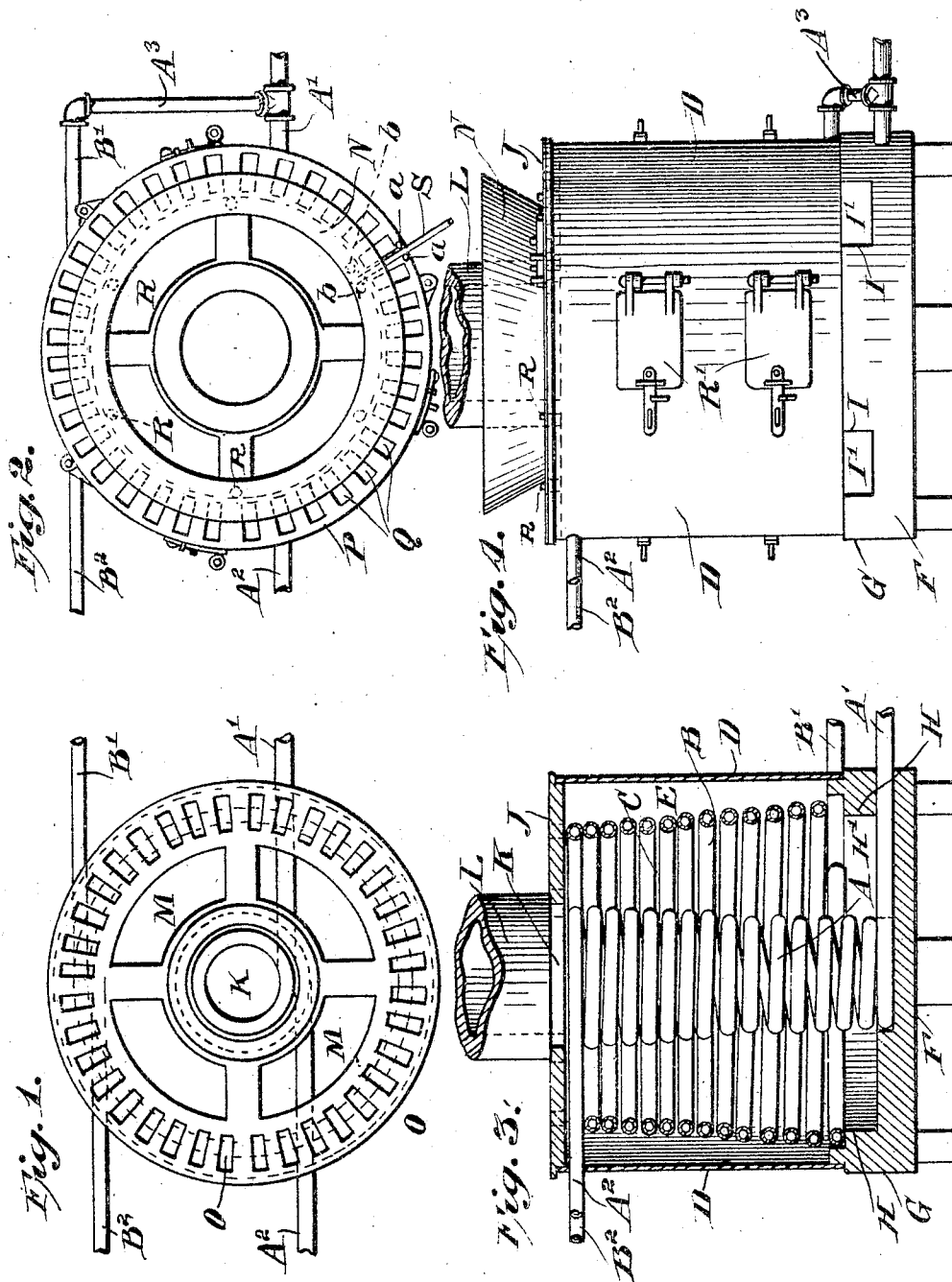


No. 828,898.

PATENTED AUG. 21, 1906.

