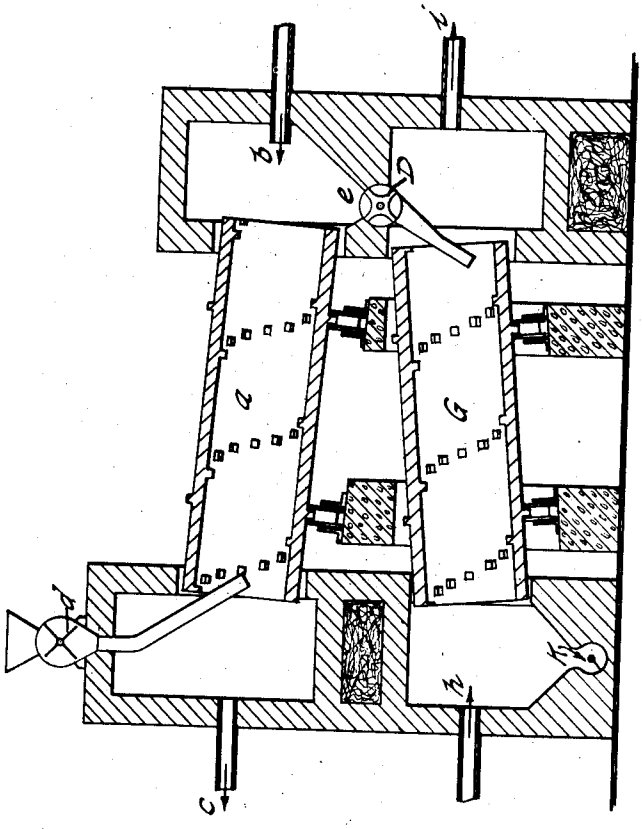
J. WEBER.

MEANS FOR HEATING GASES.

APPLICATION FILED MAR. 13, 1916.

1,203,944.

Patented Nov. 7, 1916.



Inventor

JOSEF WEBER

By his Attorney Ivan Oldenwel

UNITED STATES PATENT OFFICE.

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MEANS FOR HEATING GASES.

1,203,944. Specification of Letters Patent. Patented Nov. 7, 1916.

Application filed March 13, 1916. Serial No. 83,938.

To all whom it may concern:

Be it known that I, JOSEF WEBER, doctor of chemistry, citizen of the German Empire, residing at Essen-on-the-Ruhr, Germany, have invented a new and useful Means for Heating Gases; and I do hereby declare the following to be a full, clear, and exact description of the same.

Various means or apparatus have been proposed for heating or cooling gases by means of previously heated or cooled solid bodies.

My invention refers to that type of heating means or devices in which the gases are passed through streams of finely divided solid bodies or particles, such as sand or other finely granular material. However, all of same, as proposed up to now, show the heavy drawbacks that the sand does not come in contact with the gases but on the surface of relatively large masses or heaps and that a great number of perforated plates, brickwork or the like, guiding tubes or passages for the sand, etc., were to be provided. According to my invention all these drawbacks are avoided, the transmission of heat of the waste furnace or producer or other heating gases being realized to the utmost and without complicated and expensive constructions.

The essential feature of my method consists in causing the finely divided solid particles previously heated to form large and thin or veil-like layers or surfaces which come in contact with the gases on the whole of their extension.

This method may be carried into practice in various ways. For instance, a rotary vessel or drum, preferably inclined, may be supplied at its inner walls with teeth or projections which, bearing the sand or other solid particles upward, distribute part of it and after having passed the vertical line let fall the rest and thereby distribute the sand over the whole section of the vessel. The gases which are conducted through the vessel in a longitudinal direction are forced to penetrate the veil-like layers formed by the sand falling down during rotation and thereby to come in intimate contact with the sand on large surfaces. In this manner the quick and thorough transmission of heat is realized between the solid particles and the gases in such a way that for instance hot producer gases which as above described pass through a rotary vessel give up their caloric contents to a temperature of less than 100 degrees centigrade.

Instead of teeth or projections there may of course be used other means for conveying or raising the sand up to the vertical line, as for instance recesses or furrows or the like. All these means are preferably arranged at the inner walls of the drums in a helix form in such a way that during rotation a continuous strewing of sand is secured over the whole section of the drum and thereby a series of thin layers or veils of the solid particles is produced which come in contact with the gases introduced.

If a gas is to be heated by another gas (furnace or producer gas) without bringing the gases in contact with each other this may be effected with the aid of finely divided solid particles according to the invention in the following manner: Two rotary vessels or drums of the type as described above are arranged in such a way that the gases which passed the one vessel cannot enter the other drum. For instance this may be realized by providing in the partition-wall between the two drums a rotary cylinder or roller made of refractory material such as fire-clay and supplied with segments or means for bearing the sand, etc. The drums are preferably inclined and provided with conduits for introducing and drawing off the gases.

In the drawing, the figure is a longitudinal vertical section of an apparatus embodying the invention.

The apparatus comprises two rotary vessels or drums in accordance with the invention. The solid particles such as sand (or fire-clay, magnesia, zirconium earth or the like in granular or pulverized form) are introduced by means of a hopper or other known device *d* into the rotating drum *a* and are heated by contact with the gases such as waste furnace or producer gas entering at *b* and leaving the apparatus through the passage *c*. The hot sand after having passed the drum in the shape of numerous thin, veil-like layers falls into the recesses or segments *e* of the roller D and therefrom through a hopper-like device *f* into the second drum G. Into this vessel the gases to be heated enter at *h* and are drawn off by the tube *i*. The cooled sand is collected at *k* and then again conveyed by

elevators or similar devices to the top of the upper drum into which it is introduced again at *d*.

It stands to reason that this method and apparatus can also be advantageously employed if it is desired to cool gases.

It may be remarked that in the apparatus of the type described it has been found advantageous to provide a supplementary heating device near to the outlet for the cooled heating gases in order to preheat to a certain degree the sand entering the chamber. Thereby a condensation or precipitation of humidity existing in the gas (for instance producer gas) is avoided which eventually would cause the sand to conglomerate and to choke the openings for charging.

What I claim as my invention and desire to secure by Letters Patent is:

1. In means for heating gases, the combination of a pair of furnace heads each comprising an upper and a lower chamber each chamber having an opening therein; a pair of oppositely inclined rotary drums disposed one above the other converging toward each other, the ends of the upper drum being received by the respective openings of the upper chambers, while the ends of the lower drum are received by the corresponding lower openings; gas conduits entering the respective chambers; a substantially gas-tight seal between the chambers at the converging ends of the drums; and means for feeding solid particles to the upper drum.

2. In means for heating gases, the combination of a pair of furnace heads each comprising an upper and a lower chamber each chamber having an opening therein; a pair of oppositely inclined rotary drums disposed one above the other converging toward each other, the ends of the upper drum being received by the respective openings of the upper chambers, while the ends of the lower drum are received by the corresponding lower openings; gas conduits entering the respective chambers; a valve roller having recesses therein disposed between the chambers at the diverging end of the drums.

3. In means for heating gases, the combination of a pair of furnace heads each comprising an upper and a lower chamber each chamber having an opening therein; a pair of oppositely inclined rotary drums disposed one above the other converging toward each other, the ends of the upper drum being received by the respective openings of the upper chambers, while the ends of the lower drum are received by the corresponding lower openings; gas conduits entering the respective chambers; a substantially gas-tight seal between the chambers at the converging ends of the drums; means for feeding solid particles to the upper drum and projections on the inner face of the drums.

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

JOSEF WEBER. [L. S.]

Witnesses:
HELEN NUFER,
ALBERT NUFER.