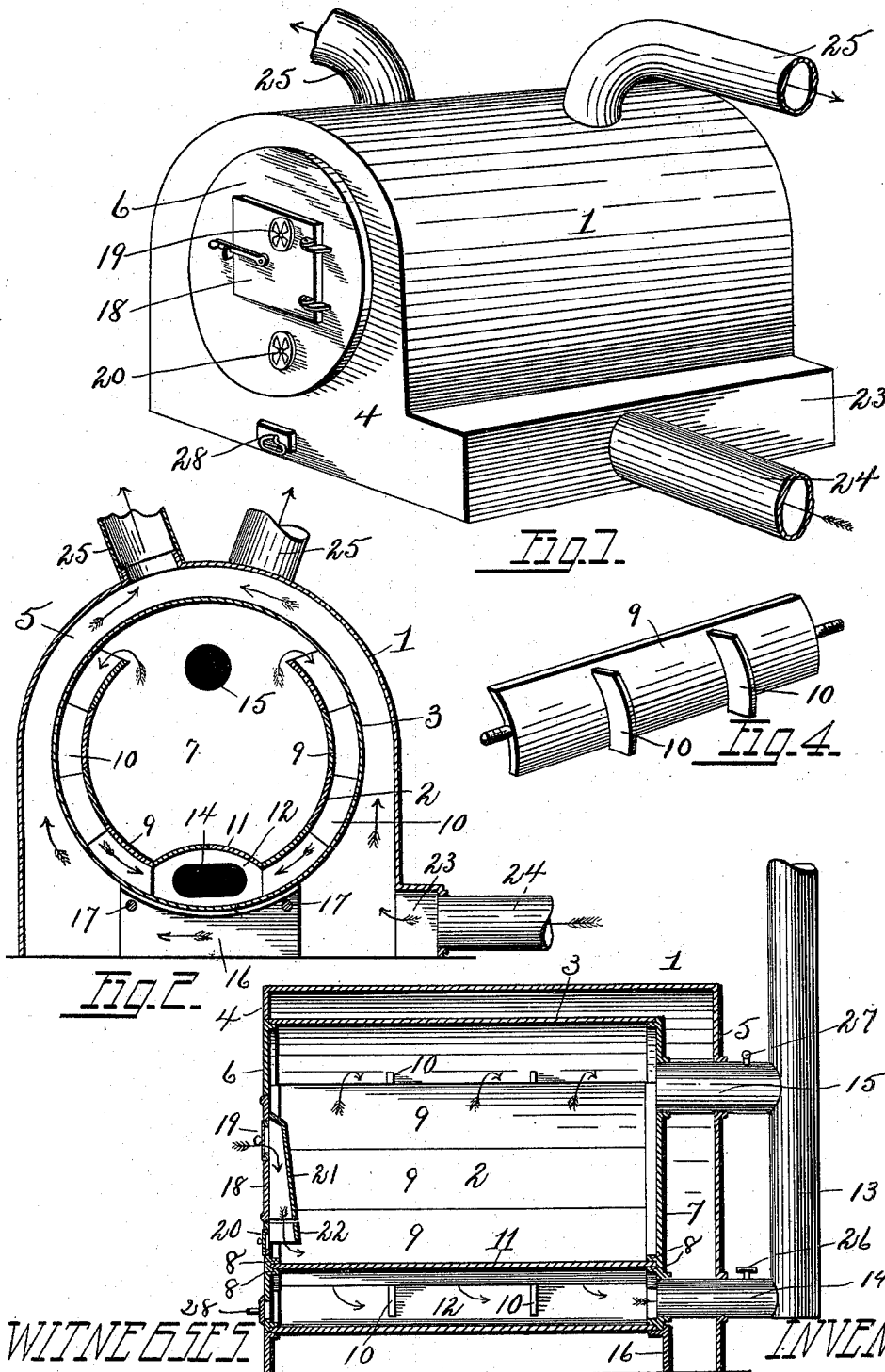


(No Model.)

R. S. SWEET & H. S. McBRIDE.  
HOT AIR FURNACE.

No. 573,930.

Patented Dec. 29, 1896.



WITNESSES  
Carroll J. Webster  
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FIG. 3

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# UNITED STATES PATENT OFFICE.

