-supplying ring around the top of the fire-pot; second, to so construct a furnace that it can be used either as a plain hot-air furnace or as a combined hot-air and hot-water furnace; third, to insure the rapid discharge of the heated air from the upper portion of the furnace; fourth, to provide efficient means for checking the draft when desired; fifth, to improve the construction of the grate, and, sixth, to prevent loosening of the joints of the casing by the expansion and contraction of the fire-pot and the parts mounted thereon. These objects we attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a longitudinal vertical section of a heating-furnace constructed in accordance with our invention. Fig. 2 is a transverse section of the same, illustrating the hot-water connection; and Fig. 3 is a sectional plan view on the line 3 3, Fig. 1.

A is the front plate of the furnace, mounted upon the base-ring A' and having the dampered fire-door A², dampered air-inlets A³, and ash-pit door A⁴ with damper-plate A⁵. The feed-door frame A⁶ is independent of the front plate and is provided with dampered air-inlet A⁷.

B is the outer sheet-iron casing of the stove, mounted upon rings B' and surmounted by the dome B², which has the usual hot-air-discharge necks, that portion of the casing which surrounds the fire-pot and combustion-chamber of the stove having also an internal casing B³ to prevent excessive radiation from this portion of the furnace.

D is the fire-pot, which is mounted upon the ash-pit casing D', as usual, and F is what is usually termed the "crab," which is mounted

upon the fire-pot and contains the feed-neck *a* and the side necks *a'*, the feed-neck *a* carrying the feed-door frame A⁶ and the side necks communicating with an annular drum G, surmounting the crab and consisting of the inner and outer sheet-metal rings *b b'*, carrying an annular cap *b²*, the rings *b b'* being mounted upon an annular ring *b³*, which is seated upon the top of the crab F; also seated upon said crab is a central cylindrical drum G', consisting of an annular casing *d* with cap-plate *d'*, the products of combustion thus having free access to both the annular and cylindrical drums. Depending from the rear portion of the ring *b³* is the discharge-neck G² with projecting elbow G³, upon which is mounted the smoke-pipe G⁴, the neck G² also communicating through a pipe G⁵ with the dampered neck G⁶, leading to the ash-pit, so as to provide for the escape of dust from the latter.

All the parts thus far described are, with the exception of the independent feed-door plate A⁶ and dampered inlet A⁷, common to hot-air furnaces heretofore constructed; but around the lower portion of the crab F of our improved furnace is formed a rib *f* of inverted-U shape, this rib resting upon the top of the fire-pot and upon a flange *f'* projecting outwardly therefrom and forming an air-tight joint with said flange by reason of packing *f²*, resting upon the flange and surrounding the rib. The rib *f*, in connection with the top of the fire-pot and its flange *f'*, thus forms an air-chamber *g*, surrounding the fire-pot, and this air-chamber communicates with the dampered air-inlet A⁷ through a passage *g'*, formed in an extension *f³* of the hollow rib *f*, projecting beneath the feed-inlet neck *a* of the crab. The inner leg of the rib *f*, which rests upon the top of the fire-pot, is somewhat shorter than the outer leg, and has formed in its under edge a series of notches *g²*, so that the air entering the chamber *g* from the front of the furnace is distributed in a number of fine jets into the products of combustion arising from the fuel in the fire-pot.

It is manifest that the same result may be attained by notching the upper edge of the fire-pot instead of the inner leg of the rib, or

by notching both parts. Hence our invention is not limited as to the location of these notches.

We are aware that the use of an air-supplying ring at the top of the fire-pot is very old, and hence we do not broadly claim the same, this part of our invention being restricted to the special construction of the fire-pot, whereby the air-supplying ring is formed and a gas-tight joint between the fire-pot and rib is insured.

In two of the lateral discharge-necks a' of the crab are formed openings, through either of which may be passed a pipe i for the introduction of water when the furnace is to be used as a combined hot-air and hot-water furnace, said pipe forming a coil i' in the central cylindrical drum G' and passing out through the cap d' of said drum and through the dome B^2 . The pipe i is threaded for the reception of nuts i^2 , whereby it is secured to the outer casing of the neck a' of the crab, the opening in the opposite neck being closed by means of a plug i^3 and nut i^4 , so that the pipe i may enter either on the right or left hand side of the furnace, as may be most convenient.

In the dome B^2 of the furnace is a frame m , in which is mounted a rotary fan m' , having vanes so inclined that the rising of the heated air in the furnace will cause rotation of said fan in the direction of the arrow, Fig. 1, such movement having the effect of throwing the heated air outward and upward, so as to direct it into and through the discharge-necks of the dome, and thus insure a more rapid circulation and discharge than usual. When the water-heating pipe i is used, the fan may have a hollow hub through which said pipe can pass. The elbow G^3 of the discharge-neck G^2 is closed at the outer end by a swinging plate n , which can be raised or lowered so as to check the draft by permitting an inflow of air. It is advisable, however, to limit the area of discharge from the neck G^2 simultaneously with the inlet of the external air, and for this reason we mount in the elbow G^3 a damper n' , which has a pivot-rod provided with an arm n^2 , the latter being connected by a rod n^3 to an arm on the check-plate n , so that as the latter is raised to permit an inflow of air the damper n' will be simultaneously raised to limit the flow of the products of combustion from the neck G^2 , the joint operation effecting a rapid and positive checking of the draft to the desired extent.

The opening in the front plate A of the furnace is somewhat larger than the feed-neck which passes through the same and carries the feed-door frame. Hence said feed-neck and door-frame are free to rise and fall as the fire-pot expands and shrinks because of changing temperatures without corresponding movements of the front plate tending to loosen the joints of the outer sheet-metal casing of the furnace.

Having thus described our invention, we claim and desire to secure by Letters Patent—

1. The combination in a heating furnace, of the dampered air inlet at the front of the casing, with the fire pot and the crab surmounting the same, and having their meeting portions constructed so as to form an air chamber, surrounding the upper portion of the fire pot and discharging into the same, a portion of the crab extending to the dampered air inlet, substantially as specified.

2. A heating furnace having a crab section with central drum, an annular drum surrounding the same and lateral discharge necks for the escape of the products of combustion, and a water pipe coiled in the central drum, the supply pipe therefor passing through one of said discharge necks, substantially as specified.

3. The combination of the internal combustion chamber casing and the outer hot air casing of a heating furnace, said outer casing having lateral hot air discharge openings, with a rotary fan located in the upper portion of the hot air chamber between the combustion chamber casing and the hot air casing, whereby it is rotated by the rise of the heated air, and directs said heated air toward the lateral hot air outlets, substantially as specified.

4. The combination of the front plate and outer casing of the furnace, with the fire pot, the crab mounted thereon, and the feed door frame carried by said crab and free to move independently of the front plate, substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

WALTER S. STEVENSON.
CLARENCE V. ROBERTS.
JOHN K. McLAUGHLIN.

Witnesses:

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