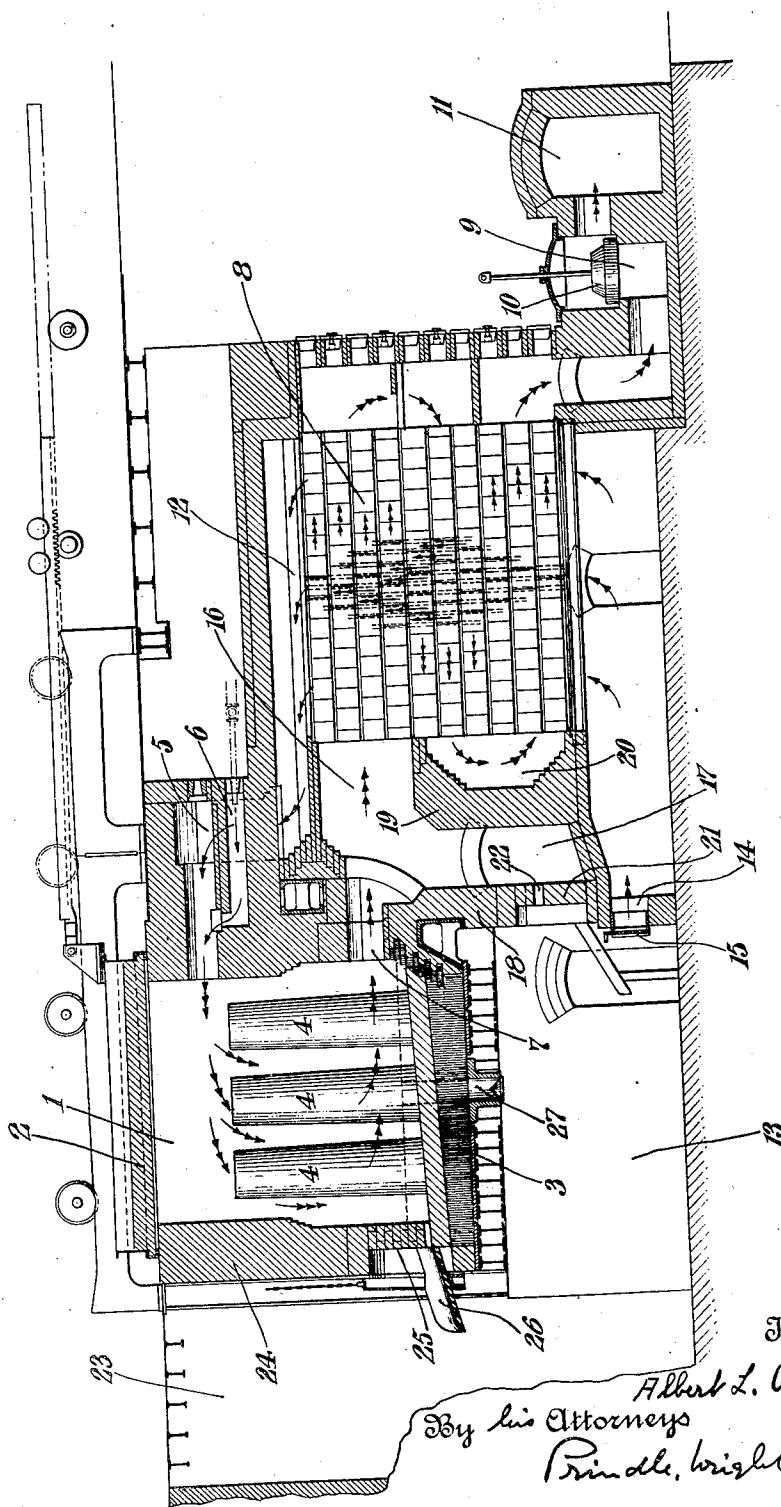


Sept. 29, 1931.

A. L. CULBERTSON
RECUPERATIVE SOAKING PIT
Filed Sept. 9, 1927

1,824,876



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UNITED STATES PATENT OFFICE

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RECUPERATIVE SOAKING PIT

Application filed September 9, 1927. Serial No. 218,381.

The invention relates to soaking pits of the type wherein the air for combustion is preheated by passing it through a recuperator heated by the waste gases exhausted from the pit, and aims to provide a furnace having various advantageous features of construction for protecting the recuperator from the slag taking care of the slag passing out of the pit, avoiding overheating of the furnace walls, admitting air to the recuperator, affording access to the pit and other parts of the furnace, cooling the cleaning pit by air circulation, etc.

Further objects and advantages of the invention will be in part obvious and in part specifically referred to in the description hereinafter contained, which, taken in conjunction with the accompanying drawings, discloses a preferred embodiment thereof; such embodiment, however, is to be considered merely as illustrative of its principles.

In the drawing,

The single figure is a vertical section through a furnace constructed in accordance with the invention.

In the illustrated form of the invention I have shown a soaking pit 1 having a removable cover 2 and a bottom 3, adapted to receive ingots 4 in the usual manner. The air and gas for combustion come in respectively through one or more air conduits 5 and gas conduits 6, which latter mix the gas with the air prior to their entry into the soaking pit, the combustible mixture being admitted into the soaking pit at the upper part of one of its side walls in such manner that the gases of combustion first pass across the pit over the tops of the ingots and then turn downwardly as indicated by the arrows in the drawing in a horse-shoe shaped path, until they pass out of the pit through one or more exhaust passages 7 located at the bottom of the same side wall.