RUXTON S. SWEET AND HENRY S. MCBRIDE, OF BOWLING GREEN, OHIO.

## HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 573,930, dated December 29, 1896.

Application filed February 24, 1896. Serial No. 580,378. (No model.)

*To all whom it may concern:*

Be it known that we, RUXTON S. SWEET and HENRY S. MCBRIDE, of Bowling Green, county of Wood, and State of Ohio, have invented certain new and useful Improvements in Hot-Air Furnaces; and we do hereby declare that the following is a full, clear, and exact description of the invention, which 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, which form part of this specification.

Our invention relates to a hot-air furnace, and has for its object to provide a device of this character of compact form, thereby economizing in the space occupied by the furnace, one that by its provision for drafts from and through the fire leads the cold draft downwardly to the fire-pot, heating the same in its passage before commingling with the products of combustion, and that causes the heat and unconsumed products of combustion to pass around the fire-pot, first downwardly in a substantially vertical line and then downwardly to the exit for the same, whereby the entire surface of the fire-pot is caused to be of uniform heat, and consequently the radiating-surface is increased to a maximum and the amount of fuel necessary to form this operation is reduced to a minimum, and one that is easy of repair.

The invention therefore consists in a fire-pot closed except at the top and an enveloping wall entirely surrounding the same, with vertical division-walls between the same dividing the space into vertical passages, whereby the indirect draft is from the fire to above the fire-pot, downwardly around the exterior of the same in a substantially vertical line, and then backward toward the rear thereof beneath the same to the exit-flue.

Surrounding the enveloping wall is a jacket having an ingress for cold air and an egress for the hot air, the air being heated in its passage by contact with and from the radiation from the enveloping wall before mentioned.

The invention further consists in the details of construction hereinafter shown, described, and claimed.

In the drawings, Figure 1 is a perspective

view of a furnace constructed in accordance with our invention. Fig. 2 is a transverse sectional view of the same. Fig. 3 is a longitudinal sectional view, and Fig. 4 is a detail view of one of the sections of the fire-pot.

1 designates the outer casing, 2 the fire-pot, and 3 the enveloping wall surrounding the fire-pot and interposed between the fire-pot and the wall 1. The outer casing 1 comprises end walls 4 and 5, the front wall 4 having a circular opening and the rear wall having two openings for the draft-pipes.

6 and 7 designate front and rear vertical plates, each the size of the opening in the forward end wall of the casing 1 and secured to the periphery, and extending from one to the other of the plates is the enveloping wall 3, the ends of the wall being secured to the end plates and together with the end plates form an air-tight compartment. Of less diameter than the wall is a recess formed by circular lugs 8, into which fit the ends of the sections 9, forming a fire-pot 2, the sections terminating near the top and curved upwardly at the bottom, as shown at Fig. 2. Each section 9 is formed with integral webs 10 extending outwardly therefrom, each web upon each section being in vertical alignment, therefore when the sections are assembled forming vertical dividing-walls between the exterior of the fire-pot and the interior of the enveloping wall 3.

The upwardly-curved portion 11 of the bottom of the fire-pot forms, together with the lower portion of the wall 3, a channel or conduit 12, leading from the front to the rear of the furnace, and communicating with the channel 12 and the exit-flue 13 is an indirect draft pipe 14. Communicating with the interior of the fire-pot and the flue 13 is a direct-draft pipe 15, which is secured in the end plate 7 at one end and passes out through the end plate 5 to the casing 1, it being understood that the draft-pipes 14 and 15 are tightly secured in the end plates.

