

(No Model.)

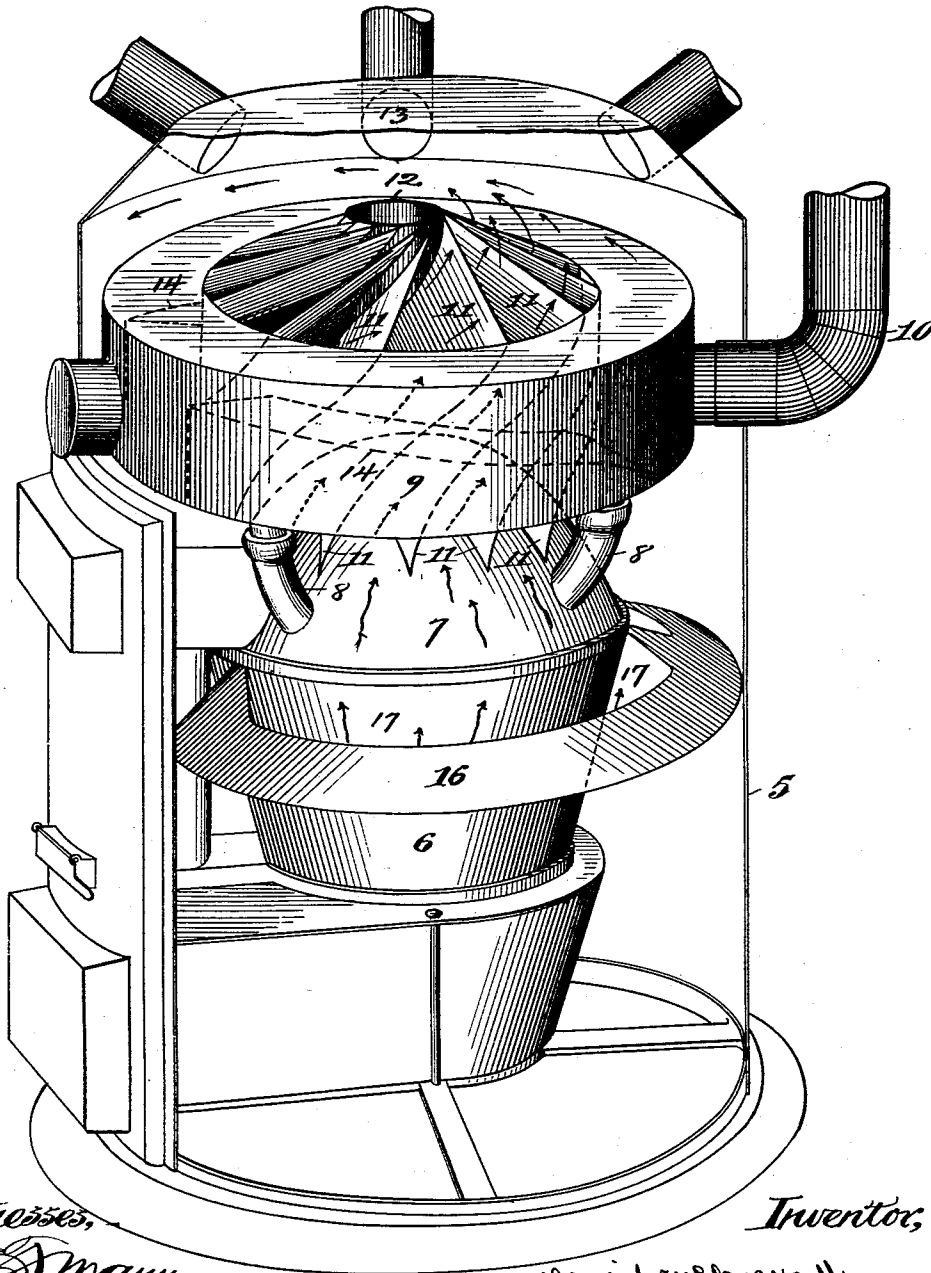
2 Sheets—Sheet 1.

D. McCOWATT.  
HOT AIR FURNACE.

No. 563,240.

Patented June 30, 1896.

*Fig. 1.*



*Witnesses,*  
*J. Mann,*  
*Frederick Goodwin*

*Inventor,*  
*David McCowatt*  
*By* *Offield, South & Williams,*  
*Attys.*

(No Model.)

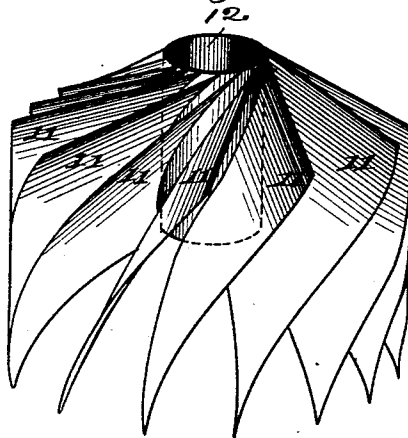
2 Sheets—Sheet 2.