The exhaust gases then pass through a suitable recuperator or heat interchanger 8 which will not be described in detail as it may be of the type shown in the United States Patent to Stein No. 1,404,721 dated January 24, 1922, in which type of recuperator the waste gases pass laterally in a zig-

zag path through the recuperator from top to bottom and are finally led into a collecting flue 9 controlled by a damper 10 and communicating with the stack flue 11.

The air for combustion passes up vertically through a recuperator of the above type to a gathering chamber 12 located at the top of the recuperator and communicating with the air conduits 5 above mentioned. In accordance with one feature of the invention I support the soaking pit above the bottom of an excavation, such as furnaces of the above type are usually installed in, so as to leave a chamber 13 beneath the soaking pit, from which the air for combustion is drawn into the bottom of the recuperator through one or more openings 14 controlled by dampers 15. Thus the air will be more or less heated in passing through chamber 13, before entering the recuperator, and circulation of air through the chamber will be afforded, which is particularly desirable in case the chamber is to be used by operatives for other purposes as hereinafter described.

In accordance with another feature of the invention, I provide between the soaking pit and the recuperator, a slag pocket so associated with the path of travel of the waste gases as to receive solid or liquid materials which the waste gases carry out of the soaking pit and also to trap molten slag which may flow over or through the bridgewall between the soaking pit and the slag protector. As shown the exhaust passage 7 leads into a chamber 16 at one side of the recuperator 8 and the slag pocket 17 is disposed beneath this chamber between an outer wall 18 of the furnace and an inner wall 19 which is interposed between the slag pocket and a passageway 20 which conducts the waste gases from one level to another in the recuperator. The wall 18 is provided with a door 21 which may be merely of removable brick work, whereby slag may be removed from the pocket 17, into chamber 13.

I also prefer to provide for the admission of air to the waste gases between the soaking pit and the recuperator, which may be accomplished for example, by providing an opening 22 in the wall 18 or doorway 21, the

opening being normally closed, but being adjustable from chamber 13 as by pulling out bricks, to permit cool air to flow into the waste gases and prevent the adjacent walls of the furnace from becoming overheated. In the same way unduly high temperatures within the recuperator may be prevented so that metal recuperators may be used if desired. I prefer to construct the walls of the furnace which surround the chambers 16 and 17 and the waste gas passage 7 of special non-shrinking refractories, for example, of special carborundum composition, to prevent the walls from sagging under high temperature conditions such as are sometimes encountered.

In accordance with another feature of the invention, a chamber 23 is provided beyond the side wall 24 of the soaking pit opposite to the side wall in which the admission and exhaust passages are located, and a door 25 similar to member 21 above described, is provided in side wall 24, which may be removed when desired to permit access to the bottom 3 of the soaking pit from chamber 23. This construction permits the bottom of the soaking pit to be made or repaired from chamber 23 instead of from above the pit by opening cover 2, thus relieving the operatives from the excessive heat which is encountered in conditioning the bottom from above as heretofore. A slag tap 26 may be employed leading from the bottom of the soaking pit to the chamber 23 for tapping off molten cinder from the solid bottom, a further slag tap 27 leading from the bottom of the pit to chamber 13 may be employed when the coke braize bottom is used.

Furnaces of the above type are customarily installed in banks or batteries, a series of units being disposed side by side parallel to the plane of the section upon which the single figure of the drawing is taken. A similar series of units will usually be disposed on the left hand side of the chamber 23 as the latter appears in the drawing, and thus the chamber 23 may serve all the units disposed on opposite sides although while each unit will have its own chamber 13 therebeneath, which is accessible from chamber 23.

While a specific embodiment of the invention has been disclosed, it is obvious that many changes may be made therein without departing from its principles as set forth in the appended claims.

I claim:

1. In combination, a soaking pit, means for admitting air and fuel thereto, a heat interchanger through which the air and the waste gases of combustion pass, a waste gas passageway leading from the soaking pit to the heat interchanger, and means for admitting air to the waste gases between the soak-

ing pit and heat interchanger to cool the surrounding walls.

2. In combination, a soaking pit having passageways leading into one side wall thereof for admitting air and fuel thereto, a heat interchanger for preheating the air from the heat of the waste gases located on the outer side of and adjacent said side wall, said heat interchanger being connected to said air passageway and there being also a waste gas passageway leading from said side wall to said heat interchanger, a chamber beneath said soaking pit, a slag pocket forming a depression in the bottom of said waste gas passageway and interposed between the soaking pit and heat interchanger, and means affording communication between said slag pocket and chamber.

3. In combination, a soaking pit having passageways leading into one side wall thereof for admitting air and fuel thereto, a heat interchanger for preheating the air from the heat of the waste gases located on the outer side of and adjacent said side wall, said heat interchanger being connected to said air passageway and there being also a waste gas passageway leading from said side wall to said heat interchanger, a chamber beneath said soaking pit, a slag pocket forming a depression in the bottom of said waste gas passageway and interposed between the soaking pit and heat interchanger, means affording communication between said slag pocket and chamber, and means for conducting air from said chamber and beneath said slag pocket into said heat interchanger.

4. The combination set forth in claim 2 wherein means is provided for conducting air from said chamber to said heat interchanger.

In testimony that I claim the foregoing, I have hereunto set my hand this 2nd day of September, 1927.

ALBERT L. CULBERTSON.