In order to support the rear end of the fire-pot and enveloping wall 3, there is interposed beneath the end plate 7 a casting 16, upon which the end plate 7 rests, and extending from the casting 16 to and through the front wall 4 are rods 17, which are of sufficient strength to support the rear end of the fire-

pot and enveloping wall when it is desired to remove the same, which operation is accomplished by pulling the same longitudinally, it being understood that the opening in the front wall 4 of the outer casing is of a size to allow this operation and that the draft-pipes 14 and 15, having an adjustment in the outer end wall 5, register with the openings in the end plate 7. By this means when it is necessary to repair the furnace the entire fire-pot may be removed. Hinged to the front end wall is a door 18. Through the opening closed thereby is inserted the fuel, and in the door is secured the draft-register 19, and below the same in the end wall 6 is an auxiliary draft-register 20. Secured to the door in rear thereof over the draft-register 19 is a conduit 21, there being a conduit 22 secured to the inside of the casing and registering with the conduit 21 when the outer casing is closed, whereby the air led into the furnace is caused to travel to the bottom of the fire-pot before uniting with the products of combustion. The conduits 21 and 22, being exposed to the heat of the fire, heat the air in its passage and therefore prevent cooling off of the fire by the indraft.

Secured to the outer casing is a box 23, into which the cold-air pipe 24 leads, and leading from the top of the casing are the hot-air flues 25, which lead to the registers in the rooms to be heated.

In operation in starting the fire the damper 26 in the indirect-draft pipe 14 is closed and the damper 27 in the direct-draft is opened. Therefore the draft is directly from the fire to the flue 13. When, however, the fire is started, the damper 27 is closed and the damper 26 is opened, and the draft is then to the top of the fire-pot between the same and the enveloping wall 3, to the lower conduit 12, through the indirect-draft pipe 14, to the flue 13, as indicated by the arrows in Figs. 2 and 3.

By the construction shown and described, to wit, the fire-pot 2 and the enveloping wall 3, with the passages between the same, it will be readily seen that the products of combustion must pass vertically downward around the fire-pot, heating the entire surface of the enveloping wall, and therefore the heat derived from the fire is distributed over the entire surface of the enveloping wall and fire-pot.

When it is desired to cool the fire, the direct cold-draft plate 28 is removed, and the cold draft passes directly through the lower flue 12 to the exit-flue 13. It will thus be seen that we have made provision for all conditions of fire, have made the furnace compact in form, thereby economizing in space, and that all the heat unites of the furnace are utilized, thereby economizing in fuel. It will also be seen that we may make many minor details in construction without departing from the spirit of our invention.

Should at any time, by reason of the direct action of the fire upon the fire-pot, the casing for the same burn out, it will be readily seen that it can be easily repaired, as by forming the same in sections it is only necessary to remove the section or sections that are burned out and insert new ones, this operation being easily accomplished with the fire-pot drawn out of the outer casing. On account of the integral webs 10, which bear against the enveloping wall 3, it will be readily seen that any warping of the fire-pot due to the action of the heat is avoided, as the webs act as a brace, and that while we have shown the ends of the sections 9 provided with integral threaded projections passed through the end plates it will be readily understood that these may be dispensed with and the ends of the plates rest in the opening formed by the webs 8, although we wish it understood that any means may be employed to effect this result without departing from the spirit of our invention.

What we claim is—

1. In a hot-air furnace, a fire-pot closed except at the top, an enveloping wall entirely surrounding the same, a series of vertical walls interposed between the fire-pot and the enveloping wall and extending from the top of the fire-pot to near the bottom of the same, thereby forming a longitudinal flue beneath the fire-pot, a direct exit-flue for the products of combustion leading from the chamber formed by the fire-pot, an exit-flue connecting the longitudinal flue, and an outer casing surrounding the enveloping wall.

2. In a hot-air furnace, a circular fire-pot closed except at the top and having a raised lower portion, an enveloping wall entirely surrounding the same, vertical walls extending from the top of the fire-pot to the longitudinal flue formed by the upward curve of the bottom of the same, forming vertical passages connecting the combustion-chamber with the lower longitudinal flue along the entire length of the fire-pot.

3. In a hot-air furnace, a combustion-chamber, a door in the forward end of the same, a draft-regulator secured in the door, a downwardly-extending casing secured to the door in rear of the regulator, a regulator in the front wall of the fire-pot in vertical alinement with the regulator in the door, a downwardly-extending casing secured in rear thereof and in alinement with the casing upon the door whereby the draft is led from either regulator to the bottom of the fire-pot.

In testimony that we claim the foregoing as our own we hereby affix our signatures in presence of two witnesses.

RUXTON S. SWEET.  
HENRY S. McBRIDE.

Witnesses:

ROBERT DUNN,  
OTIS BEVERSTOCK.