D. McCOWATT.  
HOT AIR FURNACE.

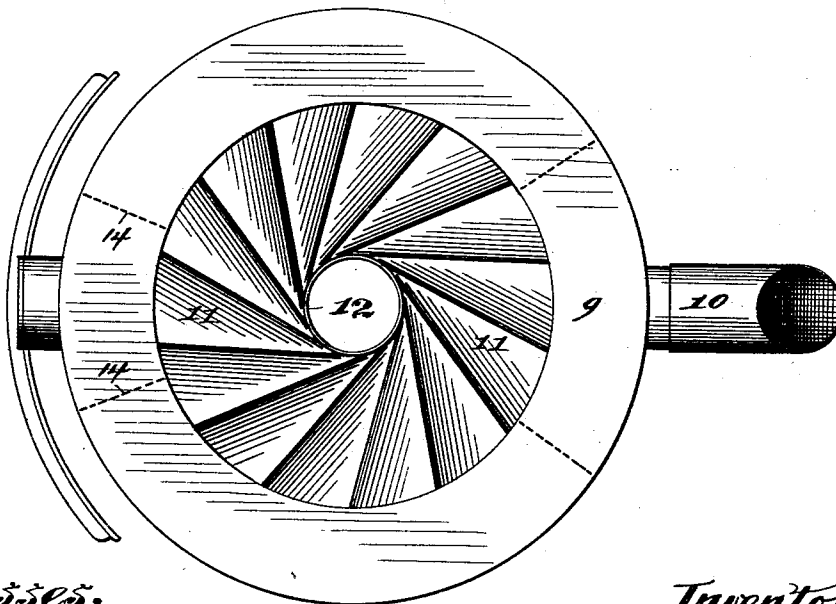
No. 563,240.

Patented June 30, 1896.

*Fig. 3.*



*Fig. 2.*



*Witnesses,*

*F. E. Mann,*  
*Frederick Goodwin*

*Inventor,*

*Daniel McCowatt*  
*By* *Offield, Smith & Williams,*  
*Attys.*

# UNITED STATES PATENT OFFICE.

DAVID McCOWATT, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF TO  
DAVID McCOWATT, JR., OF SAME PLACE.

## HOT-AIR FURNACE.

SPECIFICATION forming part of Letters Patent No. 563,240, dated June 30, 1896.

Application filed January 23, 1896. Serial No. 576,482. (No model.)

*To all whom it may concern:*

Be it known that I, DAVID McCOWATT, of Chicago, Illinois, have invented certain new and useful Improvements in Hot-Air Furnaces, of which the following is a specification.

This invention relates to certain improvements in hot-air furnaces, and has for its objects, first, to provide means for equally distributing the heated air above the dome and in the hot-air chamber and causing it to be equally delivered to the several hot-air pipes communicating with the top of the air-chamber; second, to a means for causing the products of combustion to pass from the rear to the front of the radiator, where they are permitted to escape and flow back through the radiator to the smoke-pipe, and, third, to means for deflecting the cold air entering at the bottom or base of the furnace against the sides of the fire-pot, whereby it becomes heated in its passage and is not permitted to pass along the walls of the outer jacket, whereby it might escape becoming heated.

In the accompanying drawings, Figure 1 is a perspective view. Fig. 2 is a plan view, and Fig. 3 is a perspective view, of the device for distributing the heated air to the several pipes.

In the drawings, let 5 represent the outer jacket, 6 the fire-pot, 7 the fire-pot dome, 8 smoke-flues leading therefrom, 9 the radiator, and 10 a smoke-pipe communicating with the rear side of said radiator. Above the dome of the fire-pot and inclosed by the inner wall of the radiator is a device which I call a "circulator," and the purpose of which is to break up the volume of heated air in its passage to the air-chamber and to impart to it a spiral rotary movement. This circulator is shown in Fig. 3 of the drawings, and is composed of a series of spirally-curved blades or wings 11, which may be conveniently made of sheet metal and secured to a central tubular stem 12, or, if preferred, the stem 12 may be a solid hub or support and the wings or blades cast integrally therewith, or separately cast and secured thereto. Each of these wings or blades is preferably cut away on its lower edge, so as to fit the top of the dome, the outer edges being preferably vertical opposite the inner wall of