H. F. NORWOOD.
DOWNDRAFT FURNACE.
APPLICATION FILED AUG. 4, 1905.



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UNITED STATES PATENT OFFICE.

HORACE F. NORWOOD, OF CHELSEA, MASSACHUSETTS.

DOWNDRAFT-FURNACE.

No. 828,898.

Specification of Letters Patent.

Patented Aug. 21, 1906.

Application filed August 4, 1905. Serial No. 272,648.

To all whom it may concern:

Be it known that I, HORACE F. NORWOOD, a citizen of the United States, residing at Chelsea, county of Suffolk, State of Massachusetts, have invented certain new and useful Improvements in Downdraft-Furnaces, of which the following is a specification.

This invention relates to improvements in downdraft-furnaces, and which furnaces may be used for steam-boilers or for smelting-furnaces and the like.

The object of my invention is to provide a new and improved furnace in which complete combustion takes places, which furnace is simple in construction, is composed of few parts, is very compact, not apt to get out of order, is easily controlled and regulated, and readily supplied with fuel.

In the accompanying drawings, in which like letters of reference indicate like parts in all the figures, Figure 1 is a plan view of my improved furnace, the draft-adjusting ring and hopper being omitted. Fig. 2 is a plan view showing the draft-adjusting ring and hopper and also showing a slight modification. Fig. 3 is a vertical sectional view, parts in elevation and showing the same construction as Fig. 1. Fig. 4 is an external elevation showing the modified construction of Fig. 2.

The furnace is constructed with two coils A and B, formed of tubing, the coil A being of less diameter than the coil B and located within the coil B so as to form a space C between the inner and outer coils A and B, which space will be referred to hereinafter as the "fuel-space," said coils in the specific construction illustrated forming the walls or the fuel-space. The diameter of the inner coil A gradually increases from the bottom to the top, and the diameter of the outer coil B gradually decreases from the bottom to the top, as shown, so that the annular fuel-space C is narrower at the top than it is at the bottom—that is to say, the width of the fuel-space gradually decreases toward the top. The lower ends of the pipes or tubes A' and B', forming the coils A and B, project from the furnace at the bottom and are to be connected with a suitable supply of water, and the upper ends A² and B² of these tubes or pipes can be carried to the dome of a steam-boiler, which boiler is heated by means of the combustion in the furnace, or the hot water issuing from the ends A² and B² may be used for any other suitable pur-

pose or may go to waste, as the exigencies of the case may require. As shown, the several convolutions of the pipes do not rest firmly upon each other, but an open space equal to about one-fourth, more or less, of the diameter of the tubes forming the coils is left between the several convolutions. The bottom of the inner coil A is also some distance beneath the bottom of the outer coil B. These coils are contained in a casing D, preferably made of wrought-iron and of such diameter as to leave an air-space E between the wall of the casing and the outer face of the outer coil B. This casing rests on a suitable base F, upon which base the lower ends of the coils A and B rest. As shown, the base has upwardly-extending side portions H, which support the casing D and the outer coil B, thus leaving a space H' between the bottom of the outer coil B and the upper surface of the base F. Openings I are provided in the extension G of the base F, which openings can be closed by doors or by brick or burnt-clay plates I'. The ashes accumulate around the inner coil A and may be removed from time to time after the openings I have been opened; but after the ashes have been removed these openings are to be closed. A cast stop-plate J rests upon the top of the casing above the coils and is provided with a central opening K, from which a draft-tube L extends upward for the purpose of conducting the products of combustion to the boiler or a furnace for melting metal or a kiln or to any other structure in which the heat is to be used. The central opening K is surrounded by a series of segmental openings M, formed in the top plate J, and at the outer edge of these openings a hopper N, surrounding the central tube L, is secured on the plate J.

Along the outer edge of the top plate J a series of radial openings O are formed around the entire top plate. A flat metal ring P rests upon the upper surface of the top plate J along the rim, and this ring P is provided with openings Q of the same size as the openings O in the top plate J and adapted to register therewith. This ring rests flat upon the upper surface of the top plate and is adapted to turn upon this top plate and is held in place in such a manner that it can turn by means of pins R, projecting upward from the upper surface of the plate J. At the outer edge of the damper-ring P two pins a project upward from the same and two pins b project upward from the top plate J at the

inner edge of the damper-ring, so that a bar S can be inserted between the two pairs of pins *a a* and *b b*, as shown in Fig. 2, and the damper-ring P shifted, so as to cause the openings O in the top plate J and the openings Q in the damper-ring P to register completely, or only partially, or not at all, thereby producing draft-openings in the top of the casing of the size of the openings O and Q, or of less size, or no draft-opening at all, as may be necessary. A number of doors R' are provided on the casing D for closing openings in the same, so that in case the fuel cokes between the two coils A and B flat bars or implements can be inserted between the several convolutions of the outer coil B for the purpose of breaking up the coked fuel. As shown in Figs. 2 and 4, the two pipes A' and B' at the bottom of the furnace may be connected by a pipe A³, if desired. The fuel is filled into the hopper N and passes from the same through the openings M into the space C between the coils A and B, down which space it is passed until the space is filled, and as the fuel is consumed new fuel is continually supplied automatically from the hopper at the top. The air required for combustion enters the top of the furnace through the openings O, passes down through the air-space E, surrounding the outer coil, and passes through the openings between the several convolutions of the outer coil B into and through the fuel, and the combustion takes place in the space bounded by the inner coil A, in which space there is no fuel. The products of combustion pass out through the top openings K and are carried off by the flue L. The water circulating through the pipes or tubes forming the coils A and B prevents these pipes being consumed by the extremely great heat, and at the same time the water is heated and is converted into steam to be used in any suitable manner, as may be desired.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a downdraft-furnace, the combination with an inner tube-coil and an outer tube-coil spaced therefrom to form a fuel-chamber, of a casing surrounding the coils and having fuel-supply openings above the space between the two coils, an opening for the escape of the products of combustion above the inner coil and air-supply openings above the space between the walls of the casing and the outer coil, substantially as set forth.

2. In a downdraft-furnace, the combination with an inner tube-coil and an outer tube-coil spaced therefrom to form a fuel-

chamber between them, of a casing surrounding the coils and having an opening for the escape of the products of combustion above the inner coil and also provided in its top with draft-openings leading to the space between the outer coil and the walls of the casing and means for regulating the size of the draft-openings, substantially as set forth.

3. In a downdraft-furnace, the combination with an inner tube-coil and an outer tube-coil spaced therefrom to form a fuel-chamber between them, of a casing surrounding the coils, a top plate on said casing, an opening in said top plate above the central coil a flue extending from said opening upward, openings in the top plate above the space between the inner and outer coils, fuel-supply openings in the top plate and a hopper on the top plate surrounding said openings and the flue, substantially as set forth.

4. In a downdraft-furnace, the combination with a casing, of two apertured chambers within the casing, one chamber being within the other and the chambers spaced from each other to form a fuel-chamber between them, the walls of the outer chamber being inclined downward and outward and the walls of the inner chamber being inclined downward and inward, substantially as set forth.

5. In a downdraft-furnace, the combination with two apertured walls, one surrounding the other, said walls being spaced to form a fuel-chamber between them, the diameter of the inner wall gradually increasing from the bottom to the top and the diameter of the outer wall gradually decreasing from the bottom to the top, of a casing surrounding said walls and provided with draft-openings and also provided with fuel-supply openings at the top of the space between the walls and with an outlet-opening for the products of combustion above the top of the inner wall, substantially as set forth.

6. In a downdraft-furnace, the combination with two apertured chambers, both resting on a common base and one surrounding the other, the diameter of the inner chamber decreasing from the top downward and the diameter of the outer chamber increasing from the top downward and an outlet-flue at the top of the inner chamber, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HORACE F. NORWOOD.

Witnesses:

OSCAR F. GUNZ.

SOPHIE M. BAEDER.