the radiator, so as to fit thereto. The upper edges are inclined, rising from the plane of the top of the radiator to a plane somewhat higher, the precise inclination depending somewhat upon the distance at which the several wings are arranged with reference to each other and to the diameter of the space inclosed by the radiator. Each of said blades or wings, being thus spirally formed, overlaps at its upper end, so as to form a spirally-curved passage. The heated body of air rising toward the top of the furnace passes through these spirally-curved passages and is thereby subdivided and the divided currents are delivered into the air-chamber beneath the radiator and circulator tangentially to the axis of the furnace, whereby it is given an initial whirling or rotating movement within the air-chamber. The rotary currents thus circulate within the air-chamber and find escape through the several hot-air pipes communicating with the air-chamber through the cap 13. By this means the air is prevented from escaping through the most favored pipes, and each pipe receives its proper supply. Of course these wings become highly heated and, retaining their heat, assist to induce these currents, while the form of the wings imparts the spiral movement.

Within the radiator, surrounding the central exit in which the spiral circulator is arranged, I provide diaphragms formed by plates 14. (Shown in dotted lines in Fig. 1 and in plan in Fig. 2.) These plates at their rear ends are curved down, so as to impinge the bottom wall of the radiator. They are of a width equal to the transverse width of the radiator and at their front ends are separated, so as to permit the products of combustion passing up from the fire-pot to flow out into the radiator and then flow back to the smoke-pipe. The products of combustion are thus compelled to travel practically twice through said radiator in contact with the inner wall thereof, which is adjacent to the hot-air exit in which is located the spiral circulator. The products of combustion thus serve to additionally heat the ascending volume of air and assist in causing the air to pass up through the several passages between the wings of said spiral circulator. The full effect of the products of combustion are thus secured be-

fore being permitted to escape by way of the smoke-pipe.

I also employ a deflector in the form of an annular plate 16, which is arranged in about the plane of the top of the fire-pot and which may be of sheet metal or a light casting. Said plate may be supported upon the outer jacket or upon the fire-pot, as desired. It is of less width than the space between the outer jacket and the fire-pot, and an opening 17 is thus provided concentric to the fire-pot and adjacent thereto. The currents of air entering at the bottom of the furnace, instead of being permitted to pass up along the jacket, are deflected against the fire-pot and thus become highly heated. It will be observed that this deflector is inclined upwardly from its outer edge, so as not to baffle the air, but to simply change its direction. This particular form of construction I consider important.

When the deflector is used, the radiator may be of such total width as not to extend out to the walls of the surrounding jacket; but if the deflector were omitted the radiator should extend out to the walls of the jacket, so as to close the space between the circulator and said walls, and if both deflector and radiator are omitted the circulator itself should extend out to the walls of the jacket, so as to close off the space and compel all of the air-currents to travel in the spiral paths formed by the overlapping spiral blades of such circulator. It will be obvious, therefore, that my invention is not limited in its broad scope to the conjoint use of these elements, but that the circulator may be used alone or in combination with the radiator and deflector. The construction should always be such that the air is directed toward the axis of the furnace and over the dome of the fire-pot, and so as to prevent the free passage of the air-currents directly from inlet to outlet.

I claim—

1. In a hot-air furnace having a hot-air chamber at its top with ducts leading therefrom, a circulator located above the dome of the combustion-chamber and consisting of a series of radial spiral wings, whose upper edges overlap to provide spiral passages for

the distribution and circulation of the heated air-currents, said passages delivering at their upper ends into the air-chamber, substantially as described.

2. In a hot-air furnace, an annular radiator concentric to the axis of the furnace and near the top thereof, a spiral circulator arranged above the dome of the fire-pot below the cap and surrounded by said radiator and having a series of spiral wings and a central support to which said wings are secured, substantially as described.

3. In a hot-air furnace, the combination with the furnace proper and its jacket, of a circulator located above the furnace and consisting of a series of radially-arranged spiral wings having their upper edges inclined upwardly from the periphery toward the center of the circulator and providing between them spiral passages for the heated air, substantially as described.

4. In a hot-air furnace the combination with an annular radiator concentric to the axis of the furnace and near the top thereof, a spiral circulator arranged above the dome of the fire-pot below the cap and surrounded by said radiator and having a series of spiral wings forming spiral passages leading into the air-chamber at the top of the furnace and a deflector arranged concentric to the fire-pot and having its outer margin closed against the jacket and its inner margin terminating short of the fire-pot so as to deflect and direct the air toward the axis of the furnace, substantially as described.

5. In a hot-air furnace an annular radiator arranged above the plane of the fire-pot dome and communicating with the combustion-chamber through openings in the bottom wall of the radiator-plates, arranged transversely of the radiator-chamber and beneath which the products of combustion are discharged and an escape-opening at the front of said radiator and a smoke-pipe opening from the back thereof, substantially as described.

DAVID MCCOWATT.

Witnesses:

E. L. HUBER,  
FREDERICK C. GOODWIN.